EMC TEST REPORT

On Behalf of

WIRELESS SPEAKER SUNGLASSES

Model No.: P326.981

Prepared for	:	
Address	:	

Prepared By	:	Shenzhen Alpha Product Testing Co., Ltd.
Address	:	Building i, No.2, Lixin Road, Fuyong Street, Bao'an District, 518103, Shenzhen, Guangdong, China

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Version Number	:	REV0

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TEST REPORT DECLARATION

Applicant	:	
Address	:	
Manufacturer	:	
Address	:	
EUT Description	:	WIRELESS SPEAKER SUNGLASSES
	(A) Model No.	: P326.981
	(B) Trademark	: N/A

Measurement Standard Used:

ETSI EN 301 489-1 V2.1.1

ETSI EN 301 489-17 V3.1.1

The device described above is tested by Shenzhen Alpha Product Testing Co., Ltd. to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The test results are contained in this test report and Shenzhen Alpha Product Testing Co., Ltd. is assumed full responsibility for the accuracy and completeness of test. Also, this report shows that the EUT is technically compliant with the EN 301 489-1 and EN 301 489-17 requirements.

This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Shenzhen Alpha Product Testing Co., Ltd.

Tested by (name + signature).....: Reak Yang
Project Engineer

Approved by (name + signature).....: Simple Guan
Project Manager

Date of issue..... .....: December 11, 2017

Revision History

Revision	Issue Date	Revisions	Revised By
00	December 11, 2017	Initial released Issue	Simple Guan

1. General Information

1.1. Description of Device (EUT)

EUT Name	:	WIRELESS SPEAKER SUNGLASSES
Trade Name	:	N/A
Model No.	:	P326.981
DIFF.	:	N/A
Power supply	:	DC 3.7V from battery or DC 5V from USB for charge.
Operation frequency	:	2402MHz-2480MHz
Modulation	:	GFSK, π/4 DQPSK, 8-DPSK
Antenna Type	:	PCB Antenna, Maximum Gain is 1.5dBi
Software version	:	0.1.0
Hardware version	:	HC-X13 V2

1.2. Accessories of Device (EUT)

N/A

1.3. Ancillary Equipment Details

No.	Description	Manufacturer	Model	Serial Number	Certification or DOC
1	Notebook	ACER	ZQT	N/A	DOC

1.4. Test Lab Information

Shenzhen Alpha Product Testing Co., Ltd
Building i, No.2, Lixin Road, Fuyong Street, Bao'an District, 518103,
Shenzhen, Guangdong, China

2. Summary of Standards and Results

2.1. Test Results Description:

No.	TEST PARAMETER	APPLICATION	RESULTS
EN 55032 EMC emission			
1	Radiated emission	Enclosure of ancillary equipment	**PASS**
2	Conducted emission	DC power input/output port	**N/A**
3	Conducted emission	AC mains input/output port	**PASS**
4	Harmonic Current Emissions	AC mains input port	**N/A**
5	Voltage Fluctuation & Flicker	AC mains input port	**N/A**
6	Conducted emission	Telecommunication port	**N/A**
EN 55024 Immunity			
7	RF electromagnetic field	Enclosure	**PASS**
8	Electrostatic Discharge	Enclosure	**PASS**
9	Fast transients common mode	Signal,telecommunication and control ports,DC and AC power ports	**N/A**
10	RF Common mode	Signal,telecommunication and control ports,DC and AC power ports	**N/A**
11	Transients and Surges	DC power input ports for vehicular use	**N/A**
12	Voltage dips and interruptions	AC mains power input ports	**N/A**
13	Surges,line to line and line to ground	AC mains power input ports, wired network ports	**N/A**
Note: N/A means this test item is not applicable for this device. Cause EUT belongs to portable Equipment, so test items reference to 301489-1 V2.1.1 Clause 7.1 and 7.2			

2.2. Test Standard Description:

ETSI EN 301 489-1 V2.1.1: ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU

ETSI EN 301 489-17 V3.1.1: ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU.

EN 55032:2012 + AC:2013: Electromagnetic compatibility of multimedia equipment — Emission requirements.

EN55024:2010: Information technology equipment- Immunity characteristics- Limits and methods of measurement.

2.3. Performance Criteria Description

According to EN 301489 -17 standard, the general performance criteria as following:

performance criteria A for immunity tests with phenomena of a continuous nature;

performance criteria B for immunity tests with phenomena of a transient nature;

performance criteria C for immunity tests with power interruptions exceeding a certain time.

The equipment shall meet the minimum performance criteria as specified in the following clauses.

Criteria	During test	After test
A	Shall operate as intended. (see note 1). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance (see note 3). Shall be no loss of function. Shall be no loss of stored data or user programmable functions.
B	May show loss of function (one or more). May show degradation of performance (see note 2). Shall be no unintentional transmissions.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no degradation of performance (see note 3). Shall be no loss of stored data or user programmable functions.
C	May be loss of function (one or more).	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no degradation of performance (see note 3).

NOTE 1: Operate as intended during the test allows a level of degradation not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

NOTE 2: Degradation of performance during the test is understood as a degradation to a level not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance.
If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

NOTE 3: No degradation of performance after the test is understood as no degradation below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. After the test no change of actual operating data or user retrievable data is allowed.
If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

PERFORMANCE FOR TT

The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5 000 ms duration, for which performance criteria C shall apply. Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an acknowledgement (ACK) or not-acknowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

PERFORMANCE FOR TR

The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5 000 ms duration for which performance criteria C shall apply. Where the EUT is a transceiver, under no circumstances, shall the transmitter operate unintentionally during the test. In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

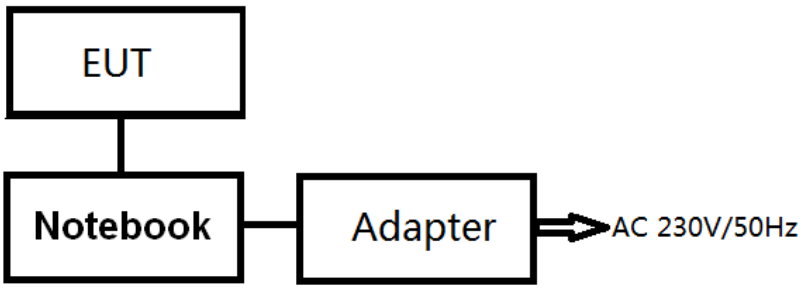
PERFORMANCE FOR CT

The performance criteria A shall apply. Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an Acknowledgement (ACK) or Not Acknowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

PERFORMANCE FOR CR

The performance criteria A shall apply. Where the EUT is a transceiver, under no circumstances, shall the transmitter operate unintentionally during the test. In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

2.4. Block Diagram of Configuration



2.5. Test mode

Number	Test mode	Radiated emission	Conducted emission	Harmonic Current Emissions	Voltage Fluctuation & Flicker
Mode 1	Charging	※	※	/	/
Mode 2	Bluetooth	/	/	/	/
	Note: 1: ※ is worst case mode.				

2.6. Test Conditions

All test were performed under the following environmental conditions

Items	Required
Temperature range	21-25℃
Humidity range	30-60%
Pressure range	86-106kPa

2.7. Measurement Uncertainty (95% confidence levels, k=2)

Item	MU	Remark
Uncertainty for Conducted Emission Test	2.74dB	
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	3.77dB	Polarize: V
	3.80dB	Polarize: H
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz)	4.16dB	Polarize: H
	4.13dB	Polarize: V
Uncertainty for radio frequency	5.4×10^{-8}	
Uncertainty for conducted RF Power	0.37dB	

2.8. Test Equipment

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due day
Test Receiver	R&S	ESCI	101165	2017.09.22	2018.09.21
Bilog Antenna	Schwarzbeck	VULB 9168	9168-438	2016.09.30	2018.09.29
Spectrum Analyzer	Agilent	E4407B	MY49510055	2017.09.23	2018.09.22
Horn Antenna	Schwarzbeck	BBHA 9120 D	BBHA 9120 D(1201)	2016.09.30	2018.09.29
L.I.S.N.#1	Schwarzbeck	NSLK8126	8126-466	2017.09.22	2018.09.21
L.I.S.N.#2	R&S	ENV216	101043	2017.09.22	2018.09.21
Pulse Limiter	Schwarzbeck	9516F	9618	2017.09.22	2018.09.21
Harmonics Flicker Analyser	Voltech	PM6000	200006700495	2017.09.28	2018.09.27
ESD Tester	HAEFELY	PESD1610	H310546	2017.09.27	2018.09.26
CONDUCTED IMMUNITY TEST SYSTEM (RF-Generator)	Frankonia	CIT-10/75	12681247/2013	2017.09.22	2018.09.21
Fixed Coaxial Attenuator (6dB Attenuation)	CD	ATT-0675	120540086	2017.09.22	2018.09.21
Coupling-Decoupling Network (CDN)	CD	CDN M2/M3	2302	2017.09.22	2018.09.21
Electromagnetic Injection Clamp (EMC-Clamp)	CD	EM-Clamp	0513A031201	2017.09.22	2018.09.21
Main Interference Simulator	3ctest	VDG-1105G	EC0171002	2017.09.22	2018.09.21
Burst Tester	3ctest	EFT-4001G	EC0461015	2017.09.28	2018.09.27
Capacitive Coupling	3ctest	EFTC	EC0441049	2017.09.22	2018.09.21

Surge CDN	3ctest	SGN-5010G	EC5591004	2017.09.22	2018.09.21
Surge Generator	3ctest	SG-5006G	EC5581006	2017.09.22	2018.09.21
Base station	Agilent	E4438C	US44271917	2017.09.28	2018.09.27
Universal Radio Communication Tester	R&S	CMU200	116785	2017.09.22	2018.09.21
Signal Generator	Agilent	N5182A	MY49060042	2017.09.22	2018.09.21
vector Signal Generator	Agilent	E4438C	US44271917	2017.09.28	2018.09.27
Power meter	Agilent	E4419B	GB40202122	2017.09.22	2018.09.21
Power Sensor	Agilent	E9300A	MY41496625	2017.09.22	2018.09.21
RF power Amplifier	OPHIR	5225R	1045	N/A	NCR
RF power Amplifier	OPHIR	5273R	1018	N/A	NCR
Antenna	SCHWARZBECK	STLP9128E-special	STLP9128Es#139	N/A	NCR
Antenna	SCHWARZBECK	STLP9128E-special	STLP 9149 #456	N/A	NCR
CMW500	R&S	CMW500	1201.0002K50-117239-sM	2017.09.22	2018.09.21

3. Conducted Emission

3.1. Limit for AC Mains Port

Frequency	Quasi-Peak Level dB (μV)	Average Level dB (μV)
150kHz ~ 500kHz	66 ~ 56*	56 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

Notes: 1. * Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.

