

FCC Part 15C  
MEASUREMENT AND TEST REPORT  
For  
**Lelux Electronics Ltd**

Unit 6, 10/F, TCL TOWER, NO.8, Tai Chung Road, Tsuen Wan,  
New Territories, Hong Kong

**FCC ID: NS3-660**

August 17, 2010

<b>This Report Concerns:</b> <input checked="" type="checkbox"/> Original Report	<b>Equipment Type:</b> Wireless Water Overflow Sensor with Alarm
<b>Test Engineer:</b>	Rocky Ge
<b>Report Number:</b>	SE10H-32F
<b>Test Date:</b>	August 14 to 16, 2010
<b>Reviewed By:</b>	
<b>Prepared By:</b>	<b>S&amp;E Technologies Laboratory Ltd</b> Room 407, Block A Shennan Garden, Hi-Tech Industrial Park, Shenzhen 518057, P.R. China. Tel: 86-755-26636573, 26630631 Fax: 86-755-26630557

**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**

<b>1-TEST RESULT CERTIFICATION.....</b>	<b>3</b>
<b>2- EUT DESCRIPTION.....</b>	<b>4</b>
<b>3-TEST METHODOLOGY.....</b>	<b>5</b>
3.1 EUT CONFIGURATION.....	5
3.2 EUT EXERCISE .....	5
3.3 GENERAL TEST PROCEDURES .....	5
3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS.....	6
3.5 DESCRIPTION OF TEST MODES.....	6
<b>4- INSTRUMENT CALIBRATION.....</b>	<b>7</b>
<b>5- FACILITIES AND ACCREDITATIONS .....</b>	<b>8</b>
5.1 FACILITIES .....	8
5.2 EQUIPMENT.....	8
5.3 LABORATORY ACCREDITATION AND LISTING .....	8
<b>6- SETUP OF EQUIPMENT UNDER TEST .....</b>	<b>9</b>
6.1 SETUP CONFIGURATION OF EUT .....	9
6.2 SUPPORT EQUIPMENT.....	9
<b>7- FCC PART 15.231 REQUIREMENTS.....</b>	<b>10</b>
7.1 20 DB BANDWIDTH .....	10
7.2 LIMIT OF TRANSMISSION .....	12
7.3 RADIATED EMISSIONS .....	17
7.4 POWER LINE CONDUCTED EMISSION .....	22

**1-Test Result Certification**

Applicant: Lelux Electronics Ltd  
Unit 6, 10/F, TCL TOWER, NO.8, Tai Chung Road,  
Tsuen Wan, New Territories, Hong Kong

Equipment Under Test: Wireless Water Overflow Sensor with Alarm

Trade Name: HomeSafe

Model: 660

Operation Frequency: 433.92MHz

Antenna Designation: Non-user replaceable (fixed)

Battery Voltage: DC9.0V [ powered by 1\*9.0V battery ]

Date of Test: August 14 to 16, 2010

Applicable Standards	
Standard	Test Result
FCC 47 CFR Part 15 Subpart C	No non-compliance noted

**We hereby certify that:**

The above equipment was tested at ATC Lab Co., Ltd (Guangdong, China). 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 Public Notice DA 00-705. The energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules (2007), Part 15.207, 15.209 and Part 15.231.

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

**2- EUT Description**

Product	Wireless Water Overflow Sensor with Alarm
Trade Name	HomeSafe
Model Number	660
Model Difference	N/A
Power Supply	Powered by 1*9.0V battery
Frequency Range	433.92MHz
Antenna Designation	Non-user replaceable (fixed)

**Remark:** This submittal(s) test report is intended for FCC ID: NS3-660 filing to comply with Section 15.207, 15.209 and 15.231 of the FCC Part 15, Subpart C Rules.

### **3-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, 15.207, 15.209 and 15.231.

#### **3.1 EUT Configuration**

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.

#### **3.2 EUT Exercise**

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

#### **3.3 General Test Procedures**

##### **Conducted Emissions**

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

##### **Radiated Emissions**

The EUT is placed on a turntable, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4.

