

# RF TEST REPORT



Report No.: 15071122-FCC-R2

Supersede Report No.:N/A

Applicant	Leader Light Ltd	
Product Name	Bluetooth Speaker	
Model No.	8042432	
Serial No.	8042435, B18, A-1540-0	
Test Standard	FCC Part 15.225: 2014; ANSI C63.10: 2013	
Test Date	December 03, 2015 to January 11, 2016	
Issue Date	January 20, 2016	
Test Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	
Equipment complied with the specification	<input checked="" type="checkbox"/>	
Equipment did not comply with the specification	<input type="checkbox"/>	
<i>Winnie Zhang</i>	<i>David Huang</i>	
Winnie Zhang Test Engineer	David Huang Checked By	
This test report may be reproduced in full only Test result presented in this test report is applicable to the tested sample only		

Issued by:

**SIEMIC (SHENZHEN-CHINA) LABORATORIES**

Zone A, Floor 1, Building 2 Wan Ye Long Technology Park

South Side of Zhoushi Road, Bao' an District, Shenzhen, Guangdong China 518108

Phone: +86 0755 2601 4629801 Email: [China@siemic.com.cn](mailto:China@siemic.com.cn)

## Laboratories Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.



In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

### Accreditations for Conformity Assessment

Country/Region	Scope
USA	EMC, RF/Wireless, SAR, Telecom
Canada	EMC, RF/Wireless, SAR, Telecom
Taiwan	EMC, RF, Telecom, SAR, Safety
Hong Kong	RF/Wireless, SAR, Telecom
Australia	EMC, RF, Telecom, SAR, Safety
Korea	EMI, EMS, RF, SAR, Telecom, Safety
Japan	EMI, RF/Wireless, SAR, Telecom
Singapore	EMC, RF, SAR, Telecom
Europe	EMC, RF, SAR, Telecom, Safety

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## 1. Report Revision History

Report No.	Report Version	Description	Issue Date
15071122-FCC-R2	NONE	Original	January 11, 2016
15071122-FCC-R2	V1	Adding RFID information	January 20, 2016

## 2. Customer information

Applicant Name	Leader Light Ltd
Applicant Add	Rm303,Chinachem Golden Plaza,77Mody Road,Tsimshatsui,Kowloon,Hongkong
Manufacturer	Leader Light Ltd
Manufacturer Add	Rm303,Chinachem Golden Plaza,77Mody Road,Tsimshatsui,Kowloon,Hongkong

## 3. Test site information

Lab performing tests	SIEMIC (Shenzhen-China) LABORATORIES
Lab Address	Zone A, Floor 1, Building 2 Wan Ye Long Technology Park South Side of Zhoushi Road, Bao' an District, Shenzhen, Guangdong China 518108
FCC Test Site No.	718246
IC Test Site No.	4842E-1
Test Software	Radiated Emission Program-To Shenzhen v2.0

## 4. Equipment under Test (EUT)

### Information

Description of EUT:	Bluetooth Speaker
Main Model:	8042432
Serial Model:	8042435, B18, A-1540-0
Date EUT received:	December 03, 2015
Test Date(s):	December 03, 2015 to January 11, 2016
Equipment Category :	DXX
Antenna Gain:	Bluetooth: 0dBi RFID : 0dBi
Type of Modulation:	RFID: ASK Bluetooth: GFSK, $\pi/4$ DQPSK, 8DPSK
RF Operating Frequency (ies):	RFID: 13.56MHz Bluetooth: 2402-2480 MHz
Number of Channels:	RFID: 1CH (ASK) Bluetooth: 79CH
Input Power:	Battery: Spec: 3.7V , 600mAh , 2.22Wh
Trade Name :	HEADRUSH
Port:	USB Port
FCC ID:	2AEHD8042432

## 5. Test Summary

The product was tested in accordance with the following specifications.

All testing has been performed according to below product classification:

FCC Rules	Description of Test	Result
15.203	Antenna Requirement	Pass
15.215(c)	20 dB Bandwidth&99% Occupied Bandwidth	Pass
15.225(a), 15.225(b), 15.225(c)	Field Strength Measurement	Pass
15.207(a)	Conducted Emissions	Pass
15.225(d),15.209	Radiated Emissions(Tx)	Pass
15.225(e)	Frequency Stability	Pass

## 6. Measurements, Examination And Derived Results

### 6.1 Antenna Requirement

#### **Applicable Standard**

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 with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

- a. Antenna must be permanently attached to the unit.
- b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### **Antenna Connector Construction**

The EUT has 2 antennas:

A permanently attached PCB antenna for Bluetooth, the gain is 0 dBi.

A permanently attached PCB antenna for RFID, the gain is 0 dBi.

**Result:** Compliance.

## 6.2 20 dB Bandwidth&99% Occupied Bandwidth

Temperature	23°C
Relative Humidity	58%
Atmospheric Pressure	1006mbar
Test date :	January 06, 2016
Tested By :	Winnie Zhang

1. Conducted Measurement  
EUT was set for low, mid, high channel with modulated mode and highest RF output power.  
The spectrum analyzer was connected to the antenna terminal.
2. Conducted Emissions Measurement Uncertainty  
All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 9kHz – 40GHz is  $\pm 1.5$ dB.

### **Standard Requirement:**

The bandwidth of a frequency hopping channel is the 20 dB emission bandwidth, measured with the hopping stopped. The system RF bandwidth is equal to the channel bandwidth multiplied by the number of channels in the hopset. The hopset shall be such that the near-term distribution of frequencies appears random, with sequential hops randomly distributed in both direction and magnitude of change in the hopset while the long-term distribution appears evenly distributed.

### **Procedures:**

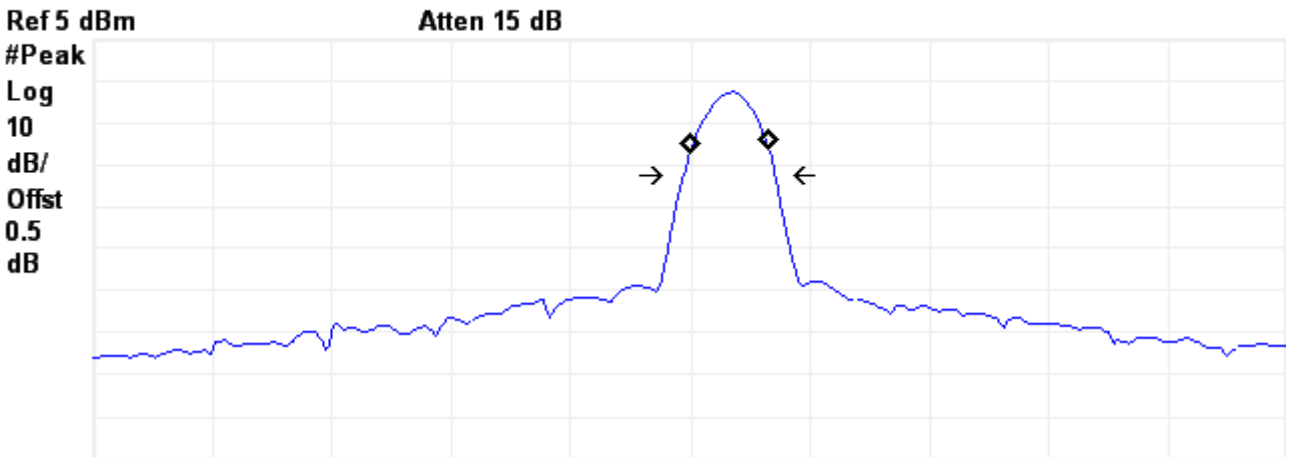
1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel, RBW  $\geq$  1% of the 20 dB bandwidth, VBW  $\geq$  RBW, Sweep = auto, Detector function = peak, Trace = max hold.
4. Set the measured low, middle and high frequency and test 20dB bandwidth with spectrum analyzer.

**Test Result: Pass**

<b>Test Mode:</b>	<b>Transmitting</b>
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Frequency (MHz)	20dB Bandwidth (KHz)	Test Result
13.56	0.777	PASS

The 20dB&99% bandwidth:



Center 13.56 MHz      #Res BW 300 Hz      #VBW 300 Hz      Span 10 kHz      Sweep 462 ms (401 pts)

**Occupied Bandwidth**  
**661.5319 Hz**

Occ BW % Pwr      99.00 %  
 x dB      -20.00 dB

Transmit Freq Error      322.866 Hz  
 x dB Bandwidth      776.792 Hz



13.56MHz

## **6.3 Field Strength Measurement**

Temperature	25°C
Relative Humidity	50%
Atmospheric Pressure	1008mbar
Test date :	January 08, 2016
Tested By :	Winnie Zhang

1. Radiated Measurement  
EUT was set for low, mid, high channel with modulated mode and highest RF output power.
2. Radiated Emissions Measurement Uncertainty  
All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 9KHz – 40GHz is  $\pm 1.5$ dB.

### **Test Requirement:**

The field strength of any emission shall not exceed the following limits:

- a. 15.848 microvolts/m (84 dB $\mu$  V/m) at 30 m, within the band 13.553– 13.567 MHz.
- b. 334 microvolts/m (50.5 dB $\mu$  V/m) at 30 m, within the bands 13.410– 13.553 MHz and 13.567– 13.710 MHz.
- c. 106 microvolts/m (40.5 dB $\mu$  V/m) at 30 m, within the bands 13.110– 13.410 MHz and 13.710– 14.010 MHz.
- d. 30 microvolts/m (29.5 dB $\mu$  V/m) at 30 m, outside the band 13.110– 14.010 MHz.

