EMC Test Report

Applicant Name&	Shenzhen Atess Power Technology Co.,Ltd.
Address	1st Floor of Building 3 at Sector B and 3rd Floor of Building 9,Henglong Industrial Park, No.4 Industrial Zone, Shuitian Community, Shiyan Street, Baoan District, Shenzhen, Guangdong, China
Product Description:	Li-ion Battery PACK
Brand Name:	ATESS
Tested Model:	ESS-BM-38.4-200T
Electrical Rating:	38.4V, 200Ah
Report No.:	E20210624-002V1
Received Date:	Jun 24. 2021
Tested Date:	Jun 25. 2021 ~ Jun 27. 2021
Issued Date:	Jun 12. 2021
Test Standards:	EN 61000-6-1:2019; EN 61000-6-3:2007+A1:2011 EN IEC 61000-3-2:2019 EN 61000-3-3:2013/A1:2019
Test Result:	PASS
Prepared By:	Engineer Jul 10. 2021
Reviewed By:	Engineer Jul 11. 2021
Approved By:	Section Manager Jul 12. 2021

Note: The test results in this report apply exclusively to the tested model / sample. Without written approval of JingCe Electronics Co., Ltd., the test report shall not be reproduced except in full.

Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Jul 12. 2021	Original Report	/

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information	
Applicant:	Shenzhen Atess Power Technology Co.,Ltd.
Address of applicant:	1st Floor of Building 3 at Sector B and 3rd Floor of Building 9,Henglong Industrial Park, No.4 Industrial Zone, Shuitian Community, Shiyan Street, Baoan District, Shenzhen, Guangdong, China
Manufacturer:	Huizhou Topband Electrical Technology Co. ,LTD
Address of manufacturer:	No.113 Dongxing Road,Dongxing Zone,Dongjiang Hi-tech Industrial Park of ZhongkaiHigh-tech Zone, Huizhou City

General Description of EUT	
Product Name:	Li-ion battery PACK
Model No.:	ESS-BM-38.4-200T
Additional Model(s):	N/A
Difference description	N/A
Rated Voltage:	38.4V, 200Ah
Highest Internal Frequency:	Less than 108MHz

1.2 EUT Operation Mode and test details

Test Mode List		
Test Mode	Description	Remark
1	Discharging	/

Special Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
DC Cable	1.5m	Unshielded	Without Ferrite

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
/	/	/	/

1.3 Measurement Uncertainty

Parameter	Frequency	Measurement uncertainty
Conducted Emission (with AMN)	150kHz~30MHz	ϕ= 2.7dB K=2
Disturbance Power	30MHz-300MHz	ϕ= 5.0dB K=2
Radiated Emission	30MHz-1000MHz	ϕ= 5.0dB K=2
Radiated Emission	Above 1000MHz	ϕ= 5.4dB K=2

1.4 Test Facility

Test Site	Guangzhou Jingce Electronics Co., Ltd
Test Location	No.6, Liankun Road, Huangpu District, Guangzhou, China

1.5 Test Equipment List and Details

Test Equipment for Conducted Emission					
Description	**Manufacturer**	**Model**	**Serial Number**	**Cal Date**	**Due Date**
Receiver	R&S	ESR3	102381	2020-12-07	2021-12-07
LISN	R&S	ENV216	101435	2020-12-07	2021-12-07
Cable	HUBER+SUHNER	RG223U(5m)	1820817	2020-07-20	2021-07-20
Shielded room	Oubite	OBT-SR-8845	OBT-CR-2018 GD08	2019-09-24	2021-09-24
Test Equipment for Radiated Emission					
Description	**Manufacturer**	**Model**	**Serial Number**	**Cal Date**	**Due Date**
Receiver	R&S	ESW44	101605	2020-12-07	2021-12-07
RF Cable-001	R&S	30M-18G	1801S225	2020-11-18	2021-11-18
RF Cable-002	/	SUCOFLEX 106（9 米）	506321/6	2020-12-11	2021-12-11
Log periodic antenna	ETS	3142E	00217809	2021-04-20	2022-04-20
Horn Antenna	ETS	3117-PA	01673	2020-10-29	2021-10-29
Preamplifier	SCHWARZBECK	BBV 9718	#324	2020-10-29	2021-10-29
966 Chamber	ETS	/	RFD100-CT001790-Q1374	2020-10-17	2023-10-17

Test Equipment for ESD					
Description	**Manufacturer**	**Model**	**Serial Number**	**Cal Date**	**Due Date**
ESD Gun	EMTEST	ESD NX30	11766	2020-12-23	2021-12-23
/	/	/	/	/	/
Test Equipment for EFT/DIPS					
Description	**Manufacturer**	**Model**	**Serial Number**	**Cal Date**	**Due Date**
Signal Generator	TESEQ	NSG3040	6002	2020-09-04	2021-09-04
Dip Controller	TESEQ	INA 6502	2037	2020-09-04	2021-09-04
Test Equipment for CS					
Description	**Manufacturer**	**Model**	**Serial Number**	**Cal Date**	**Due Date**
Generator	TESEQ	NSG 4070	47989	2020-12-23	2021-12-23
6dB attenuator	TESEQ	ATN 6060	17073102	2020-12-23	2021-12-23
CDN	TESEQ	M016	48093	2020-12-23	2021-12-23
Test Equipment for RS					
Description	**Manufacturer**	**Model**	**Serial Number**	**Cal Date**	**Due Date**
Transmit antenna（80M-1G）	R&S	HL046E	100258	2021-01-08	2022-01-07
Transmit antenna (1G-6G)	R&S	STLP 9149	00517	2021-01-08	2022-01-07
Generator	R&S	SMB 100A	114901	2021-01-08	2022-01-07
Power amplifier（80M-1G）	R&S	BBA150 BC250	102983	2021-01-08	2022-01-07
Power amplifier（0.69G-6G）	R&S	BBA150 D110E60	102981	2021-01-08	2022-01-07
Toggle switch	R&S	OSP 120	101968	2021-01-08	2022-01-07
Test Equipment for Harmonic/Flicker					
Description	**Manufacturer**	**Model**	**Serial Number**	**Cal Date**	**Due Date**
Harmonic Flicker Power Analyzer	EMTEST	DPA 500N	P1744207049	2021-06-19	2022-06-18
Stable power supply with matching network impedance	EMTEST	ACS 500N	P1720198100	2021-06-19	2022-06-18
Test Equipment for Surges					
Description	**Manufacturer**	**Model**	**Serial Number**	**Cal Date**	**Due Date**
Surge Generator	EMTEST	UCS 500N	P1723199421	2021-06-19	2022-06-18

1.6 Performance Criteria for EMS

According to Clause 6 of EN 61000-6-1:2019:

• **Performance Criteria Description**

Criterion A:
The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.
Criterion B:
The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.
Criterion C:
Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

2. SUMMARY OF TEST RESULTS

EN 61000-6-3:2007+A1:2011 Emissions		
Test Standards	**Description of Test Item**	**Result**
EN 61000-6-3	Conducted Emissions	N/A[1]
EN 61000-6-3	Radiated Emissions	PASS

EN 61000-6-1:2019 Immunity		
Test Standards	**Description of Test Item**	**Result**
EN 61000-4-2	Electrostatic Discharge	PASS
EN 61000-4-3	Continuous Radiated Disturbances	PASS
EN 61000-4-4	Electrical Fast Transients	N/A[1]
EN 61000-4-5	Surges	N/A[1]
EN 61000-4-6	Continuous Conducted Disturbances	N/A[1]
EN 61000-4-8	Power Frequency Magnetic Field	N/A[2]
EN 61000-4-11	Voltage Dips and Interruptions	N/A[1]

EN IEC 61000-3-2:2019		
Rule	**Description of Test Item**	**Result**
EN 61000-3-2	Harmonic Current Emissions	N/A[1]

EN 61000-3-3:2013/A1:2019		
Rule	**Description of Test Item**	**Result**
EN 61000-3-3	Voltage Fluctuations & Flicker	N/A[1]

*Note1: N/A means not applicable.

