



# FCC TEST REPORT

for

**Cordless Keyboard & Mouse Combo**

**MODEL: CG-RF116I+RFOP02MS**

**Test Report Number:**

**SZ080917B01-RP**

Issued for

**Shenzhen Sunspring Technology Co., Ltd.**

**63 Fang Keng Road, Ping Hu Town, Long Gang District,  
Shenzhen China**

Issued by:

**COMPLIANCE CERTIFICATION SERVICES (SHENZHEN) INC.**

**(aka Compliance Engineering Service (China))**

**NO. 5, JINAO INDUSTRIAL PARK, NO. 35 JUKENG ROAD,**

**DASHUIKENG VILLAGE, GUANLAN TOWN, BAOAN**

**DISTRICT, SHENZHEN, CHINA, 518102**

**TEL: 86-755-28055000**

**FAX: 86-755-28055221**

**Issued Date: October 13, 2008**



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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	October 13, 2008	Initial Issue	ALL	Clinton Kao



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# 1 TEST CERTIFICATION

**Product:** Cordless Keyboard & Mouse Combo**Model:** CG-RF116I+RFOP02MS**Brand:** N/A**Tested:** September 17-October 13, 2008**Applicant:** Shenzhen Sunspring Technology Co., Ltd.

63 Fang Keng Road, Ping Hu Town, Long Gang District, Shenzhen China

**Manufacturer:** Shenzhen Sunspring Technology Co., Ltd.

63 Fang Keng Road, Ping Hu Town, Long Gang District, Shenzhen China

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 15 Subpart C	No non-compliance noted
DEVIATION FROM APPLICABLE STANDARD	
None	

## We hereby certify that:

The above equipment was tested by Compliance Certification Services (Shenzhen) Inc.. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4:2003 and the energy emitted by the sample tested as described in this report is in compliance with the requirements of FCC Rules Part 15.227.

The test results of this report relate only to the tested sample identified in this report.

**Approved by:**

**Clinton Kao**  
Manager  
Compliance Certification Service Inc.

**Reviewed by:**

**Vincent Yao**  
Assistant manager  
Compliance Certification Service Inc.



## 2 EUT DESCRIPTION

<b>Product</b>	Cordless Keyboard & Mouse Combo
<b>Trade Name</b>	N/A
<b>Model Number</b>	CG-RF116I+RFOP02MS
<b>Model Discrepancy</b>	N/A
<b>Serial Number</b>	N/A
<b>Power Supply</b>	TX: DC3V powered by the battery
<b>Frequency Range</b>	27.045 MHz
<b>Transmit Power</b>	56.98dBuV/m (Max.)
<b>Modulation Technique</b>	FSK
<b>Number of Channels</b>	1 Channel

**Note:** 1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.

2. This submittal(s) (test report) is intended for FCC ID: WTBRF-OP02 filing to comply with Section 15.207, 15.209 and 15.227 of the FCC Part 15, Subpart C Rules.



### **3 TEST METHODOLOGY**

#### **3.1. DESCRIPTION OF TEST MODES**

The EUT has been tested under engineering test mode condition and the EUT staying in continuous transmitting mode.



## 4 TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4:2003 and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, and 15.227.

### 4.1. EUT EXERCISE

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.107 and 15.109 under the FCC Rules Part 15 Subpart B and Section 15.207, 15.209, 15.227 under the FCC Rules Part 15 Subpart C.

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

### 4.2. FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

- (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 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	( <sup>2</sup> )
13.36 - 13.41	322 - 335.4		

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

<sup>2</sup> Above 38.6

- (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.



## 5 INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

## 6 SETUP OF EQUIPMENT UNDER TEST

### 6.1. DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Equipment	Model No.	Serial No.	FCC ID	Trade Name	Data Cable	Power Cord
1	N/A						

**Note:**

- 1) All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
- 2) Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

### 6.2. CONFIGURATION OF SYSTEM UNDER TEST

See test photographs attached in Appendix II for the actual connections between EUT and support equipment.