Carrier frequency stability shall be maintained to  $\pm 0.01\%$  ( $\pm 100$  ppm).

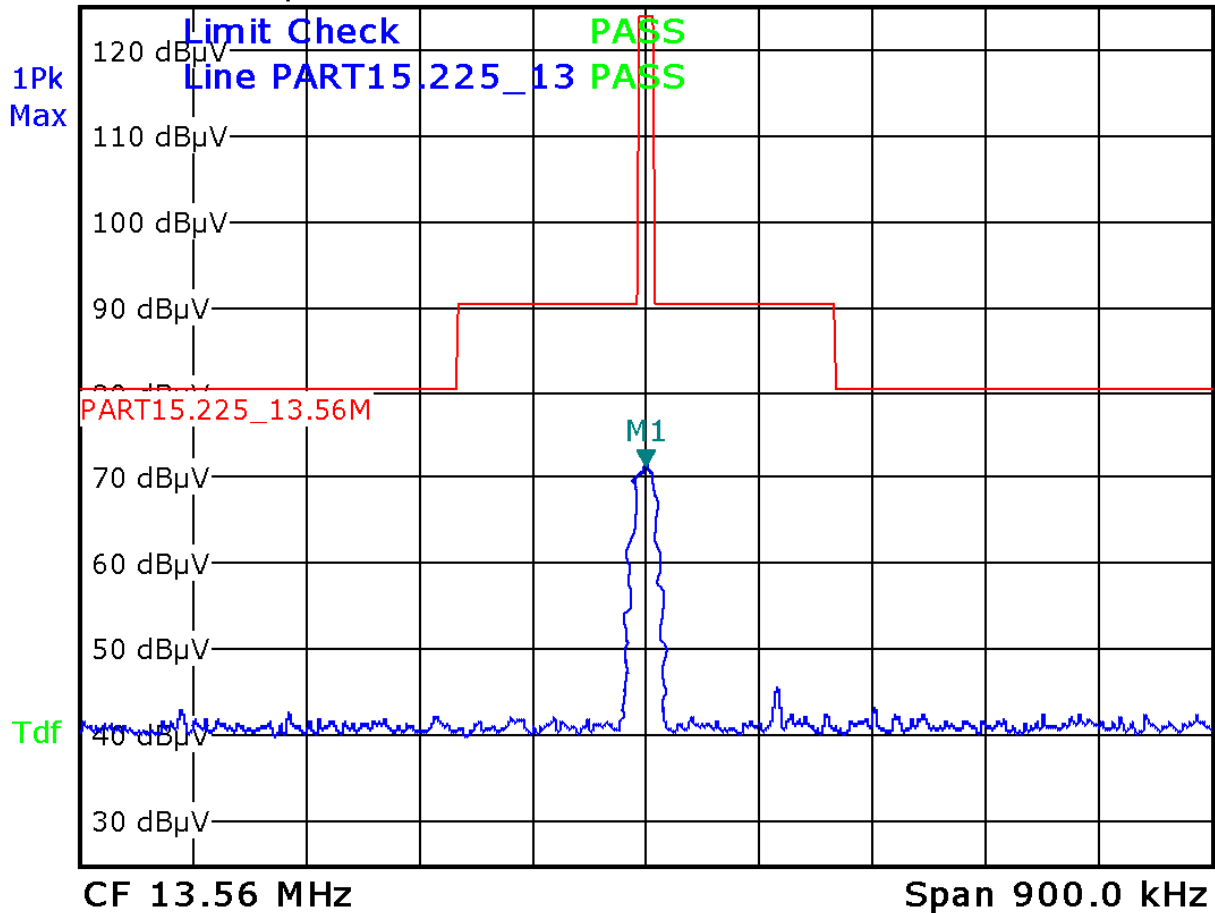
Test Result: Pass

<b>Test Mode:</b>	<b>Transmitting</b>
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**Fundamental Field Strength:**



\* Att 30 dB      \* RBW 10 kHz      M1[1]      73.24 dBμV  
 Ref 125.0 dBμV      VBW 30 kHz      13.56000000 MHz  
 SWT 10ms



Date: 8.JAN.2016 14:34:51

## **6.4 Conducted emissions Test Result**

Temperature	25°C
Relative Humidity	50%
Atmospheric Pressure	1008mbar
Test date :	January 08, 2016
Tested By :	Winnie Zhang

### **Standard Requirement:**

Frequency of emission (MHz)	Conducted limit (dB $\mu$ V)	
	Quasi-peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30	60	50

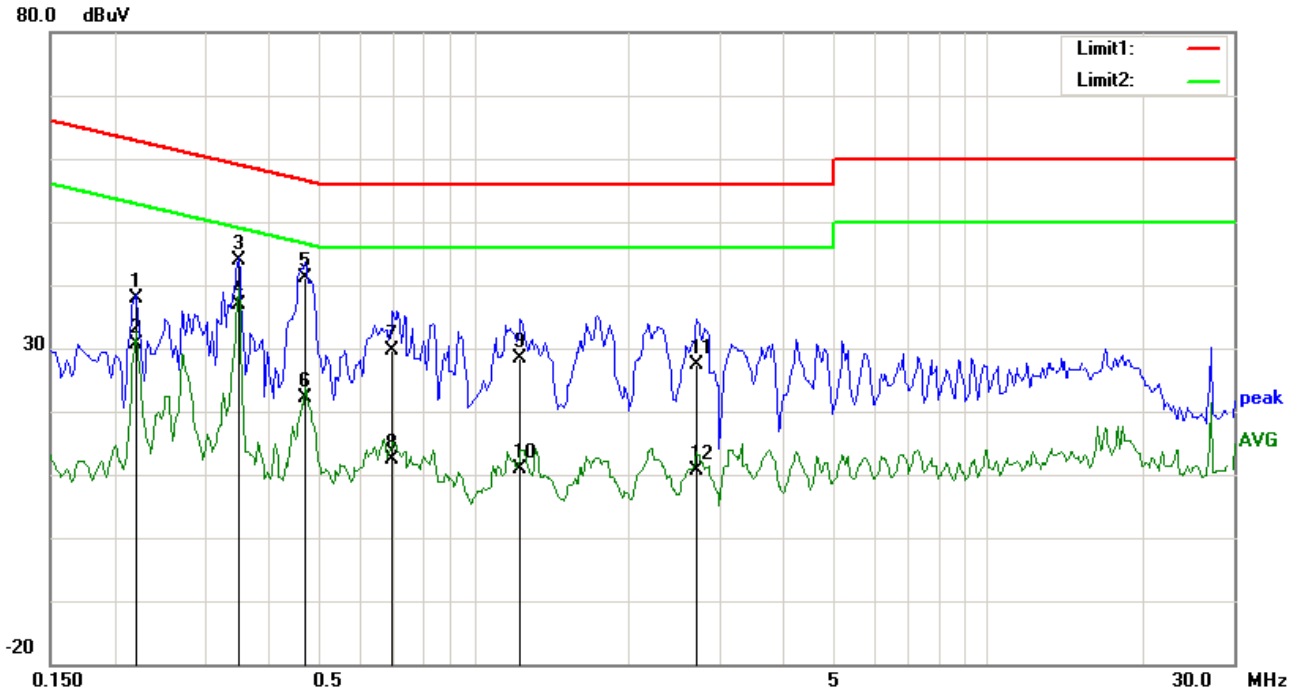
\*Decreases with the logarithm of the frequency.

### **Procedures:**

1. All possible modes of operation were investigated. Only the 6 worst case emissions measured, using the correct CISPR and Average detectors, are reported. All other emissions were relatively insignificant.
2. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
3. **Conducted Emissions Measurement Uncertainty**  
All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 9kHz – 30MHz (Average & Quasi-peak) is  $\pm 3.5$ dB.