Remark: “NA[1]” means EUT has no AC mains and DC mains,and connection cable of DC output less than 3 meter.

“ N/A[2] ” The immunity against power frequency magnetic field was not tested because the EUT does not contain components, which are susceptible to magnetic fields.

3. GENERAL REMARKS

When applying the basic standard in this test report, the latest amendment is always included.

3.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix 1: Test Result

3.2 Result Level & Over Limit Calculation

The Measurement (Result Level) is calculated by Reading Level adding the Correct Factor(maybe including LISN Factor and the Cable Factor etc.), The basic equation is as follows:

Measurement = Reading Level + Correct Factor(including LISN Factor ,Cable Factor etc.)

The “Over Limit” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a “Over Limit” of -6dB means the emission is 6dB below the maximum limit for device. The equation for “over limit” calculation is as follows:

Over Limit = Measurement(Result Level) –Limit

4. Conducted Emissions

4.1 Conducted Emission Limit

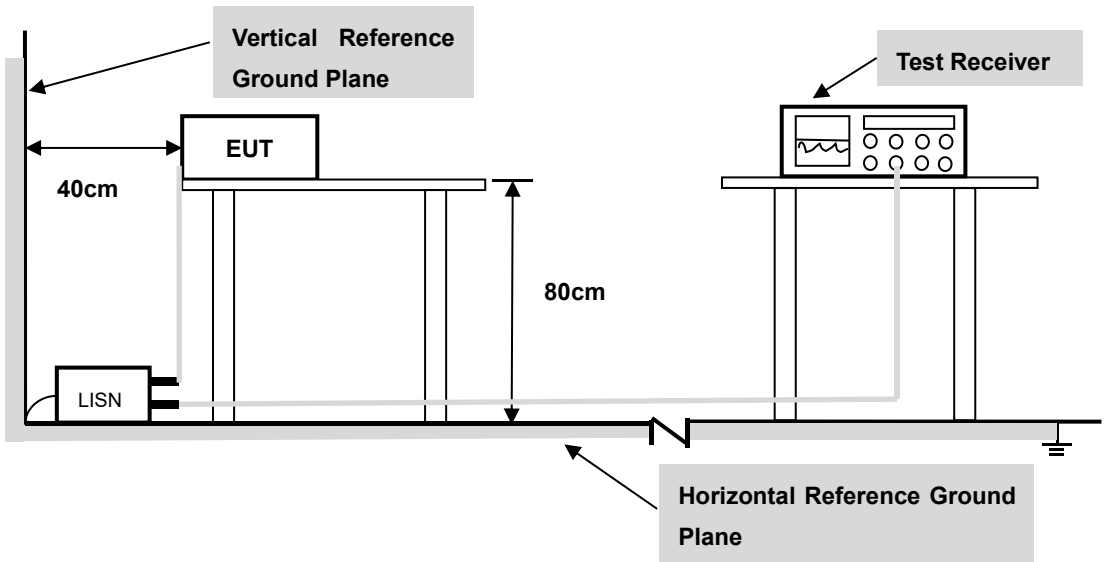
Limits for conducted emissions at the AC mains power ports

Frequency Range	Quasi Peak(dBμV)	Average(dBμV)
0.15 to 0.50	66-56	59-46
0.50 to 5	56	46
5 to 30	60	50
Note1 The lower limit shall apply at the transition frequencies. Note2 The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.		

Limits for conducted emissions at additional ports

Frequency Range	Quasi Peak(dBμV)	Average(dBμV)
0.15 to 0.50	80	70
0.50 to 5	74	64
5 to 30	74	64
Note1 The lower limit shall apply at the transition frequencies. Note2 The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.		

4.2 Block Diagram of Test Setup



4.3 Test Procedure

(1)The mains terminal disturbance voltage test was conducted in a shielded room.

(2)The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.

(3)The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane.

(4)The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.

4.4 Environmental Conditions

Temperature:	/
Relative Humidity:	/
Atmospheric Pressure:	/
Test Voltage:	/
Test Date:	/
Tested By:	/

4.5 Test Data and Result

Not applicable

5. Radiated Emissions

5.1 Radiated Emission Limit

Limits for radiated emissions at frequencies up to 1GHz

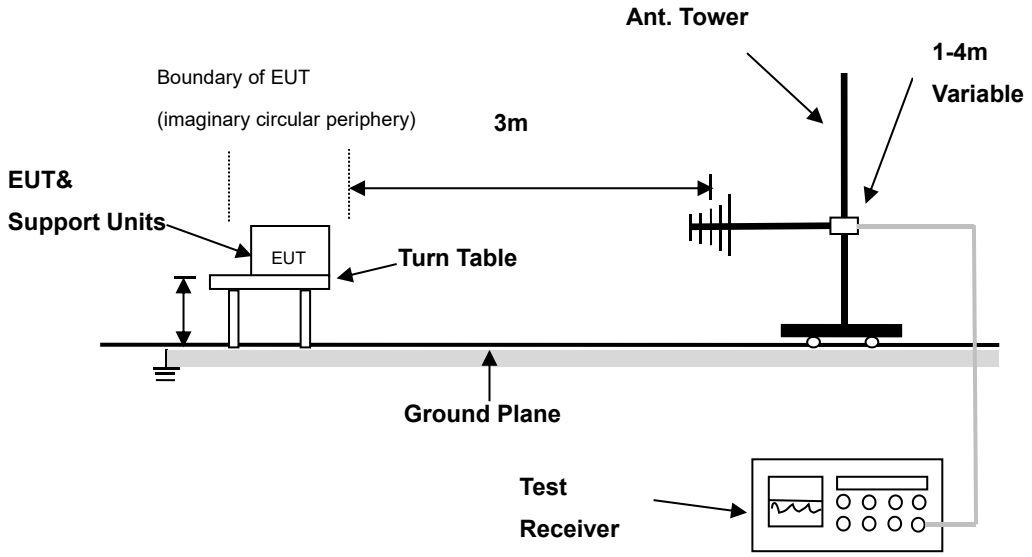
Frequency range (MHz)	Measurement		Class B limits dB(μV/m)
	Distance (m)	Detector type/bandwidth	
30 ~ 230	3	Quasi Peak/120kHz	40
230 ~ 1000			47

Limits for radiated emissions at frequencies above 1GHz

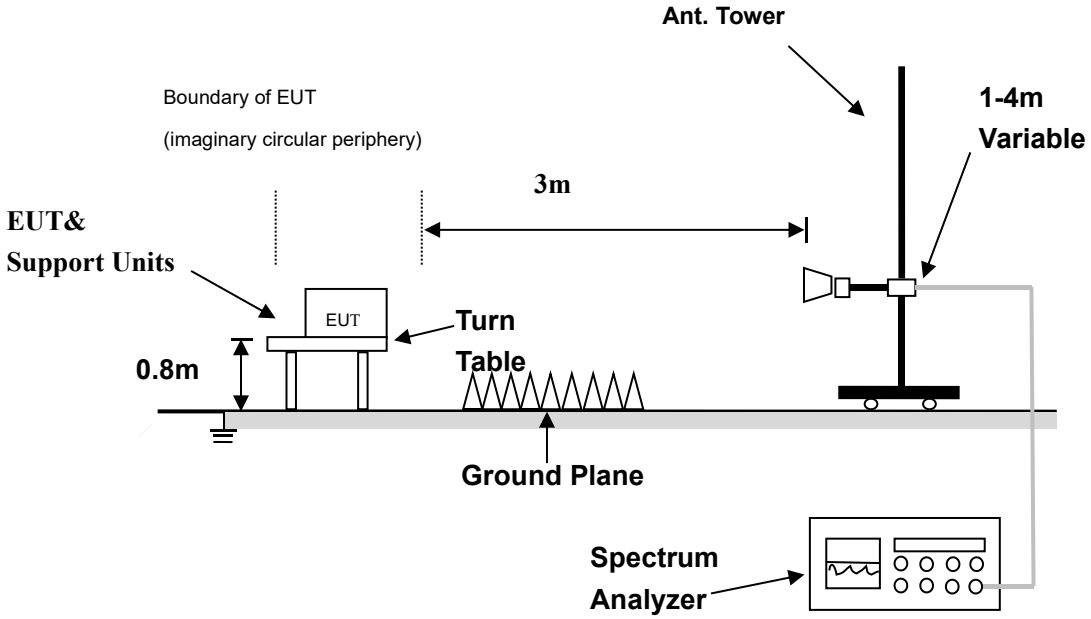
Frequency range (MHz)	Measurement		Class B limits dB(μV/m)
	Distance (m)	Detector type/bandwidth	
1000 ~ 3000	3	Average/1MHz	50
3000 ~ 6000			54
1000 ~ 3000	3	Peak/1MHz	70
3000 ~ 6000			74