## 7 FACILITIES AND ACCREDITATIONS

### 7.1. FACILITIES

All measurement facilities used to collect the measurement data are located at

☒ **No. 5, Jinao industrial park, No.35 Jukeng Road, Dashuikeng Village, Guanlan Town, Baoan District, Shenzhen, China**

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."

### 7.2. ACCREDITATIONS

Our laboratories are accredited and approved by the following accreditation body according to ISO/IEC 17025.

**Taiwan** TAF

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

**USA** FCC  
**Japan** VCCI  
**Canada** INDUSTRY CANADA  
**Taiwan** BSMI

Copies of granted accreditation certificates are available for downloading from our web site, <http://www.ccsemc.com.tw>

### 7.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in ETR 028:

Measurement	Frequency		Uncertainty
Conducted emissions	9kHz~30MHz		± 3.5863
Radiated emissions	Horizontal	30MHz ~ 200MHz	± 4.7685
		200MHz ~1000MHz	± 4.9330
	Vertical	30MHz ~ 200MHz	± 5.0411
		200MHz ~1000MHz	± 4.9262

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



## 8 FCC PART 15.227 REQUIREMENTS

### 8.1. 20 dB BANDWIDTH

#### LIMIT

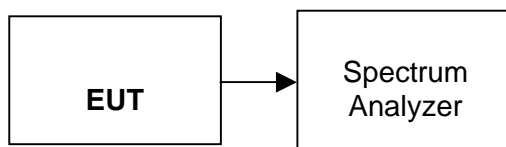
The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

#### MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US44300399	02/24/2009

**Remark:** Each piece of equipment is scheduled for calibration once a year.

#### TEST CONFIGURATION



#### TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The spectrum analyzer center frequency is set to the transmitter frequency. The RBW is set to 10 kHz and VBW is set 10kHz.

#### TEST RESULTS

*No non-compliance noted*

#### Test Data

Frequency (MHz)	20 dB Bandwidth (kHz)
27.045	35.20



## Test Plot

Agilent 11:07:46 Oct 22, 2008

R L

▲ Mkr1 35.2 kHz  
0.88 dB

Ref 80 dB $\mu$ V

#Atten 30 dB

#Peak

Log

10

dB/

DI

40.2

dB $\mu$ V

LgAv

M1 S2

S3 FC

$E(f)$ :

f>50k

Swp

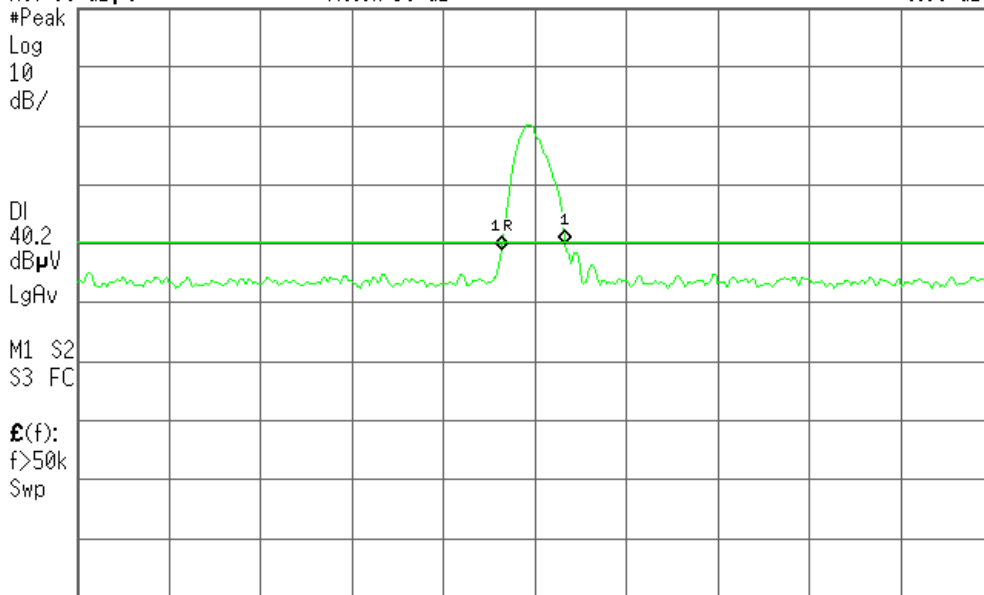
Center 27.045 0 MHz

#Res BW 10 kHz

#VBW 10 kHz

Span 500 kHz

Sweep 6.04 ms (601 pts)





## 8.2. RADIATED EMISSIONS

### LIMIT

The field strength of any emission within this band shall not exceed 10,000 microvolts/meter at 3 meters. The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in Section 15.35 for limiting peak emissions apply.

