FCC Part 15
MEASUREMENT AND TEST REPORT

For

Lelux Electronics Ltd

Flat 19, 5/F, Sun Fung Centre, 88 Kwok Shui Road, Kwai Chung,
N.T. Hong Kong

FCC ID: NS3LELUX512

October 12, 2007

This Report Concerns:	**Equipment Type:**
☒ Original Report	Wireless Electronic Key Finder

Test Engineer: Robert Lee

Report Number: **SE07J-249R**

Test Date: October 10-11, 2007

Reviewed By:

Prepared By: **S&E Technologies Laboratory Ltd**
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Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior written consent of S&E Technologies Laboratory Ltd.

Table of contents

1. Test Summary

FCC Rules	Description of Test	Result
§ 15.207	Conducted Emission	N/A
§ 15.231	Radiated Emission	Compliant
§ 15.231	Occupied Bandwidth	Compliant

2. General Information

2.1 Client Information

Applicant:	**Lelux Electronics Ltd**
Address of Applicant:	Flat 19, 5/F, Sun Fung Centre, 88 Kwok Shui Road, Kwai Chung, N.T. Hong Kong

2.2 General Description of E.U.T.

Product description:	Wireless Electronic Key Finder
Model No.:	512
Operation Frequency:	433.92MHz
Modulation:	ASK
Antenna Designation:	Non-user replaceable (fixed)

* *The test data gathered are from the production sample provided by the manufacturer.*
* *The EUT stops transmitting approx. 500ms after triggering.*

2.3 Details of E.U.T.

Power Supply: 6.0VDC Battery

2.4 Description of Support Units

The EUT has been tested as an independent device unit.

2.5 Standards Applicable for Testing

The customer requested FCC tests for a remote control. The standards used were FCC 15 Paragraph 15.205, Paragraph 15.209, Paragraph 15.231,Paragraph 15.31,Paragraph 15.33, Paragraph 15.35.

2.6 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

FCC – Registration No.: 101879

Compliance Certification Services (Shenzhen) Inc., EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

2.7 Test Location

All Emissions tests were performed at Compliance Certification Services (Shenzhen) Inc. at No.5 Jinao Industrial Park, No.35 Jukeng Rd., Guanlan Town, Baoan District, Shenzhen, Guangdong, China.

3. Equipment Used During Test

Conducted Emission Test

Item	Test Equipment	Manufacturer	Model No	Serial No.	Cal. Date	Due dat
1	Artificial Mains	Rohde & Schwarz	ESH2-Z5	100028	2007/10	2008/10
2	Pulse Limiter	Rohde & Schwarz	ESH2-Z2	100044	2007/10	2008/10
3	EMI Test Software	Rohde & Schwarz	ES-K1 V1.71	N/A	2007/10	2008/10
4	EMI Test Receiver	Rohde & Schwarz	ESCS30	100038	2007/10	2008/10

Radiated Emission Test

Item	Test Equipment	Manufacturer	Model No	Serial No.	Cal. Date	Due dat
1	3m Semi- Anechoic Chamber	ETS	N/A	N/A	2007/10	2008/10
2	EMI Test Receiver	Rohde & Schwarz	ESI 26	100009	2007/10	2008/10
3	RF Test Panel	Rohde & Schwarz	TS/RSP	335015/0017	N/A	N/A
4	Turntable	ETS	2088	2149	N/A	N/A
5	Antenna Mast	ETS	2075	2346	N/A	N/A
6	EMI Test Software	Rohde & Schwarz	ES-K1	N/A	N/A	N/A
7	Double-Ridged-Waveguide Horn Antenna	Rohde & Schwarz	HF906	100039	2007/10	2008/10
8	Ultra-Broadband Antenna	Rohde & Schwarz	HL562	100015	2007/10	2008/10

