



Microtest
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Test Report

Report No.: MTi19090403-3E2

Date of issue: Sept. 29, 2019

Sample description: 6W IPX4 metal speaker

Model(s): P329.28X

Applicant:

Address:

Date of test: Sept. 04, 2019 – Sept. 29, 2019

Shenzhen Microtest Co., Ltd.
<http://www.mtitest.com>



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Table of Contents

1 General description.....	5
1.1 Feature of equipment under test (EUT)	5
1.2 Test mode	5
1.3 Test conditions.....	5
1.4 Ancillary equipment list.....	6
1.5 Measurement Uncertainty	7
2 Testing site.....	7
3 List of test equipment	8
4 EMC emission test.....	10
4.1 Conducted emission	10
4.2 Radiated emission	13
4.3 Harmonic current emission / Voltage fluctuations & flicker	19
5 Immunity test	20
5.1 Electrostatic discharge immunity (ESD)	20
5.2 RF electromagnetic field immunity (RS)	25
5.3 Fast transients immunity (EFT)	27
5.4 Surges immunity	29
5.5 Injected current immunity (CS)	31
5.6 Voltage interruptions voltage Dips	33
Photographs of the Test Setup.....	35
Photographs of the Test EUT.....	40



Test Result Certification	
Applicant's name:	
Address:	
Manufacture's name:	
Address:	
Product name:	6W IPX4 metal speaker
Trademark:	N/A
Model name:	P329.28X
Series model:	N/A
Standards:	Final draft ETSI EN 301 489-1 V2.2.2 (2019-09) (Draft) EN 301 489-17 V3.2.0 (2017-03)

This device described above has been tested by Shenzhen Microtest Co., Ltd. and the test results show that the equipment under test (EUT) is in compliance with the Radio equipment directive requirements. And it is applicable only to the tested sample identified in the report.

Tested by:

Danny Xu

Sept. 29, 2019

Reviewed by:

Blue Zheng

Sept. 29, 2019

Approved by:

Smith Chen

Sept. 29, 2019



Summary of Test Result

Item	Description of Test	Result
EMC emission		
1	Conducted emission	Pass
2	Radiated emission	Pass
3	Harmonic current emission	N/A*
4	Voltage fluctuations & flicker	Pass
Immunity		
1	Electrostatic discharge immunity (ESD)	Pass
2	Radiated electromagnetic field immunity(RS)	Pass
3	Fast transients / burst immunity (EFT)	Pass
4	Surge immunity	Pass
5	Conducted disturbance immunity (CS)	Pass
6	Voltage interruptions & voltage Dips immunity	Pass

*Not Applicable.



1 General description

1.1 Feature of equipment under test (EUT)

Product name:	6W IPX4 metal speaker
Model name:	P329.28X
Power source:	DC 5V from adapter AC 230V/50Hz or DC 3.7V from battery
Antenna designation:	PCB antenna (Antenna Gain: 0dBi)
Battery:	DC 3.7V 1200mAh
Specification:	N/A
Difference in series models:	N/A
BT	
Bluetooth version:	V5.0
Tx/Rx frequency range:	2402MHz~2480MHz

1.2 Test mode

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	Charging+BT

For Conducted Test	
Final Test Mode	Description
Mode 1	Charging+BT

For Radiated Test	
Final Test Mode	Description
Mode 1	Charging+BT

For EMS Test	
Pretest Mode	Description
Mode 1	Charging+BT

NOTE: The test modes were carried out for all operation modes. The final test mode of the EUT was the worst test mode for EMI, and its test data was showed.

1.3 Test conditions

During the measurement the environmental conditions were within the listed ranges:

- Temperature: 15°C~35°C



- Humidity: 20%~75% (30%~60% for ESD test)
- Atmospheric pressure: 98kPa~101kPa

1.4 Ancillary equipment list

Equipment	Model	S/N	Manufacturer
Adapter	XED-CE050100CU	/	Shenzhen XED Power Supply Co., Ltd.
iPhone	/	/	/



1.5 Measurement Uncertainty

Measurement Uncertainty for a Level of Confidence of 95 %, $U=2 \times U_c(y)$

Conducted emission(150kHz~30MHz)	± 2.5 dB
Radiated emission(30MHz~1GHz)	± 4.2 dB
Radiated emission (above 1GHz)	± 4.3 dB
Temperature	± 1 degree
Humidity	± 5 %

2 Testing site

Test laboratory:	Shenzhen Microtest Co., Ltd.
Laboratory location:	No.102A & 302A, East Block, Hengfang Industrial Park, Xingye Road, Xixiang, Bao'an District, Shenzhen, Guangdong, China
CNAS Registration No.:	L5868
Telephone:	(86-755)88850135
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3 List of test equipment

Emission test:

Equipment	Manufacturer	Model	Serial No.	Calibration Due	Expiration date
EMI Test Receiver	Rohde&schwarz	ESCI3	101368	2018/10/09	2019/10/08
EMI Test Receiver	Rohde&schwarz	ESPI7	100314	2018/10/09	2019/10/08
TRILOG Broadband Antenna	schwarabeck	VULB 9163	9163-872	2018/10/15	2020/10/14
EMI Absorbing Clamp	Schwarzbeck	MDS 21 B	P1511152040	2018/10/10	2019/10/09
amplifier	Hewlett-Packard	8447D	3113A06150	2018/10/09	2019/10/08
Artificial mains network	Schwarzbeck	NSLK 8127	#841	2018/10/09	2019/10/08
Artificial mains network	Schwarzbeck	NSLK 8127	#183	2018/10/09	2019/10/08
EMI Test Receiver	Rohde&schwarz	ESCS30	100210	2019/05/21	2020/05/20
Pulse limiter	Schwarzbeck	VSTD 9561-F	00351	2019/04/29	2020/04/28
Artificial mains network	Rohde&schwarz	ESH2-Z5	100263	2019/04/16	2020/04/15
Power amplifier	Space-Dtroniccs	EWLNA0118G-P40	1852001	2019/04/29	2020/04/28
Harmonics & Flicker Analyser	Laplace Instruments LTD	AC 2000A	311216	2018/10/09	2019/10/08