The field strength of any emissions which appear outside of this band shall not exceed the general radiated emission limits in Section 15.209.

1. 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 (mV/m)	Measurement Distance (m)
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

**Remark:** 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.

2. In the above emission table, the tighter limit applies at the band edges.

Frequency (Hz)	Field Strength ( $\mu$ V/m at 3-meter)	Field Strength (dB $\mu$ V/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

3. 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:

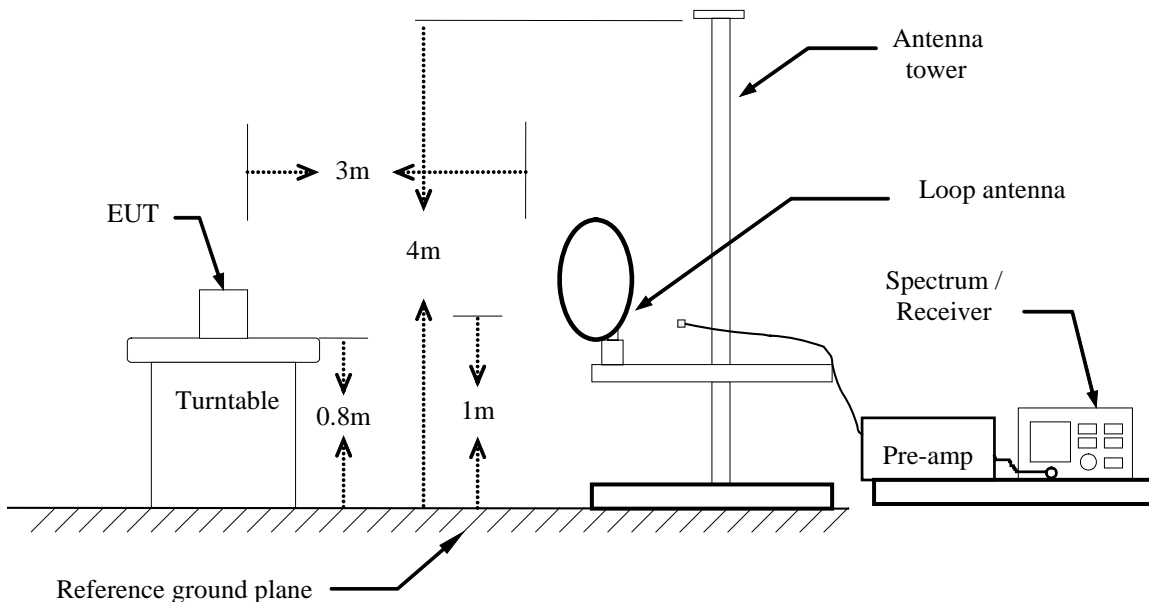
Frequency (Hz)	Field Strength ( $\mu$ V/m at meter)	Measurement Distance (meter)
0.009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 – 30.0	30	30
30 - 88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

\*\* 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.