Dwell Time Test

Item	Test Equipment	Manufacturer	Model No.	Series No.	Cal. Date	Due date
1	Shielded Room	ETS LINDGREN	RFD-100	2391	N/A	N/A
2	EMI Test Receiver	Rohde & Schwarz	ESI 26	100009	2007/10	2008/10

Common Used Equipment

Item	Test Equipment	Manufacturer	Model No.	Series No.	Cal. Date	Due date
1	Temperature, Humidity&Barometer	Oregon Scientific	BA-888	EMC0001 to EMC0004	2007/10	2008/10
2	DMM	Fluke	73	70681569 or 70671122	2007/07	2008/07

4. Conducted Emission Test

Product:	Remote control
Test Requirement:	FCC Part15 Paragraph 15.207
Test Method:	Based on FCC Part15 Paragraph 15.207
Test Date:	-
Frequency Range:	150kHz to 30MHz
Class:	Class B
Detector:	Peak for pre-scan (9kHz Resolution Bandwidth) Quasi-Peak & Average if maximized peak within 6dB of Average Limit

4.1 Test Equipment

Please refer to Section 3 this report.

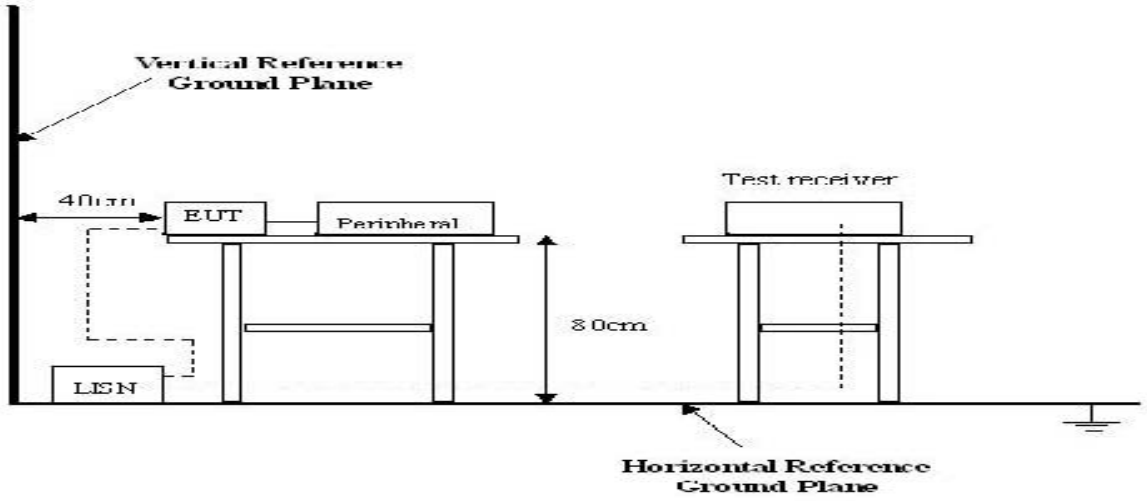
4.2 Test Procedure

1. The EUT was tested according to ANSI C63.4. The frequency spectrum from 150kHz to 30MHz was investigated.

2. The maximized peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

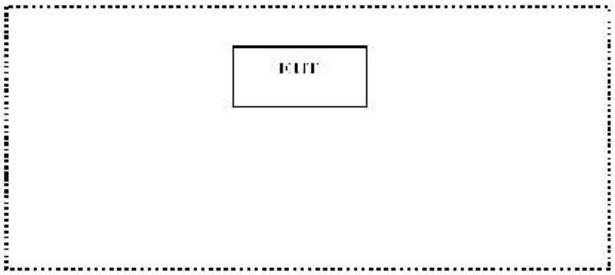
4.3 Conducted Test Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.4, The specification used in this report was the FCC Part15 Paragraph 15.207 limits.



4.4 EUT Operating Condition

Operating condition is according to ANSI C63.4.
A. Setup the EUT and simulators as shown on follow.
B. Enable RF signal and confirm EUT active.
C. Modulate output capacity of EUT up to specification.