**Test Result: Pass**

**Test Mode: Running**

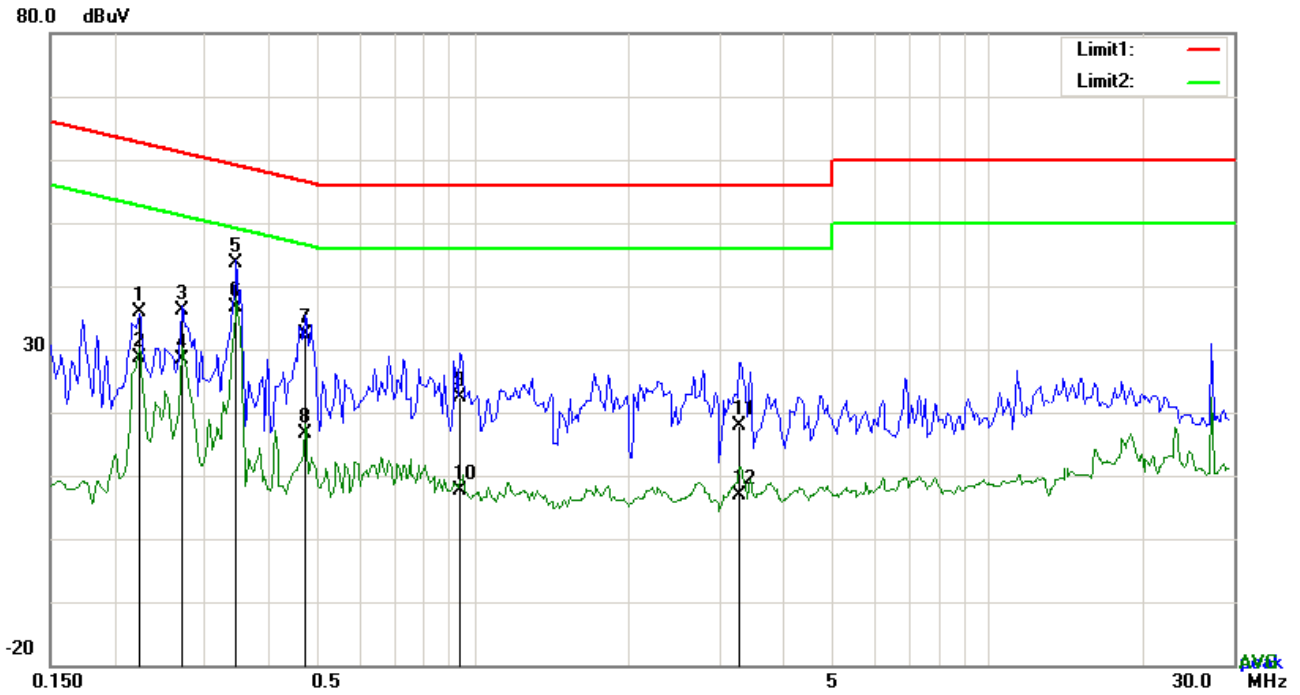


**Test Data**

**Phase Line Plot at 120Vac, 60Hz**

No.	P/L	Frequency (MHz)	Reading (dBuV)	Detector	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)
1	L1	0.2202	27.93	QP	10.03	37.96	62.81	-24.85
2	L1	0.2202	20.56	AVG	10.03	30.59	52.81	-22.22
3	L1	0.3489	33.83	QP	10.03	43.86	58.99	-15.13
4	L1	0.3489	26.96	AVG	10.03	36.99	48.99	-12.00
5	L1	0.4698	31.04	QP	10.03	41.07	56.52	-15.45
6	L1	0.4698	12.16	AVG	10.03	22.19	46.52	-24.33
7	L1	0.6960	19.65	QP	10.03	29.68	56.00	-26.32
8	L1	0.6960	2.42	AVG	10.03	12.45	46.00	-33.55
9	L1	1.2342	18.24	QP	10.03	28.27	56.00	-27.73
10	L1	1.2342	0.88	AVG	10.03	10.91	46.00	-35.09
11	L1	2.7201	17.35	QP	10.05	27.40	56.00	-28.60
12	L1	2.7201	0.53	AVG	10.05	10.58	46.00	-35.42

**Test Mode: Running**

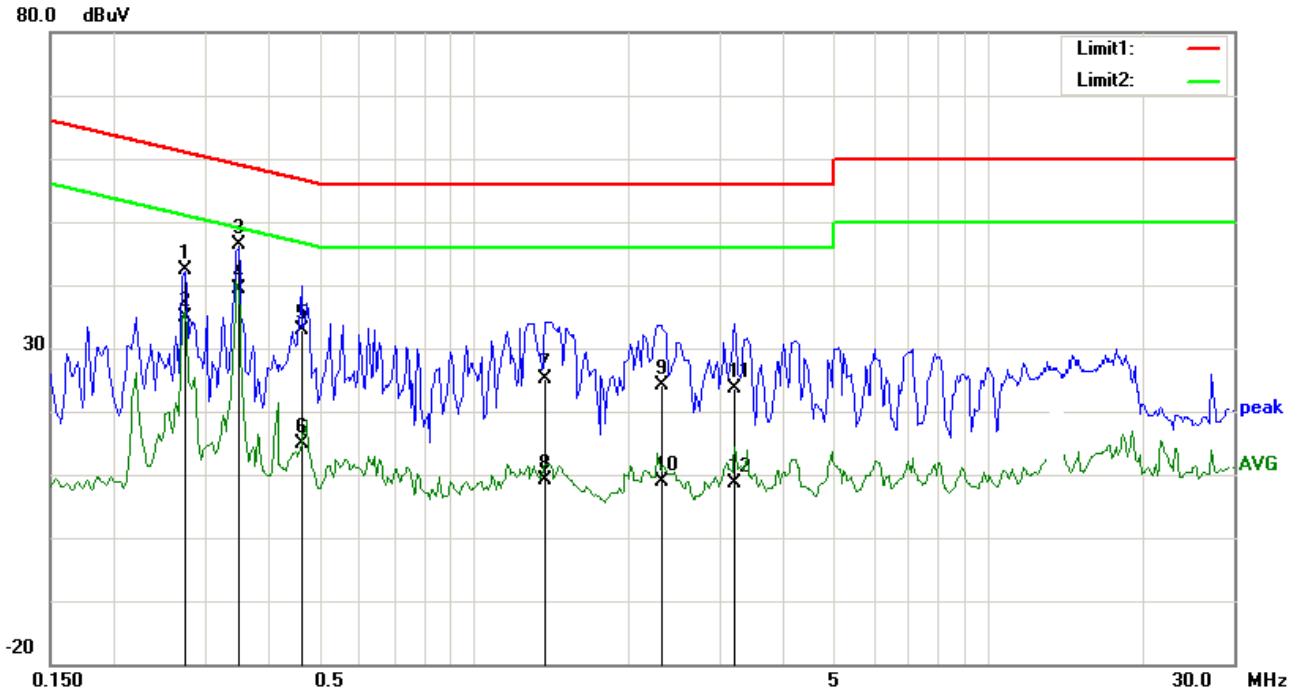


**Test Data**

**Phase Neutral Plot at 120Vac, 60Hz**

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB)	(dBuV)	(dBuV)	(dB)
1	N	0.2241	25.81	QP	10.02	35.83	62.67	-26.84
2	N	0.2241	18.66	AVG	10.02	28.68	52.67	-23.99
3	N	0.2709	26.22	QP	10.02	36.24	61.09	-24.85
4	N	0.2709	18.25	AVG	10.02	28.27	51.09	-22.82
5	N	0.3450	33.58	QP	10.02	43.60	59.08	-15.48
6	N	0.3450	26.70	AVG	10.02	36.72	49.08	-12.36
7	N	0.4698	22.43	QP	10.02	32.45	56.52	-24.07
8	N	0.4698	6.65	AVG	10.02	16.67	46.52	-29.85
9	N	0.9417	12.39	QP	10.03	22.42	56.00	-33.58
10	N	0.9417	-2.30	AVG	10.03	7.73	46.00	-38.27
11	N	3.2925	7.86	QP	10.05	17.91	56.00	-38.09
12	N	3.2925	-3.20	AVG	10.05	6.85	46.00	-39.15

**Test Mode: Running**

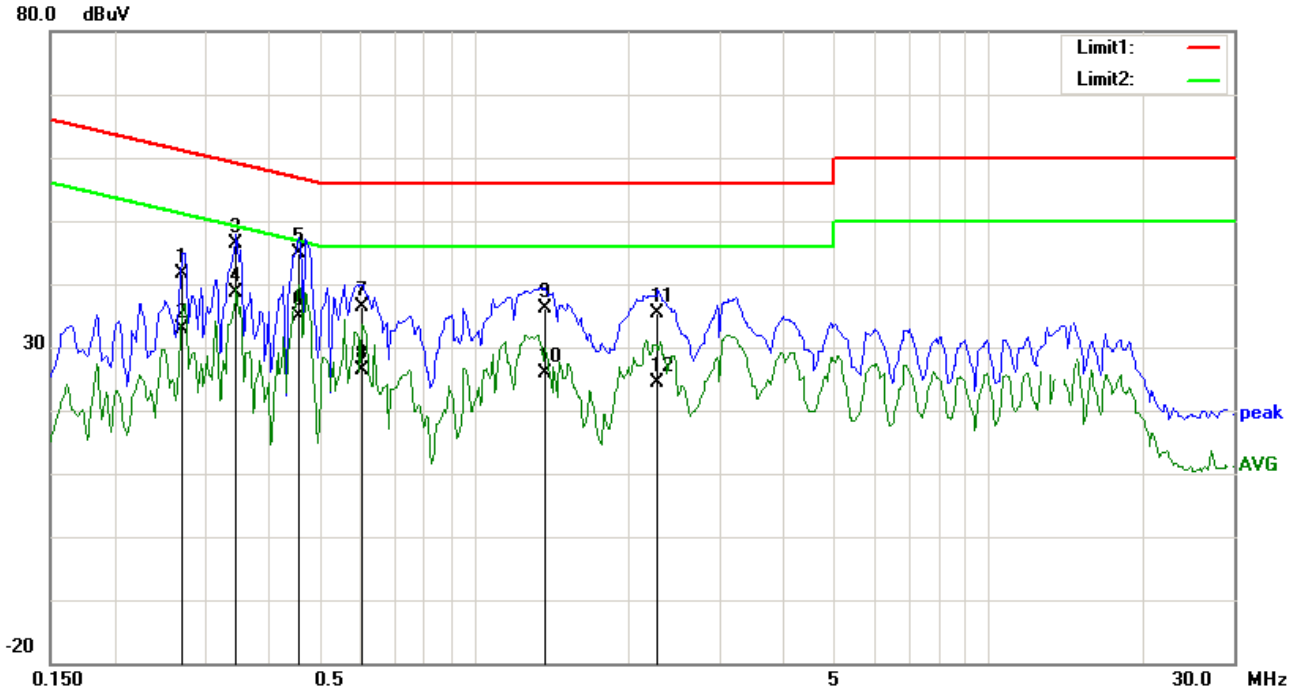


**Test Data**

**Phase Line Plot at 240Vac, 60Hz**

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB)	(dBuV)	(dBuV)	(dB)
1	L1	0.2748	32.30	QP	10.03	42.33	60.97	-18.64
2	L1	0.2748	24.93	AVG	10.03	34.96	50.97	-16.01
3	L1	0.3489	36.31	QP	10.03	46.34	58.99	-12.65
4	L1	0.3489	29.37	AVG	10.03	39.40	48.99	-9.59
5	L1	0.4620	22.76	QP	10.03	32.79	56.66	-23.87
6	L1	0.4620	4.96	AVG	10.03	14.99	46.66	-31.67
7	L1	1.3746	15.18	QP	10.03	25.21	56.00	-30.79
8	L1	1.3746	-1.00	AVG	10.03	9.03	46.00	-36.97
9	L1	2.3106	14.11	QP	10.05	24.16	56.00	-31.84
10	L1	2.3106	-1.12	AVG	10.05	8.93	46.00	-37.07
11	L1	3.2106	13.61	QP	10.06	23.67	56.00	-32.33
12	L1	3.2106	-1.41	AVG	10.06	8.65	46.00	-37.35