5.2 Block Diagram of Test Setup

Radiated Emissions Frequency:30MHz to 1000MHz:



Radiated Emissions Frequency:1000MHz to 6000MHz:



5.3 Test Procedure

From 30 MHz to1GHz test procedure as below:

(1)The radiated emissions were tested in a semi-anechoic chamber.

(2)The EUT is placed on a turntable, which is 0.8m above ground plane.

(3) The EUT is placed on a turntable, which is 0.8 meter high above the ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.

(4)And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

(5)Repeat above procedures until the measurements for all frequencies are complete.

5.4 Environmental Conditions

Temperature:	25℃
Relative Humidity:	50%
Atmospheric Pressure:	101KPa
Test Voltage:	DC 38.4V
Test Date:	Jun 26. 2021
Tested By:	John Qu

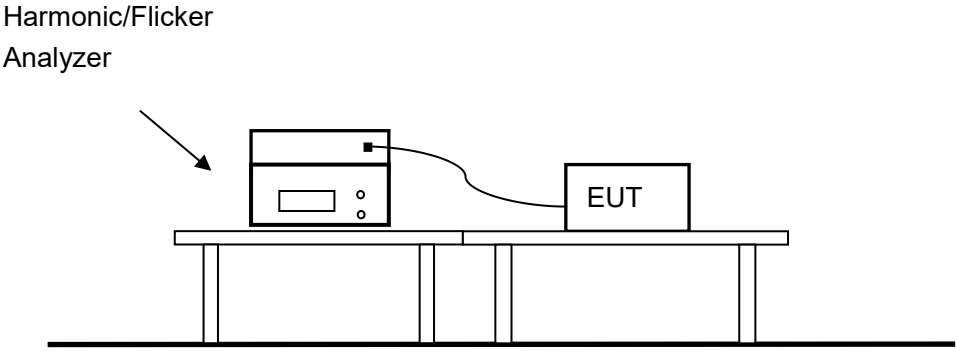
5.5 Test Data and Result

6. Harmonic current emissions

6.1 Classification of equipment

For the purpose of harmonic current limitation, equipment is classified as follows:
Class A:
– balanced three-phase equipment;
– household appliances, excluding equipment identified as Class D;
– tools, excluding portable tools;
– dimmers for incandescent lamps;
– audio equipment.
Equipment not specified in one of the three other classes shall be considered as Class A equipment.
Class B:
– portable tools;
– arc welding equipment which is not professional equipment.
Class C:
– lighting equipment.
Class D:
Equipment having a specified power according to 6.2.2 less than or equal to 600 W, of the following types:
– personal computers and personal computer monitors;
– television receivers;
– refrigerators and freezers having one or more variable-speed drives to control compressor motor(s).

6.2 Block Diagram of Test Setup



6.3 Environmental Conditions

Temperature:	/
Relative Humidity:	/
Atmospheric Pressure:	/
Test Voltage:	/
Test Date:	/
Tested By:	/

6.4 Test Data and Result

Not applicable.

7. Voltage fluctuations and flicker

7.1 Limits

The following limits apply:

-the value of Pst shall not be greater than 1,0;

-the value of Plt shall not be greater than 0,65;

-Tmax, the accumulated time value of d(t) with a deviation exceeding 3,3% during a single voltage change at the EUT terminals, shall not exceed 500ms;

-the maximum relative steady-state voltage change, dc, shall not exceed 3,3%;

-the maximum relative voltage change dmax, shall not exceed:

a) 4% without additional conditions;

b) 6% for equipment which is:

- switched manually, or

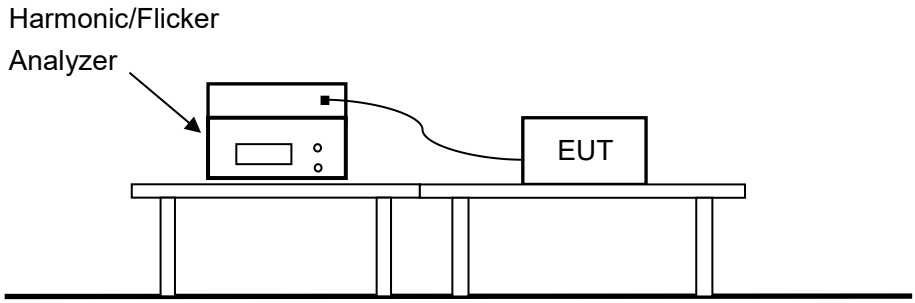
- switched automatically more frequently than twice per day, and also has either a delayed restart(the delay being not less than a few tens of seconds), or manual restart, after a power supply interruption.

c) 7% for equipment which is:

-attended whilst in use (for example: hair dryers, vacuum cleaners, kitchen equipment such as mixers, garden equipment such as lawn mowers, portable tools such as electric drills), or

-switched on automatically, or is intended to be switched on manually, no more than twice per day, and also has either a delayed restart(the delay being not less than a few tens of seconds) or manual restart after a power supply interruption.

7.2 Block Diagram of Test Setup



7.3 Environmental Conditions

Temperature:	/
Relative Humidity:	/
Atmospheric Pressure:	/
Test Voltage:	/
Test Date:	/
Tested By:	/

7.4 Test Data and Result

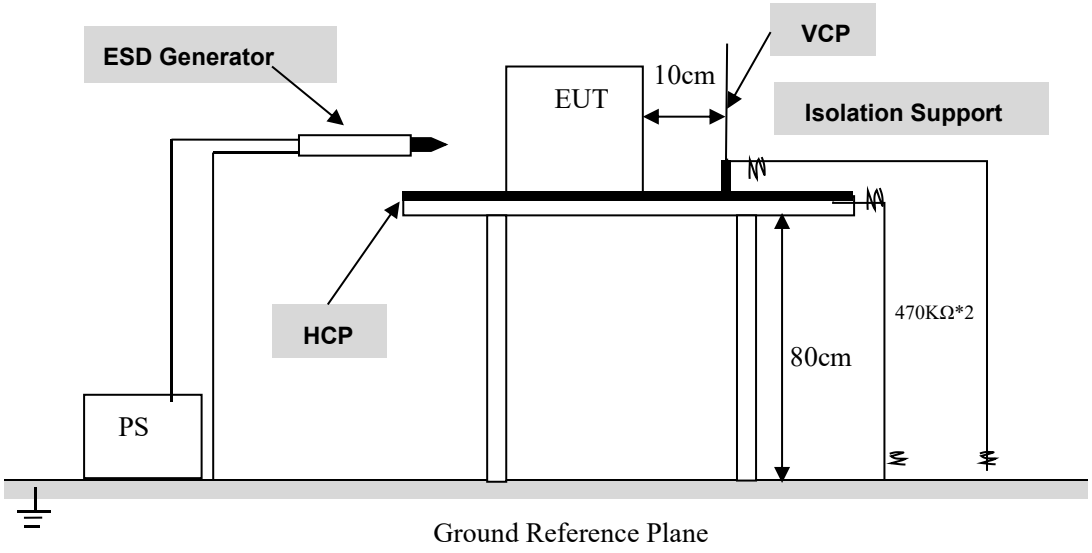
Not applicable.

