

RF TEST REPORT



Report No.: 16070726-FCC-R V2

Supersede Report No.: N/A

Applicant	SAINARA(HK)LTD	
Product Name	WIRELESS MICROPHONE	
Model No.	LI-198	
Serial No.	LI-WM306,LI-WM307,LI-WM308	
Test Standard	FCC Part 74.861e: 2016,ANSI C63.10-2013	
Test Date	June 22 to November 25, 2016	
Issue Date	March 24, 2017	
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"/>	
Loren Luo	David Huang	
Loren Luo 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

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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
16070726-FCC-R	NONE	Original	March 15, 2017
16070726-FCC-R V1	V1	Updated the Equipment Category	March 18, 2017
16070726-FCC-R V2	V2	Added EIRP on page 13	March 24, 2017

2. Customer information

Applicant Name	SAINARA(HK)LTD
Applicant Add	Unit A&B, 7/Floor, Hody Commercial Building, 6-6A Hart Avenue, T.S.T, Kowloon, Hong Kong
Manufacturer	GUANGZHOU DIWEIQI SPEAKER MANUFACTORY
Manufacturer Add	No.32 Zhushui 1st Road, Shenshan, Jianggao Town, Baiyun District, Guangzhou, China

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: WIRELESS MICROPHONE

Main Model: LI-198

Serial Model: LI-WM306,LI-WM307,LI-WM308

Date EUT received: June 21, 2016

Test Date(s): June 22 to November 25, 2016

Equipment Category : TNB

Antenna Gain: 0dBi

Antenna Type: Fixed antenna

Type of Modulation: FM (F3E)

RF Operating Frequency (ies): 210.3 MHz(TX/RX)

EIRP: 14.3dBm

Number of Channels: 1CH

LI-WM306

Port: LI-WM307

LI-WM308

Input Power: DC3.0V,2*AA Batteries

Trade Name : LAX-MAX

FCC ID: 2AIT5LI-198

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
FCC §74.861(e)(1)	Maximum Output Power	Compliance
FCC§74.861(e)(5)(6)	Emission Bandwidth &Mask	Compliance
FCC §74.861(e)(6)	Spurious radiation at the Antenna Port	Compliance
FCC §74.861(e)(6)	Radiated Spurious Emissions	Compliance
FCC §74.861(e)(4)	Frequency stability	Compliance
FCC §74.861(e)(3)	Modulation Characteristics Measurement	Compliance

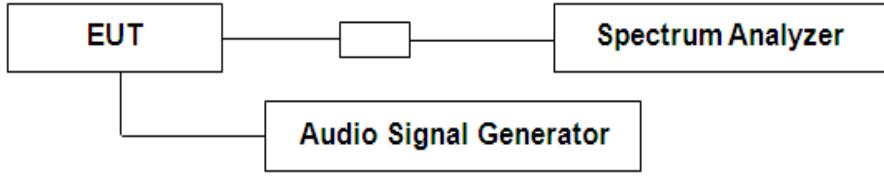
Measurement Uncertainty

Emissions		
Test Item	Description	Uncertainty
Emission Bandwidth &Mask and Radiated Spurious Emissions	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	+5.6dB/-4.5dB
-	-	-

6. Measurements, Examination And Derived Results

6.1 Emission Bandwidth & Mask

Temperature	23°C
Relative Humidity	56%
Atmospheric Pressure	1014mbar
Test date :	November 14, 2016
Tested By :	Loren Luo

Spec	Item	Requirement	Applicable		
FCC§74.861	(e)(5)	The operating bandwidth shall not exceed 200 kHz.	<input checked="" type="checkbox"/>		
	(e)(6)	<p>The mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:</p> <ul style="list-style-type: none"> (i) On any frequency removed from the operating frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: at least 25 dB; (ii) On any frequency removed from the operating frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: at least 35 dB; (iii) On any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth: at least $43 + 10\log_{10}$ (mean output power in watts) dB. 			
Test Setup	 <pre> graph LR EUT[EUT] --- Att[20dB] Att --- SA[Spectrum Analyzer] SA --- ASG[Audio Signal Generator] </pre>				
Test Procedure	<ol style="list-style-type: none"> (1) The EUT was connected to the 50 ohm input of a spectrum analyzer through 20dB of attenuation; the reference offset of the spectrum analyzer was set to the measured value of the attenuation path. (2) The unmodulated carrier signal level was recorded and used to set the reference level on the spectrum analyzer. (3) The spectrum analyzer span was then set to 1.5 MHz and the resolution bandwidth set to 2 kHz (1% of Authorized BW). (4) The emission limits were overlaid on the spectrum analyzer display and the 				

	trace was recorded. (5)The test item was modulated with a 2500 Hz sine wave at an input level 16 dB greater than that necessary to produce 50% of the rated system deviation.
Remark	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