### 3.4 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 - 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	(2)
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

(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.

### 3.5 Description of Test Modes

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

## **4- 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.

## **5- Facilities and Accreditations**

### **5.1 Facilities**

All measurement facilities used to collect the measurement data are located on the address of ATC Lab Co., Ltd (Guangdong, China), 205#, Yingfeng Building, Ronggu Rd, Ronggui Shunde, Foshan 528305, P.R. China.

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

### **5.2 Equipment**

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn.

Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

### **5.3 Laboratory Accreditation and Listing**

FCC-Registration No.: 415467

ATC Lab Co., Ltd (Guangdong, China) 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. Registration 415467. Listing date October 10, 2008.

IC-Registration No.: 7949A

The 3m Alternate Test Site of ATC Lab Co., Ltd (Guangdong, China) has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 7949A on Oct. 29th, 2008.

## **6- Setup of Equipment Under Test**

### **6.1 Setup Configuration of EUT**

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

### **6.2 Support Equipment**

Device Type	Brand	Model	FCC ID	Series No.	Data Cable	Power Cord
N/A						

*Remark:*

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.

## 7- FCC Part 15.231 Requirements

### 7.1 20 db Bandwidth

#### Limit

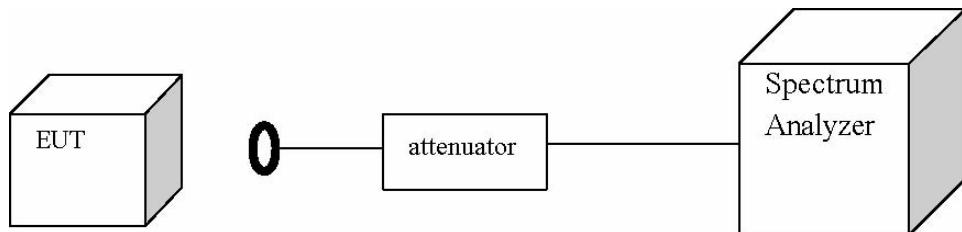
The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated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