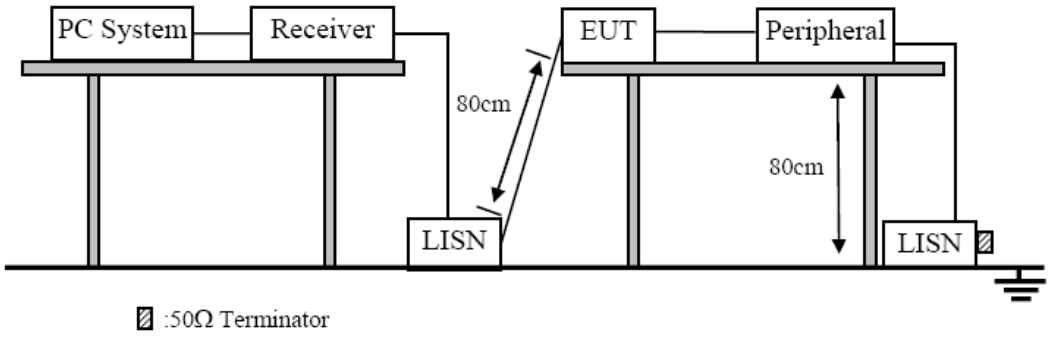
3.2. Test Procedure

The EUT was placed on a non-metallic table, 80cm above the ground plane. The EUT was power charged from notebook which powered from power mains through a line impedance stabilization network (L.I.S.N. 1#). This provided a 50-ohm coupling impedance for the EUT (Please refer to the block diagram of the test setup and photographs). The other peripheral devices power cord connected to the power mains through a line impedance stabilization network (L.I.S.N.3#). Both sides of power line were checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to the EN55032 regulations during conducted emission test.

The bandwidth of the test receiver (R&S Test Receiver ESCI) is set at 9kHz.

The frequency range from 150kHz to 30MHz is checked. The test result are reported on Section 3.6

3.3. Test Setup



3.4. Operation Condition of EUT

1, Setup the EUT and the simulators as shown on Section 2.4
2, Turned on the power of all equipments.
3, EUT transmit though EUT and mobile phone

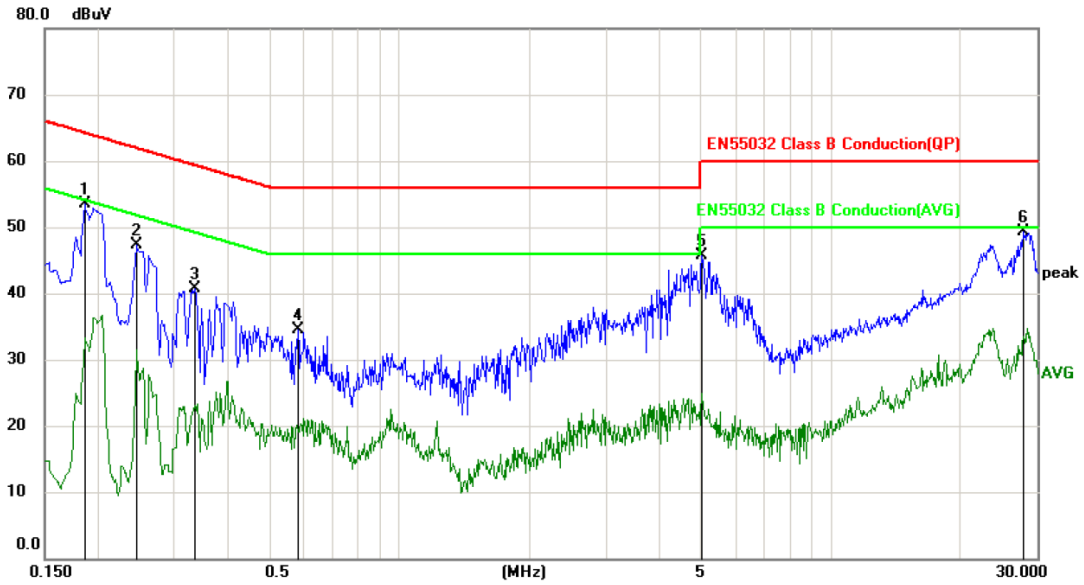
3.5. Test Result

PASS. (All emissions not reported below are too low against the prescribed limits.)
The EUT with the following test mode was tested and read QP values and average values, the test results are listed in next pages.

Site LAB	Phase: *L1*	Temperature: 24.9
Limit: EN55032 Class B Conduction(QP)	Power: AC 230V/50Hz	Humidity: 47 %
EUT: WIRELESS SPEAKER SUNGLASSES		
M/N: P326.981		
Mode: Charging		
Note:		
Engineer Signature:		

Conducted Emission Measurement

File : Data :#1 Date: 2017-12-7 Time: 21:55:59



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1860	43.71	9.74	53.45	64.21	-10.76	peak	
2		0.2445	37.63	9.76	47.39	61.94	-14.55	peak	
3		0.3345	31.03	9.77	40.80	59.34	-18.54	peak	
4		0.5820	24.63	9.79	34.42	56.00	-21.58	peak	
5		5.0235	35.48	10.19	45.67	60.00	-14.33	peak	
6		27.9645	38.23	10.99	49.22	60.00	-10.78	peak	

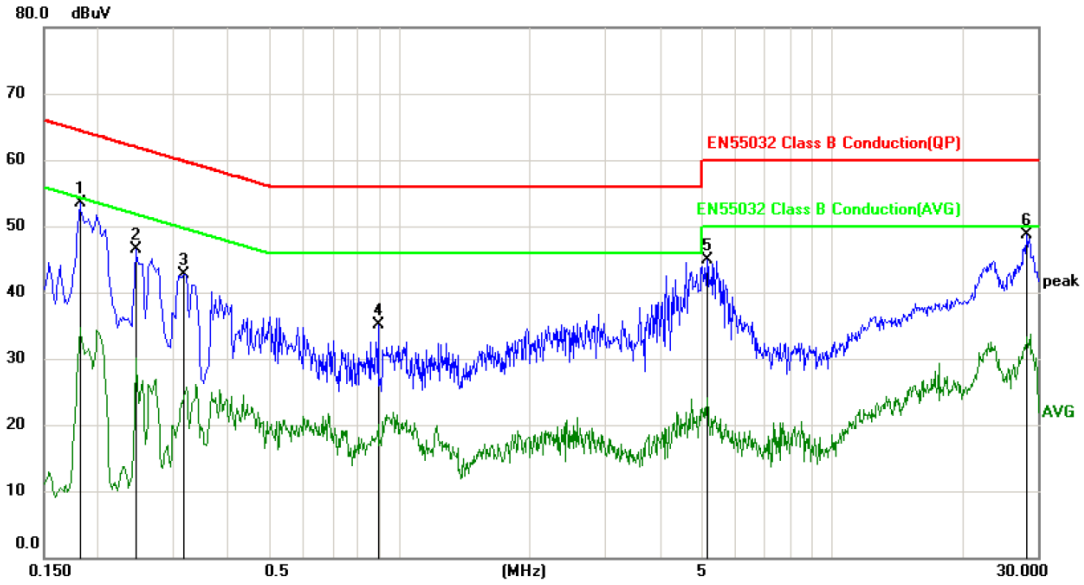
*:Maximum data x:Over limit !:over margin

Note: Measurement=Reading Level+Correc Factor. Factor=(LISN or ISN or PLC or Current Probe)Factor+Cable

Site	LAB	Phase:	*N*	Temperature:	24.9
Limit:	EN55032 Class B Conduction(QP)	Power:	AC 230V/50Hz	Humidity:	47 %
EUT:	WIRELESS SPEAKER SUNGLASSES				
M/N:	P326.981				
Mode:	Charging				
Note:					
Engineer Signature:					

Conducted Emission Measurement

File : Data :#2 Date: 2017-12-7 Time: 21:57:38



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1815	43.68	9.74	53.42	64.42	-11.00	peak	
2		0.2445	36.80	9.76	46.56	61.94	-15.38	peak	
3		0.3165	32.96	9.77	42.73	59.80	-17.07	peak	
4		0.8925	25.22	9.82	35.04	56.00	-20.96	peak	
5		5.1450	34.77	10.20	44.97	60.00	-15.03	peak	
6		28.4280	37.63	11.03	48.66	60.00	-11.34	peak	

*:Maximum data x:Over limit !:over margin

Note: Measurement=Reading Level+Correc Factor. Factor=(LISN or ISN or PLC or Current Probe)Factor+Cable