Test Data Yes N/A

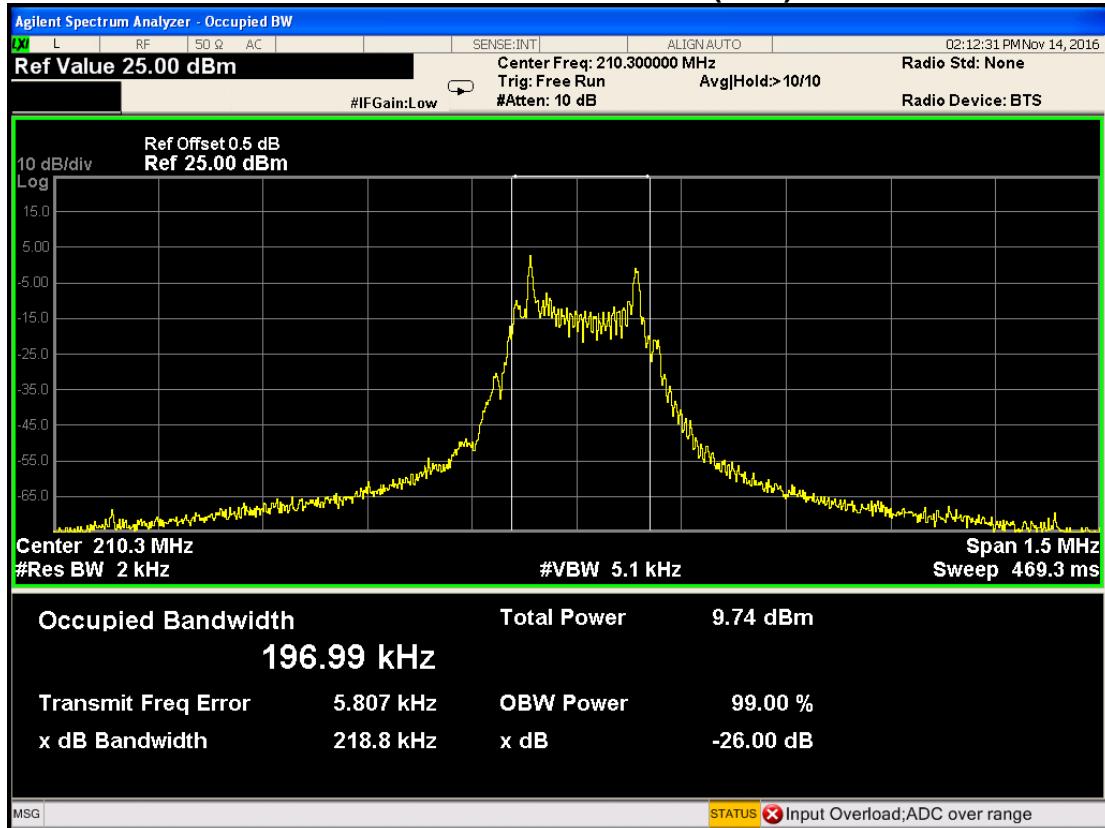
Test Plot Yes (See below) N/A

Measurement result

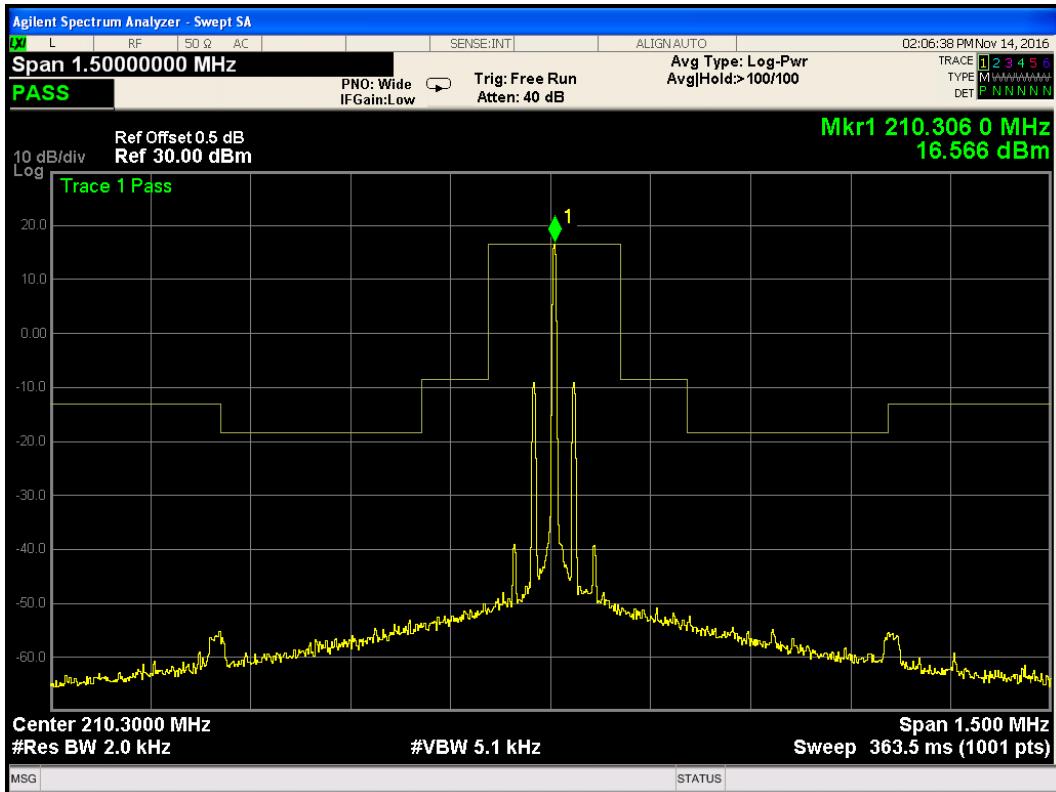
Freq (MHz)	99% Emission Bandwidth (KHz)	Limit (KHz)
210.3	196.99	200

Test Plots

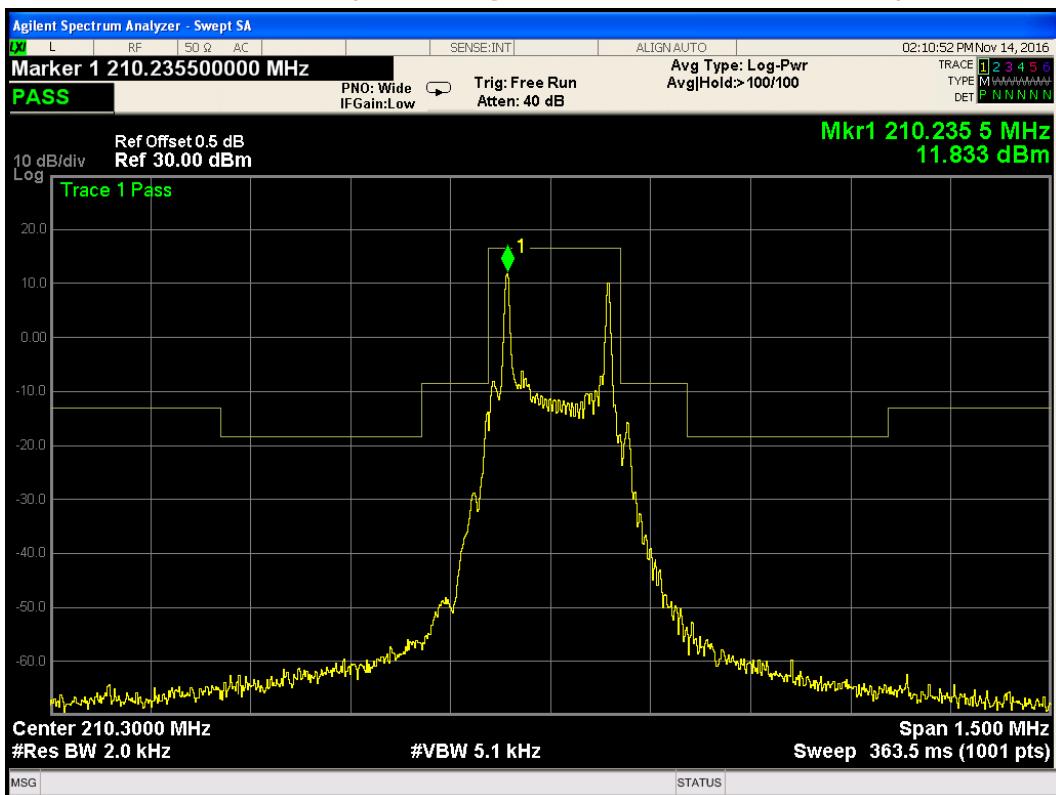
99% Emission Bandwidth (KHz)