Immunity test:

Equipment	Manufacturer	Model	Serial No.	Calibration Due	Expiration date
ESD Simulator	Schloder	SESD 30000	509325	2018/10/10	2019/10/09
Electrical Fast Transient Generator	HTEC Instrument Ltd.	HEFT 51	153701	2018/10/09	2019/10/08
Surge Generator	HTEC Instrument Ltd.	HCWG 51	153702	2018/10/09	2019/10/08
power frequency magnetic field generator	HTEC Instrument Ltd.	HPFMF 100	153703	2018/10/09	2019/10/08
Single-phase frequency conversion power supply	shenzhen tongyuan	TY-8205	20150916809	2018/10/09	2019/10/08
Three-phase frequency conversion power supply	shenzhen tongyuan	TY-8210	20150916809	2018/10/09	2019/10/08
Cycle Sag Simulator	Prima	DRP61011A G	PR15056303	2018/10/09	2019/10/08
AC power source	MToni	PHF-5010	/	2018/10/09	2019/10/08



RS equipment:

Equipment	Manufacturer	Model	Serial No.	Calibration Due	Equipment
Thermometer clock humidity monitor	-	HTC-1	/	2019/05/06	2020/05/05
EPM Series Power Meter	Agilent	E4419B	MY50000438	2019/04/16	2021/04/15
E-Series AVG Power Sensor	Agilent	E9304A H18	GB41290699	2019/04/16	2021/04/15
E-Series AVG Power Sensor	Agilent	E9304A H18	US39212422	2019/04/16	2021/04/15
Power Amplifier	micotop	MPA-80-100 0-250	MPA1903081	2019/04/16	2020/04/15
Power Amplifier	micotop	MPA-1000-6 000-75	MPA1903082	2019/04/16	2020/04/15
Power Amplifier	micotop	MPA-80-100 0-600	MPA1905172	2019/06/17	2020/06/16
Power Amplifier	micotop	MPA-1000-3 200-400	MPA1906232	2019/06/17	2020/06/16
MXG RF Signal Generator	Agilent	N5181A	MY50144755	2019/04/16	2020/04/15
stacked Log. Per. Broadband Antenna	Schwarzbeck	STLP 9129	9129 113	2019/02/14	2021/02/13
Three-phase frequency conversion power supply	shenzhen tongyuan	TY-8330	2017101302651	2019/04/16	2020/04/15
DC power source	shenzhen tongyuan	TY-500V 100A	201710190325689	2019/04/16	2020/04/15
Stacked Double Log. per. Antenna	Schwarzbeck	STLP 9128 E	3091	2019/05/27	2021/05/26
Broadband High Gain Horn Antenna	Schwarzbeck	BBHA 9120 J	00212	2019/05/27	2021/05/26
Flat broadband antenna	Schwarzbeck	420NJ	#732	2019/05/27	2021/05/26

Note: The calibration interval of the above test instruments is 12 or 24 months and the calibrations are traceable to international system unit (SI).



4 EMC emission test

4.1 Conducted emission

4.1.1 Limits

Frequency (MHz)	Class A (dBμV)		Class B (dBμV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 -0.5	79	66	66 - 56 *	56 - 46 *
0.5 -5	73	60	56	46
5 -30	73	60	60	50

4.1.2 Test Procedures

The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through an Artificial mains networks (AMN). All other support equipment powered from additional AMN. The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

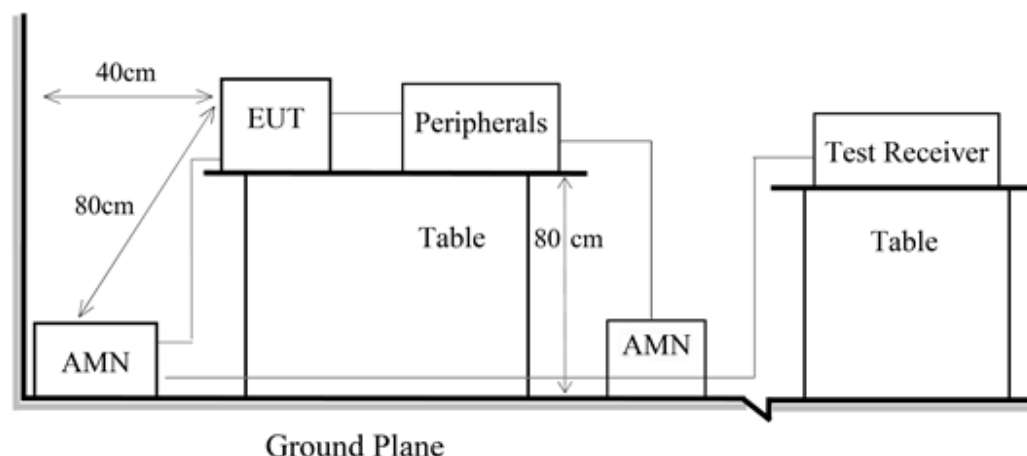
I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

AMN is at least 80 cm from nearest part of EUT chassis.