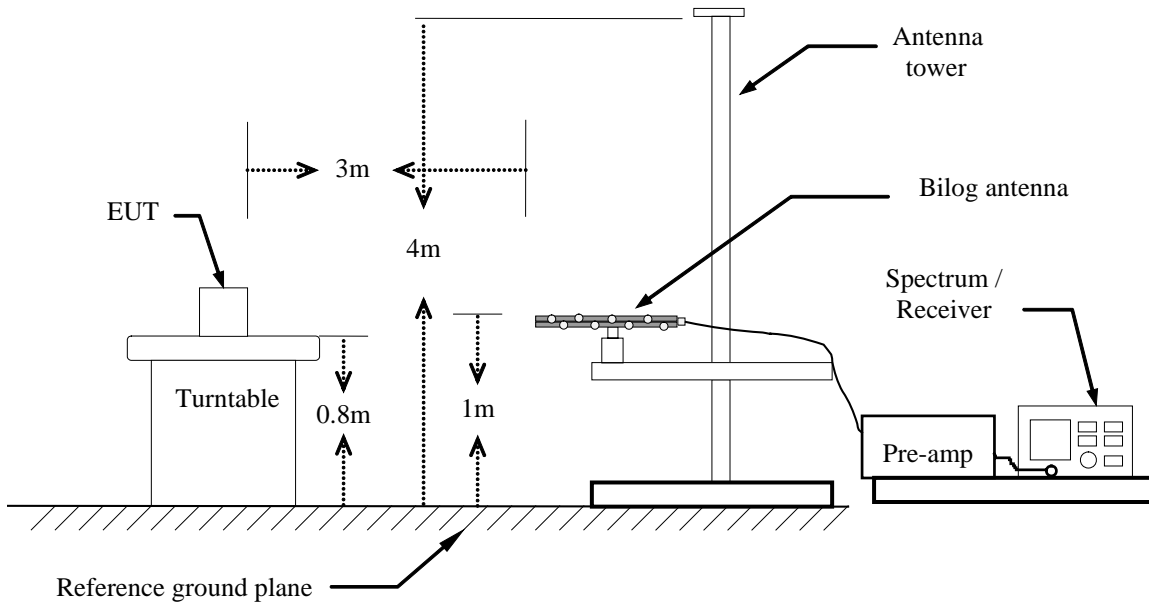
**MEASUREMENT EQUIPMENT USED**

966 RF CHAMBER 2				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US44300399	02/24/2009
EMI Test Receiver	R&S	ESCI	1166.5950 03	01/13/2009
Pre-Amplifier	MITEQ	N/A	AFS42-00102650-4 2-10P-42	02/14/2009
Bilog Antenna	SCHWAZBECK	CBL6143	5082	06/09/2009
Turn Table	EMCO	2081-1.21	N/A	N.C.R
Antenna Tower	CT	N/A	N/A	N.C.R
Controller	CT	N/A	N/A	N.C.R
RF Comm. Test set	HP	8920B	US36142090	N.C.R
Site NSA	C&C	N/A	N/A	06/09/2009
Horn Antenna	TRC	N/A	N/A	03/04/2009
Loop Antenna	ARA	PLA-1030/B	1029	02/24/2009

**Remark:** Each piece of equipment is scheduled for calibration once a year.

**TEST CONFIGURATION****Below 30MHz**

### **Below 1 GHz**



### **TEST PROCEDURE**

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.

## TEST RESULTS

## Below 1 GHz

<b>Operation Mode:</b>	TX	<b>Test Date:</b>	September 25, 2008
<b>Temperature:</b>	27°C	<b>Tested by:</b>	Simple
<b>Humidity:</b>	56 % RH	<b>Polarity:</b>	Ver. / Hor.

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit 3m (dBuV/m)	Safe Margin (dB)
27.045	V	Peak	46.75	5.15	51.90	80.00	-28.10
53.807	V	Peak	47.95	-19.36	28.59	40.00	-11.41
135.511	V	Peak	45.78	-19.35	26.43	43.50	-17.07
216.673	V	Peak	46.25	-17.29	28.96	46.00	-17.04
271.322	V	Peak	46.86	-15.58	31.28	46.00	-14.72
350.501	V	Peak	41.06	-13.32	27.74	46.00	-18.26
378.557	V	Peak	40.74	-12.32	28.42	46.00	-17.58
27.045	H	Peak	51.83	5.15	56.98	80.00	-23.02
80.861	H	Peak	43.77	-19.92	23.85	40.00	-16.15
104.669	H	Peak	55.23	-20.17	35.06	43.50	-8.44
216.673	H	Peak	55.09	-17.29	37.80	46.00	-8.20
271.322	H	Peak	58.66	-15.58	43.08	46.00	-2.92
378.557	H	Peak	54.48	-12.32	42.16	46.00	-3.84
405.210	H	Peak	51.93	-11.42	40.51	46.00	-5.49