210.3MHz (Unmodulated carrier)



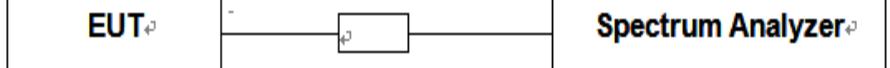
470.125MHz (2500Hz @ 16dB over 50% deviation)



6.2 Maximum Output Power

Temperature	23°C
Relative Humidity	56%
Atmospheric Pressure	1014mbar
Test date :	November 14, 2016
Tested By :	Loren Luo

Requirement(s):

Spec	Item	Requirement	Applicable												
FCC§74.861(e)	(e)(1)	For low power auxiliary stations operating in the 600 MHz duplex gap and the bands allocated for TV broadcasting, the following technical requirements apply: (1) The power may not exceed the following values. (i) 54-72, 76-88, and 174-216 MHz bands: 50 mW EIRP (ii) 470-608 and 614-698: 250 mW conducted power (iii) 600 MHz duplex gap: 20 mW EIR	<input checked="" type="checkbox"/>												
Test Setup															
Test Procedure	Connect the EUT to spectrum analyzer and set the spectrum analyzer as following: <table> <tr> <td>Frequency :</td> <td>Test Frequency</td> </tr> <tr> <td>SPAN :</td> <td>3MHz</td> </tr> <tr> <td>RBW :</td> <td>1MHz</td> </tr> <tr> <td>VBW :</td> <td>3MHz</td> </tr> <tr> <td>Sweep Time :</td> <td>Auto</td> </tr> <tr> <td>Detector Mode :</td> <td>Peak</td> </tr> </table> Max-hold the trace and record the peak value once the trace stabilized.			Frequency :	Test Frequency	SPAN :	3MHz	RBW :	1MHz	VBW :	3MHz	Sweep Time :	Auto	Detector Mode :	Peak
Frequency :	Test Frequency														
SPAN :	3MHz														
RBW :	1MHz														
VBW :	3MHz														
Sweep Time :	Auto														
Detector Mode :	Peak														
Remark															
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail														

Test Data Yes N/A

Test Plot Yes (See below) N/A

Output Power measurement result

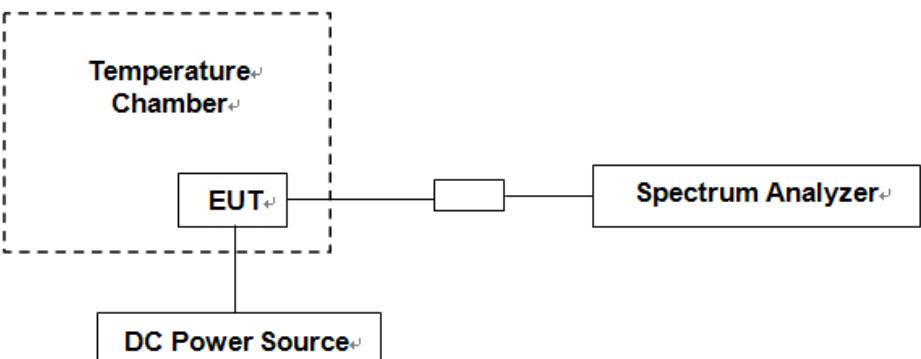
Type	Frequency (MHz)	Conducted Power (dBm)	Antenna Gain(dBm)	EIRP (dBm)	EIRP (mw)	Limit (mw)	Result
Output power	210.3	14.3	0	14.3	26.92	50	Pass

Note: Antenna Gain is 0dBi.

6.3 Frequency Stability

Temperature	23°C
Relative Humidity	56%
Atmospheric Pressure	1014mbar
Test date :	November 14, 2016
Tested By :	Loren Luo

Requirement(s):

Spec	Item	Requirement	Applicable
FCC§74.861(e)(4)	a)	As per FCC §74.861(e) (4):The frequency tolerance of the transmitter shall be 0.005 percent.	<input checked="" type="checkbox"/>
Test Setup			
Test Procedure	<p>According to ANSI/TIA603-D 2010 section 2.2.2, the carrier frequency stability is the ability of the transmitter to maintain an assigned carrier frequency.</p> <p>(1)The antenna port of the EUT was connected to the 50 Ohm input of a spectrum analyzer.</p> <p>(2)The EUT was allowed to soak for ~15 minutes after the temperature chamber reached the set temperature.</p> <p>(3) The EUT was then powered on and allowed to stabilize for ~ 1 minute.</p> <p>(4)The measured frequency of the transmitter was plotted with the screen capture function of the spectrum analyzer.</p> <p>(5)Steps a. through d. were repeated at -20C through +50C in ten degree increments for representative low, mid and high frequencies within the EUTs operational band.</p> <p>-</p>		
Remark			
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

Test Data Yes

N/A

Test Plot Yes (See below) N/A

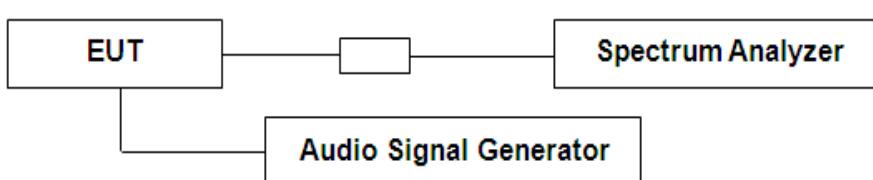
Test Data:

Temperature (°C)	Measured (MHz)	Channel Frequency (MHz)	Frequency Tolerance (ppm)	Limit (ppm)
-20	210.2963	210.3	-17.5939	50
-10	210.3062	210.3	29.4817	50
0	210.3035	210.3	16.6429	50
10	210.2956	210.3	-20.9225	50
20	210.2973	210.3	-12.8388	50
30	210.2921	210.3	-37.5654	50
40	210.3025	210.3	11.8878	50
50	210.3019	210.3	9.0347	50