4.5 Conducted Emission Limits

66-56 dBμV/m between 0.15MHz & 0.5MHz
56 dBμV/m between 0.5MHz & 5MHz
60 dBμV/m between 5MHz & 30MHz

Note: In the above limits, the tighter limit applies at the band edges.

4.6 Conducted Emission Test Result

Owing to the DC operation of EUT, this test is not performed.

5. Radiation Emission Test

Product:	Remote control
Test Requirement:	FCC Part15 Paragraph 15.209, Paragraph 15.231
Test Method:	Based on FCC Part15 Paragraph 15.33
Test Date:	November 29, 2006
Frequency Range:	30MHz to 5GHz
Measurement Distance:	3m
Detector:	Peak for pre-scan (120kHz resolution bandwidth) Quasi-Peak if maximized peak within 6dB of limit

5.1 Test Equipment

Please refer to Section 3 this report.

5.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the 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 ANSI C63.4, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at SZHTW is +4.0 dB.

5.3 Test Procedure

1. For the radiated emissions test, since the EUT does not have a power source, there was no connection to AC outlets.

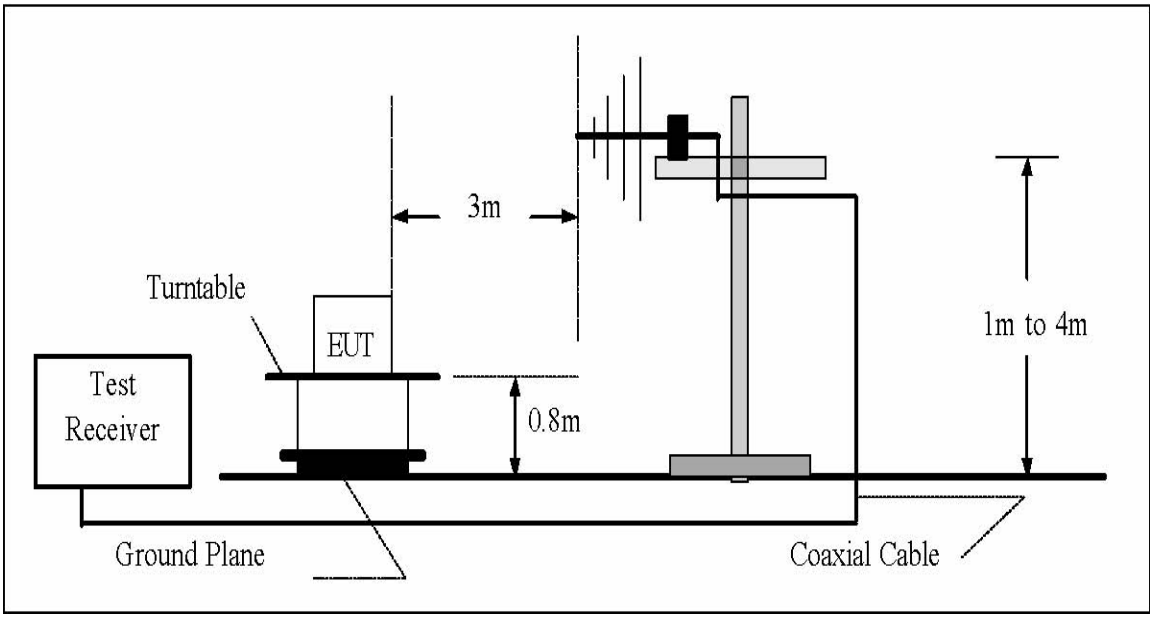
2. Maximizing procedure was performed on the six (6) highest emissions to ensure EUT is compliant with all installation combinations.

3. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dBµV of specification limits), and are distinguished with a "Qp" in the data table.

4. The EUT was under normal mode during the final qualification test and the configuration was used to represent the worst case results.