Setup of the receiver

Frequency	Detector	Setting
0.15MHz – 30MHz	QP	IF bandwidth: 9kHz

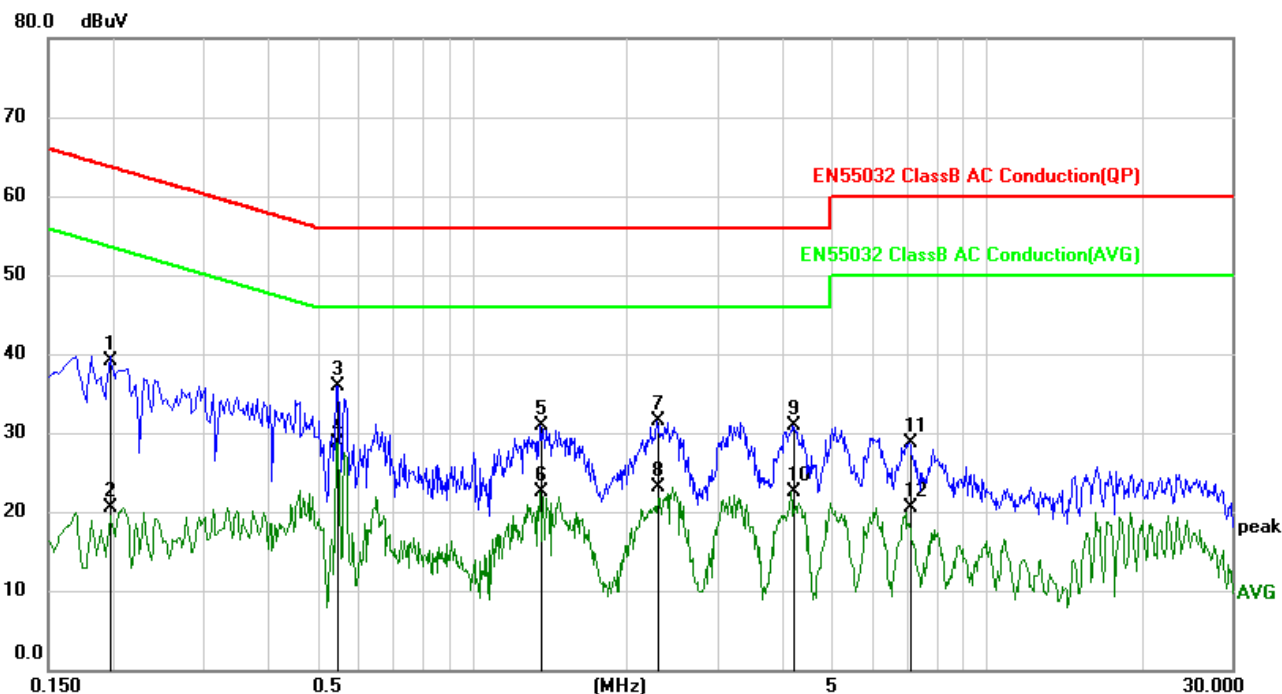
4.1.3 Test setup





4.1.4 Test Result

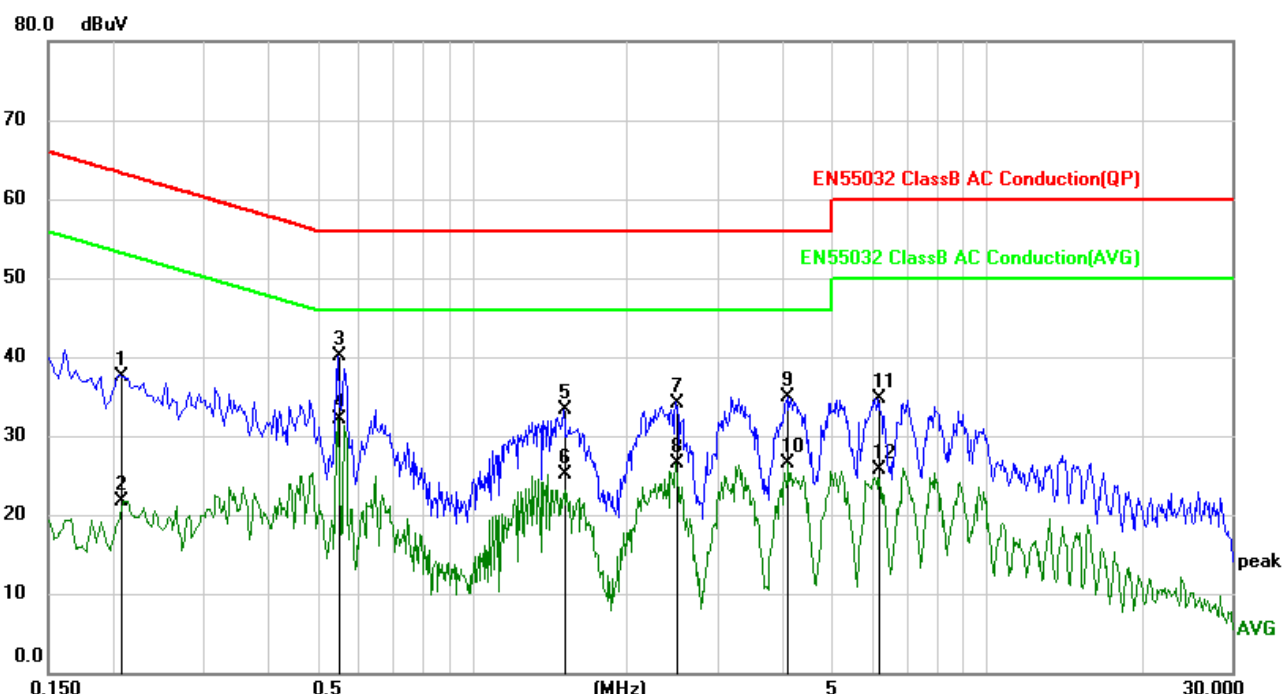
EUT:	6W IPX4 metal speaker	Model Name:	P329.28X
Pressure:	101kPa	Phase:	L
Test voltage:	DC 5V from Adapter AC 230V/50Hz	Test mode:	Mode 1