Voltage & Temperature (°C)	Measured (MHz)	Channel Frequency (MHz)	Frequency Tolerance (ppm)	Limit (ppm)
3.3V at 20°C	210.3067	210.3	31.8592	50
3.0V at 20°C	210.3026	210.3	12.3633	50
2.7V at 20°C	210.2934	210.3	-31.3837	50

6.4 Spurious Emissions at Antenna Port

Temperature	23°C
Relative Humidity	56%
Atmospheric Pressure	1014mbar
Test date :	November 14, 2016
Tested By :	Loren Luo

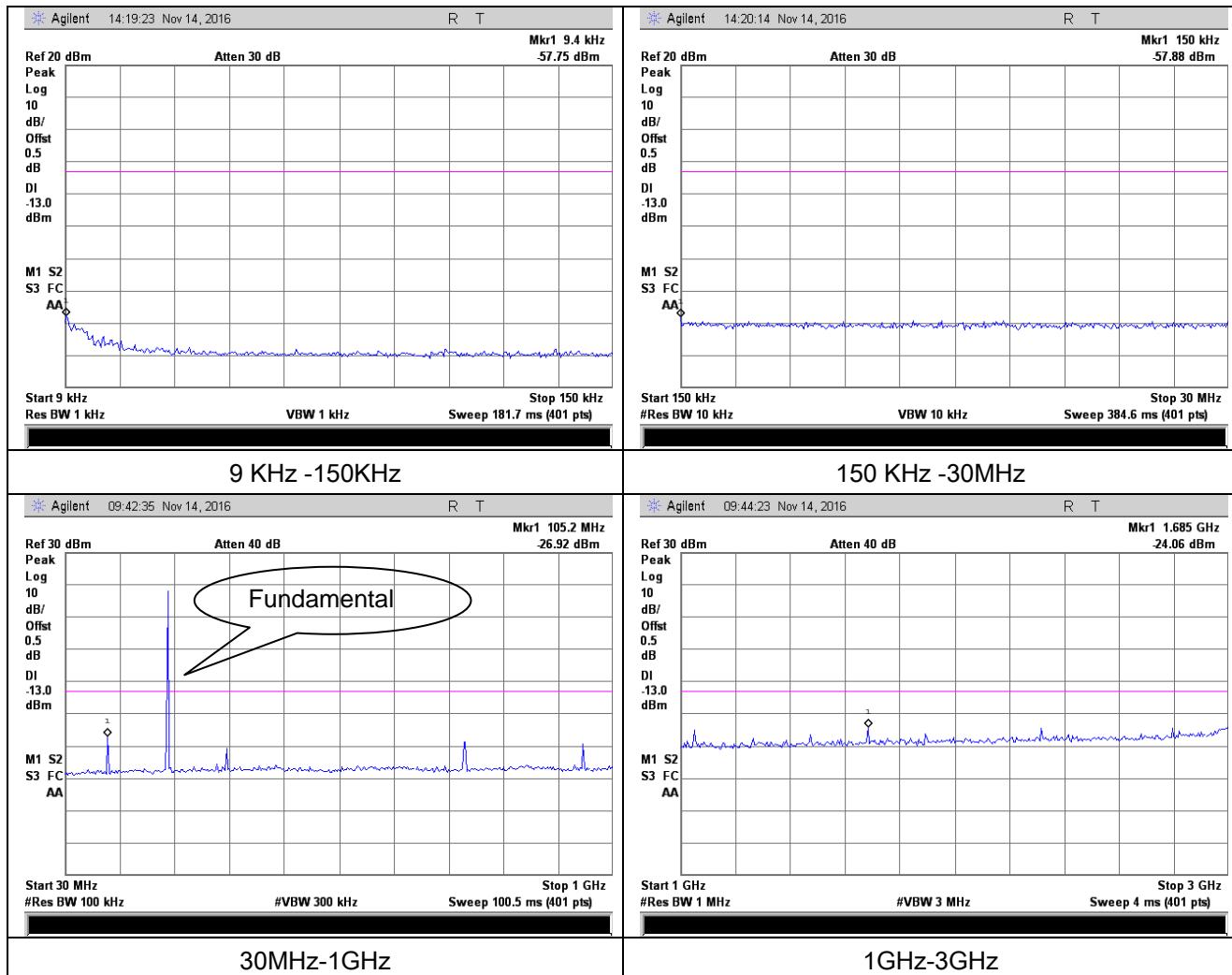
Spec	Item	Requirement	Applicable
FCC§74.861(e)	a)	On any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth: at least $43 + 10\log$ (mean output power in watts) dB	<input checked="" type="checkbox"/>
Test Setup			
Test Procedure	<p>According to ANSI/TIA-603-D 2010 section 2.2.13, conducted spurious emissions are emissions at the antenna terminals on a frequency or frequencies that are outside a band sufficient to ensure transmission of information of required quality for the class of communication desired. The method of measurement is as following:</p> <p>Set the center frequency of the spectrum analyzer to the assigned transmitter frequency, key the transmitter, and set the level of the carrier to the full scale reference line.</p> <p>Modulate the transmitter with a 2500 Hz sine wave at an input level 16 dB greater than that necessary to produce 50% of rated system deviation.</p> <p>The input level shall be established at the frequency of maximum response of the audio modulating circuit.</p> <p>Adjust the spectrum analyzer for the following setting:</p> <p>Resolution bandwidth = 200Hz/10/100 kHz for spurious emissions below 1 GHz, and 1 MHz for spurious emissions above 1 GHz.</p> <p>Video bandwidth ≥ 3 times the resolution bandwidth.</p> <p>Detector mode=peak</p> <p>Record the frequencies and levels of spurious emissions.</p> <p>In measuring unwanted emissions, the spectrum shall be investigated from 30 MHz or the lowest radio frequency signal generated in the equipment, whichever is lower, without going below 9 kHz, up to at least</p>		

	<p>the frequency given in (a) and (b):</p> <p>(a) If the equipment operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.</p> <p>(b) If the equipment operates at or above 10 GHz: to the fifth harmonic of the highest fundamental frequency or to 100 GHz, whichever is lower.</p> <p>Particular attention should be paid to harmonics and sub-harmonics of the carrier frequency, as well as to those frequencies removed from the carrier by multiple of the oscillator frequency. Radiation at the frequencies of multiplier stages should also be checked.</p> <p>The amplitude of spurious emissions attenuated more than 20 dB below the permissible value need not be reported.</p> <p>When limits are expressed in absolute terms, compliance with the emission limits shall be demonstrated using a CISPR quasi-peak detector and the related measurement bandwidth for emissions below 1000 MHz. as an alternative to CISPR quasi-peak measurement, compliance with the emission limits can be demonstrated using measuring equipment employing a peak detector function properly adjusted for factors such as pulse desensitization as required, with an equal or greater measurement bandwidth relative to the applicable CISPR quasi-peak bandwidth.</p> <p>Above 1000 MHz, compliance with the emission limits shall be demonstrated using an average detector with a minimum resolution bandwidth of 1 MHz.</p>
Remark	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