5.4 Radiated Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.4, The specification used in this report was the FCC Part15 Paragraph 15.209, Paragraph 15.231 limits.



5.5 Spectrum Analyzer Setup

According to FCC Part15 Paragraph 15.209, Paragraph 15.231 Rules, the system was tested to 5000 MHz.

Start Frequency:	30 MHz
Stop Frequency:	5000 MHz
Sweep Speed Auto	
IF Bandwidth:	100 kHz
Video Bandwidth:	1 MHz
Quasi-Peak Adapter Bandwidth:	120 kHz
Quasi-Peak Adapter Mode:	Normal
Resolution Bandwidth:	1MHz

5.6 Corrected Amplitude & Margin Calculation

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

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

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

Margin = Corr. Ampl. – Class B Limit

5.7 Summary of Test Results

According to the data in section 7.10, the EUT complied with the FCC Part15 Paragraph 15.209 and Paragraph 15.231 standards.

5.8 EUT Operating Condition

Same as section 4.4 of this report.

5.9 Radiated Emissions Limit

A. FCC Part 15 subpart C Paragraph 15.231 Limit

Fundamental Frequency (MHz)	Field Strength of Fundamental	
	uV/m	dBuV/m
433.92	10996.7	80.83
Harmonics	1100.0	60.83

Note: (1) RF Voltage (dBuV)=20 log RF Voltage (uV)
(2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
(3)The emission limit in this paragraph is based on measurement instrumentation employing an average detector. Measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.

B. Frequencies in restricted band are complied to limit on Paragraph 15.209

Frequency (MHz)	Distance (m)	Field strength (dBuV/m)
30-88	3	40.0
88-216	3	43.5
216-960	3	46.0
Above 960	3	54.0

Note: (1) RF Voltage (dBuV)=20 log RF Voltage (uV)
(2) In the above table,the tighter limit applies at the band edges.
(3) Distance refers to the distance in meters between the measuring instrument antennas.

5.10 Radiated Emissions Test Result

Formula of conversion factors: the field strength at 3m was established by adding The meter reading of the spectrum analyzer (which is set to read in units of dBuV) To the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stared in terms of dB. The gain of the pressletor was accounted for in the spectrum analyzer meter reading.

Example:
Freq (MHz) Meter Reading +ACF=FS
33 20dBuV+10.36dB=30.36dBuV/m @3m

A. Fundamental Radiated Emission Data for 433MHz

Test Item:	Fundamental Radiated Emission Data
Test Voltage:	6.0VDC Battery
Test Mode:	Transmitting
Temperature:	23 °C
Humidity:	53%RH
Test Result:	PASS

Frequency (MHz)	Antenna Polarization	Emission Level (dBuV/m)	FCC 15 Subpart C Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Turntable Angle (°)
433.929	Vertical	75.13	80.83	-5.70	1.9	36
867.866	Vertical	52.53	60.83	-8.30	2.1	321
1301.779	Vertical	45.4	60.83	-15.43	1.6	125
1735.689	Vertical	43.74	60.83	-17.09	2.3	332
2169.632	Vertical	41.72	60.83	-19.11	1.8	105
Others		-				
433.929	Horizontal	65.06	80.83	-15.77	1.9	150
867.866	Horizontal	47.51	60.83	-13.32	2.1	10
1301.779	Horizontal	42.62	60.83	-18.21	2.0	176
1735.689	Horizontal	39.83	60.83	-21.00	2.1	210
2169.632	Horizontal	36.27	60.83	-24.56	1.8	105
Others		-				

Note: 1. Datum 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.