#### Measurement Equipment Used

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	R & S	ESCI	100106	10/2009

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

#### Test Configuration

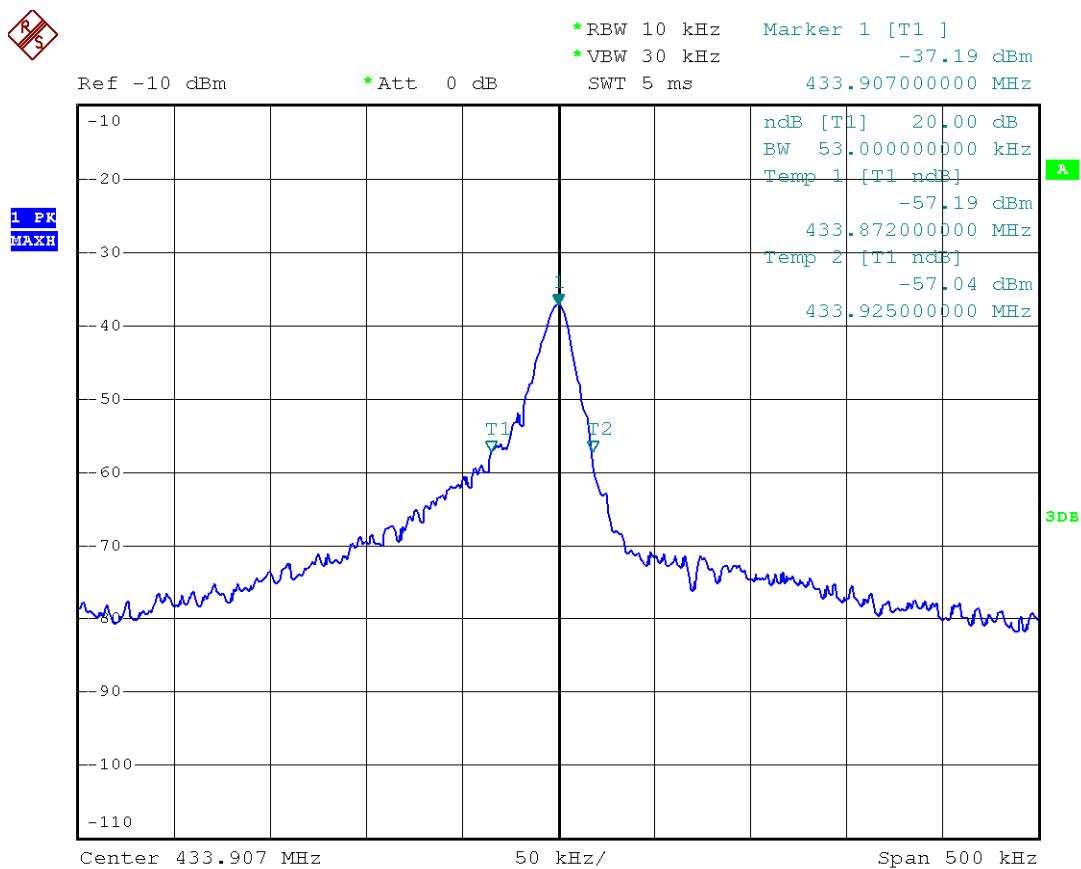


#### Test Procedure

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 30kHz.

#### Test Results

*No non-compliance noted.*

Test Plot

Horizontal

Date: 16.AUG.2010 22:27:21

## 7.2 Limit of transmission

### Time Limit

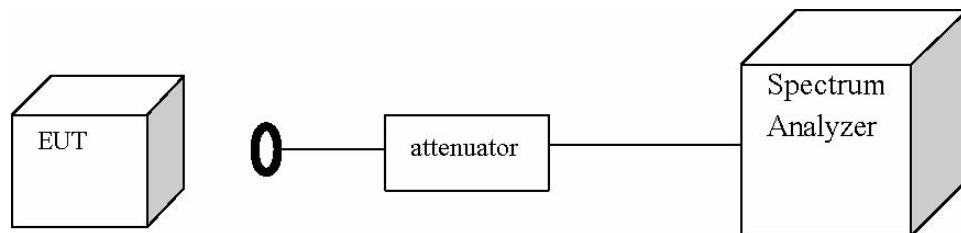
According to 15.231 (a)(1), a manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