Test Data Yes N/A
 Test Plot Yes (See below) N/A

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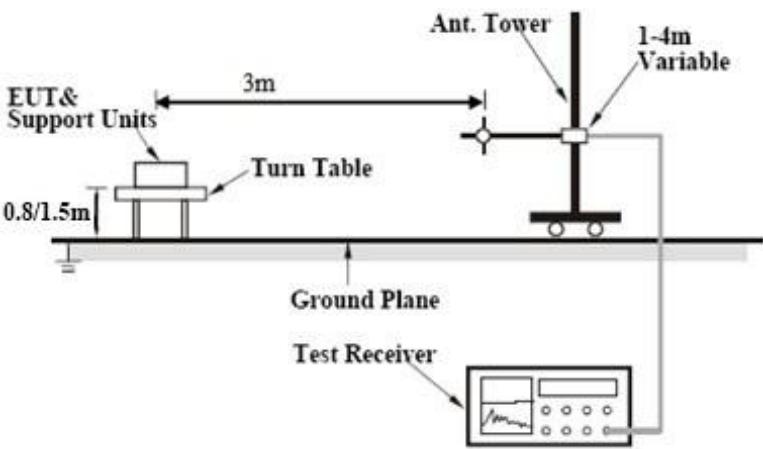
Test Plots



6.5 Radiated Spurious Emissions

Temperature	23°C
Relative Humidity	56%
Atmospheric Pressure	1014mbar
Test date :	November 14, 2016
Tested By :	Loren Luo

Requirement(s):

Spec	Item	Requirement	Applicable
§74.861	(e)(6)	<p>The mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:</p> <p>(i) On any frequency removed from the operating frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: at least 25 dB;</p> <p>(ii) On any frequency removed from the operating frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: at least 35 dB;</p> <p>(iii) On any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth: at least $43 + 10\log_{10}$ (mean output power in watts) dB.</p>	<input checked="" type="checkbox"/>
Test setup			
Test Procedure	<p>The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-</p>		

	<p>orthogonal axis. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution. Sample Calculation: EUT E.I.R.P = Signal Generator Reading(dBm) – Amplifier Gain (dB) + Cable Loss (dB)</p>
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

Test Data Yes N/A

Test Plot Yes (See below) N/A

Test Result:

210.3MHz

Frequency (MHz)	Substituted level (dBm)	Antenna Polarization (H/V)	Antenna Gain correction (dBi)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
150.2	-33.51	V	1.1	0.19	-32.6	-13	-19.6
150.6	-35.67	H	1.1	0.19	-34.76	-13	-21.76
420.7	-26.62	V	6.5	0.3	-20.42	-13	-7.42
420.9	-27.93	H	6.5	0.3	-21.73	-13	-8.73
631.2	-30.63	V	6.8	0.38	-24.21	-13	-11.21
631.2	-32.65	H	6.8	0.38	-26.23	-13	-13.23
1463.1	-47.73	V	7.63	0.64	-40.74	-13	-27.74
1463.4	-49.12	H	7.63	0.64	-42.13	-13	-29.13

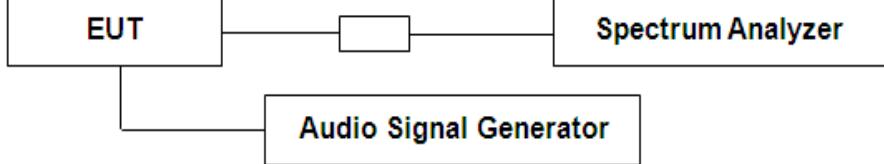
Note:

- 1, The testing has been conformed to $10*210.3\text{MHz}=2,103\text{MHz}$
- 2, All other emissions more than 30 dB below the limit
- 4, X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case.

6.6 Modulation Characteristics Measurement

Temperature	23°C
Relative Humidity	56%
Atmospheric Pressure	1014mbar
Test date :	November 14, 2016
Tested By :	Loren Luo

Requirement(s):