B. General Radiated Emission Data

Test Item:	General Radiated Emission Data
Test Voltage:	4.5VDC Battery
Test Mode:	Transmitting
Temperature:	23 °C
Humidity:	53%RH
Test Result:	PASS

Frequency (MHz)	Antenna Polarization	Emission Level (dBuV/m)	FCC 15 Subpart C Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Turntable Angle (°)
103.345901	Vertical	20.7	43.5	-22.8	1.5	201
199.030245	Vertical	21.2	43.5	-22.3	1.9	5
243.398012	Vertical	22.5	46.0	-23.5	2.1	112
369.297811	Vertical	21.9	46.0	-24.1	1.8	170
667.874543	Vertical	21.0	46.0	-25.0	1.6	356
1012.090454	Vertical	26.6	54.0	-27.4	1.8	310
78.038458	Horizontal	16.2	40.0	-23.8	2.1	47
187.185923	Horizontal	16.4	43.5	-27.1	2.5	362
265.109231	Horizontal	17.4	46.0	-28.6	1.8	35
401.887610	Horizontal	16.9	46.0	-29.1	1.8	176
630.009012	Horizontal	13.8	46.0	-32.2	1.5	293
999.812090	Horizontal	16.9	54.0	-37.1	1.5	3

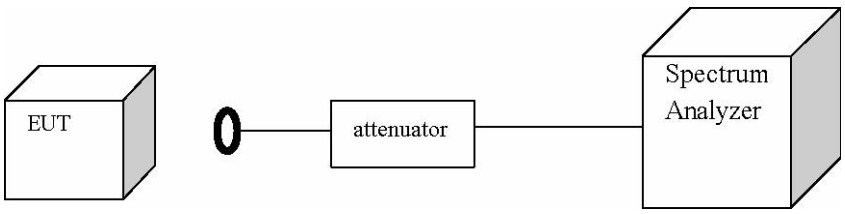
6. Dwell Time

6.1 Test Standards

FCC Rules and Regulations Part 15 Subpart C –Intentional Radiators

According to 15.231 (a), a manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

6.2 Diagram of Test Setup



Remark: the attenuator is the built-in part of spectrum analyzer.