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1		0.1985	29.33	9.73	39.06	63.67	-24.61	QP
2		0.1985	10.73	9.73	20.46	53.67	-33.21	AVG
3		0.5460	25.95	9.93	35.88	56.00	-20.12	QP
4	*	0.5460	18.74	9.93	28.67	46.00	-17.33	AVG
5		1.3580	20.90	9.99	30.89	56.00	-25.11	QP
6		1.3580	12.44	9.99	22.43	46.00	-23.57	AVG
7		2.2860	21.48	10.01	31.49	56.00	-24.51	QP
8		2.2860	13.01	10.01	23.02	46.00	-22.98	AVG
9		4.2219	20.81	10.05	30.86	56.00	-25.14	QP
10		4.2219	12.50	10.05	22.55	46.00	-23.45	AVG
11		7.0900	18.46	10.18	28.64	60.00	-31.36	QP
12		7.0900	10.33	10.18	20.51	50.00	-29.49	AVG



EUT:	6W IPX4 metal speaker	Model Name:	P329.28X
Pressure:	101kPa	Phase:	N
Test voltage:	DC 5V from Adapter AC 230V/50Hz	Test mode:	Mode 1



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1		0.2083	27.83	9.73	37.56	63.27	-25.71	QP
2		0.2083	11.98	9.73	21.71	53.27	-31.56	AVG
3		0.5500	30.22	9.93	40.15	56.00	-15.85	QP
4	*	0.5500	22.18	9.93	32.11	46.00	-13.89	AVG
5		1.5100	23.30	9.99	33.29	56.00	-22.71	QP
6		1.5100	15.18	9.99	25.17	46.00	-20.83	AVG
7		2.4900	24.19	10.01	34.20	56.00	-21.80	QP
8		2.4900	16.56	10.01	26.57	46.00	-19.43	AVG
9		4.1100	24.76	10.05	34.81	56.00	-21.19	QP
10		4.1100	16.43	10.05	26.48	46.00	-19.52	AVG
11		6.1579	24.64	10.13	34.77	60.00	-25.23	QP
12		6.1579	15.67	10.13	25.80	50.00	-24.20	AVG



4.2 Radiated emission

4.2.1 Limits

Frequency (MHz)	Class B Limit (dB μ V/m)		Class A Limit (dB μ V/m)	
	Quasi-peak/Peak	Average	Quasi-peak/Peak	Average
30 ~ 230	40 (at 3m)	/	50 (at 3m)	/
230 ~ 1000	47 (at 3m)	/	57 (at 3m)	/
1000 ~ 3000	70 (at 3m)	50 (at 3m)	76 (at 3m)	56 (at 3m)
3000 ~ 6000	74 (at 3m)	54 (at 3m)	80 (at 3m)	60 (at 3m)

4.2.2 Test Procedures

- The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- For the actual test configuration, please refer to the related item –EUT Test Photos.

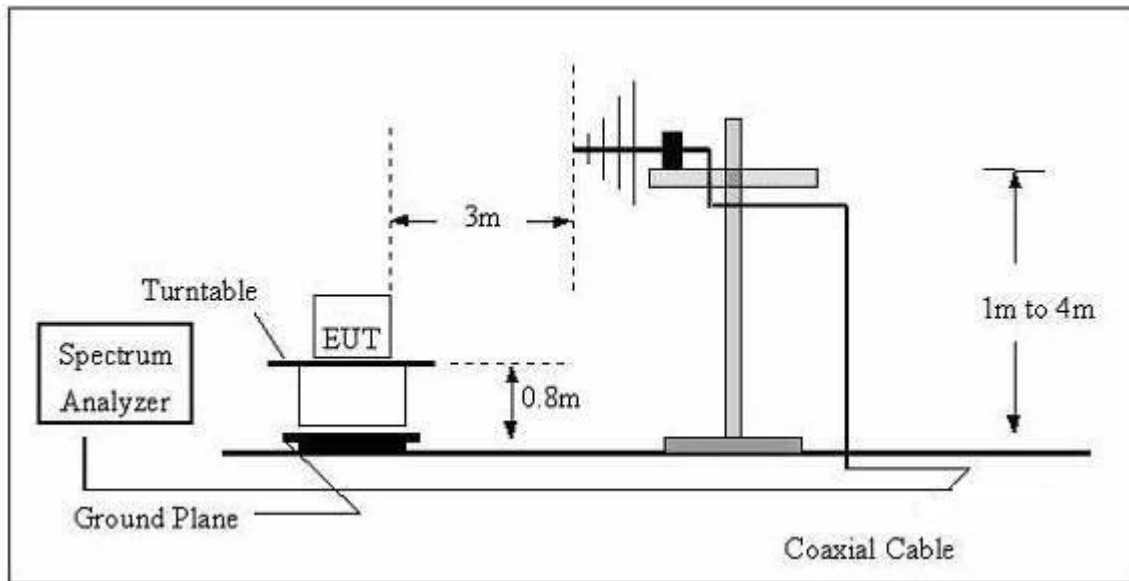
Setup of receiver

Frequency	Detector	Setting
30MHz – 1GHz	QP	IF bandwidth: 120kHz
Above 1GHz	Peak	RBW: 1MHz, VBW: 3MHz
	AV	RBW: 1MHz, VBW: 10Hz