4. Radiated Emission

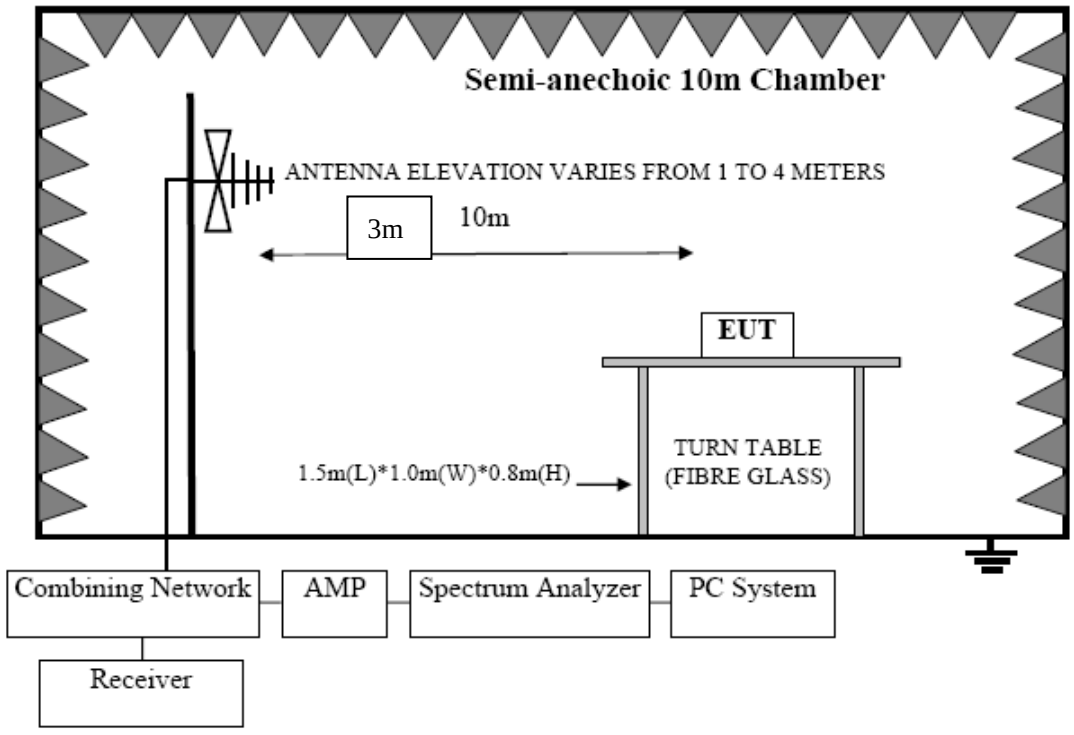
4.1. Limit

FREQUENCY (MHz)	DISTANCE (Meters)	FIELD STRENGTHS LIMITS (dBμV/m)
30 ~ 230	3	40
230 ~ 1000	3	47
1000-3000	3	Average limit:50 Peak limit:70
3000-6000	3	Average limit:54 Peak limit:74

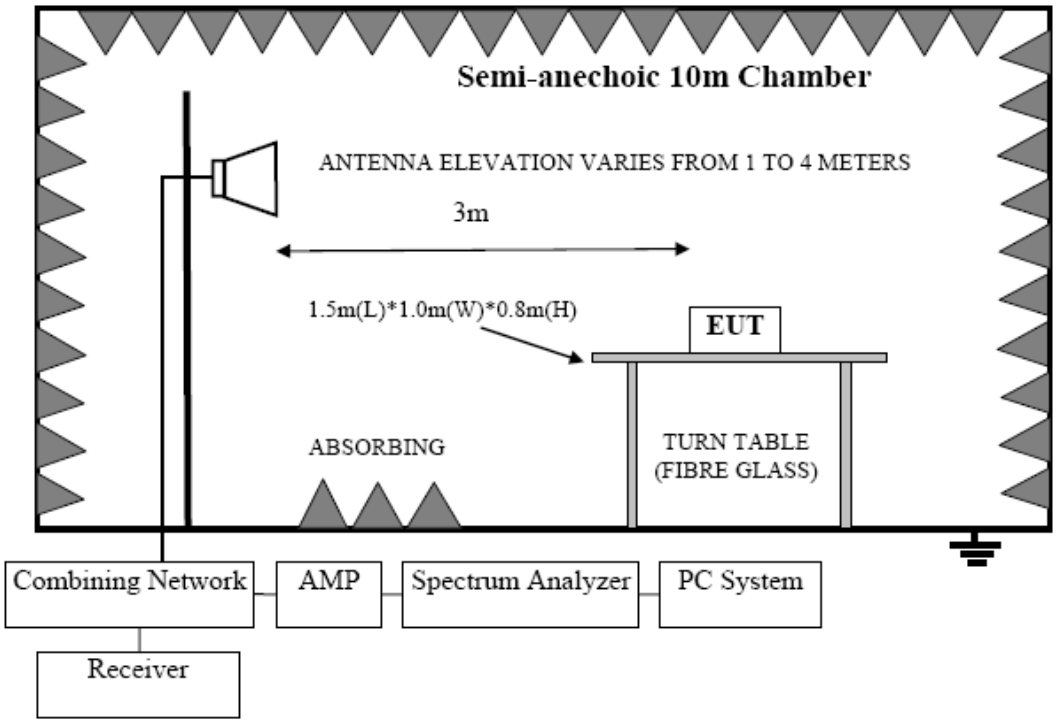
Note: The lower limit shall apply at the transition frequencies.

4.2. Test Setup

5.2.1. In Anechoic Chamber Test Setup Diagram for 30MHz~1000MHz



5.2.2. In Anechoic (10m) Chamber Test Setup Diagram for 1-6GHz



4.3. Test Procedure

The EUT was placed on a non-metallic table, 80cm above the ground plane inside a semi-anechoic chamber. An antenna was located 10m from the EUT for below 1GHz test and 3m for above 1GHz test on an adjustable mast. A pre-scan was first performed in order to find prominent radiated emissions. For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to EN 55032 Class B on Radiated Disturbance test.

The bandwidth setting on the test receiver (R&S TEST RECEIVER ESR) is 120 kHz for below 1GHz test. For emission above 1GHz, The Spectrum's RWB is set 1MHz and VBW 1MHz to measure Peak Level.

4.4. Operation Condition of EUT

Please refer to Clause 2.3 for details.

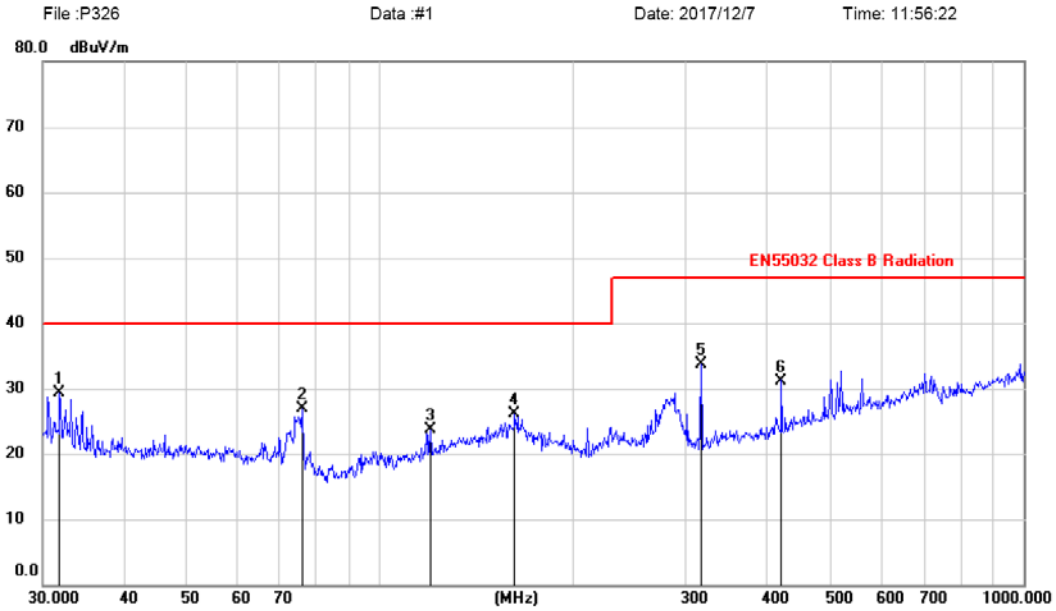
4.5. Test Result

PASS

See below original test data

Site LAB	Polarization: *Vertical*	Temperature:	23.9
Limit: EN55032 Class B Radiation	Power: AC 230V/50Hz	Humidity:	46 %
EUT: WIRELESS SPEAKER SUNGLASSES	Distance: 3m		
M/N: P326.981			
Mode: Charging			
Note:			
Engineer Signature:			

Radiated Emission Measurement



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	31.8427	16.00	13.38	29.38	40.00	-10.62	peak			
2		75.7114	16.69	10.15	26.84	40.00	-13.16	peak			
3		119.8556	11.15	12.58	23.73	40.00	-16.27	peak			
4		162.6106	11.82	14.37	26.19	40.00	-13.81	peak			
5		316.5890	19.82	13.79	33.61	47.00	-13.39	peak			
6		420.5803	15.15	16.05	31.20	47.00	-15.80	peak			

Note:1. *:Maximum data; x:Over limit; !:over margin.
2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

Site LAB	Polarization: ***Horizontal***	Temperature: 23.9
Limit: EN55032 Class B Radiation	Power: AC 230V/50Hz	Humidity: 46 %
EUT: WIRELESS SPEAKER SUNGLASSES	Distance: 3m	
M/N: P326.981		
Mode: Charging		
Note:		
Engineer Signature:		

Radiated Emission Measurement

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		31.8427	16.00	13.38	29.38	40.00	-10.62	peak			
2		75.7114	16.69	10.15	26.84	40.00	-13.16	peak			
3		119.8556	11.15	12.58	23.73	40.00	-16.27	peak			
4		162.0414	15.24	14.41	29.65	40.00	-10.35	peak			
5	*	265.6757	24.23	12.59	36.82	47.00	-10.18	peak			
6		520.8882	14.74	17.92	32.66	47.00	-14.34	peak			

Note:1. *:Maximum data; x:Over limit; !:over margin.
2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

Remark: The test data above 1GHz is too lower than the limit, so not show in this report.