**Test Mode: Running**



**Test Data**

**Phase Neutral Plot at 240Vac, 60Hz**

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB)	(dBuV)	(dBuV)	(dB)
1	N	0.2709	31.73	QP	10.02	41.75	61.09	-19.34
2	N	0.2709	22.86	AVG	10.02	32.88	51.09	-18.21
3	N	0.3450	36.46	QP	10.02	46.48	59.08	-12.60
4	N	0.3450	28.55	AVG	10.02	38.57	49.08	-10.51
5	N	0.4581	34.84	QP	10.02	44.86	56.73	-11.87
6	N	0.4581	24.91	AVG	10.02	34.93	46.73	-11.80
7	N	0.6063	26.28	QP	10.02	36.30	56.00	-19.70
8	N	0.6063	16.33	AVG	10.02	26.35	46.00	-19.65
9	N	1.3746	26.19	QP	10.03	36.22	56.00	-19.78
10	N	1.3746	15.94	AVG	10.03	25.97	46.00	-20.03
11	N	2.2833	25.24	QP	10.04	35.28	56.00	-20.72
12	N	2.2833	14.23	AVG	10.04	24.27	46.00	-21.73

## **6.5 Radiated Emissions (TX)**

Temperature	25°C
Relative Humidity	50%
Atmospheric Pressure	1008mbar
Test date :	January 08, 2016
Tested By :	Winnie Zhang

1. All possible modes of operation were investigated. Only the 6 worst case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
2. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
3. Radiated Emissions Measurement Uncertainty  
All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 1 MHz – 1GHz ( 3m & 10m ) & 1GHz above ( 3m ) is +5.6/-4.5dB.

### **Standard Requirement:**

The emissions from the Low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges.

The spurious emission scanned frequency range is 1MHz – 1000 MHz.

**Test Result: Pass**

**1 MHz-30 MHz**

Loop Antenna :

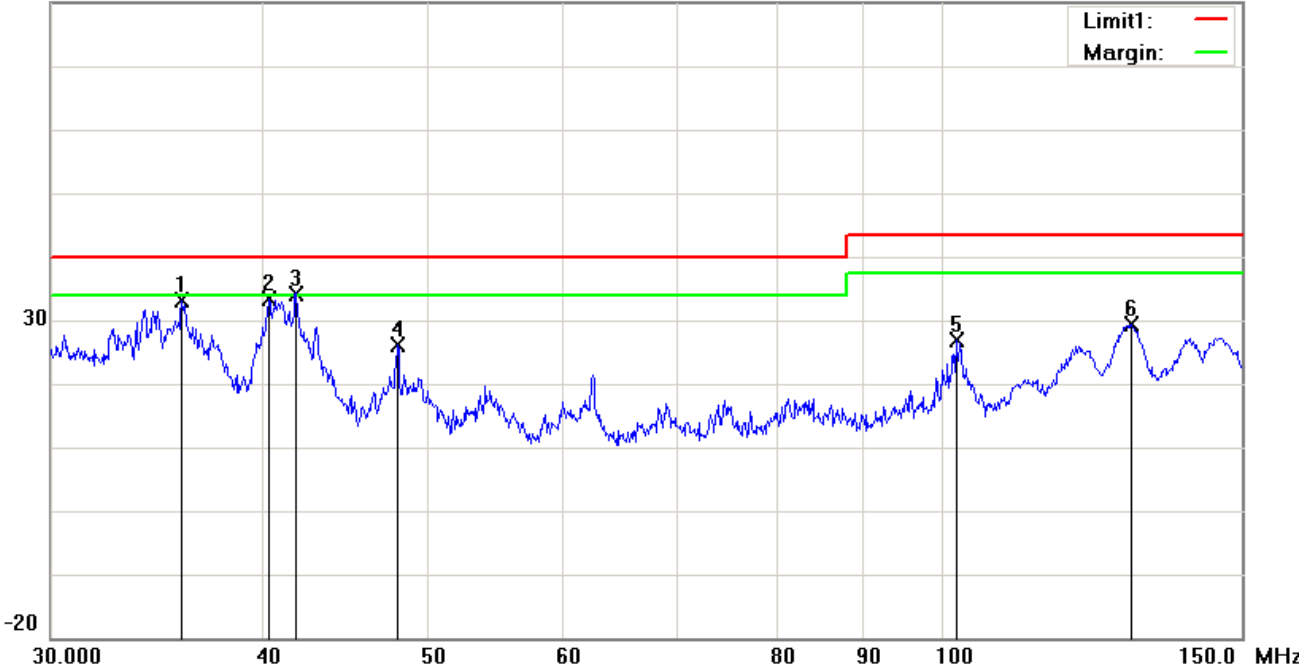
@ 3M

Frequency	Peak ( Corrected )	Factor	Height	Azimuth h	Limits @ 3m	Margin
(MHz)	(dB $\mu$ V/m)	(dB)	(cm)	(deg)	(dB $\mu$ V/m)	(dB)
17.59MHz	60.02	20.1	120	153	69.54	-9.52
19.44 MHz	60.55	18.3	130	96	69.54	-8.99
6.17 MHz	59.86	34.2	110	102	69.54	-9.68

<b>Test Mode:</b>	<b>Transmitting</b>
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**30-150MHz**

80.0 dBuV/m

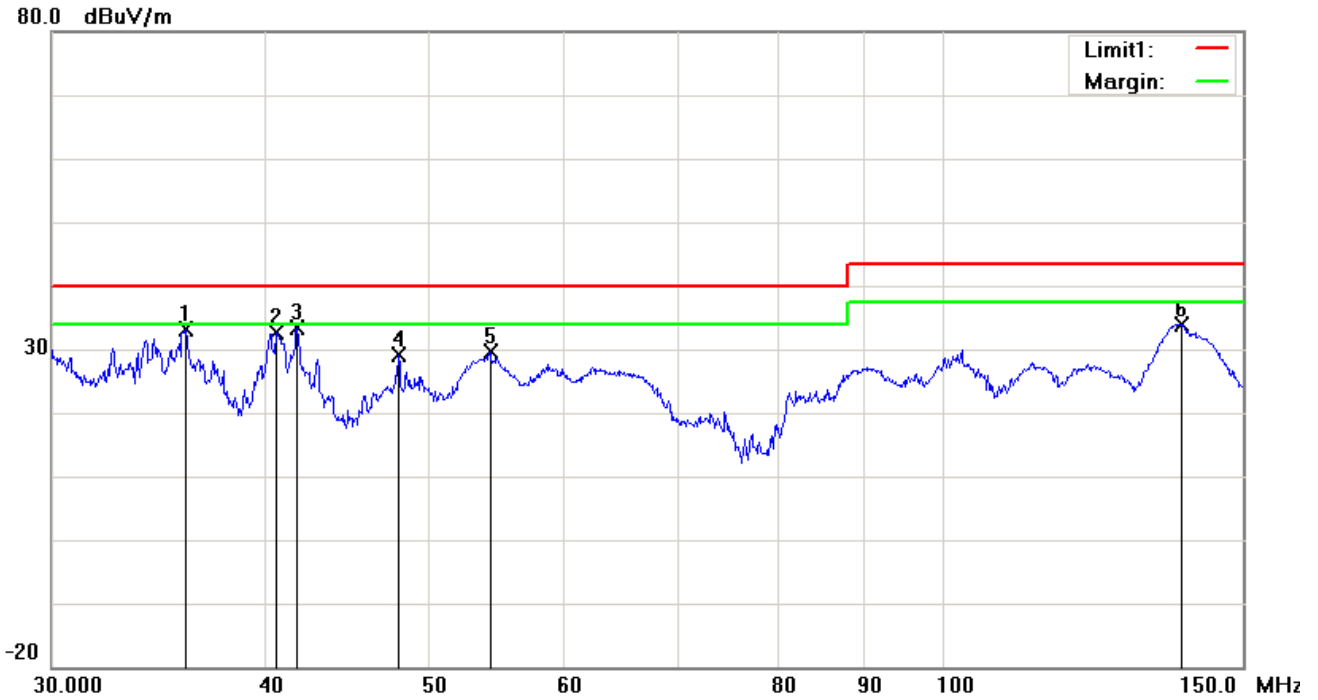


**Test Data**

**Horizontal Polarity Plot @3m**

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin	Height	Degree
		(MHz)	(dBuV/m)		(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( )
1	H	35.8103	37.66	peak	-4.53	33.13	40.00	-6.87	100	254
2	H	40.2747	41.05	peak	-7.77	33.28	40.00	-6.72	100	169
3	H	41.7935	43.03	peak	-8.78	34.25	40.00	-5.75	100	73
4	H	47.9205	38.39	peak	-12.25	26.14	40.00	-13.86	100	182
5	H	101.9386	37.22	peak	-10.45	26.77	43.50	-16.73	100	271
6	H	129.1478	37.19	peak	-7.87	29.32	43.50	-14.18	100	136