6.3 Test Equipments Used

Please refer to Section 3 this report

6.4 Test Description

6.4.1 Test Receiver Setting:

RBW (KHz)	VBW (KHz)	Detector	Comment
30	100	Peak	

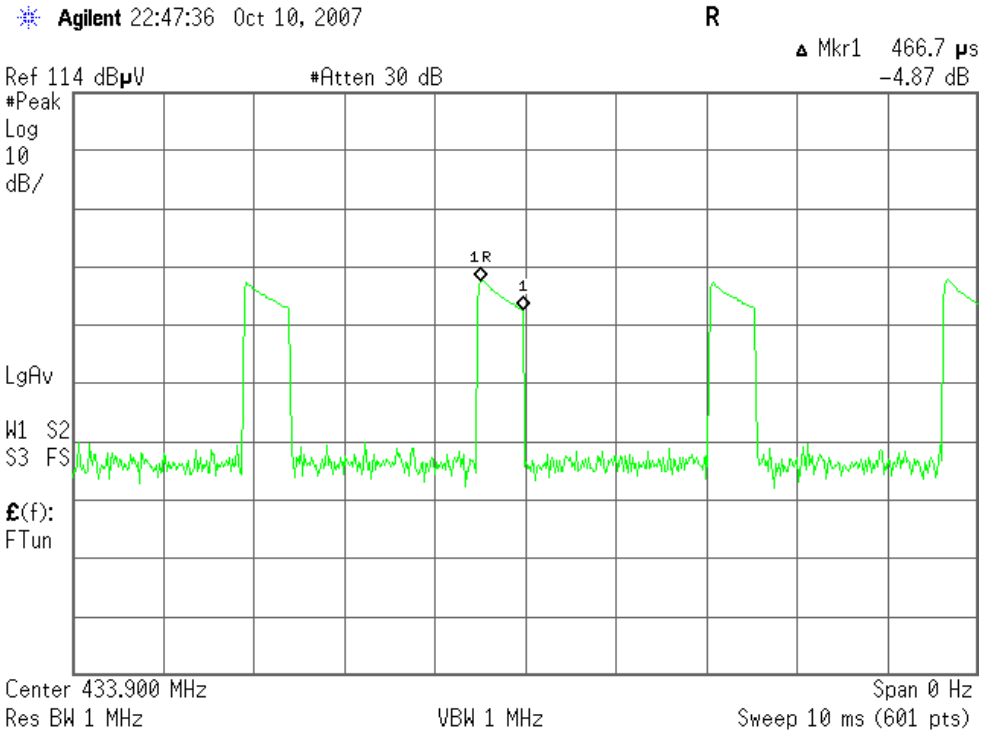
6.4.2 Test Procedure

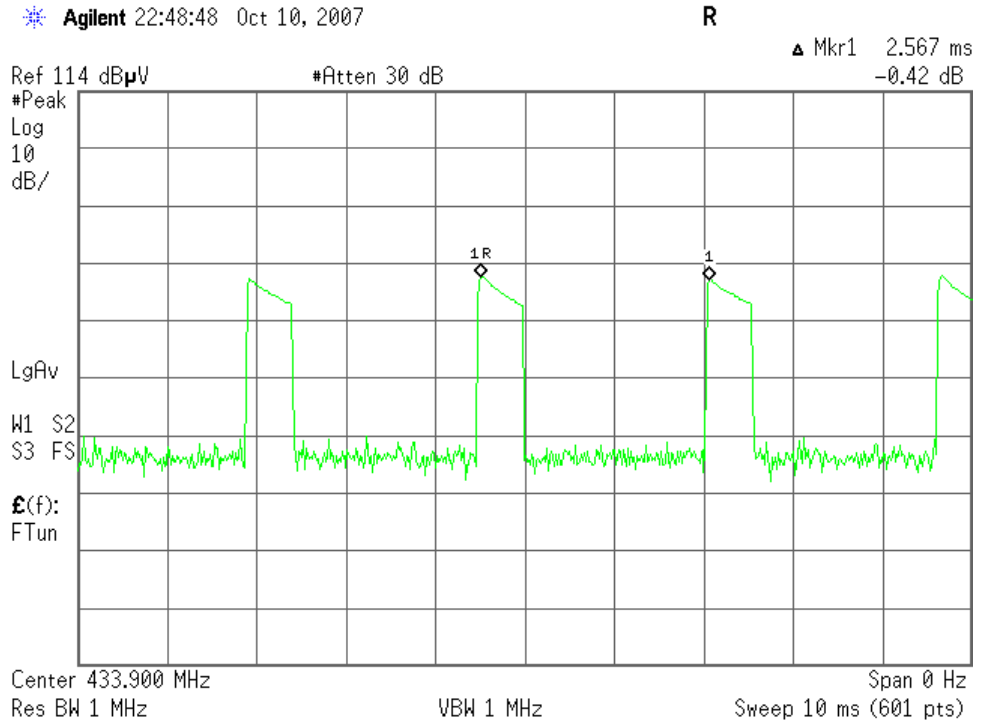
The EUT was set up per the test configuration figured in Sec 6.2 of this test report to simulate the typical usage per the user's manual. The transmitter output of EUT was connected to the spectrum analyzer through an attenuator.

Set the spectrum analyzer into zero span and perform the dwell time bandwidth measurement.
Record the dwell time and compare with the required limit.