**Remark:**

1. *Measuring frequencies from 30 MHz to the 1GHz.*
2. *Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak detector mode.*
3. *Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
4. *The IF bandwidth of SPA between 30MHz to 1GHz was 100kHz.*



### 8.3. POWER LINE CONDUCTED EMISSIONS MEASUREMENT

#### 8.3.1. LIMITS OF CONDUCTED EMISSIONS MEASUREMENT

According to §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 Range (MHz)	Limits (dB $\mu$ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

**NOTE:**

- (1) The lower limit shall apply at the transition frequencies.
- (2) The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
- (3) All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

### TEST INSTRUMENTS

Conducted Emission Test Site G				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100088	02/24/2009
LISN	EMCO	3825/2	1371	02/24/2009
LISN	EMCO	3825/2	8901-1459	02/24/2009

- NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.  
2. N.C.R = No Calibration Request.

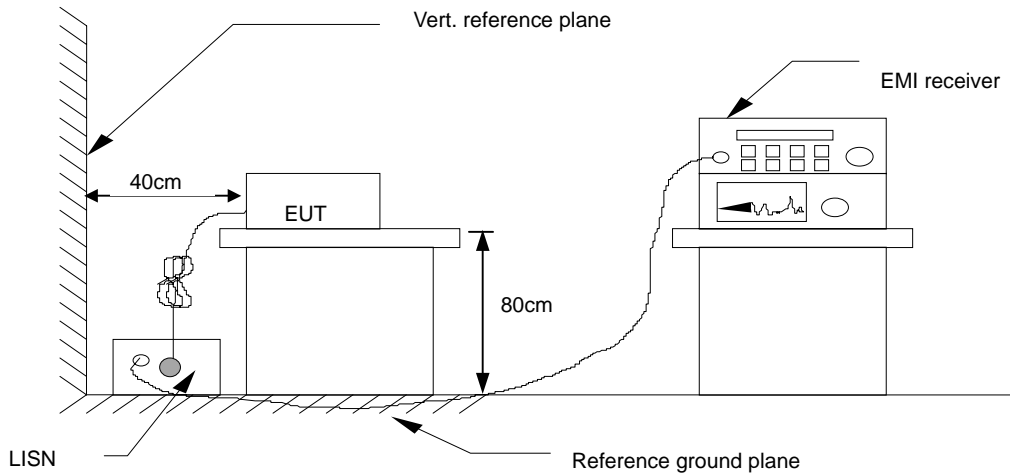




**8.3.2. TEST PROCEDURES** (please refer to measurement standard)

- The EUT and Support equipment, if needed, was placed on a non-conducted table, which is 0.8m above the ground plane and 0.4m away from the conducted wall.
- The test equipment EUT installed received AC main power, through a Line Impedance Stabilization Network (LISN), which supplied power source and was grounded to the ground plane. All support equipment power received from a second LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- The EUT test program was started. Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.
- The frequency range from 150 kHz to 30 MHz was searched. The test data of the worst-case condition(s) was recorded. Emission levels under limit 20dB were not recorded.

## 8.3.3. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

## 8.3.4. Data Sample:

Freq. (MHz)	Q.P. Raw (dBuV)	Average Raw (dBuV)	Q.P. Limit (dBuV)	Average Limit (dBuV)	Q.P. Margin (dB)	Average Margin (dB)	Note
x.xx	43.95	33.00	56.00	46.00	-12.05	-13.00	L1

Frequency (MHz)	= Emission frequency in MHz
Reading (dBuV)	= Uncorrected Analyzer/Receiver reading
Correction factor (dB)	= Insertion loss of LISN
Limit (dBuV)	= Limit stated in standard
Margin (dB)	= Reading (dBuV) – Limit (dBuV)
Note	= Current carrying line of reading

## 8.3.5. TEST RESULTS

*Not applicable, since the EUT is powered by the battery.*