5. Harmonic Current Emissions

5.1. Test Procedure

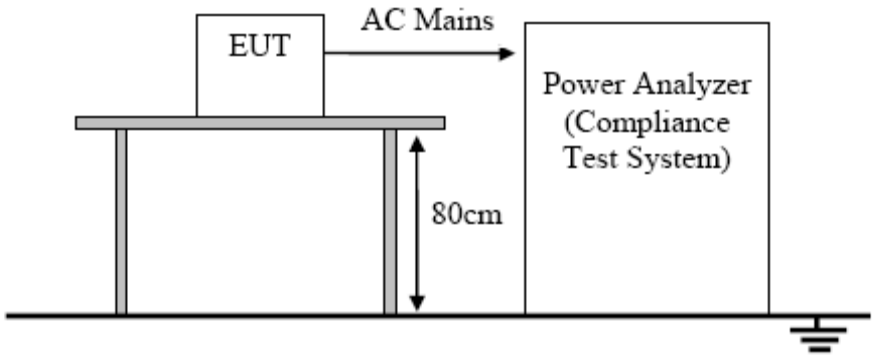
The EUT was placed on a non-metallic table, 80cm above the ground plane. The EUT was powered from notebook which's power was connected to the power mains through a power Analyzer, let EUT worked in test mode then measure Harmonic current emissions by power analyzer and recorded data.

5.2. Limit

Limits for Class A equipment	
Harmonic order **n**	**Maximum permissible Harmonic current** **A**
Odd harmonics	
3 5 7 9 11 13 15≤n≤39	2,30 1,14 0,77 0,40 0,33 0,21 $0,15 \frac{15}{n}$
Even harmonics	
2 4 6 8≤n≤40	1,08 0,43 0,30 $0,23 \frac{8}{n}$

Remark: if the EUT Power level is below 75 Watts and therefore has no defined limits.

5.3. Test Setup



5.4. Operation Condition of EUT

1, Setup the EUT and the simulators as shown on Section 2.4

2, Turned on the power of all equipments.

3, EUT transmit data with mobile phone

5.5. Test Result

Not applicable for equipment operated with battery power supply.

6. Voltage Fluctuations and Flicker

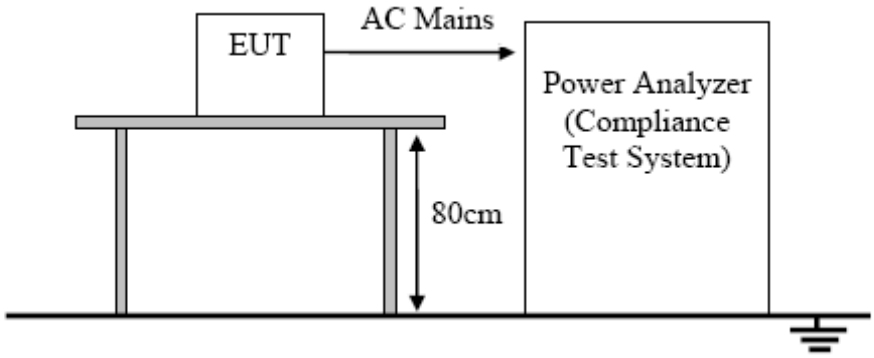
6.1. Test Procedure

The EUT was placed on a non-metallic table, 80cm above the ground plane. The EUT was powered from notebook which's power through a power Analyzer, let EUT worked in test mode then measure voltage fluctuations and flicker by power analyzer and recorded data.

6.2. Limit

Test Item	Limit	Note
P_{st}	1.0	P_{st} means Short-term flicker indicator
P_{lt}	0.65	P_{lt} means long-term flicker indicator
T_{dt}	0.2	T_{dt} means maximum time that dt exceeds 3%
d_{max}(%)	4%	d_{max} means maximum relative voltage change.
d_c(%)	3%	d_c means relative steady-state voltage change.

6.3. Test Setup



6.4. Operation Condition of EUT

1, Setup the EUT and the simulators as shown on Section 2.4

2, Turned on the power of all equipments.

3, EUT transmit data with mobile phone

6.5. Test Result

Not applicable for equipment operated with battery power supply.

7. RF Electromagnetic Field

7.1. Lest Levels and Performance Criteria

Test Level		Performance Criteria
Frequency	80MHz-6000MHz	**A**
Field Strength	3V/m measured unmodulated	
Modulation	AM modulated to a depth of 80% by a sinusoidal audio signal of 1KHz(Note)	
Step Size	1% increments	
Dwell time	3 Sec.	

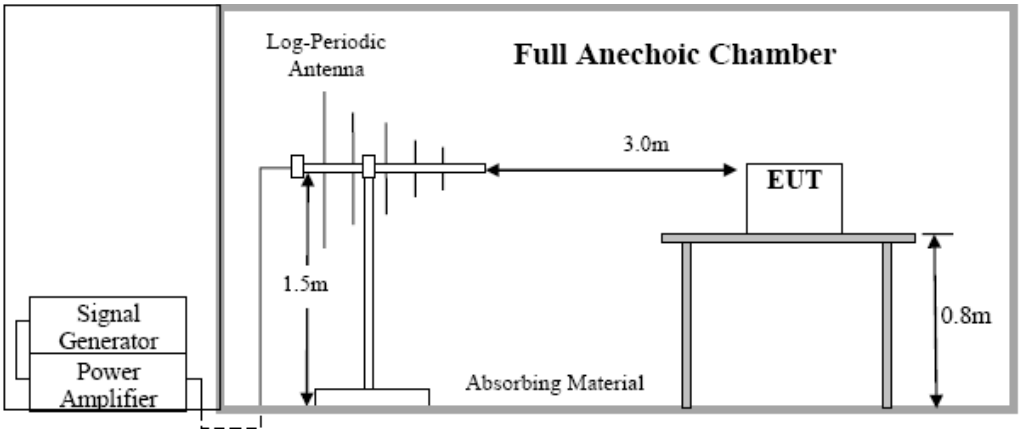
7.2. Test Procedure

The field sensor is placed on the EUT table (0.8 meter above the ground) which is 3 meters away from the transmitting antenna. Through the signal generator, power amplifier and transmitting antenna to produce a uniformity field strength (3V/m measured by field sensor) around the EUT table from frequency range specified and records the signal generator‘s output level at the same time for whole measured frequency range. Then, put EUT and its simulators on the EUT turn table and keep them 3 meters away from the transmitting antenna which is mounted on an antenna tower and fixes at 1 meter height above the ground. Using the recorded signal generator’s output level to measure the EUT from frequency range specified and both horizontal & vertical polarization of antenna must be set and measured. Each of the four sides of EUT must be faced this transmitting antenna and measures individually.

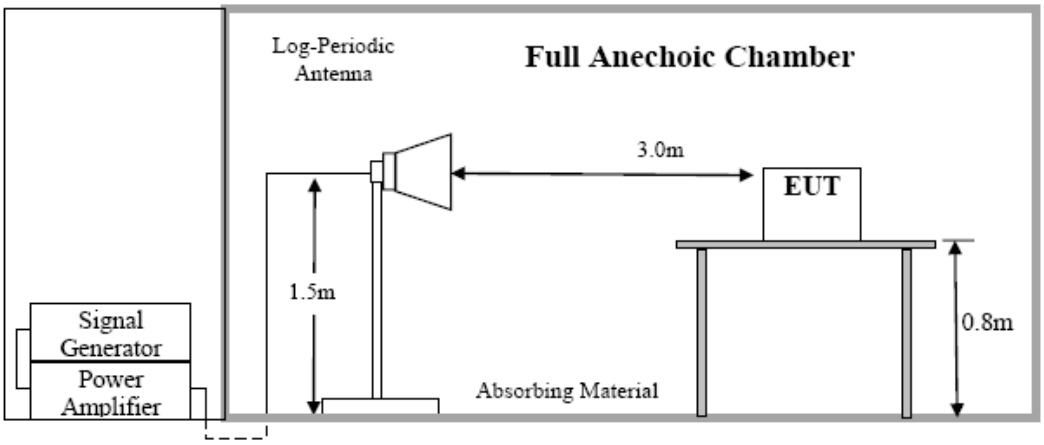
Set EUT in idle mode and repeated test with a receive antenna connected to a spectrum analyzer to see if there was unintentional transmissions happened.

7.3. Test Setup

For frequency from 80MHz to 1GHz



Frequency For 1-6GHz



7.4. Operation Condition of EUT

1, Setup the EUT and the simulators as shown on Section 2.4

2, Turned on the power of all equipments.

3, EUT transmit data with mobile phone

7.5. Test Result

EUT Position	Antenna	R.F. Field Strength	Observation	Perform. Criteria	Conclusion
Front	H/V	3 V/m (rms) AM Modulated 1000Hz, 80%	CT, CR	A	PASS
Right	H/V			A	PASS
Rear	H/V			A	PASS
Left	H/V			A	PASS

8. Electrostatic Discharge

8.1. Test Level and Performance Criteria

Test Level		Performance Criteria
Air Discharge	±2kV, ±4kV and ±8kV	**B**
Contact Discharge	±2kV and ±4kV	

8.2. Test Procedure

Air discharge:

The test was applied on non-conductive surfaces of EUT. The round discharge tip of the discharge electrode was approached as fast as possible to touch the EUT. After each discharge, the discharge electrode was removed from the EUT. The generator was re-triggered for a new single discharge and repeated 20 times for each pre-selected test point. This procedure was repeated until all the air discharge completed

Contact Discharge:

All the procedure was same as air discharge. except that the generator was re-triggered for a new single discharge and repeated 50 times for each pre-selected test point. The tip of the discharge electrode was touching the EUT before the discharge switch was operated.