8. Electrostatic Discharge

8.1 ESD Immunity Requirements

Environmental Phenomenon	Port	Test Specification	Basic Standard	Performance criterion
Electrostatic discharge	Enclosure port	4kV (Contact Discharge) 8kV (Air Discharge)	EN 61000-4-2	B

8.2 Block Diagram of Test Setup



8.3 Test Procedure

Air Discharges:

This test is done on a non-conductive surface. The round Discharges tip of the Discharges electrode shall be approached as fast as possible to touch the EUT. After each Discharge, the Discharges electrode shall be removed from the EUT. The generator is then re-triggered for a new single Discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air Discharges completed.

Contact Discharges:

All the procedure shall be same as Section 8.3.1 of EN 61000-4-2, except that the tip of the Discharges electrode shall touch the EUT before the Discharges switch is operated.

Indirect Discharges for HCP

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

Indirect Discharges for VCP

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

8.4 Environmental Conditions

Temperature:	23℃
Relative Humidity:	54%
Atmospheric Pressure:	101KPa
Test Voltage:	DC 76.8V
Test Date:	Jun 27. 2021
Tested By:	John Qu

8.5 Test Data and Result

EN 61000-4-2 Test Points	Test Levels (kV)							
	-2	+2	-4	+4	-8	+8	-15	+15
Air Discharge								
Com ports	A	A	A	A	A	A	/	/

EN 61000-4-2 Test Points	Test Levels (kV)							
	-2	+2	-4	+4	-6	+6	-8	+8
Contact Discharge								
Screw	A	A	A	A	/	/	/	/
Shell	A	A	A	A	/	/	/	/

EN 61000-4-2 Test Points	Test Levels (kV)							
	Indirect Contact Discharge (HCP)				Indirect Contact Discharge (VCP)			
	-2	+2	-4	+4	-2	+2	-4	+4
/	A	A	A	A	A	A	A	A
/	A	A	A	A	A	A	A	A
/	A	A	A	A	A	A	A	A
/	A	A	A	A	A	A	A	A

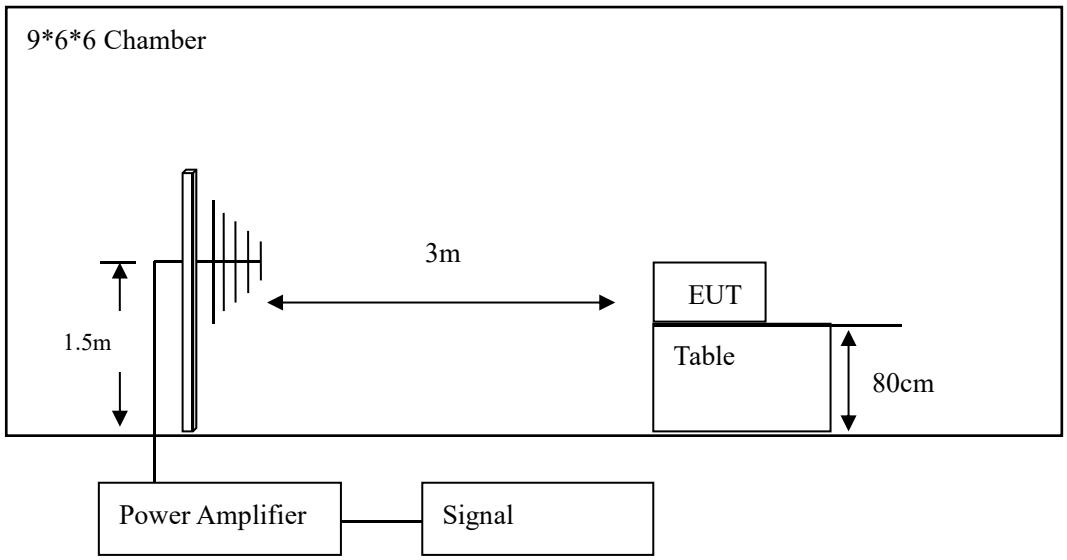
Remark: The equipment was not disturbed during the test.

9. Radio Frequency Electromagnetic Field

9.1 RS Immunity Requirements

Environmental Phenomenon	Port	Test Specification	Basic Standard	Performance criterion
Radio-frequency electromagnetic field Amplitude modulated	Enclosure port	3V/m(unmodulated, r.m.s) 80% AM(1kHz)	EN 61000-4-3	A

9.2 Block Diagram of Test Setup



9.3 Test Procedure

a) Test is conducting under the description of IEC61000-4-3.

(1)The EUT was switched on and allowed to warm up to its normal operating condition.

(2)The EUT was exercised and monitored in the manner specified by the customer.

(3)All test instruments were PC controlled, via their IEEE 488.2 bus interfaces, and the test conducted in the following manner:

The testing frequencies were swept over the required frequency range, with a step frequency equal to 1% of fundamental. The sweep rate was 1.0×10^{-3} decades/s.For each frequency tested, the signal generator output level was adjusted automatically until the unmodulated field strength registered by the field monitor reached the desired level. This level was held constant for the specified dwell time.

(4)The EUT was continuously monitored during the test in accordance with the Pass / Fail criteria declared by the customer.

(5)The test was done in both horizontal and vertical antenna polarization, and for all necessary sides of the EUT.

b) For Display and display output functions

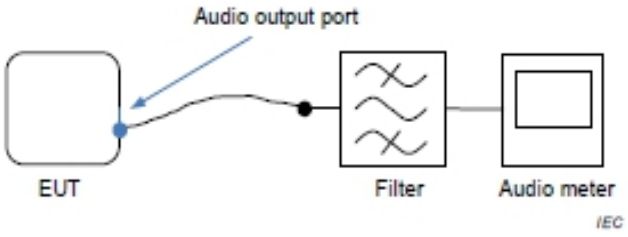
The display quality evaluated by direct observation.

For display output function evaluation, a suitable display device shall be connected. This device shall meet the immunity requirements for displays specified in this document. The screen size shall be typical for the display output. the diagonal screen size shall be at least 0,50 m.

The display shall be observed under normal viewing conditions including viewing distance using a reduced ambient light level preferably in the range 15 lx to 20 lx. The viewing distance or settings of the video camera monitoring system shall be sufficient to provide visibility of the whole display. In the case of direct observation the selected viewing distance shall be recorded in the test report.

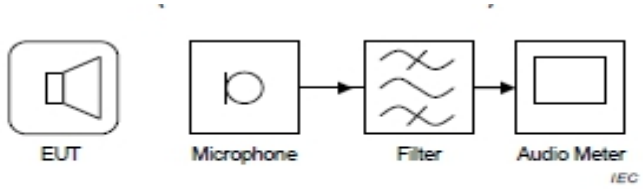
c) For Audio output function

(1) For Audio output port

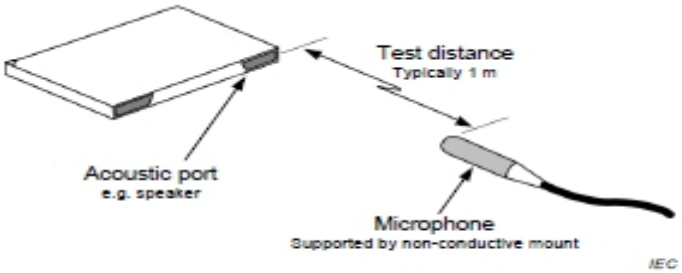


The filter is the audio filter specified in G.6.1 and is typically incorporated into the audio meter. Additional filtering might be necessary to ensure that the RF disturbance signal does not interfere with the measurement.