**30-150MHz**



**Test Data**

**Vertical Polarity Plot @3m**

No.	P/L	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree ( )
1	V	35.9258	37.85	peak	-4.62	33.23	40.00	-6.77	100	53
2	V	40.6001	40.67	peak	-7.99	32.68	40.00	-7.32	100	318
3	V	41.7935	42.16	peak	-8.78	33.38	40.00	-6.62	100	177
4	V	47.9205	41.26	peak	-12.25	29.01	40.00	-10.99	100	183
5	V	54.2428	43.25	peak	-13.68	29.57	40.00	-10.43	100	141
6	V	138.1796	42.33	peak	-8.43	33.90	43.50	-9.60	100	255

## **6.6 Frequency Stability**

Temperature	25°C
Relative Humidity	50%
Atmospheric Pressure	1008mbar
Test date :	January 08, 2016
Tested By :	Winnie Zhang

**Requirement(s):** 47 CFR §15.225(e)

**Procedures:** Frequency Stability was measured according to 47 CFR§2.1055. Measurement was taken with spectrum analyzer. The spectrum analyzer bandwidth and span was set to read in hertz. A voltmeter was used to monitor when varying the voltage.

Limit:  $\pm 0.01\%$  of 13.56MHz=1356Hz

**The result: Pass**

Frequency Stability versus Temperature: The Frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  of the operating frequency over a temperature variation of  $-20^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  at normal supply voltage.

Reference Frequency: 13.56MHz at  $-20^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  3.7V AC

Temperature ( $^{\circ}\text{C}$ )	Measured Freq. (MHz)	Freq. Drift (Hz)	Freq. Deviation (Limit: 0.01%)	Pass/Fail
50	13.5605	500	< 0.01	Pass
40	13.5604	400	< 0.01	Pass
30	13.5608	800	< 0.01	Pass
20	13.5603	300	< 0.01	Pass
10	13.5606	600	< 0.01	Pass
0	13.5605	500	< 0.01	Pass
-10	13.5604	400	< 0.01	Pass
-20	13.5607	700	< 0.01	Pass

Frequency Stability versus Input Voltage: The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$ , the frequency of the transmitter was measured at 85% and at 115% of the rated power supply voltage at  $20^{\circ}\text{C}$  environmental temperature.

Carrier Frequency: 13.56MHz at  $20^{\circ}\text{C}$  at 3.7 V AC

Measured Voltage $\pm 15\%$ of nominal(DC)	Measured Freq. (MHz)	Freq. Drift (Hz)	Freq. Deviation (Limit: 0.01%)	Pass/Fail
10.8	13.5603	300	< 0.01	Pass
13.2	13.5608	800	< 0.01	Pass

## Annex A. TEST INSTRUMENT

### Annex A. i.EST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Due	In use
<b>AC Line Conducted</b>					
EMI test receiver	ESCS30	8471241027	09/17/2015	09/16/2016	<input checked="" type="checkbox"/>
Line Impedance	LI-125A	191106	09/25/2015	09/24/2016	<input checked="" type="checkbox"/>
Line Impedance	LI-125A	191107	09/25/2015	09/24/2016	<input checked="" type="checkbox"/>
LISN	ISN T800	34373	09/25/2015	09/24/2016	<input checked="" type="checkbox"/>
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	09/24/2015	09/23/2016	<input checked="" type="checkbox"/>
Transient Limiter	LIT-153	531118	09/01/2015	08/31/2016	<input checked="" type="checkbox"/>
<b>RF conducted test</b>					
Agilent ESA-E SERIES	E4407B	MY45108319	09/17/2015	09/16/2016	<input checked="" type="checkbox"/>
Power Splitter	1#	1#	09/01/2015	08/31/2016	<input checked="" type="checkbox"/>
DC Power Supply	E3640A	MY40004013	09/17/2015	09/16/2016	<input checked="" type="checkbox"/>
Temperature/Humidity	UHL-270	001	10/09/2015	10/08/2016	<input checked="" type="checkbox"/>
<b>Radiated Emissions</b>					
EMI test receiver	ESL6	100262	09/17/2015	09/16/2016	<input checked="" type="checkbox"/>
Positioning Controller	UC3000	MF780208282	11/19/2015	11/18/2016	<input checked="" type="checkbox"/>
OPT 010 AMPLIFIER (0.1-1300MHz)	8447E	2727A02430	09/01/2015	08/31/2016	<input checked="" type="checkbox"/>
Microwave Preamplifier (1 ~ 26.5GHz)	8449B	3008A02402	03/25/2015	03/24/2016	<input checked="" type="checkbox"/>
Bilog Antenna (30MHz~6GHz)	JB6	A110712	09/21/2015	09/20/2016	<input checked="" type="checkbox"/>
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	09/24/2015	09/23/2016	<input checked="" type="checkbox"/>
Universal Radio Communication Tester	CMU200	121393	09/24/2015	09/23/2016	<input checked="" type="checkbox"/>

## Annex A. ii RADIATED EMISSIONS TEST DESCRIPTION

### Limit

- 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.

- 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

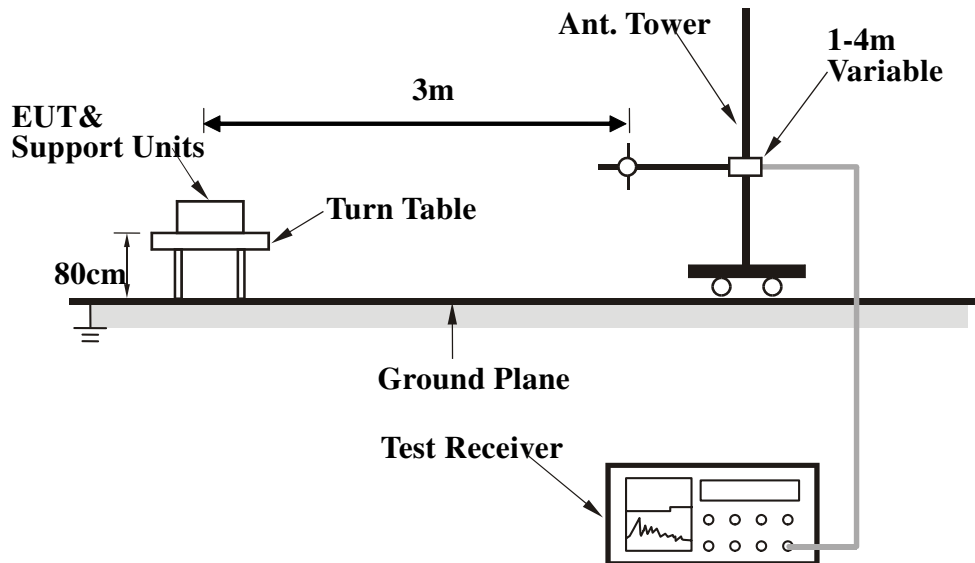
### EUT Characterisation

EUT characterisation, over the frequency range from 30MHz to 10<sup>th</sup> Harmonic, was done in order to minimise radiated emissions testing time while still maintaining high confidence in the test results.

The EUT was placed in the chamber, at a height of about 0.8m on a turntable. Its radiated emissions frequency profile was observed, using a spectrum analyzer /receiver with the appropriate broadband antenna placed 3m away from the EUT. Radiated emissions from the EUT were maximised by rotating the turntable manually, changing the antenna polarisation and manipulating the EUT cables while observing the frequency profile on the spectrum analyzer / receiver. Frequency points at which maximum emissions occurred, clock frequencies and operating frequencies were then noted for the formal radiated emissions test at the Open Area Test Site (OATS) or 3m EMC chamber.

## Test Set-up

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m X 1.0m X 0.8m high, non-metallic table.
2. The filtered power supply for the EUT and supporting equipment were tapped from the appropriate power sockets located on the turntable.
3. The relevant broadband antenna was set at the required test distance away from the EUT and supporting equipment boundary.



## Test Method

The following procedure was performed to determine the maximum emission axis of EUT:

1. With the receiving antenna is H polarization, rotate the EUT in turns with three orthogonal axes to determine the axis of maximum emission.
2. With the receiving antenna is V polarization, rotate the EUT in turns with three orthogonal axes to determine the axis of maximum emission.
3. Compare the results derived from above two steps. So, the axis of maximum emission from EUT was determined and the configuration was used to perform the final measurement.