### Measurement Equipment Used

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	R & S	ESCI	100106	10/2010

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

### Test Configuration

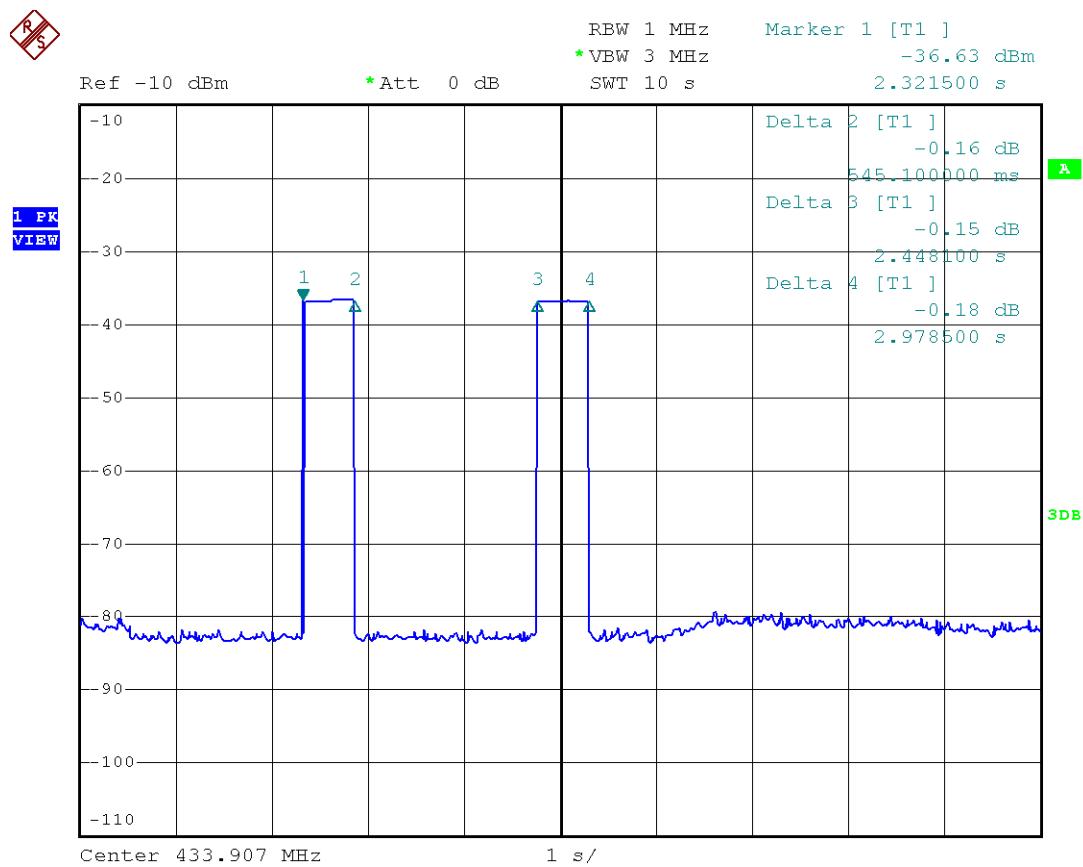


### Test Procedure

The transmitter output is connected to the spectrum analyzer. The spectrum analyzer center frequency is set to the transmitter frequency. The RBW and VBW are set to 1MHz.