(2) For Loudspeaker

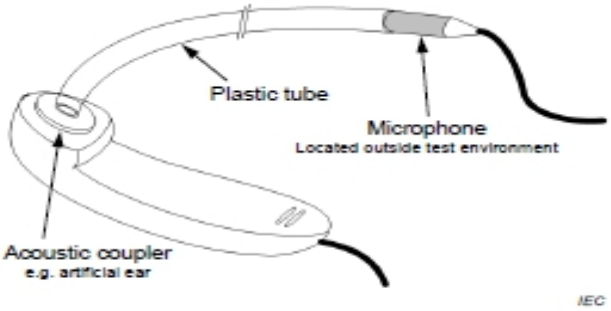


The filter is the audio filter specified in G.6.1 and is typically incorporated into the audio meter. Additional filtering might be necessary to ensure that the RF disturbance signal does not interfere with the measurement



The microphone is connected via the cable to a suitable amplifier. Ensure that there is minimal acoustic loss between EUT and microphone.

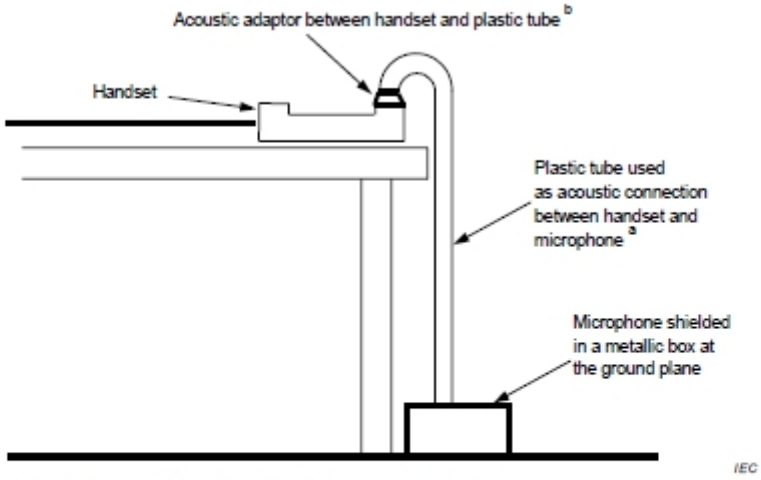
(3) For on-ear acoustic measurements:



NOTE 1 The microphone is connected via the cable to a suitable amplifier.

NOTE 2 This setup is suitable for radiated immunity testing. See G.6.3

(4) For Telephone handset:

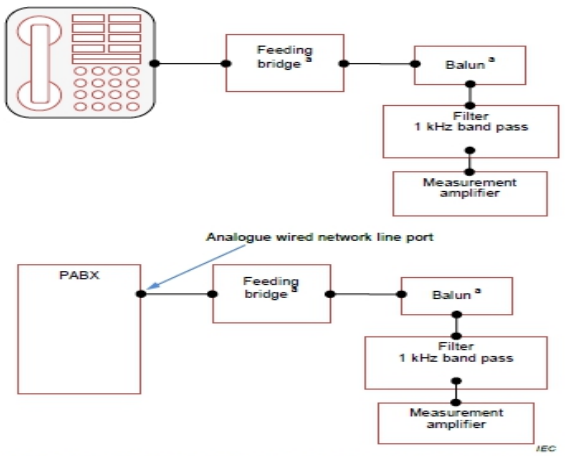


NOTE This set up is suitable for radiated immunity testing. See G.6.3.

[a] The acoustic measurement procedure compensates for the acoustic properties of the tube. Typically, the tube has an inner diameter of 15 mm, an outer diameter of 19 mm, and a total length of 1,5 m.

[b] Conically formed adaptor which is connected acoustically to the various forms of handsets with some type of soft rubber. This stable coupling of the handset to the acoustical tube should not be changed between establishing the reference level and measuring the demodulated levels.

(5) For measuring the demodulation on analogue wired network lines:



[a] The feeding bridge current and the balun impedance are to be chosen according to the intended purpose of the EUT. In addition the feeding bridge may provide the power required for the MME to operate.

9.4 Environmental Conditions

Temperature:	24℃
Relative Humidity:	54%
Atmospheric Pressure:	101KPa
Test Voltage:	DC 76.8V
Test Date:	Jun 26. 2021
Tested By:	John Qu

9.5 Test Data and Result

Field Strength: 3V/m
Frequency step: 1% of fundamental
Dwell time: 1 second
Modulation: AM by 1kHz sine wave with 80% modulation depth

Frequency Range(MHz)	Field (V/m)	Front		Rear		Left Side		Right Side	
		VERT	HORI	VERT	HORI	VERT	HORI	VERT	HORI
80-1000 1400-6000	3	A	A	A	A	A	A	A	A

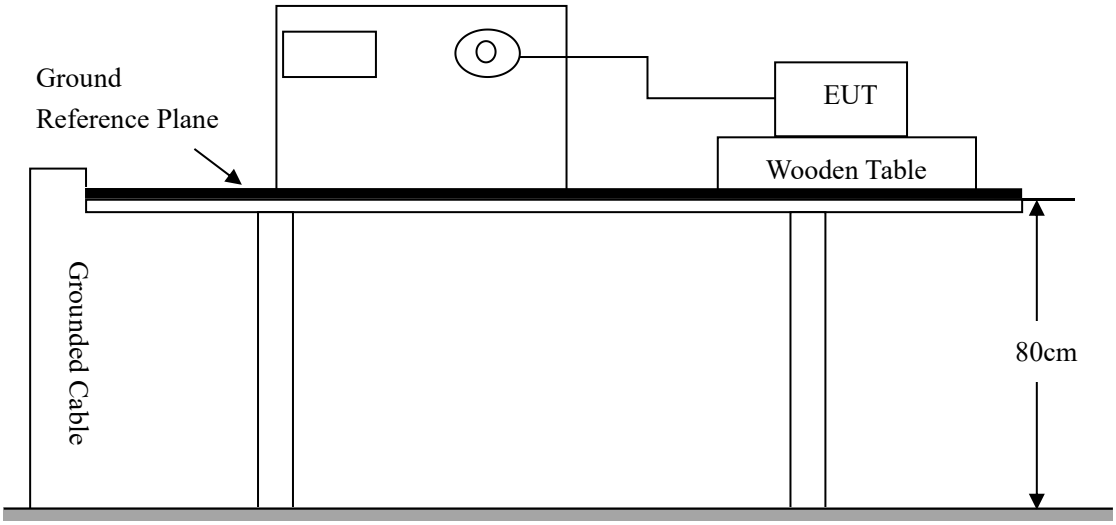
Remark: The equipment was not disturbed during the test.

10. Electrical fast transients

10.1 EFT Immunity Requirements

Environmental Phenomenon	Port	Test Specification	Basic Standard	Performance criterion
Electrical fast transients	a.c. power. ports	1kV(peak) Tr/Th:5/50ns Repetition frequency:5kHz	EN 61000-4-4	B
	I/O Signal & Control Line	0.5kV(peak) Tr/Th:5/50ns Repetition frequency:5kHz		B

10.2 Block Diagram of Test Setup



10.3 Test Procedure

(1)The EUT was switched on and allowed to warm up to its normal operating condition.

(2)D.C./A.C. Power Line Test

The EFT/B test system has a built-in coupling/decoupling network which couples the generated EFT bursts into the EUT power supply lines connected to it. The EFT bursts were coupled to the selected lines (one at a time) of the EUT.

(3)I/O Signal & Control Line Test

The interference impulses were capacitively coupled to the EUT's signal cables.