### Final Radiated Emission Measurement

1. Setup the configuration according to figure 1. Turn on EUT and make sure that it is in normal function.
2. For emission frequencies measured below 1 GHz, a pre-scan is performed in a shielded chamber to determine the accurate frequencies of higher emissions will be checked on a open test site. As the same purpose, for emission frequencies measured above 1 GHz, a pre-scan also be performed with a 1 meter measuring distance before final test.
3. For emission frequencies measured below and above 1 GHz, set the spectrum analyzer on a 100 kHz and 1 MHz resolution bandwidth respectively for each frequency measured in step 2.

4. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0° to 360° with a speed as slow as possible, and keep the azimuth that highest emission is indicated on the spectrum analyzer. Vary the antenna position again and record the highest value as a final reading.

5. Repeat step 4 until all frequencies need to be measured was complete.

6. Repeat step 5 with search antenna in vertical polarized orientations.

During the radiated emission test, the Spectrum Analyzer was set with the following configurations:

Frequency Band (MHz)	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	Peak	100 kHz	100 kHz
Above 1000	Peak	1 MHz	1 MHz
	Average	1 MHz	10 Hz

### **Description of Radiated Emissions Program**

This EMC Measurement software run LabView automation software and offers a common user interface for electromagnetic interference (EMI) measurements. This software is a modern and powerful tool for controlling and monitoring EMI test receivers and EMC test systems. It guarantees reliable collection, evaluation, and documentation of measurement results. Basically, this program will run a pre-scan measurement before it proceeds with the final measurement. The pre-scan routine will run the scan on four different antenna heights, 2 antenna polarity, and 360 degrees table rotation. For example, the program was set to run 30 MHz to 1 GHz scan; the program will first start from a meter antenna height and divide the 30 MHz to 1 GHz into 10 separate parts of maximum hold sweeps. Each parts of maximum hold sweep, the program will collect the data from 0 degree to 360 degrees table rotation. After the program complete the 1m scan, the antenna continues to rise to 2m and continue the scan. The step will repeated for all specified antenna height and polarity. This program will perform the Quasi Peak measurement after the signal maximization process and pre-scan routine. The final measurement will be base on the pre-scan data reduction result.

### **Sample Calculation Example**

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. For the limit is employed average value, therefore the peak value can be transferred to average value by subtracting the duty factor. The basic equation with a sample calculation is as follows:

$$\text{Peak} = \text{Reading} + \text{Corrected Factor}$$

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where

Corr. Factor = Antenna Factor + Cable Factor - Amplifier Gain (if any)

And the average value is

Average = Peak Value + Duty Factor or

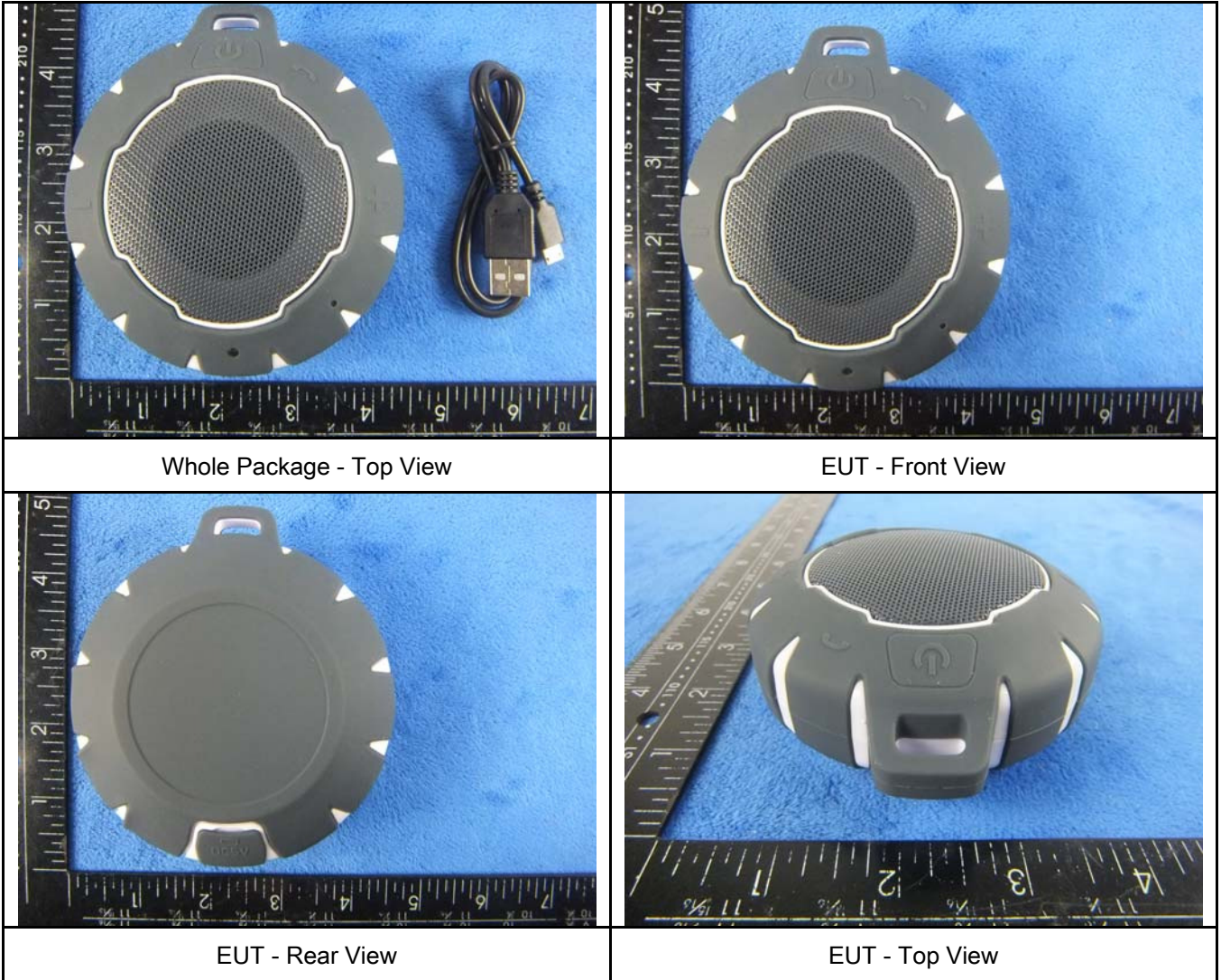
Set RBW = 1MHz, VBW = 10Hz.

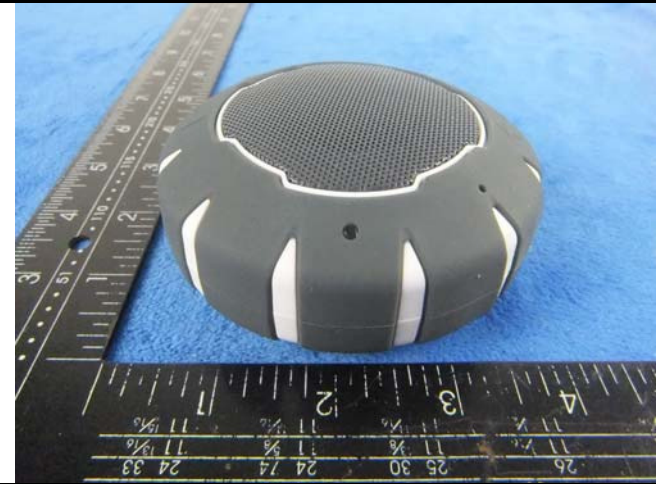
Note:

If the measured frequencies are fall in the restricted frequency band, the limit employed must be quasi peak value when frequencies are below or equal to 1 GHz. And the measuring instrument is set to quasi peak detector function.