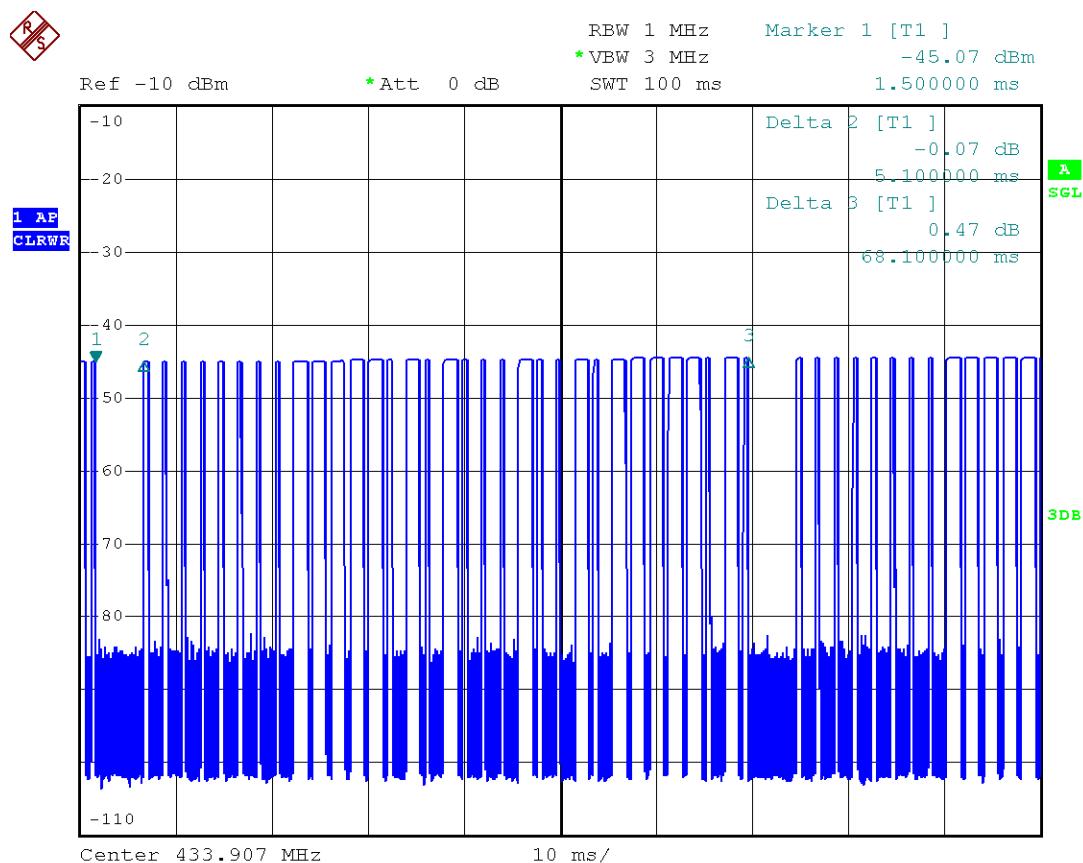
### Test Results

*No non-compliance noted*

Test Plot

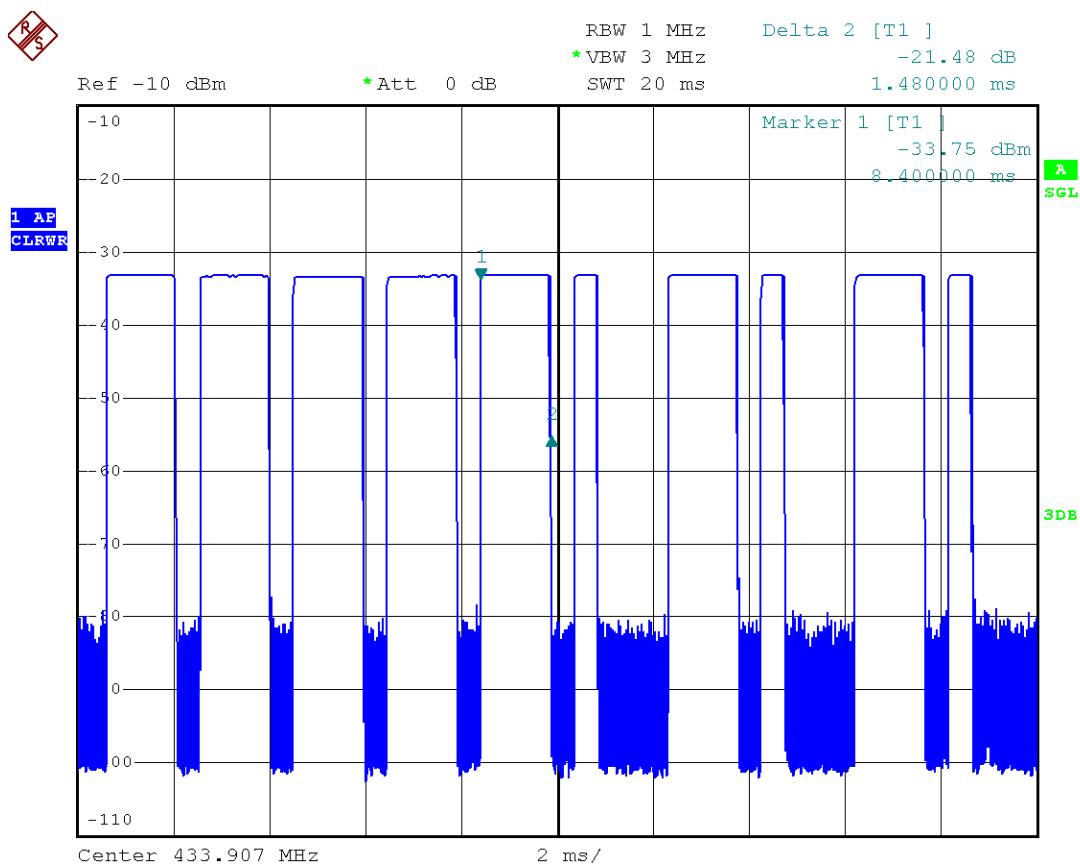
Horizontal

Date: 16.AUG.2010 22:31:59

Test Plot

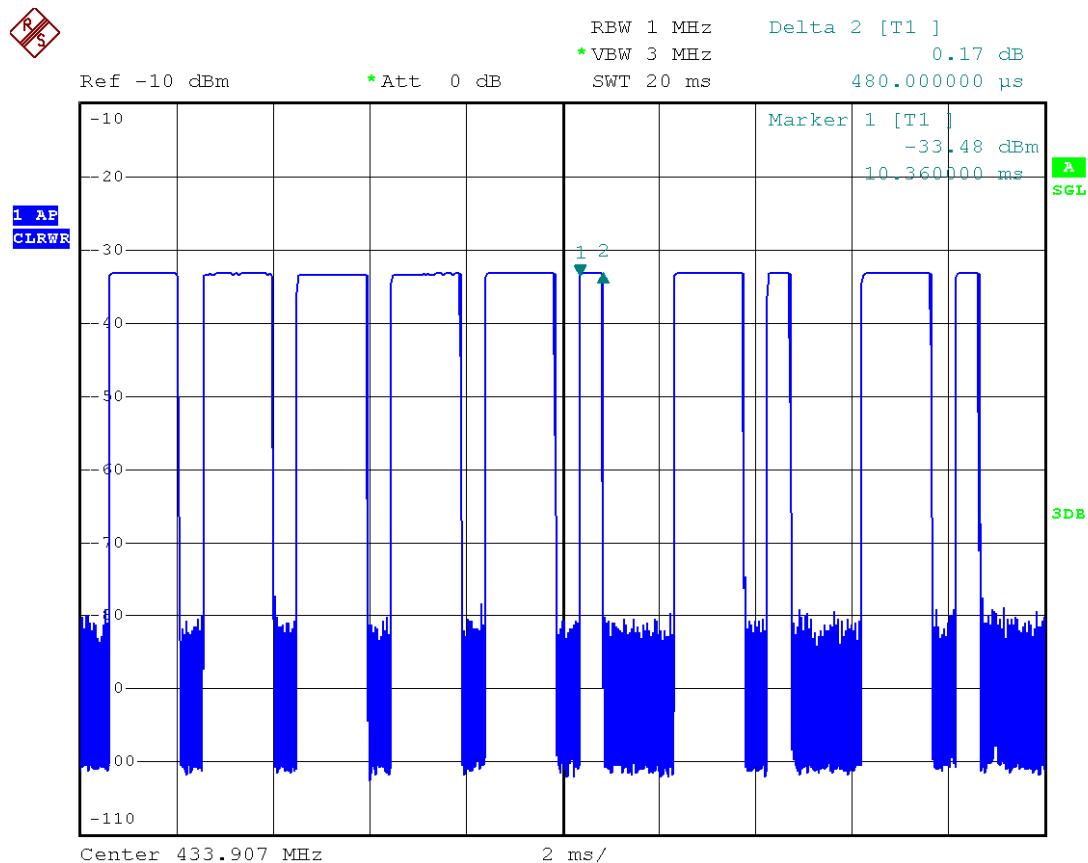
Horizontal

Date: 16.AUG.2010 22:29:36

Test Plot

Horizontal

Date: 16.AUG.2010 22:39:09

Test Plot

### 7.3 Radiated Emissions

#### Limit

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.*

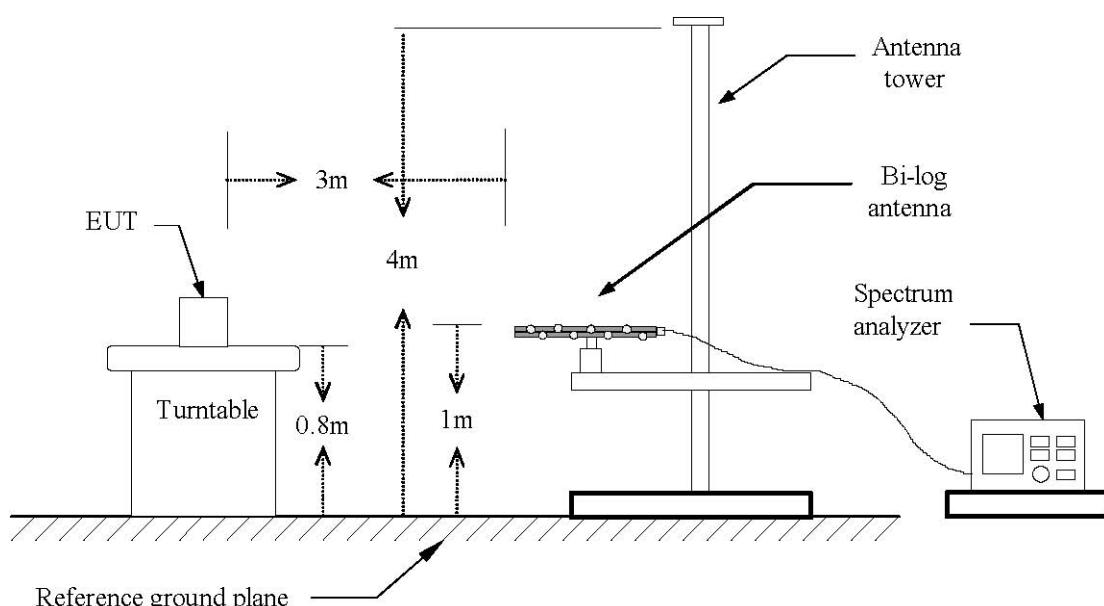
2. In the above emission table, the tighter limit applies at the band edges.

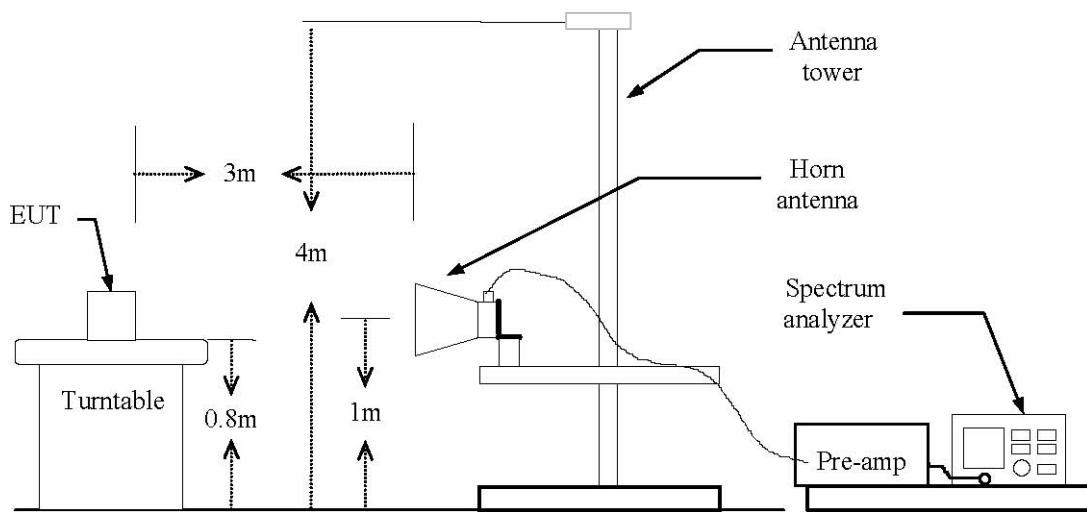