Indirect discharge for horizontal coupling plane

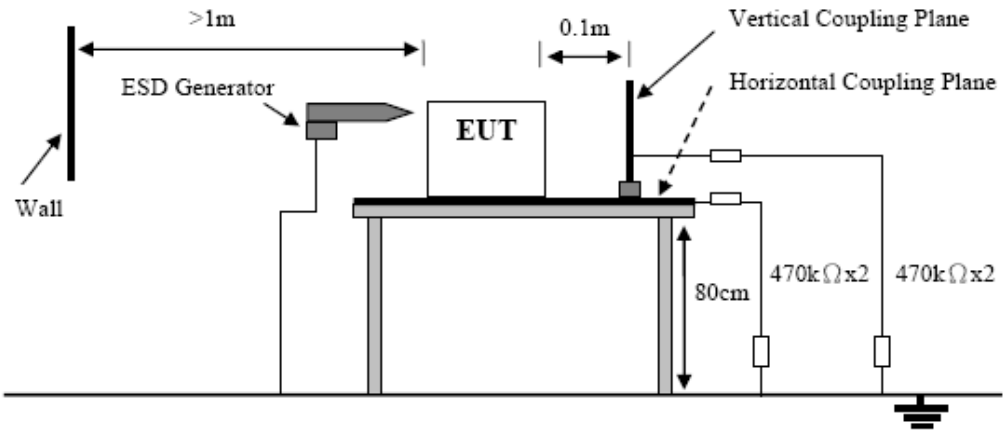
At least 20 single discharges were applied to the horizontal coupling plane, at points on each side of the EUT. The discharge electrode positions vertically at a distance of 0.1m from the EUT and with the discharge electrode touching the coupling plane.

Indirect discharge for vertical coupling plane

At least 20 single discharges were applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, was placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges were applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

Set EUT in idle mode and repeated test with a receive antenna connected to a spectrum analyzer to see if there was unintentional transmissions happened.

8.3. Test Setup



8.4. Test Result

Discharge Voltage (kV)	Type of discharge	Dischargeable Points	Observation	Perform. Criteria	Conclusion
±2	Contact	1,2	TT,TR	B	PASS
±4	Contact	1,2	TT,TR	B	PASS
±2	Air	3,4	TT,TR	B	PASS
±4	Air	3,4	TT,TR	B	PASS
±8	Air	3,4	TT,TR	B	PASS
±2	HCP-Bottom	Edge of the HCP	TT,TR	B	PASS
±2	VCP-Front	Center of the VCP	TT,TR	B	PASS
±2	VCP-Left	Center of the VCP	TT,TR	B	PASS
±2	VCP-Back	Center of the VCP	TT,TR	B	PASS
±2	VCP-Right	Center of the VCP	TT,TR	B	PASS
±4	HCP-Bottom	Edge of the HCP	TT,TR	B	PASS
±4	VCP-Front	Center of the VCP	TT,TR	B	PASS
±4	VCP-Left	Center of the VCP	TT,TR	B	PASS
±4	VCP-Back	Center of the VCP	TT,TR	B	PASS
±4	VCP-Right	Center of the VCP	TT,TR	B	PASS

Discharge Points Description			
1	Screw	3	Button
2	Port	4	Slot

9. Fast Transients Test

9.1. Lest Levels and Performance Criteria

Test Level		Performance Criteria
Test voltage	1KV For AC mains Port	**B**
	0.5KV for wired network ports	
Repetition Frequency	5KHz	
Burst Duration	15ms	
Burst Period	300ms	
Inject Time(s)	120s	
Inject Method	Direct For AC mains port	
	Couple for wired network ports	
Inject Line	AC Mains of adapter and wired network ports	

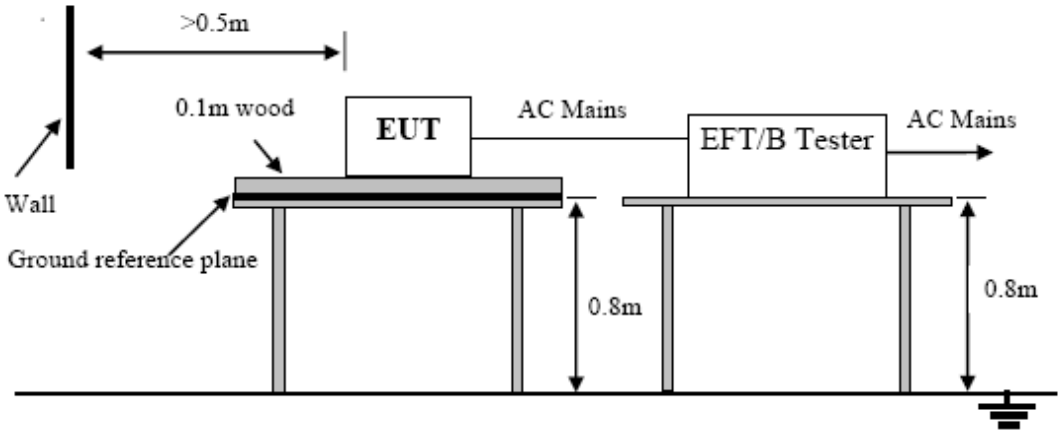
9.2. Test Procedure

The EUT and its simulators were placed on the ground reference plane and were insulated from it by a wood support 0.1m $\pm$ 0.01m thick. The ground reference plane was 1m*1m metallic sheet with 0.65mm minimum thickness. This reference ground plane was project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane was more than 0.5m. All cables to the EUT was placed on the wood support, cables not subject to EFT/B was routed as far as possible from the cable under test to minimize the coupling between the cables.

The EUT was powered from notebook which powered from power mains by using a coupling device that couples the EFT interference signal to AC power lines. Both positive transients and negative transients of test voltage were applied during compliance test and the duration of the test can’t less than 1min.

Set EUT in idle mode and repeated test with a receive antenna connected to a spectrum analyzer to see if there was unintentional transmissions happened.

9.3. Test Setup



9.4. Test Result

Not applicable for equipment operated with battery power supply.

10. Injection Current Test

10.1. Test Level and Performance Criteria

Test Level		Performance Criteria
Frequency	0.15MHz to 80MHz	**A**
Field Strength	3V/m measured unmodulated	
Modulation	AM modulated to a depth of 80% by a sinusoidal audio signal of 1KHz(Note)	
Step Size	1% increments	
Dwell time	3 Sec.	

10.2. Test Procedure

The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).

The disturbance signal described below is injected to EUT through CDN.

The EUT operates within its operational mode(s) under intended climatic conditions after power on.

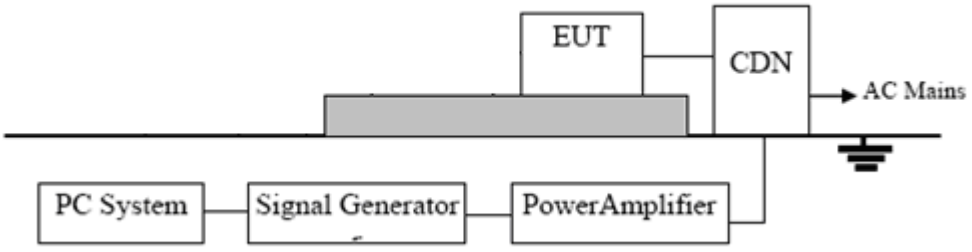
The frequency range is swept from 0.150MHz to 80MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 400Hz sine wave.

The rate of sweep shall not exceed $1.5*10^{-3}$decades/s. Where the frequency is swept incrementally; the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.

Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

Set EUT in idle mode and repeated test with a receive antenna connected to a spectrum analyzer to see if there was unintentional transmissions happened.

10.3. Test Setup



10.4. Test Result

Not applicable for equipment operated with battery power supply.

11. Voltage Dips and Interruptions

11.1. Test level and Performance Criteria

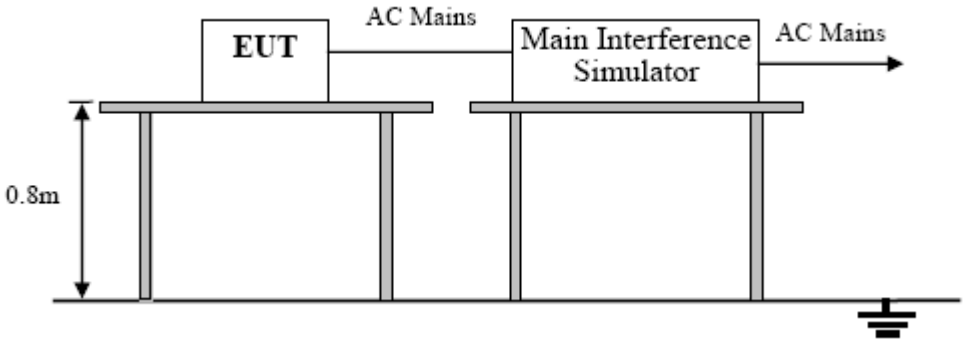
Test Level %U_T	Duration (in period)	Performance Criterion
0	0.5P	B
0	1P	B
70	25P	B
0	250P	C

11.2. Test Procedure

The EUT and test generator were setup as shown on Section 10.3
The interruptions are introduced at selected phase angles with specified duration.
Record any degradation of performance.

Set EUT in idle mode and repeated test with a receive antenna connected to a spectrum analyzer to see if there was unintentional transmissions happened.

11.3. Test Setup



11.4. Test Result

Not applicable for equipment operated with battery power supply.

12. Surge Test

12.1. Test Level and Performance Criteria

Test level for AC mains ports		Performance Criterion
Line to Line	1KV	B
Line to ground	2KV	B
Test level for wired network ports		Performance Criterion
Line to ground	0.5KV	B

12.2. Test Procedure

Set up the EUT and test generator as shown on Section 11.2.2.
For line-to-line coupling mode, provide a 1kV 1.2/50us voltage surge (at pen-circuit condition) and 8/20us current surge to EUT selected points, and for active line / neutral lines to ground are same except test level is 2kV.