(4)The EUT was monitored during the test in accordance with the Pass /Fail criteria declared by the customer.

(5)The test was performed with EFT bursts in the positive and negative polarities and repeated on all necessary lines.

10.4 Environmental Conditions

Temperature:	/
Relative Humidity:	/
Atmospheric Pressure:	/
Test Voltage:	/
Test Date:	/
Tested By:	/

10.5 Test Data and Result

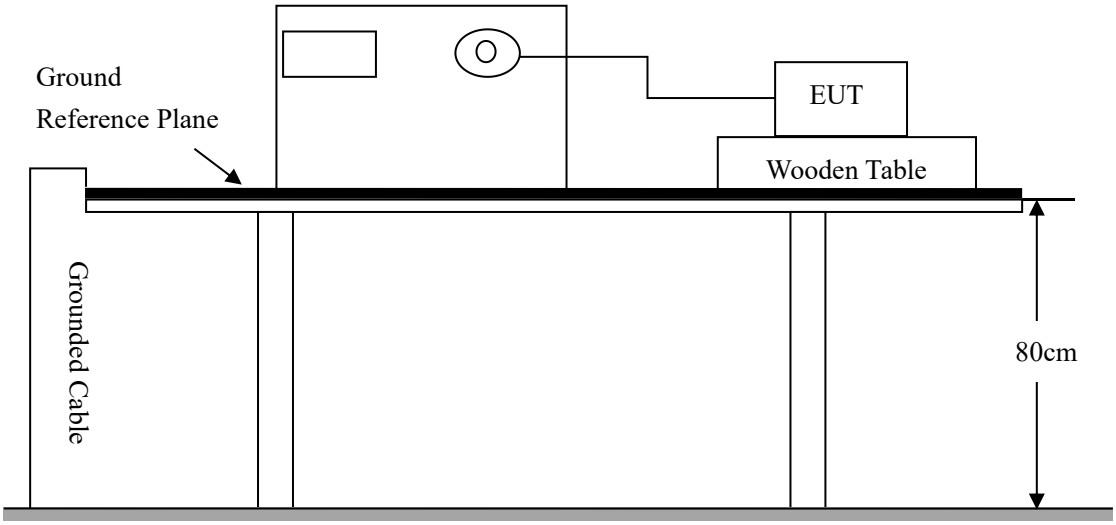
Not applicable.

11. Surges

11.1 Surges Immunity Requirements

Environmental Phenomenon	Port	Test Specification	Basic Standard	Performance criterion
Surges	a.c. power ports	Tr/Th:1,2/50μs 1kV (line to line) 2kV(line to earth)	EN 61000-4-5	B

11.2 Block Diagram of Test Setup



Ground Reference Plane

11.3 Test Procedure

(1)The power supply to EUT was switched on and allowed to warm up to its normal operating condition.

(2)The surge generator phase shifter was set to different angle.

(3)The correct open-circuit test level was set with the surge generator disconnected from the coupling network.

(4)The output of the generator was then reconnected back to the coupling network.

(5)Five discharges, generated by the voltage surge generator, were made on each relevant line, for each polarity, at each test level, with the relevant discharge interval.

(6)The EUT was observed during, and checked after the test to determine the result.

11.4 Environmental Conditions

Temperature:	/
Relative Humidity:	/
Atmospheric Pressure:	/
Test Voltage:	/
Test Date:	/
Tested By:	/

11.5 Test Data and Result

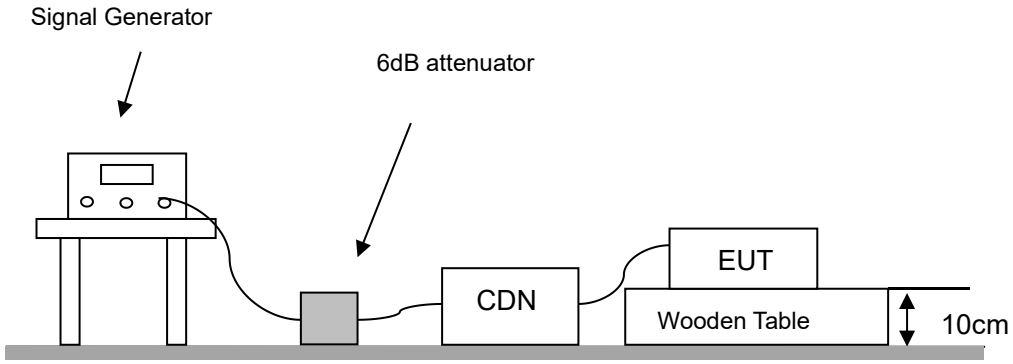
Not applicable.

12. Radio-Frequency Continuous Conducted

12.1 CS Immunity Requirements

Environmental Phenomenon	Port	Test Specification	Basic Standard	Performance criterion
Radio-frequency continuous conducted	Input a.c. power ports	0.15~230MHz, 3V	EN 61000-4-6	A

12.2 Block Diagram of Test Setup



12.3 Test Procedure

(1)The EUT was switched on and allowed to warm up to its normal operating condition.

(2)The EUT are placed on an insulating support 0.1 m high above a ground reference plane. CDN(coupling and decoupling device) is placed on the ground plane about 0.3 m 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).

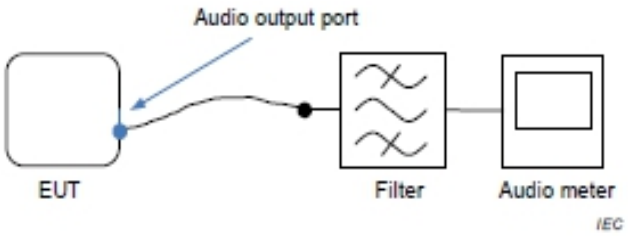
(3)The frequency range is swept from 150 kHz to 80 MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1 kHz sine wave.

(4)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.

(5)The EUT was continuously monitored during the test in accordance with the PASS/FAIL criteria declared by the customer.

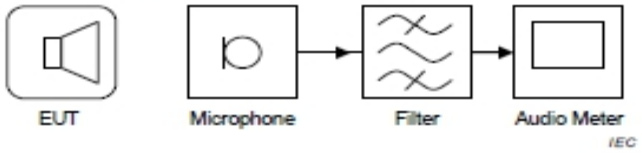
For Audio output function

(1) For Audio output port

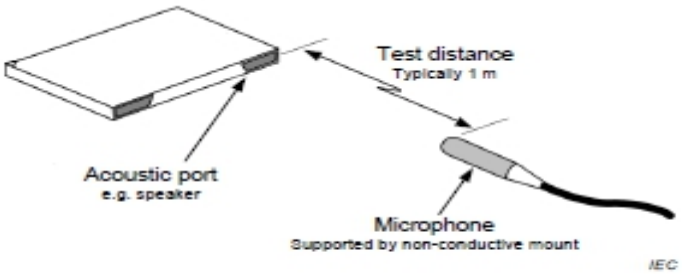


The filter is the audio filter specified in G.6.1 and is typically incorporated into the audio meter. Additional filtering might be necessary to ensure that the RF disturbance signal does not interfere with the measurement.

(2) For Loudspeaker

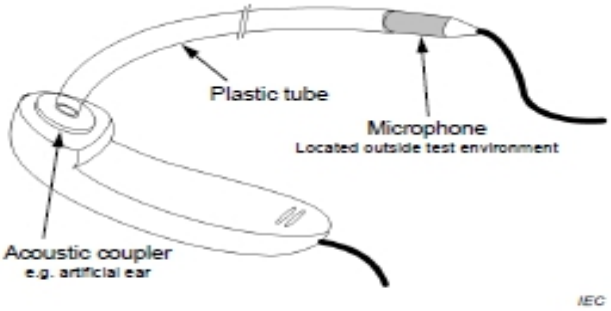


The filter is the audio filter specified in G.6.1 and is typically incorporated into the audio meter. Additional filtering might be necessary to ensure that the RF disturbance signal does not interfere with the measurement



The microphone is connected via the cable to a suitable amplifier. Ensure that there is minimal acoustic loss between EUT and microphone.