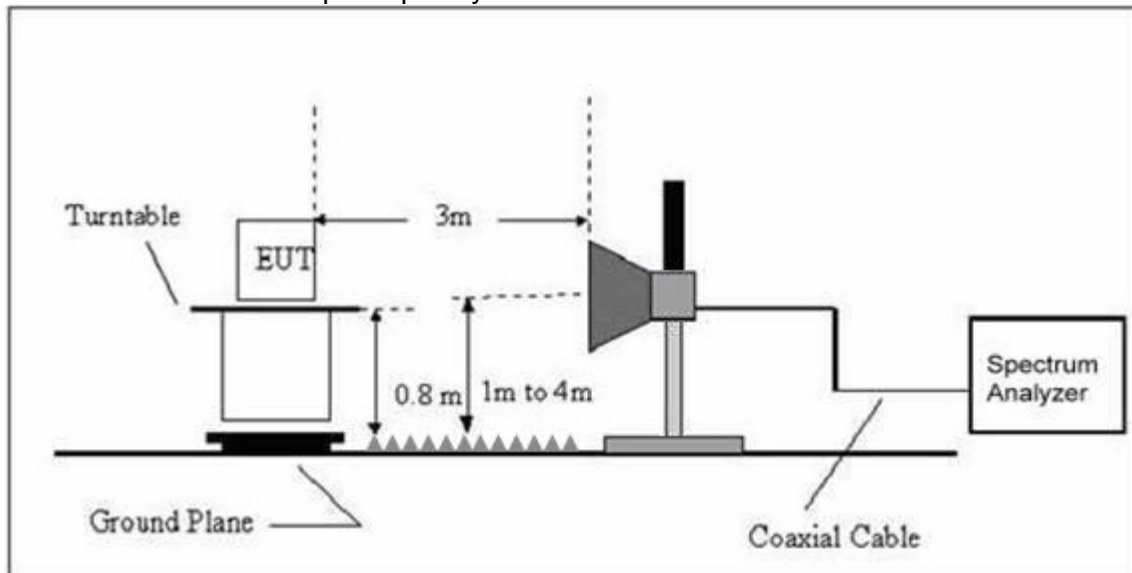


4.2.3 Test Setup

Radiated Emission Test Set-Up Frequency Below 1 GHz



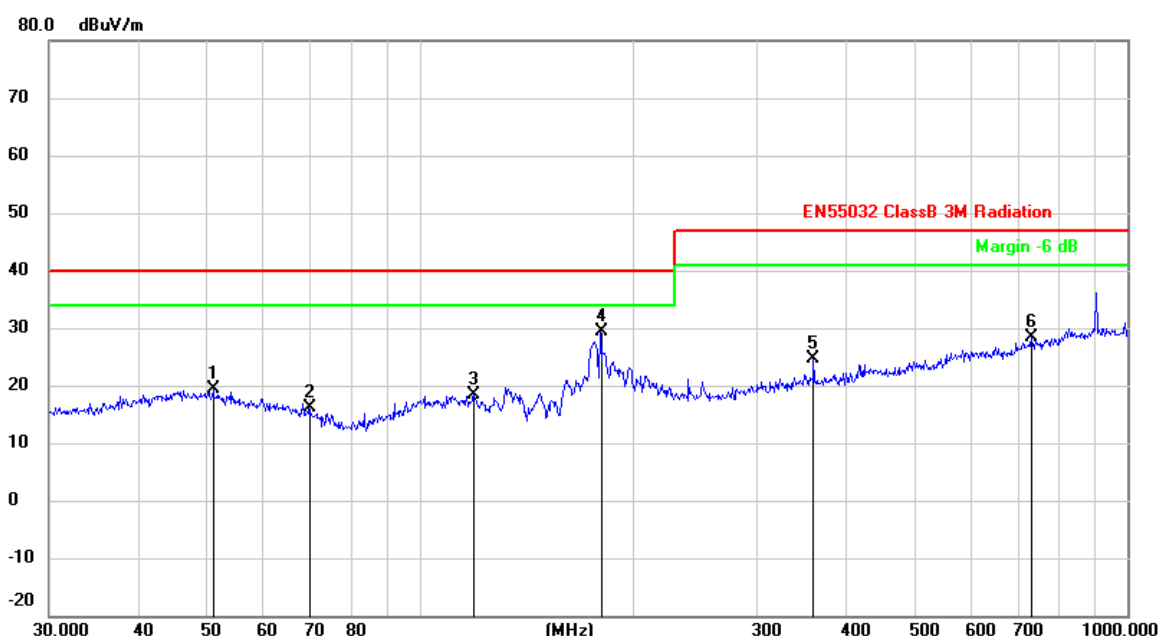
Radiated Emission Test Set-Up Frequency Above 1GHz