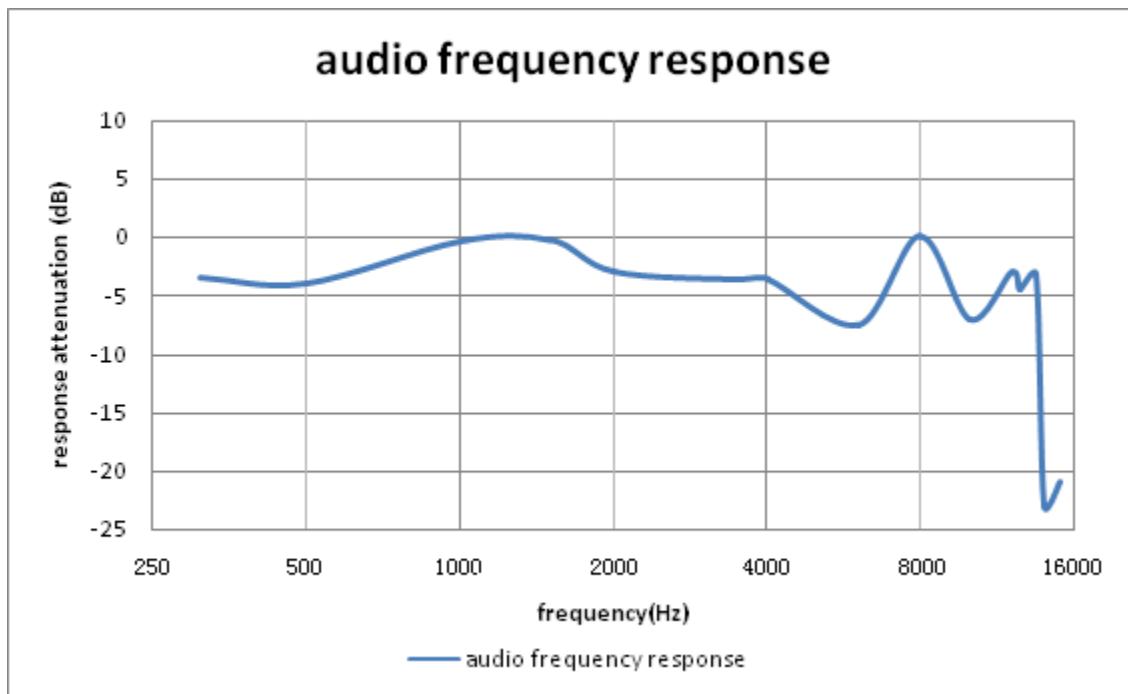
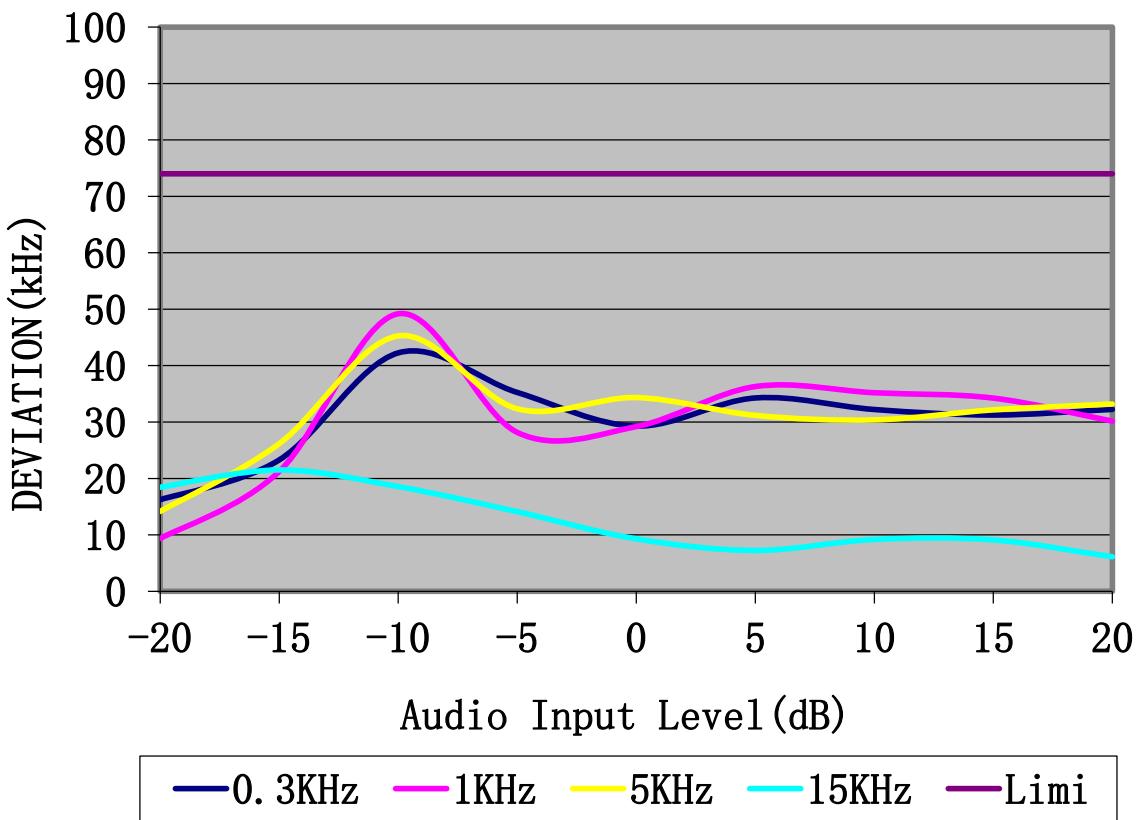
Spec	Item	Requirement	Applicable
FCC §74.861	(e) (3)	According to FCC §74.861(e) (3):Any form of modulation may be used. A maximum deviation of $\pm 75\text{kHz}$ is permitted when frequency modulation is employed.	<input checked="" type="checkbox"/>
Test Setup			
Procedure	<ol style="list-style-type: none"> 1、 Connect the modulation analyzer to EUT and EUT to test receiver. 2、 Apply a 1000Hz modulating signal to the transmitter from the modulation analyzer, and adjust the level to obtain 60% of full rated system deviation. 3、 increase the level from the modulation analyzer by 5dB in one step, record the deviation obtained from the receiver. 4、 Decrease the level from the modulation analyzer by 5dB in one step, record the deviation obtained from the receiver. 5、 With the level from the modulation analyzer held constant at each level, vary frequency from 300Hz to 15000H. Record the deviation. 		
Remark			
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

Test Data Yes N/A

Test Plot Yes (See below) N/A

Test Result:

AF level (dBm)	AF Frequency(Hz) Peak Deviation(kHz)				Limit (kHz)
	300Hz	1000Hz	5000Hz	15000Hz	
20.0	16.23	9.36	14.16	18.45	75
15.0	23.28	21.23	26.16	21.51	75
10.0	42.26	49.19	45.27	18.56	75
5.0	35.24	28.16	32.35	14.11	75
0.0	29.28	29.19	34.34	9.29	75
-5.0	34.27	36.29	31.18	7.24	75
-10.0	32.22	35.19	30.38	9.18	75
-15.0	31.24	34.24	32.16	9.1	75
-20.0	32.24	30.16	33.19	6.12	75