Frequency (Hz)	Field Strength ( $\mu$ V/m at 3-meter)	Field Strength (dB $\mu$ V/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

**Measurement Equipment Used**

3/5 Anechoic Chamber Radiation Test Site # 4				
Equipment type	Manufacturer	Model	Serial Number	Calibration Due
Ultra-Broadband Antenna	R & S	HL562	100015	10/2010
EMI Test Receiver	R & S	ESI 26	100009	10/2010
Double-Ridged-Wave- guide Horn Antenna	R & S	HF906	100039	10/2010
Turntable	ETS	2088	2149	N/A
RF Test Panel	R & S	TS / RSP	335015/ 0017	N/A
Antenna Mast	ETS	2075	2346	N/A
EMI Test Software	R & S	ES-K1 V1.71	N/A	10/2010

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

**Test Configuration Below 1 GHz**

**Above 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. Set the spectrum analyzer in the following setting as:

Below 1GHz:

RBW=100 kHz / VBW=300 kHz / Sweep=AUTO

Above 1GHz:

PEAK: RBW=VBW=1MHz / Sweep=AUTO

7. Repeat above procedures until the measurements for all frequencies are complete.

**Test Results**

Below 1 GHz

Operation Mode: TX Test Date: August 14, 2010

Temperature: 25 C Humidity: 70 % RH Polarity: Ver. / Hor.