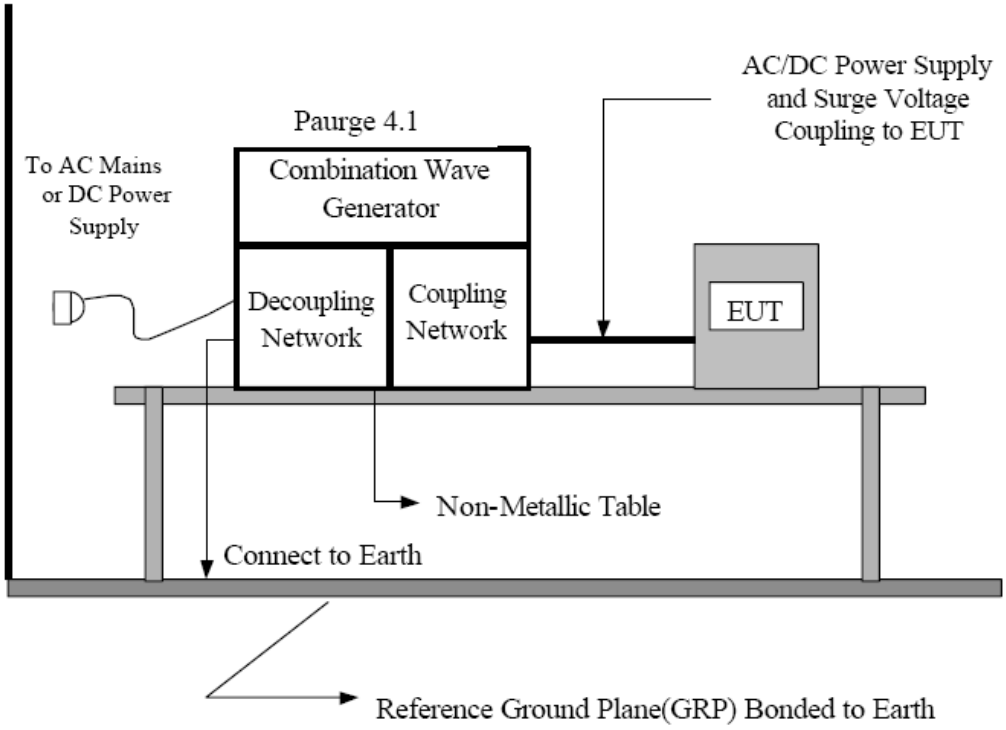
At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are applied during test.

Different phase angles are done individually.

Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

Set EUT in idle mode and repeated test with a receive antenna connected to a spectrum analyzer to see if there was unintentional transmissions happened.

12.3. Test Setup

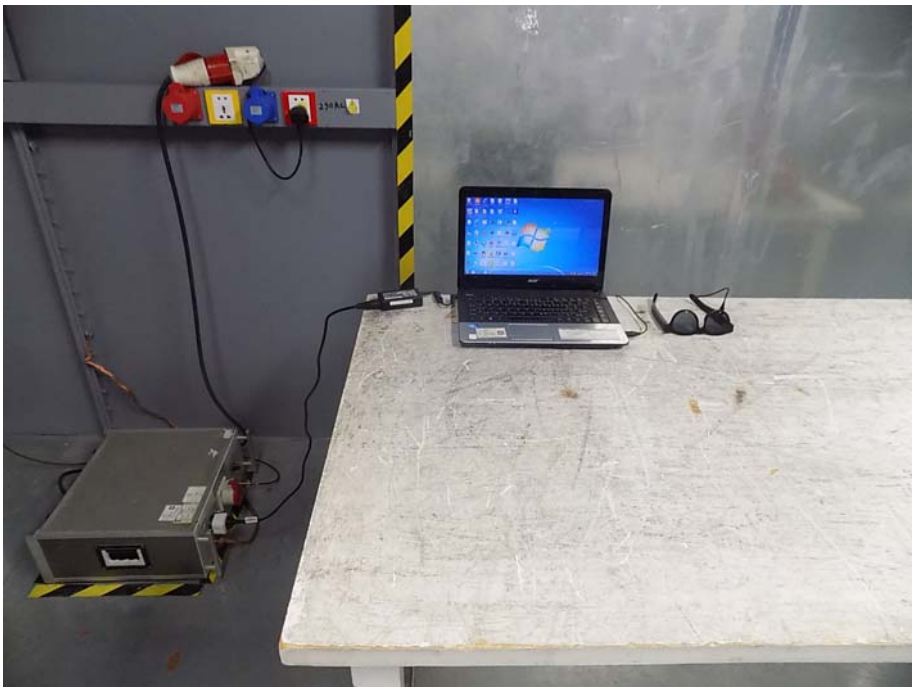


12.4. Test Result

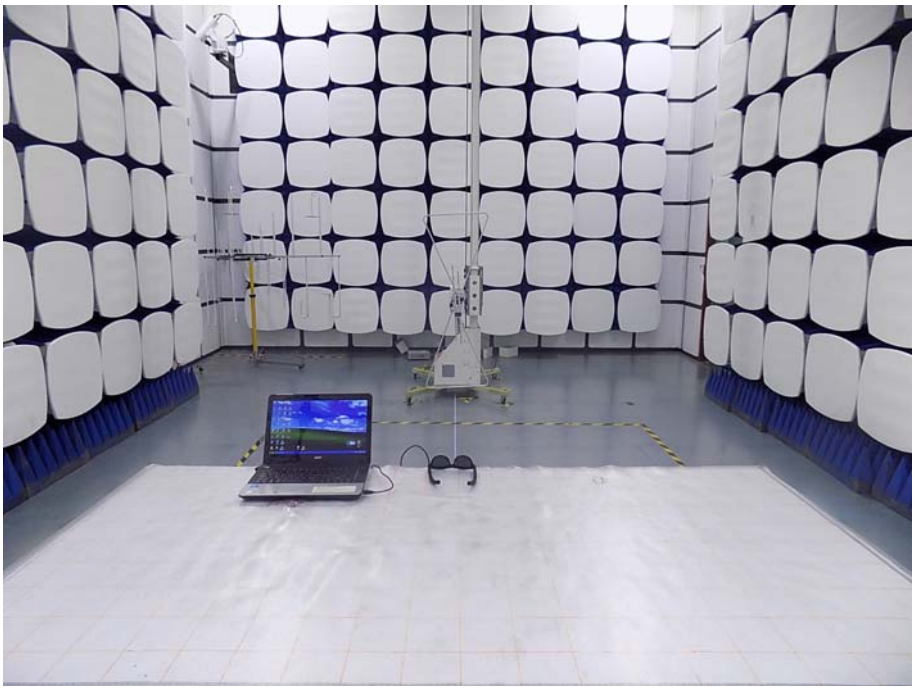
Not applicable for equipment operated with battery power supply.