Annex A. TEST INSTRUMENT

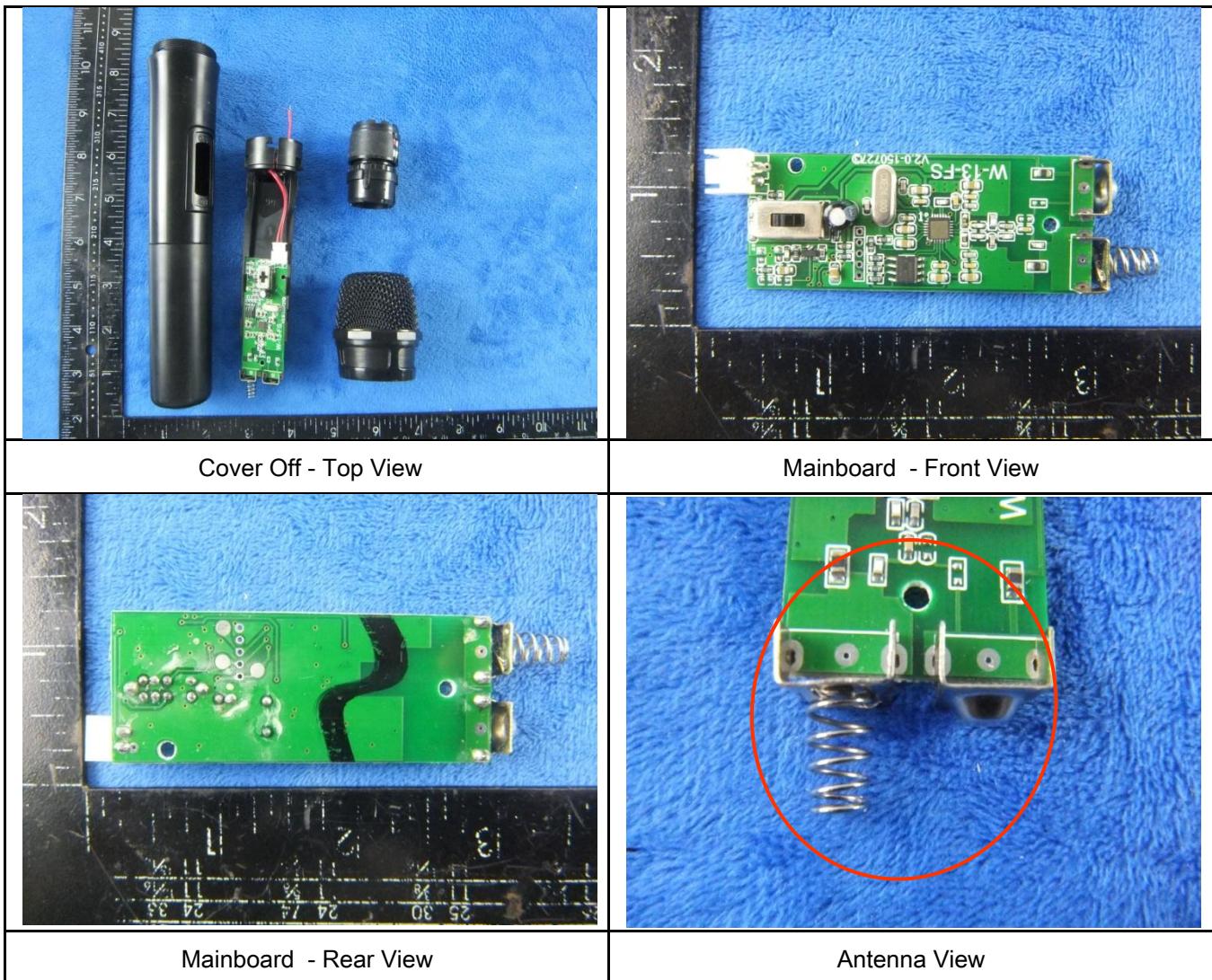
Instrument	Model	Serial #	Cal Date	Cal Due	In use
RF conducted test					
Agilent ESA-E SERIES	E4407B	MY45108319	09/16/2016	09/15/2017	<input checked="" type="checkbox"/>
Power Splitter	1#	1#	08/31/2016	08/30/2017	<input checked="" type="checkbox"/>
DC Power Supply	E3640A	MY40004013	09/16/2016	09/15/2017	<input checked="" type="checkbox"/>
Radiated Emissions					
EMI test receiver	ESL6	100262	09/16/2016	09/15/2017	<input checked="" type="checkbox"/>
Positioning Controller	UC3000	MF780208282	11/18/2016	11/17/2017	<input checked="" type="checkbox"/>
OPT 010 AMPLIFIER (0.1-1300MHz)	8447E	2727A02430	08/31/2016	08/30/2017	<input checked="" type="checkbox"/>
Microwave Preamplifier (1 ~ 26.5GHz)	8449B	3008A02402	03/24/2016	03/23/2017	<input checked="" type="checkbox"/>
Bilog Antenna (30MHz~6GHz)	JB6	A110712	09/20/2016	09/19/2017	<input checked="" type="checkbox"/>
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	09/23/2016	09/22/2017	<input checked="" type="checkbox"/>
Universal Radio Communication Tester	CMU200	121393	09/24/2016	09/23/2017	<input checked="" type="checkbox"/>

Annex B. EUT and Test Setup Photographs

Annex B.i. Photograph: EUT External Photo



Annex B.ii. Photograph: EUT Internal Photo



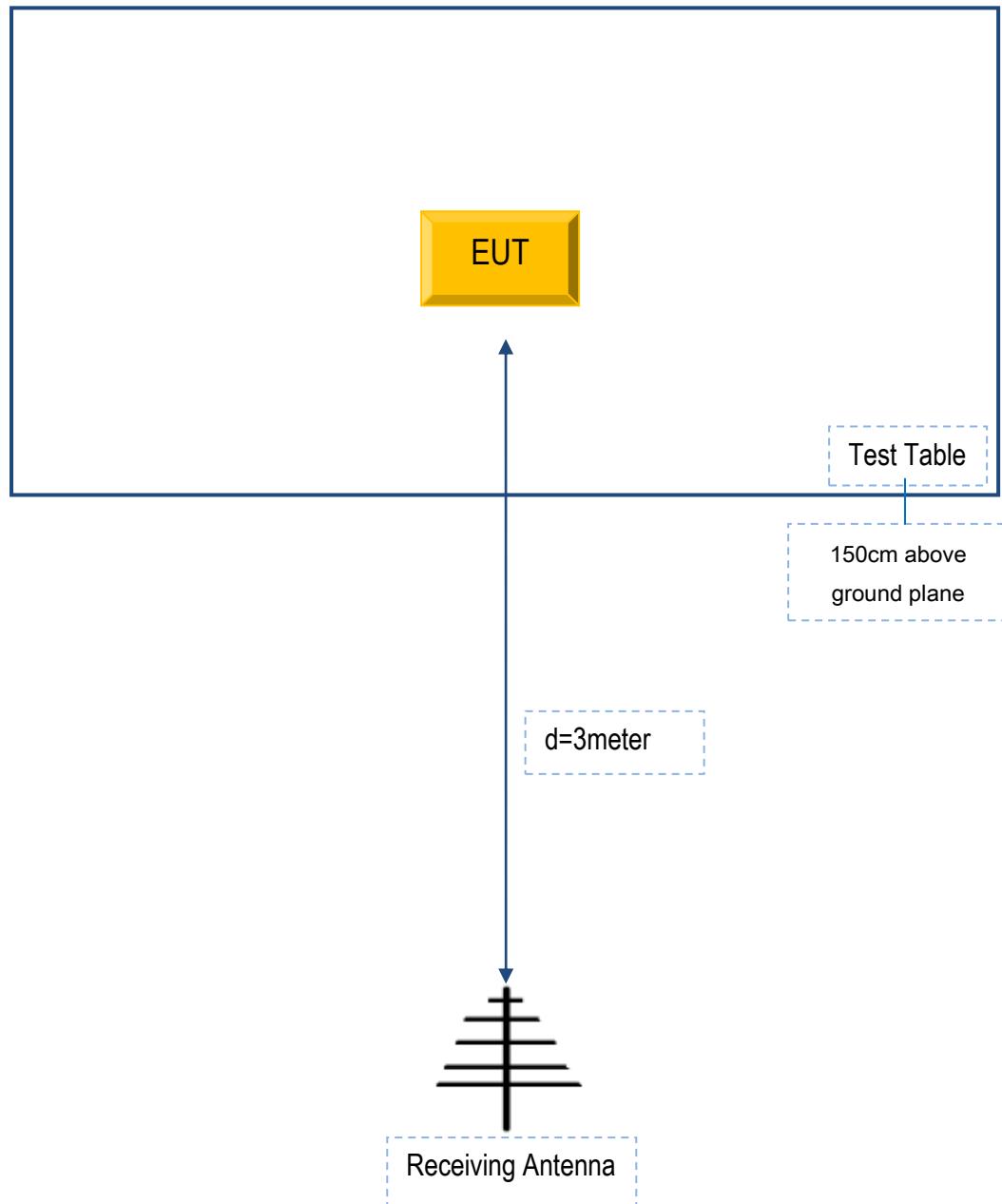
Annex B.iii. Photograph: Test Setup Photo