## Annex B. EUT AND TEST SETUP PHOTOGRAPHS

Annex B.i. Photograph: EUT External Photo

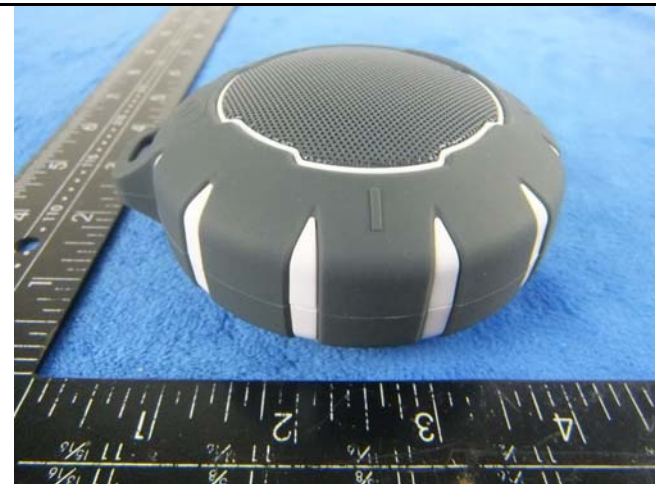




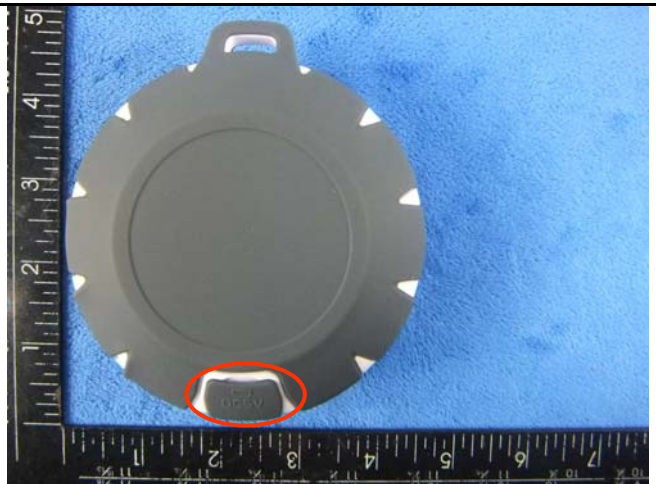
EUT - Bottom View



EUT - Left View

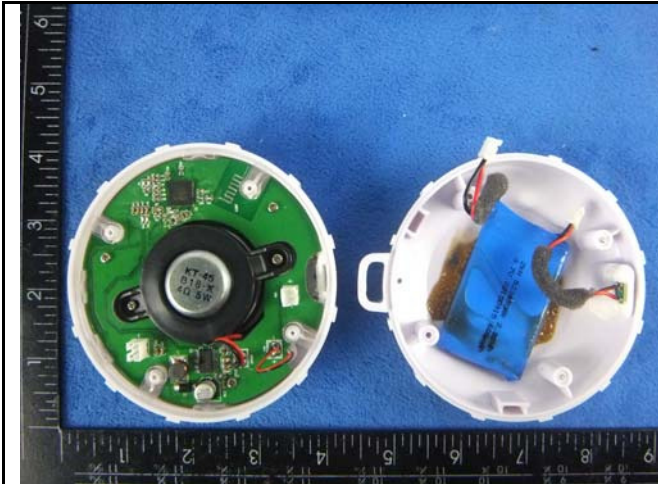


EUT - Right View



USB View

Annex B.ii. Photograph: EUT Internal Photo



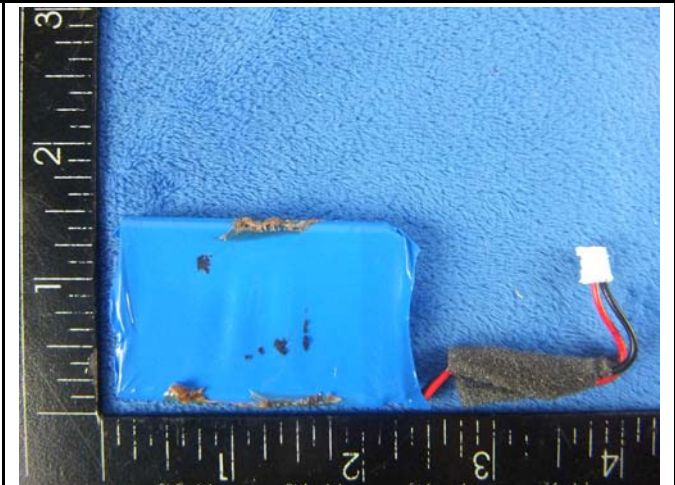
Cover Off - Top View 1



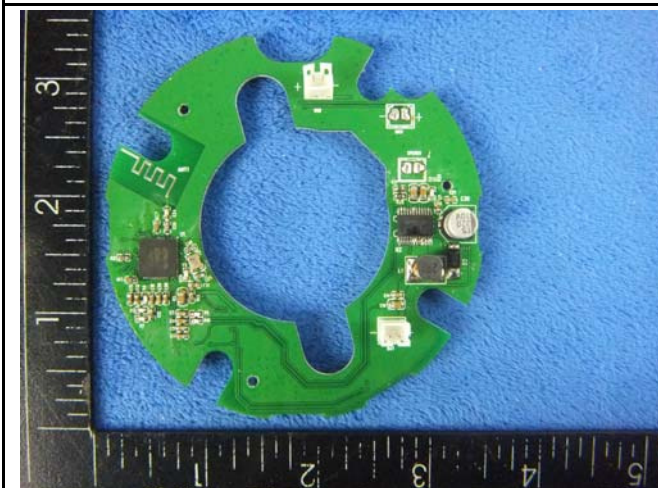
Cover Off - Top View 2



Battery - Front View



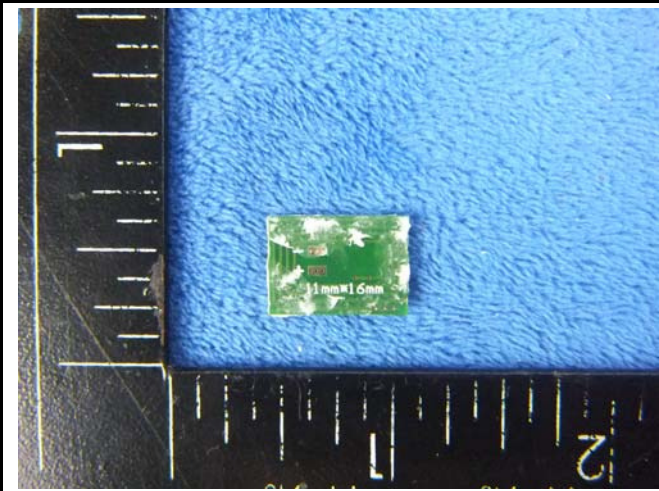
Battery - Rear View



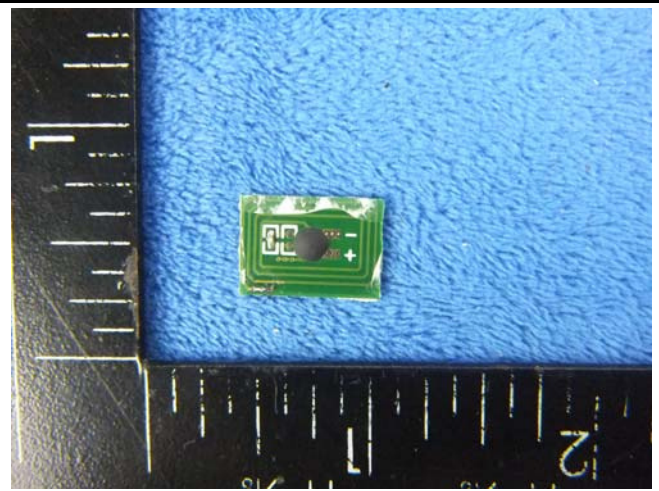
Mainboard - Front View



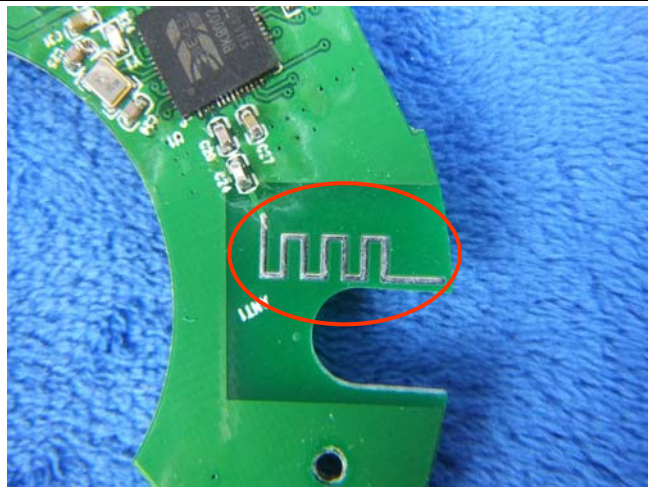
Mainboard - Rear View



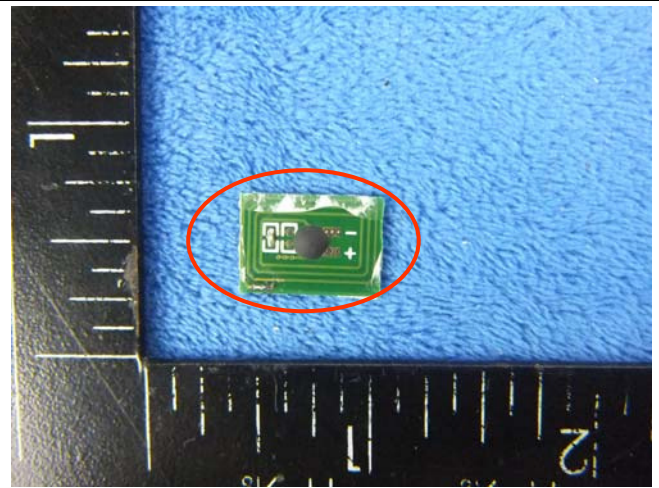
Mini Mainboard - Front View



Mini Mainboard - Rear View



BT - Antenna View



RFID - Antenna View

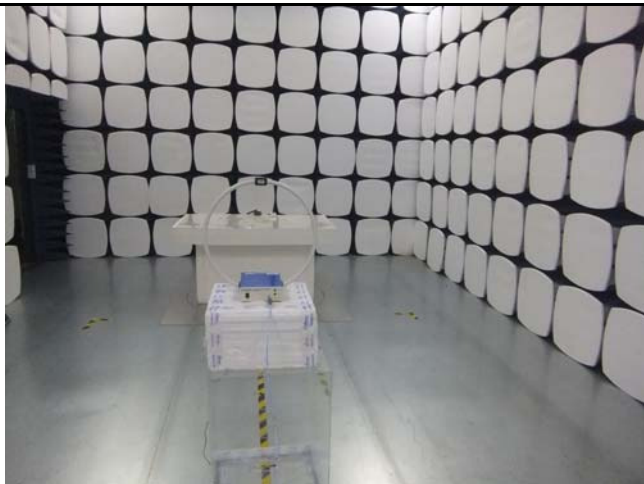
**Annex B.iii. Photograph: Test Setup Photo**



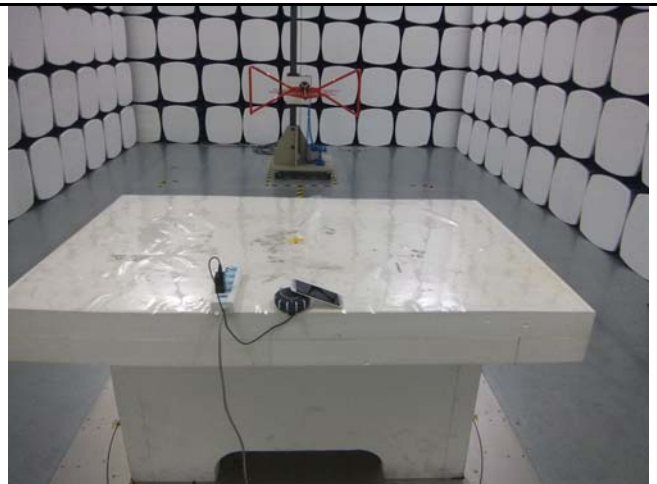
Conducted Emissions Test Setup – Front View



Conducted Emissions Test Setup – Side View



Radiated Spurious Emissions Test Setup 1MHz-30MHz



Radiated Spurious Emissions Test Setup 30MHz-150MHz

## Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

### EUT TEST CONDITIONS

#### Annex C. i. SUPPORTING EQUIPMENT DESCRIPTION

The following is a description of supporting equipment and details of cables used with the EUT.