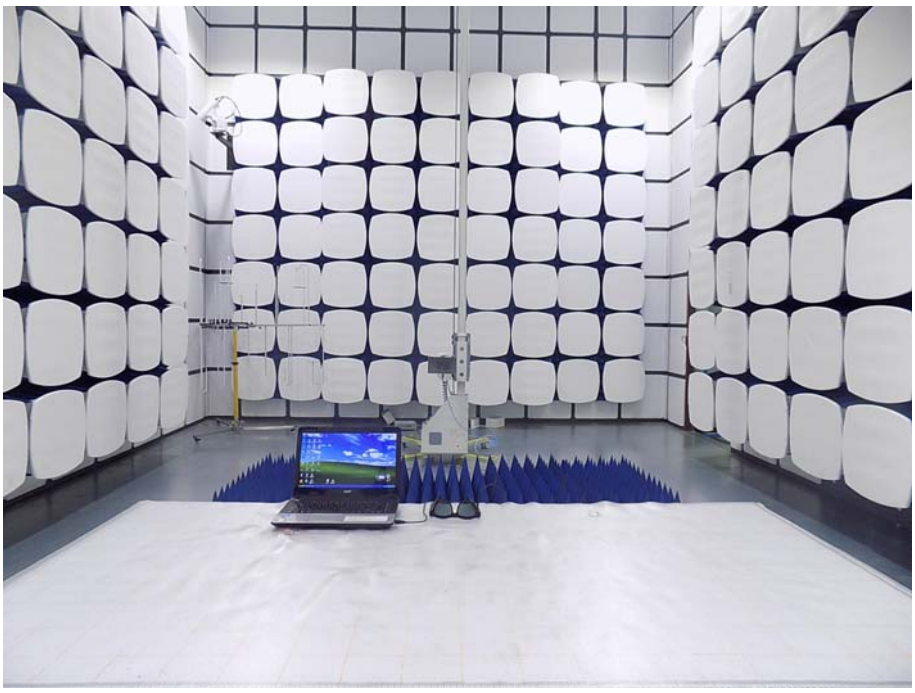
13. Photos of Test Setup

13.1. Photos of Power Line Conducted Emission Test



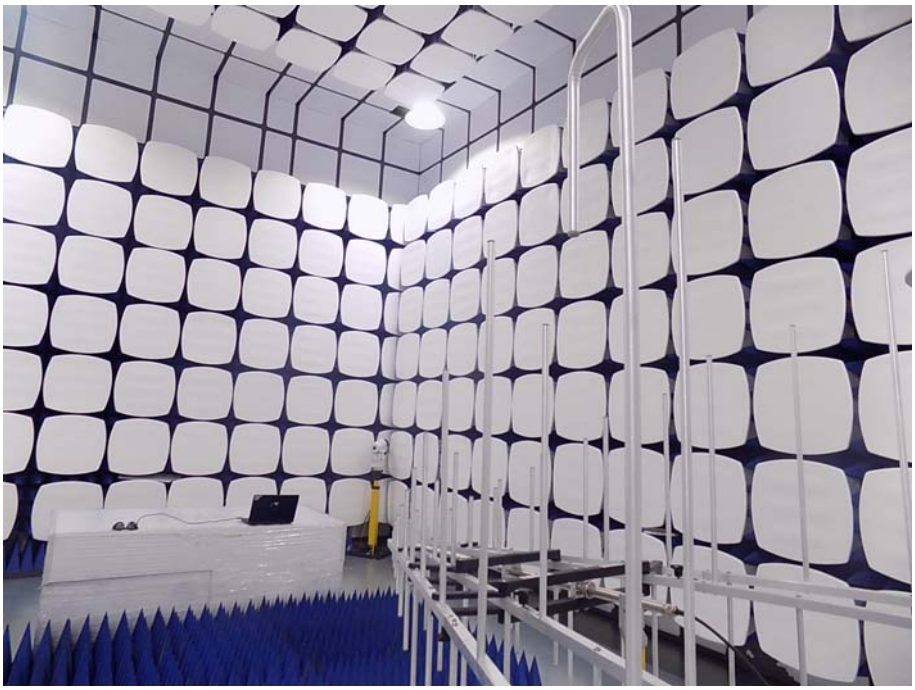
13.2. Photos of Radiated Emission



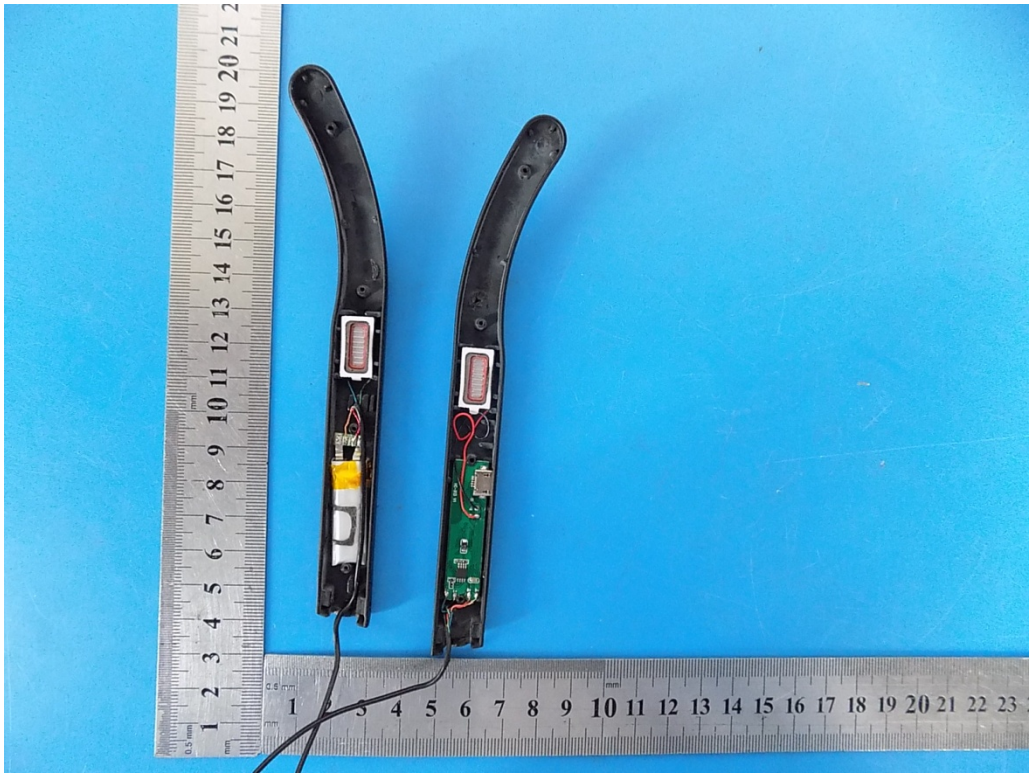


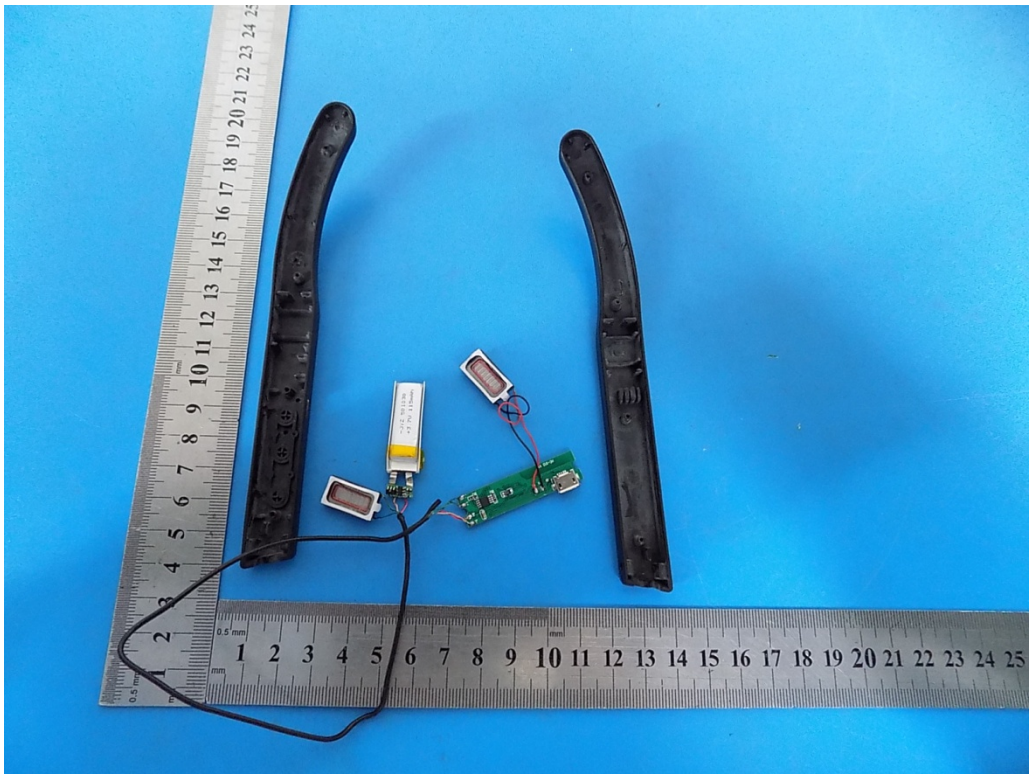
13.3. Photos of Electrostatic Discharge Immunity Test