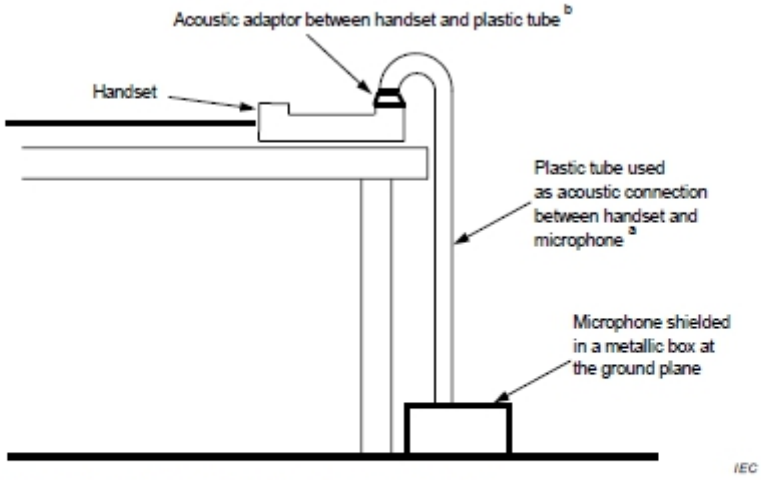
(3) For on-ear acoustic measurements:



NOTE 1 The microphone is connected via the cable to a suitable amplifier.

NOTE 2 This setup is suitable for radiated immunity testing. See G.6.3

(4) For Telephone handset:

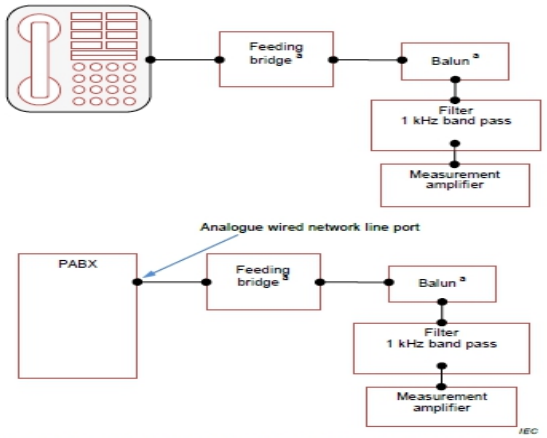


NOTE This set up is suitable for radiated immunity testing. See G.6.3.

[a] The acoustic measurement procedure compensates for the acoustic properties of the tube. Typically, the tube has an inner diameter of 15 mm, an outer diameter of 19 mm, and a total length of 1,5 m.

[b] Conically formed adaptor which is connected acoustically to the various forms of handsets with some type of soft rubber. This stable coupling of the handset to the acoustical tube should not be changed between establishing the reference level and measuring the demodulated levels.

(5) For measuring the demodulation on analogue wired network lines:



[a] The feeding bridge current and the balun impedance are to be chosen according to the intended purpose of the EUT. In addition the feeding bridge may provide the power required for the MME to operate.

12.4 Environmental Conditions

Temperature:	/
Relative Humidity:	/
Atmospheric Pressure:	/
Test Voltage:	/
Test Date:	/
Tested By:	/

12.5 Test Data and Result

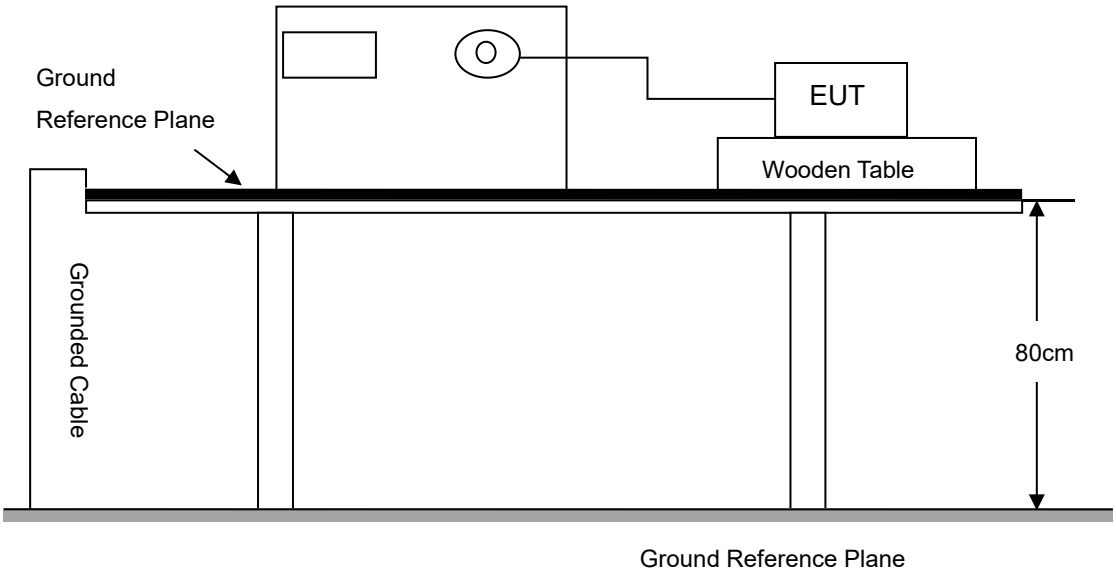
Not applicable.

13. Voltage Dips and Interruptions Test Result

13.1 DIPS Immunity Requirements

Environmental Phenomenon	Port	Test Specification	Basic Standard	Performance criterion
Voltage Dips	Input a.c. power port	>95% reduction 0.5 period	IEC61000-4-11	B
		30% reduction 25 period		C
		60% reduction 10 period		C

13.2 Block Diagram of Test Setup



13.3 Test Procedure

(1)The interruption is introduced at selected phase angles with specified duration.

(2)Record any degradation of performance.

13.4 Environmental Conditions

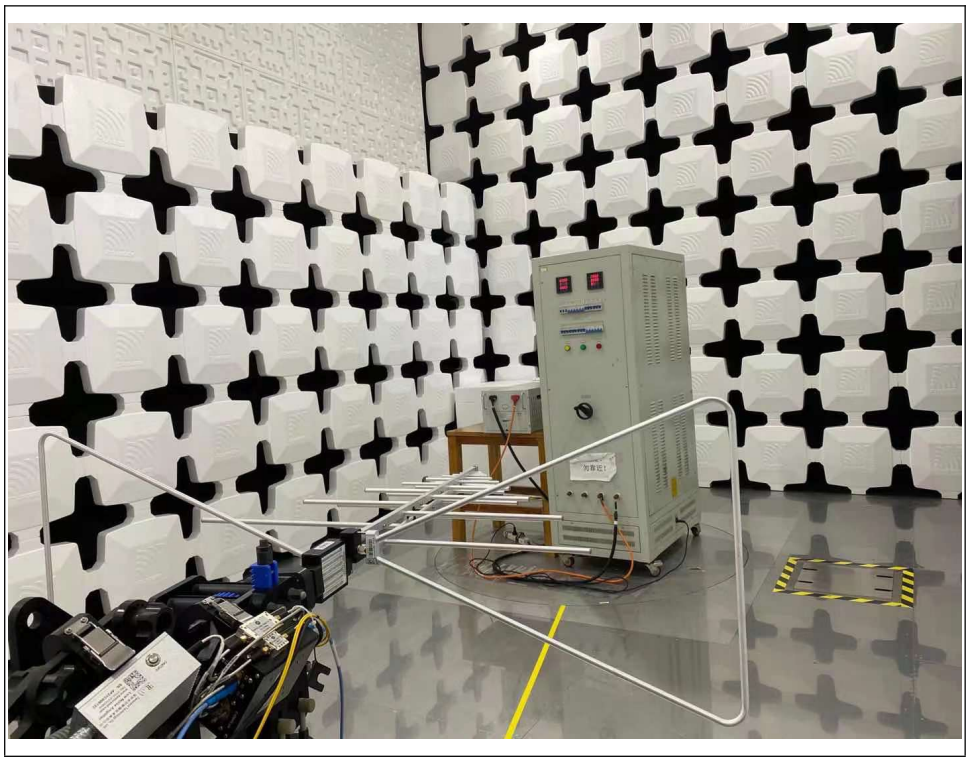
Temperature:	/
Relative Humidity:	/
Atmospheric Pressure:	/
Test Voltage:	/
Test Date:	/
Tested By:	/

13.5 Test Data and Result

Not applicable.