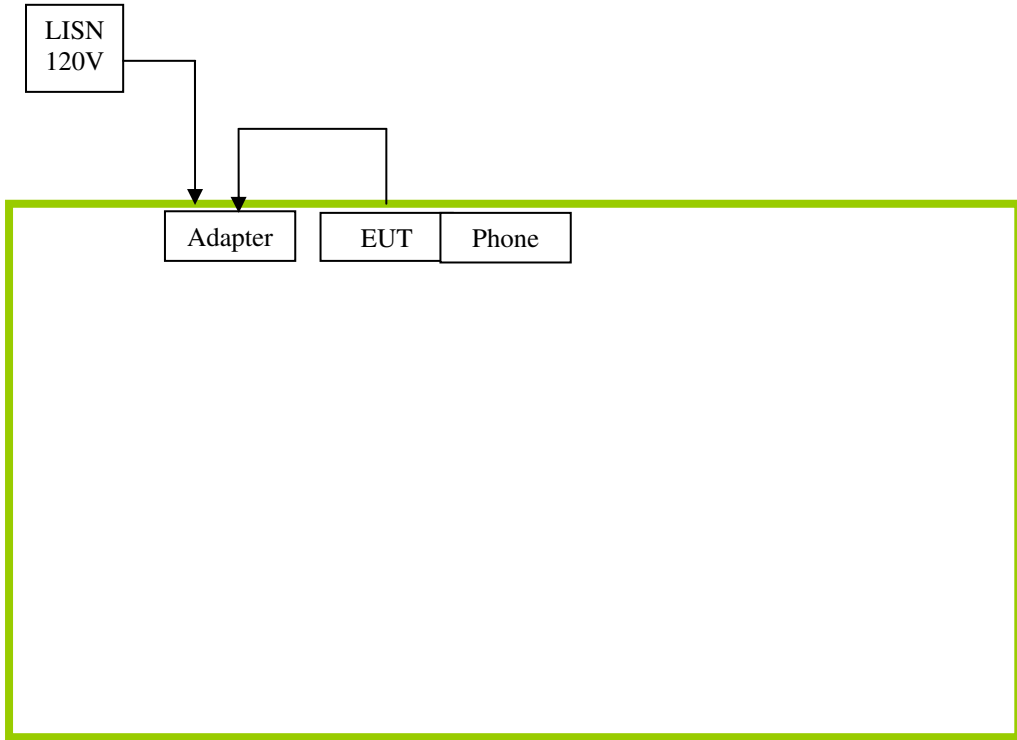
#### Supporting Equipment:

Manufacturer	Equipment Description	Model	Serial No
HTC	Adapter	ST15001	CN013302452
HTC	Phone	One M8	M8t
Com-power	Active loop antenna	AL-130	121031

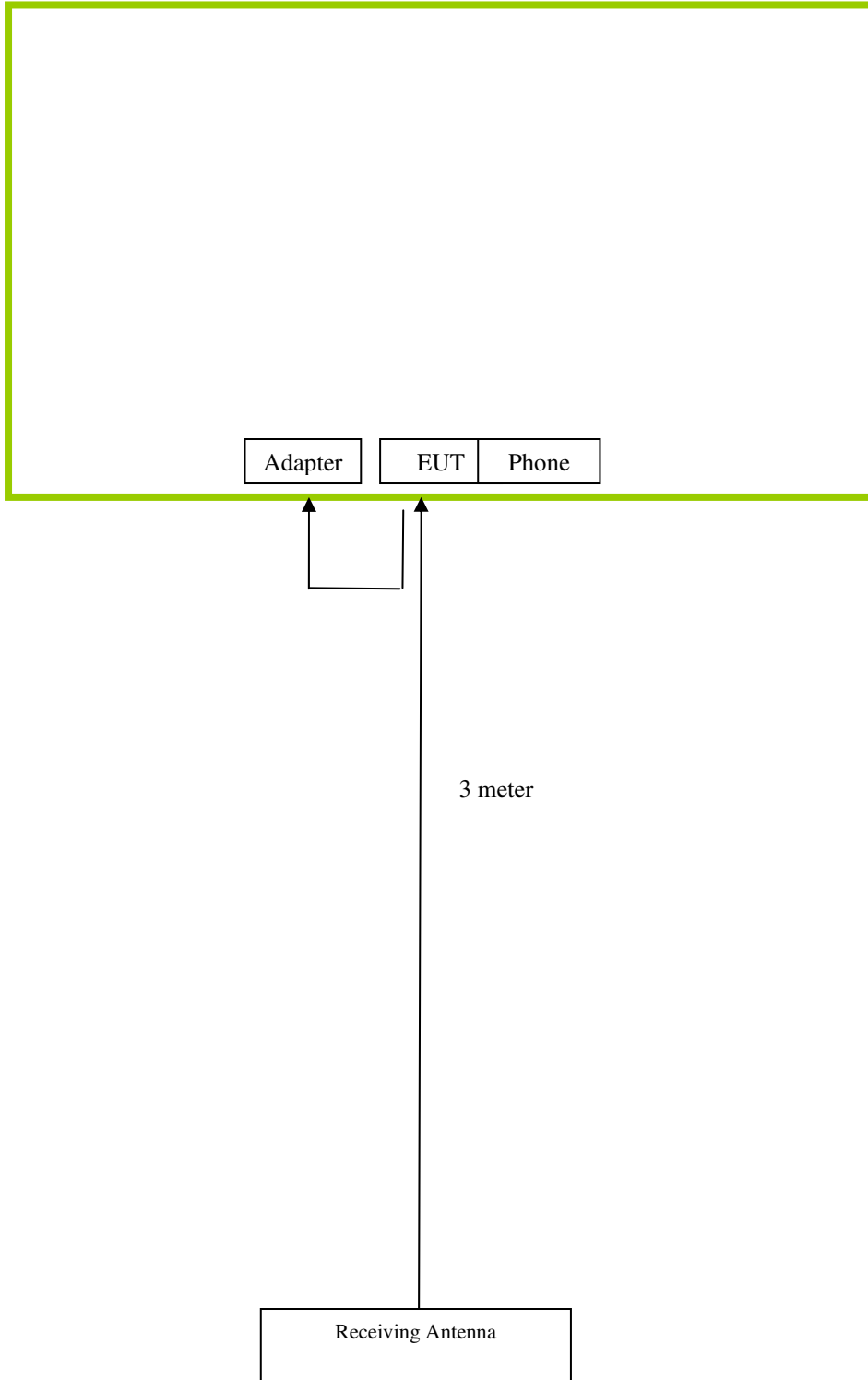
#### Supporting Cable:

Cable type	Shield Type	Ferrite Core	Length	Serial No
USB Cable	Un-shielding	No	0.8m	CN013302452

### Block Configuration Diagram for Conducted Emissions



### Block Configuration Diagram for Radiated Emissions



**Annex C.ii. EUT OPERATING CONDITIONS**

The following is the description of how the EUT is exercised during testing.

<b>Test</b>	<b>Description Of Operation</b>
<b>Emissions Testing</b>	The EUT was continuously transmitting to stimulate the worst case.

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**Annex D. User Manual / Block Diagram / Schematics / Partlist**

Please see attachment

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## Annex E. DECLARATION OF SIMILARITY

### Leader Light Ltd

To: SIEMIC ,775 Montague Expressway, Milpitas, CA 95035,USA

### Declaration Letter

Dear Sir,

For our business issue and marketing requirement, we would like to list 4 model numbers on the FCC certificates and reports, as following:

Model No.: 8042432, 8042435,B18,A-1540-0

We declare that, all the model PCB ,Antenna and Appearance shape , accessories are the same . The difference of these is listed as below:

Main Model No	Serial Model No	Difference
8042432	8042435,B18,A-1540-0	Different model name

Thank you!

Signature:

For and on behalf of  
**LEADER LIGHT LIMITED**  
.....  
Authorized Signature(s)



Printed name/title: Jerry Chow

Address: Rm303,Chinachem Golden Plaza,77Mody Road, Tsimshatsui,Kowloon,Hongkong