Freq. (MHz)	Ant.Pol. (H/V)	Detector Mode (PK /Q P)	Reading (dBuV )	Factor (dB)	Actual FS (dBuV /m )	Lim it 3m (dBuV/m )	Safe Margin (dB)
433.90	V	Peak	41.16	17.44	58.60	100.80	-42.20
433.90	V	Average	--	--	51.28	80.80	-29.52
867.80	V	Peak	29.98	23.52	53.50	60.80	-7.30
33.52	V	Peak	10.30	17.10	27.40	40.00	-12.60
631.76	V	Peak	12.55	19.35	31.90	46.00	-14.10
825.44	V	Peak	9.59	22.81	32.40	46.00	-13.60
947.84	V	Peak	11.78	23.52	35.30	46.00	-10.70
Others			-				
433.90	H	Peak	29.36	17.44	46.80	100.80	-54.00
433.90	H	Average	--	--	39.48	80.80	-41.32
867.80	H	Peak	19.58	23.52	43.10	60.80	-17.70
37.20	H	Peak	15.07	12.43	27.50	40.00	-12.50
659.00	H	Peak	9.98	21.32	31.30	46.00	-14.70
837.28	H	Peak	10.29	22.81	33.10	46.00	-12.90
925.92	H	Peak	10.78	23.52	34.30	46.00	-11.70
Others			-				

**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 100 kHz.
5. Average Filed strength = Peak Filed strength + Duty cycle correction Factor.
6. Duty cycle correction Factor =  $20 \log (28 \times 0.48 + 20 \times 1.48)/100 = -7.32$

Above 1 GHz

Operation Mode: TX Test Date: August 16, 2010

Temperature: 25 °C Humidity: 70 % RH Polarity: Ver. / Hor.

Freq. (MHz)	Ant.Pol. (H/V)	Detector Mode (PK /Q P)	Reading (dBuV )	Factor (dB)	Actual FS (dBuV /m )	Lim it 3m (dBuV/m )	Safe Margin (dB)
1298.60	V	Peak	67.22	-9.62	57.60	60.80	-3.20
1736.00	V	Peak	68.69	-7.25	61.44	80.80	-19.36
1736.00	V	AV	50.20	-7.25	42.95	60.80	-17.85
2168.00	V	Peak	52.85	-7.25	45.60	60.80	-15.20
3472.00	V	Peak	55.86	-0.62	55.24	60.80	-5.56
Others			-				
1296.00	H	Peak	58.78	-9.62	49.16	60.80	-11.64
1735.60	H	Peak	64.85	-7.25	57.60	60.80	-3.20
3472.00	H	Peak	47.29	-0.62	46.67	60.80	-14.13
Others			-				

*Remark:*

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode shown in Actual FS column.
4. Spectrum setting: RBW = 1MHz, VBW = 1MHz, Sweep time = 200ms.
5. Average Filed strength = Peak Filed strength + Duty cycle correction Factor.
6. Duty cycle correction Factor =  $20 \log (28 \times 0.48 + 20 \times 1.48)/100 = -7.32$

## 7.4 Power line Conducted Emission

### Limit

For an intentional radiator which 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 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

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

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

### Measurement Equipment Used

Conducted Emission Test Site # 3				
Equipment type	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	R & S	ESCI	100106	10/2010
Artificial Mains	R & S	ESH2-Z5	100028	10/2010
Pulse Limiter	R & S	ESHSZ2	100044	10/2010
EMI Test Software	R & S	ES-K1 V1.71	N/A	10/2010

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

### Test Configuration

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

### Test Procedure

Not applicable (Since the EUT is powered by battery)

### Test Results

Not applicable (Since the EUT is powered by battery)