6.5 Test Results Test Results : PASS

Test data see following graph:





7. Band Edge

Test Requirement:	FCC Part15 C
Test Method:	Based on FCC Part15 Paragraph 15.231
Test Date:	November 29, 2006
Test mode:	Transmitting
Temperature:	23 °C
Humidity:	53%RH

7.1 Test Procedure

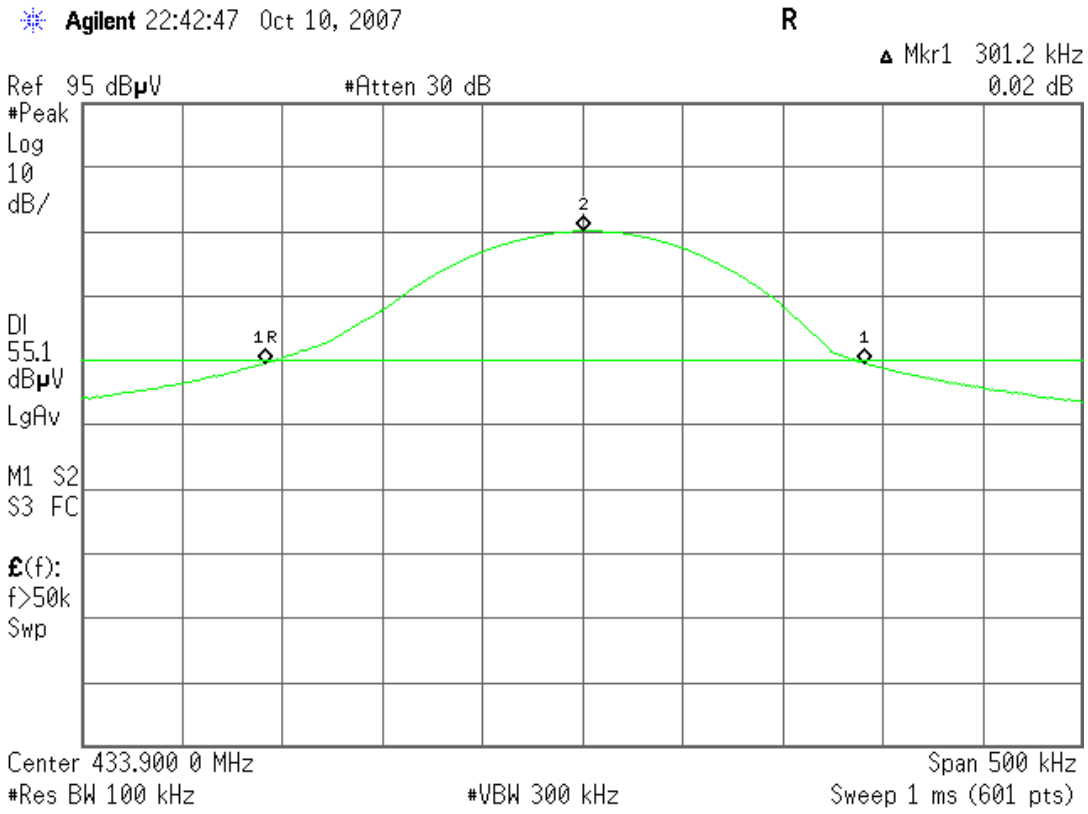
1. The EUT, peripherals were put on the turntable which table size is 1mX1.5m, table high 0.8m. All set up is according to ANSI C63.4.
2. With the EUT's antenna attached, The EUT's radiated emission power was received by the test antenna which was connected to the spectrum analyzer with the START and STOP frequencies set to the EUT's operation band. Measurements were made at 3 meters.
3. The antenna high was varied from 1m to 4m high to find the maximum emission for each frequency.
4. The bandwidth of the fundamental frequency was measure by spectrum analyzer with 20KHz RBW and 200KHz VBW.The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power 20dB.

7.2 Band Edge

Requirements: Paragraph 15.231,The emission power at the START and STOP frequencies shall be at least 50dB below the level of the fundamental or to the general radiated emission limits in FCC 15.209.