13.4. Photo of RF Test

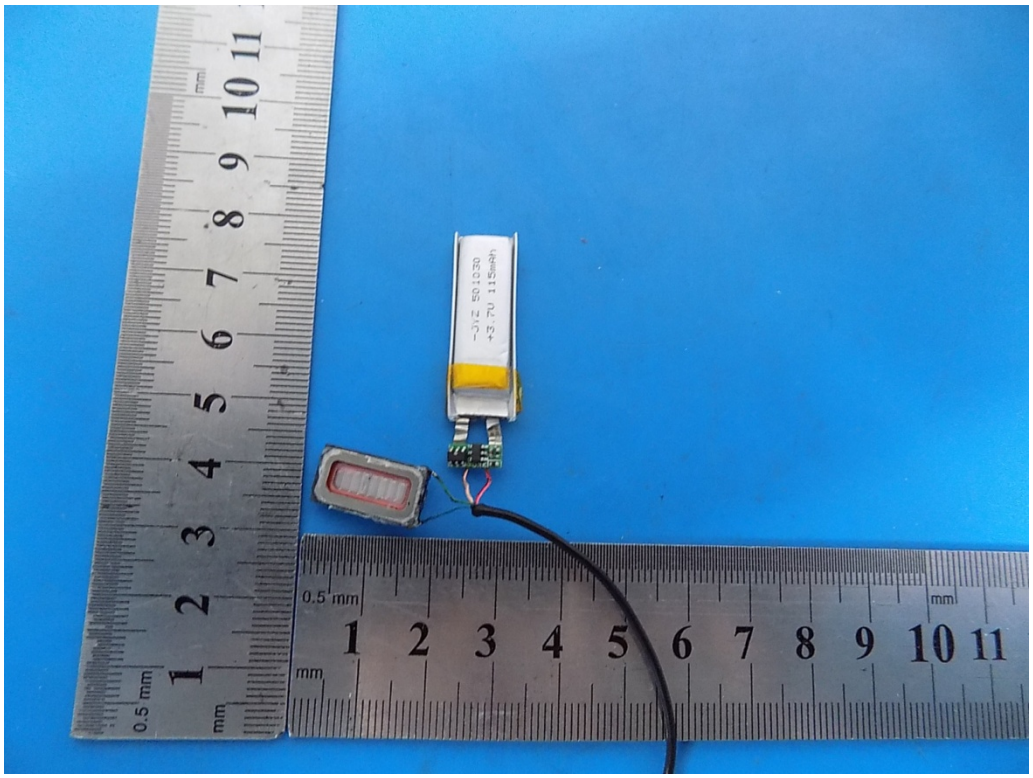


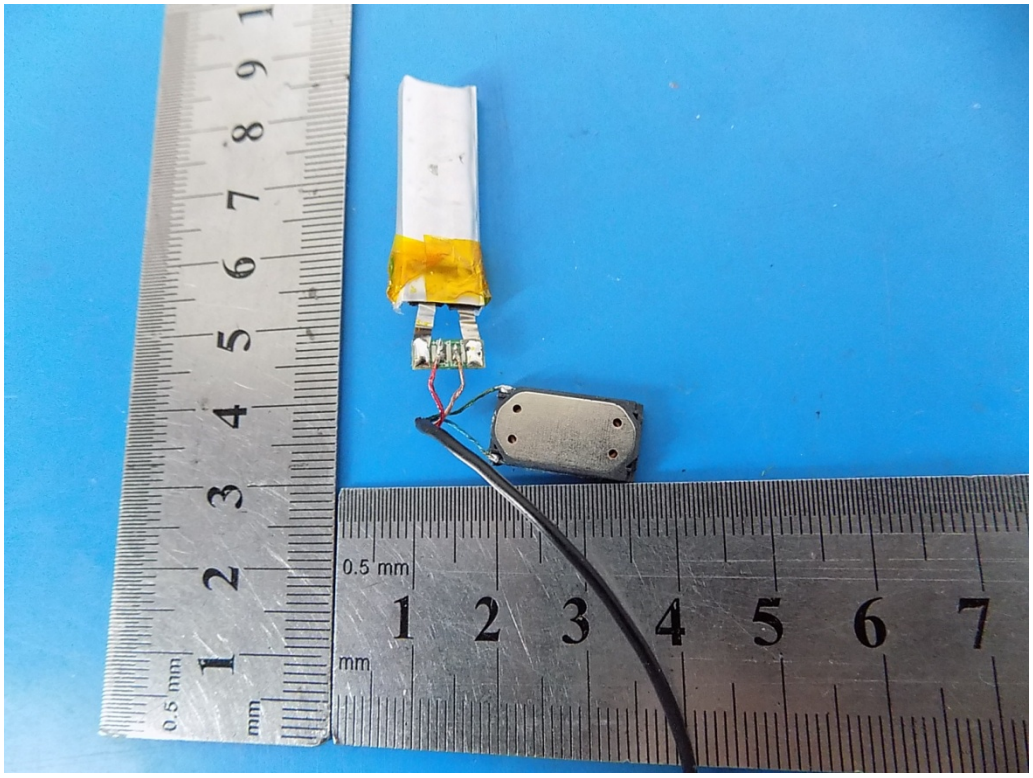
14. Photos of EUT

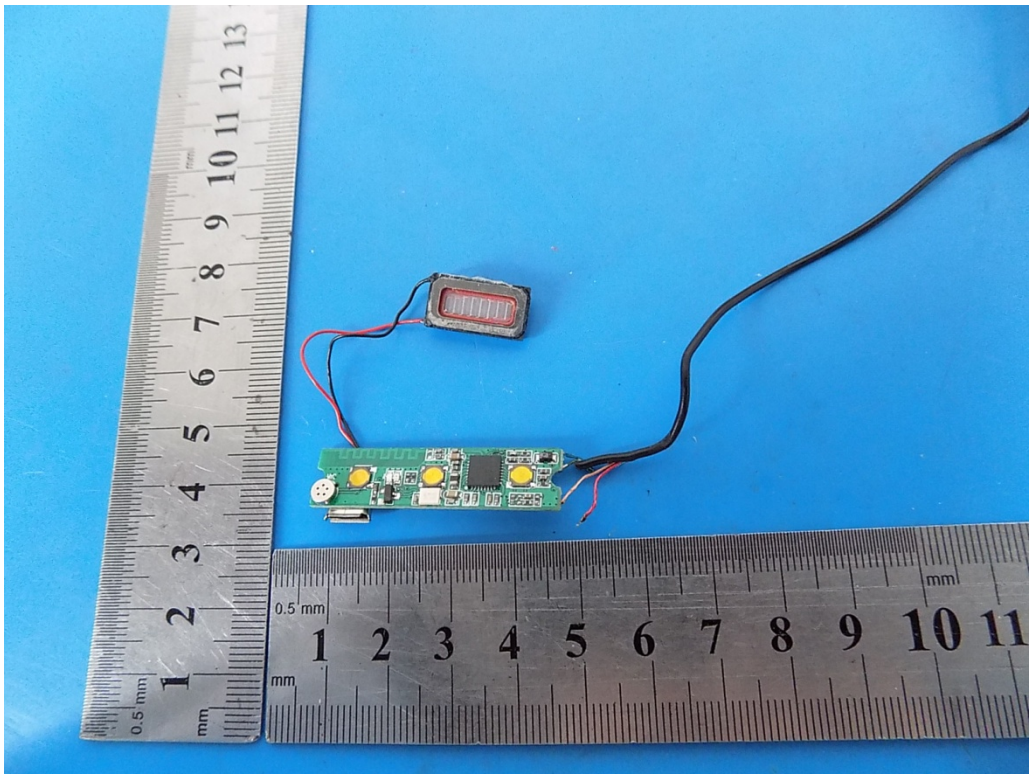


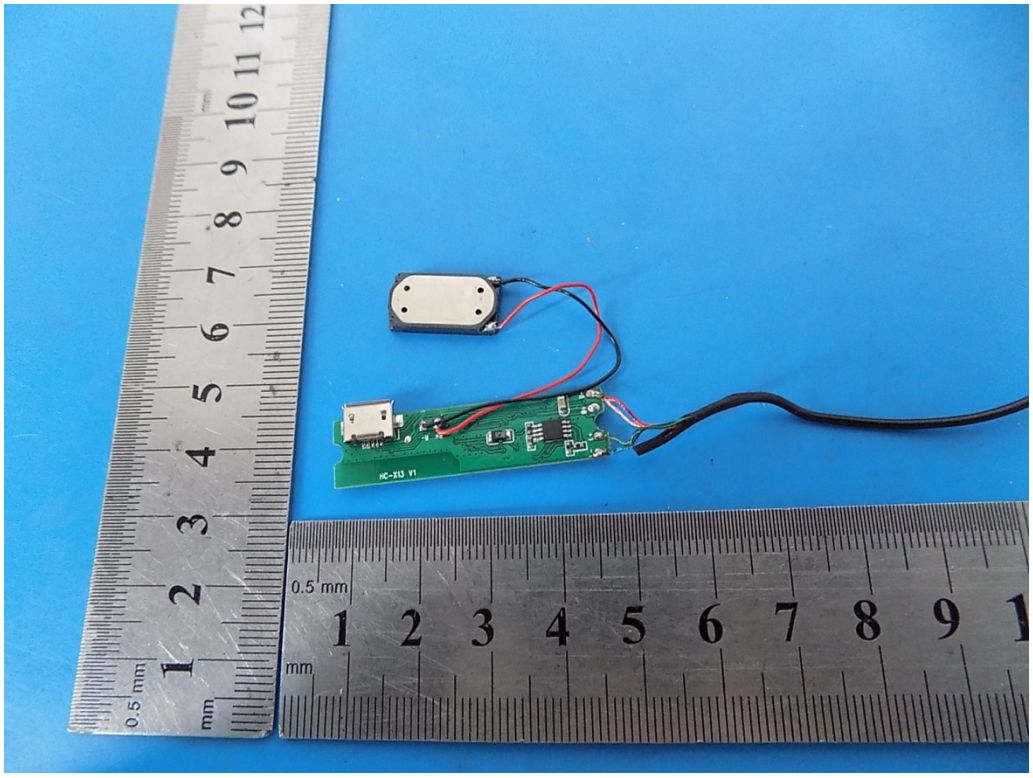


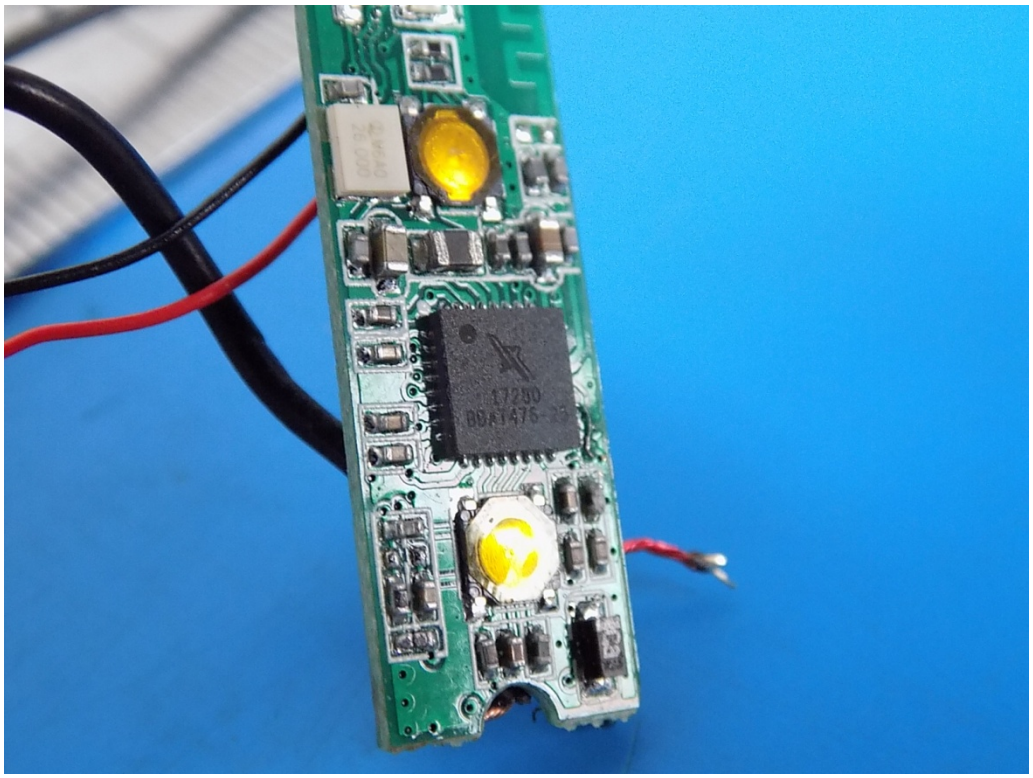

-JYZ 501030
+3.7V 115mAh






0.5 mm
mm


HC-X13 V1
0.5 mm
mm



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