Radiated Spurious Emissions Test Setup Below 1GHz	Radiated Spurious Emissions Test Setup Above 1GHz

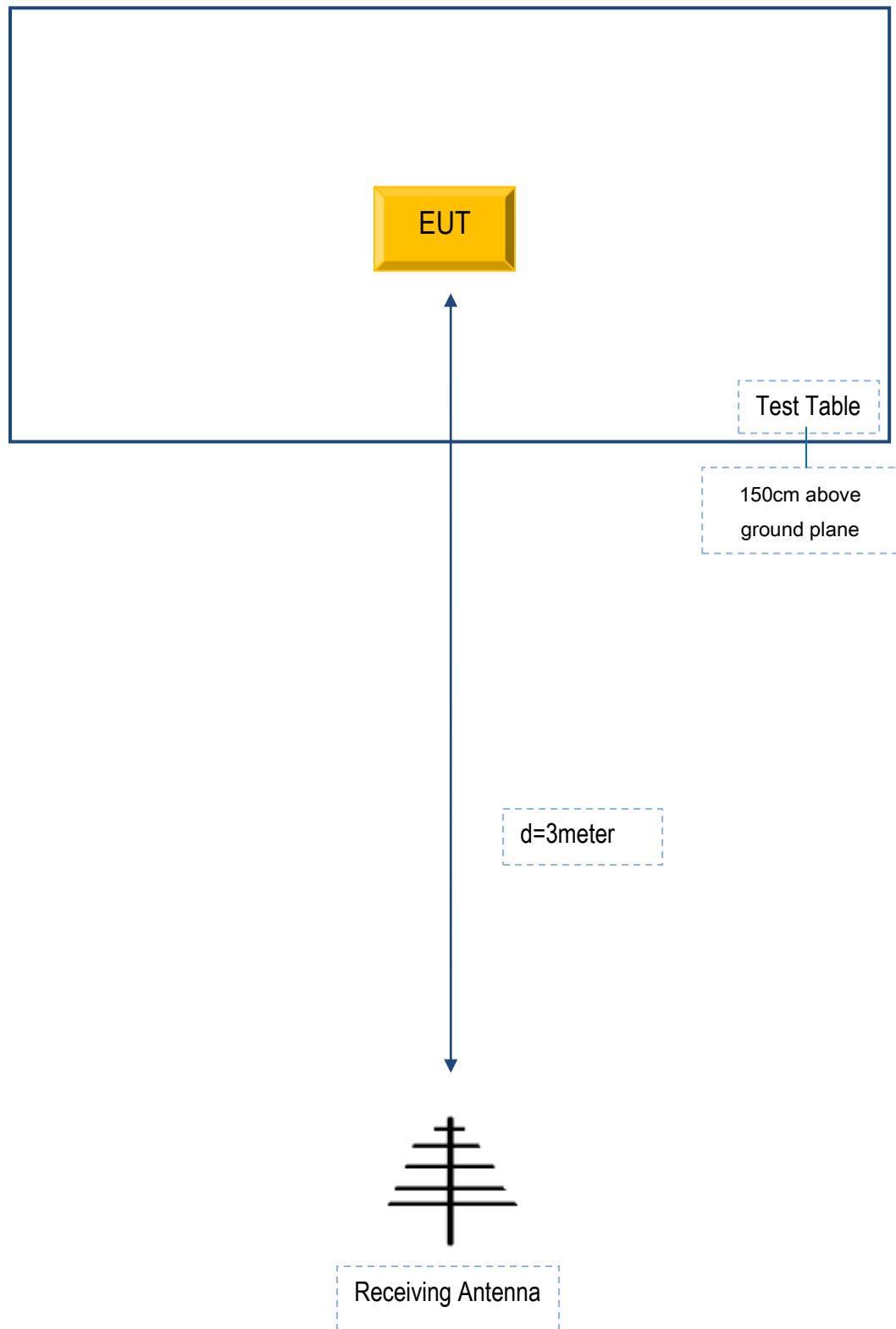
Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

Annex C.ii.TEST SET UP BLOCK

Block Configuration Diagram for Radiated Spurious Emissions (Below 1GHz) .



Block Configuration Diagram for Radiated Spurious Emissions (Above 1GHz) .



Annex C. ii. 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
N/A	N/A	N/A	N/A

Supporting Cable:

Cable type	Shield Type	Ferrite Core	Length	Serial No
N/A	N/A	N/A	N/A	N/A

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

Please see the attachment

Annex E. DECLARATION OF SIMILARITY

Declaration Letter

We SAINARA (HK) LTD hereby declare that our product WIRELESS MICROPHONE will list several model numbers in the reports, the main model number is LI-198, and serial model are LI-WM306, LI-WM307, LI-WM308, they are actually the same product with different model number, no other difference.

Thanks & best regards

Signature:

Job title: DIRECTOR