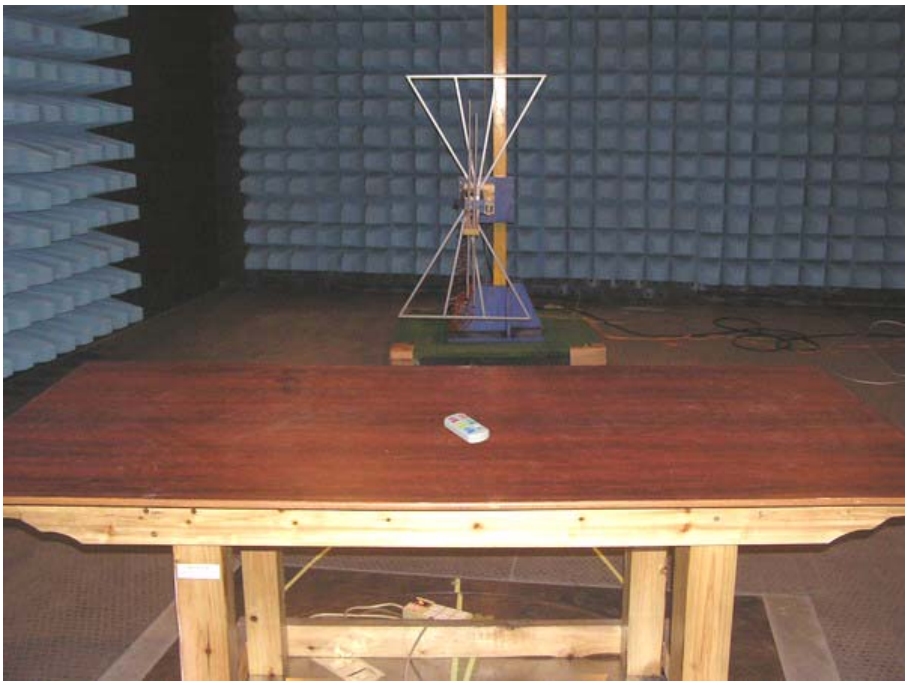
7.3 Band Edge Test Result: Pass

The graph as below, represents the emissions take for this device.



8. Photographs of Testing

Radiated Emission Setup Photo



9. Photographs – Constructional Details

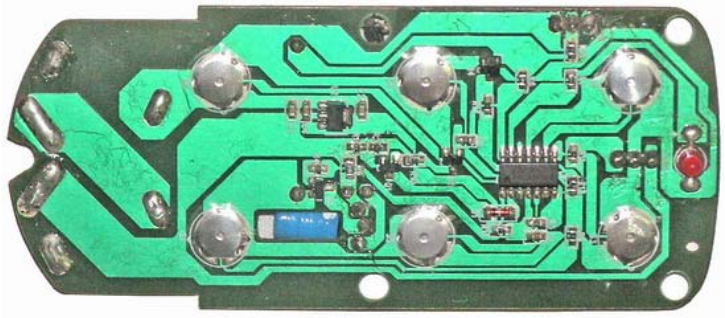
9.1 EUT – External View

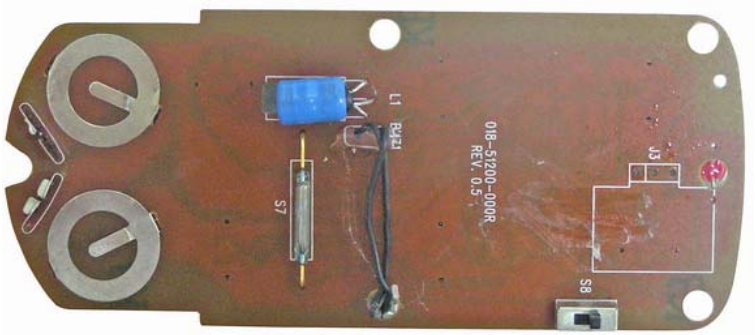
9.2 EUT – Front View

9.3 EUT – Rear View

9.4 EUT - Internal View

9.5 EUT - PCB View





10. FCC ID Label

FCC ID: NS3LELUX512

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation

The Label must not be a stick-on paper. The Label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

Proposed Label Location on EUT
EUT Rear View/proposed FCC Mark Location