4.2.4 Test Result

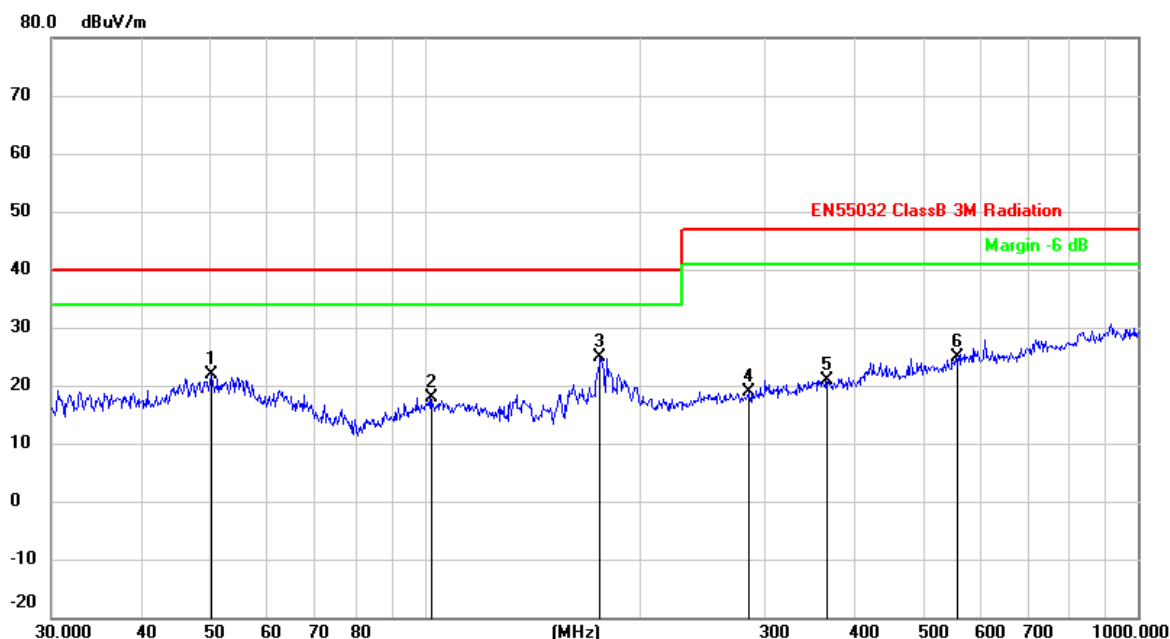
EUT:	6W IPX4 metal speaker	Model Name:	P329.28X
Pressure:	101kPa	Polarization:	Horizontal
Test voltage:	DC 5V from adapter AC 230V/50Hz	Test mode:	Mode 1



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	
		MHz	Level	Factor	ment			
			dBuV	dBuV/m	dBuV/m	dBuV/m	dB	Detector
1		51.1208	25.99	-6.70	19.29	40.00	-20.71	QP
2		69.8450	25.86	-9.73	16.13	40.00	-23.87	QP
3		119.4360	26.82	-8.52	18.30	40.00	-21.70	QP
4	*	180.0165	38.43	-9.16	29.27	40.00	-10.73	QP
5		360.4476	28.46	-3.80	24.66	47.00	-22.34	QP
6		731.9202	27.16	1.17	28.33	47.00	-18.67	QP



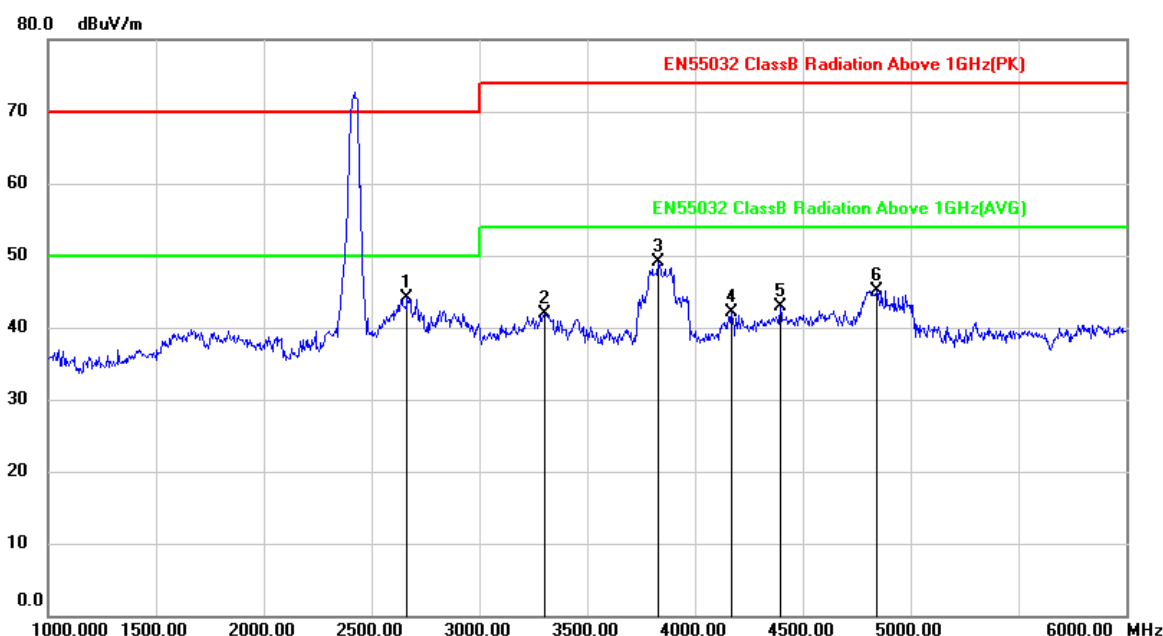
EUT:	6W IPX4 metal speaker	Model Name:	P329.28X
Pressure:	101kPa	Polarization:	Vertical
Test voltage:	DC 5V from adapter AC 230V/50Hz	Test mode:	Mode 1