EXHIBIT A – PHOTOGRAPHS OF TEST SETUP

Radiated Emission Test Setup(30MHz-1000MHz)



ESD Immunity Test View

RS Immunity Test View (Below 1GHz)

RS Immunity Test View (Above 1GHz)

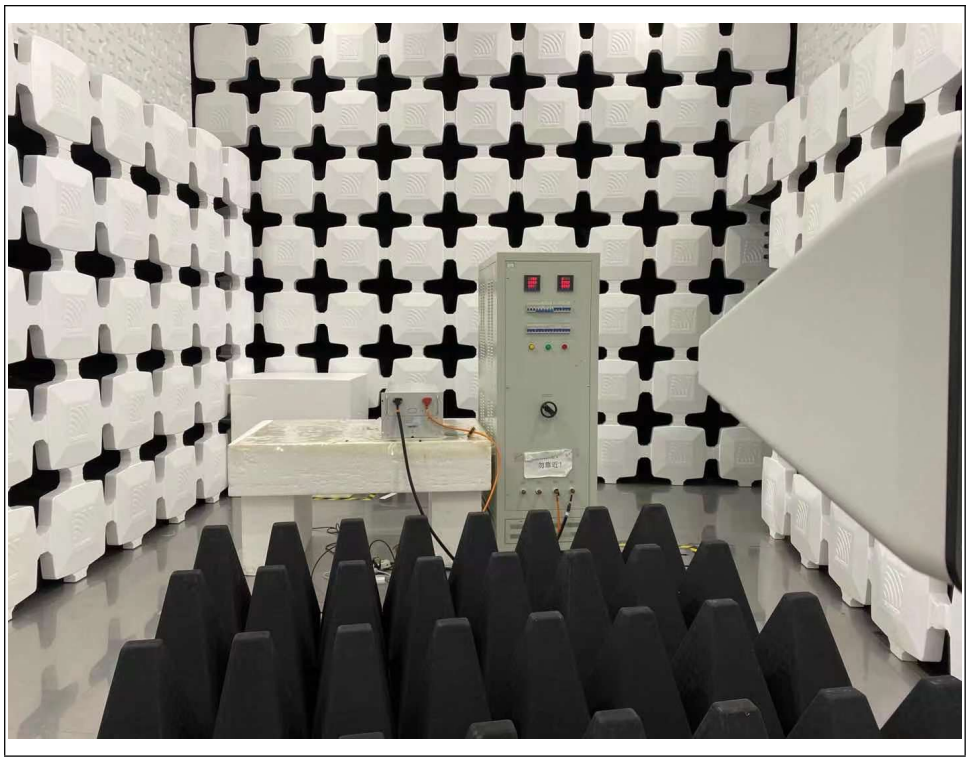


EXHIBIT B – PHOTOGRAPHS OF EUT

External photos

External photos

External photos

External photos

******* END OF REPORT *******

Appendix 1

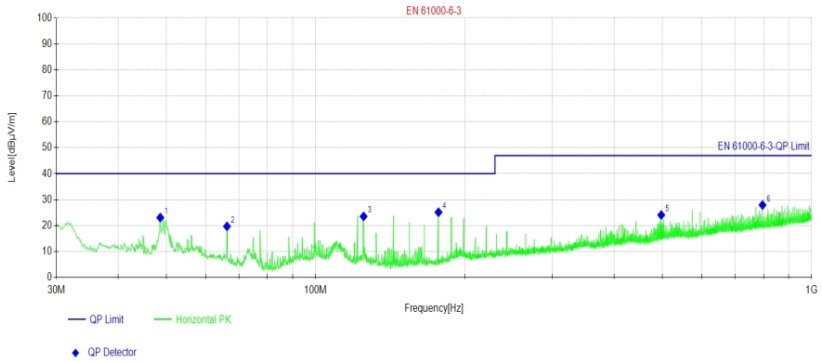
Radiated Emissions (Below 1GHz):

Test Report

Project Information			
Customer:		EUT:	Li-ion battery PACK
Model:	ESS-BM-38.4-200T	SN:	
Mode:	Discharging	Voltage:	DC 38.4V
Environment:	Temp: 25℃; Humi:60%	Engineer:	John Qu
Remark:			
Test Standard:			

Start of Test: 2021-06-26 15:06:49

Test Graph



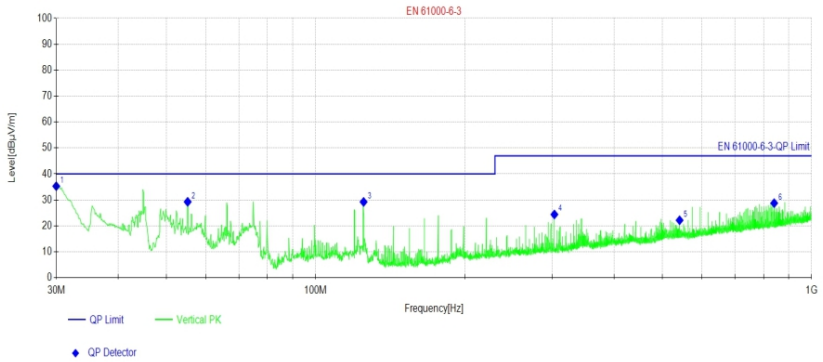
Final Data List								
NO.	Freq. [MHz]	Factor [dB]	QP Value [dBµV/m]	QP Limit [dBµV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
1	48.6259	-26.23	23.09	40.00	16.91	100	99	Horizonta
2	66.2816	-29.74	19.70	40.00	20.30	200	61	Horizonta
3	124.972	-31.01	23.54	40.00	16.46	100	62	Horizonta
4	176.969	-30.58	25.15	40.00	14.85	100	2	Horizonta
5	497.683	-20.45	24.08	47.00	22.92	200	323	Horizonta
6	796.376	-15.04	27.92	47.00	19.08	200	7	Horizonta

Test Report

Project Information			
Customer:		EUT:	Li-ion battery PACK
Model:	ESS-BM-38.4-200T	SN:	
Mode:	Discharging	Voltage:	DC 38.4V
Environment:	Temp: 25℃; Humi:60%	Engineer:	John Qu
Remark:			
Test Standard:			

Start of Test: 2021-06-26 15:09:09

Test Graph



Final Data List								
NO.	Freq. [MHz]	Factor [dB]	QP Value [dBµV/m]	QP Limit [dBµV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
1	30.0000	-30.30	35.29	40.00	4.71	100	40	Vertical
2	55.2225	-26.65	29.25	40.00	10.75	100	136	Vertical
3	124.972	-31.01	29.22	40.00	10.78	100	341	Vertical
4	303.082	-25.71	24.39	47.00	22.61	100	0	Vertical
5	541.920	-19.72	22.17	47.00	24.83	200	337	Vertical
6	840.613	-14.61	28.76	47.00	18.24	200	343	Vertical

***** END OF DATA *****