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dBuV/m	dBuV/m	dBuV/m	dB	Detector
1		50.2324	28.46	-6.56	21.90	40.00	-18.10	QP
2		102.0014	25.61	-7.79	17.82	40.00	-22.18	QP
3	*	176.2686	34.04	-9.27	24.77	40.00	-15.23	QP
4		284.9766	24.36	-5.42	18.94	47.00	-28.06	QP
5		365.5391	24.66	-3.84	20.82	47.00	-26.18	QP
6		556.7744	26.15	-1.29	24.86	47.00	-22.14	QP



EUT:	6W IPX4 metal speaker	Model Name:	P329.28X
Pressure:	101kPa	Polarization:	Horizontal
Test voltage:	DC 5V from adapter AC 230V/50Hz	Test mode:	Mode 1



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over
		MHz	dBuV	dBuV/m	dBuV/m	dBuV/m	dB Detector
1		2665.000	51.49	-7.29	44.20	70.00	-25.80 peak
2		3300.000	46.53	-4.69	41.84	74.00	-32.16 peak
3	*	3830.000	52.35	-3.30	49.05	74.00	-24.95 peak
4		4170.000	45.78	-3.58	42.20	74.00	-31.80 peak
5		4395.000	47.78	-4.85	42.93	74.00	-31.07 peak
6		4840.000	52.55	-7.38	45.17	74.00	-28.83 peak

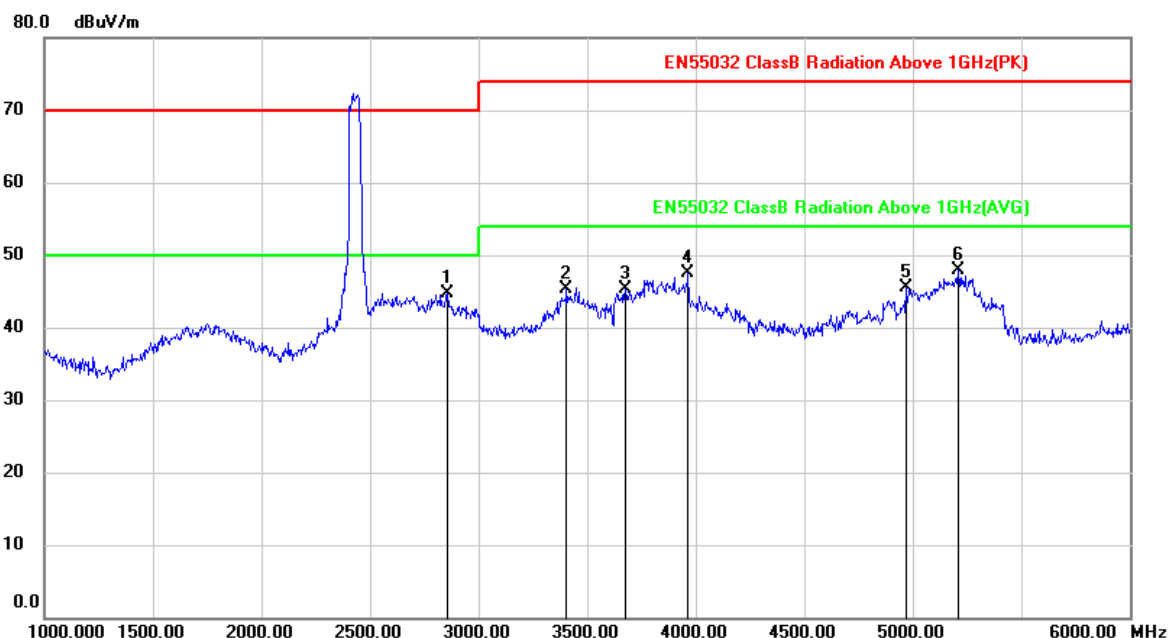
Note 1: The test modes were carried out for all operation modes. The worst test mode for test data was showed in the report.

2: Exceeding the emission limit is the main frequency.

3: Peak test margin is greater than 20dBm, so AVG is also pass.



EUT:	6W IPX4 metal speaker	Model Name:	P329.28X
Pressure:	101kPa	Polarization:	Vertical
Test voltage:	DC 5V from adapter AC 230V/50Hz	Test mode:	Mode 1



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dBuV/m	dBuV/m	dBuV/m	dB	Detector
1	*	2855.000	52.16	-7.54	44.62	70.00	-25.38	peak
2		3405.000	51.40	-6.15	45.25	74.00	-28.75	peak
3		3675.000	50.66	-5.38	45.28	74.00	-28.72	peak
4		3965.000	51.87	-4.34	47.53	74.00	-26.47	peak
5		4970.000	55.23	-9.82	45.41	74.00	-28.59	peak
6		5210.000	57.42	-9.60	47.82	74.00	-26.18	peak

Note 1: The test modes were carried out for all operation modes. The worst test mode for test data was showed in the report.

2: Exceeding the emission limit is the main frequency.

3: Peak test margin is greater than 20dBm, so AVG is also pass.



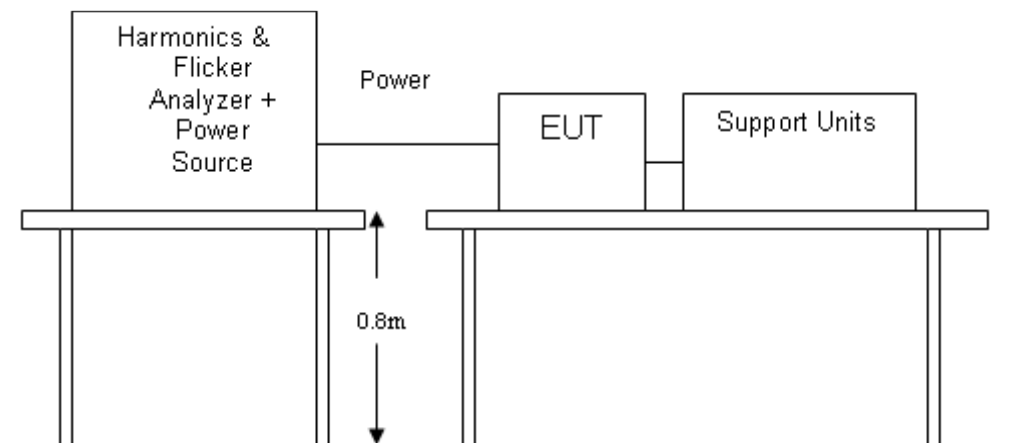
4.3 Harmonic current emission / Voltage fluctuations & flicker

4.3.1 Test Procedures

The EUT was installed and placed on a non-conductive table and operated to produce the maximum harmonic components under normal operating conditions for each successive harmonic component in turn.

The correspondent test program of test instrument to measure the current harmonics / voltage fluctuations & flicker emanated from EUT. The measure time shall be not less than the time necessary for the EUT to be exercised.

4.3.2 Test Setup



4.3.3 Test Result

Harmonic current emission:

N/A, the rated power of EUT is below 75W.

Voltage fluctuations & flicker:

EUT:	6W IPX4 metal speaker	Model Name:	P329.28X
Pressure:	101kPa	Test mode:	Mode 1

	Pst	dc (%)	dmax (%)	d(t) > 3.3% (ms)
Limit	1.000	3.300	4.000	500
Reading	0.12	0.38	0.81	0



5 Immunity test

5.1 Electrostatic discharge immunity (ESD)

5.1.1 Test Method

The test method shall be in accordance with EN 61000-4-2.

For radio equipment and ancillary equipment the following requirements and evaluation of test results shall apply.

The test severity level for contact discharge shall be 4 kV and for air discharge 8kV. All other details, including intermediate test levels, are contained within EN 61000-4-2.

Electrostatic discharges shall be applied to all exposed surfaces of the EUT except where the user documentation specifically indicates a requirement for appropriate protective measures (see EN 61000-4-2).

5.1.2 Performance criteria

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

Criteria	During the test	After the 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

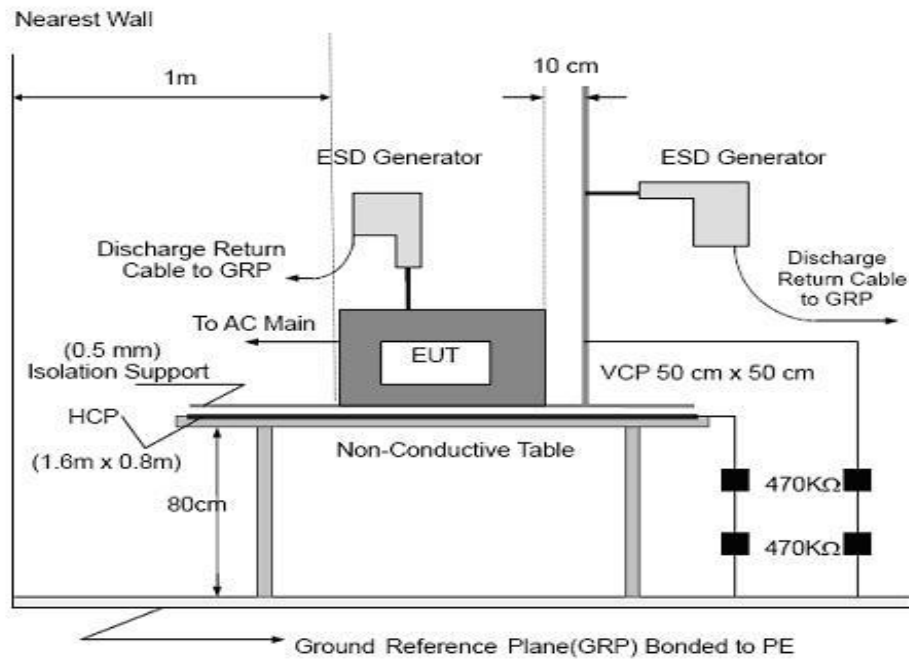
The performance criteria A shall apply. Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an Acknowledgement (ACK) or Not Acknowledgement (NACK) transmission may 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.



5.1.3 Test Setup





5.1.4 Test Result

EUT:	6W IPX4 metal speaker	Model Name:	P329.28X
Pressure:	101kPa	Test mode:	Mode 1

Indirect discharge

Test Point	Contact discharge level (kV)	Number and polarity	Criterion met	Criterion Required
1. VCP-Front side	<input type="checkbox"/> ..2 <input checked="" type="checkbox"/> ..4	10 (+)	A	B
	<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	10 (-)	A	
2.VCP-Rear side	<input type="checkbox"/> ..2 <input checked="" type="checkbox"/> ..4	10 (+)	A	
	<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	10 (-)	A	
3.VCP-Left side	<input type="checkbox"/> ..2 <input checked="" type="checkbox"/> ..4	10 (+)	A	
	<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	10 (-)	A	
4. VCP-Right side	<input type="checkbox"/> ..2 <input checked="" type="checkbox"/> ..4	10 (+)	A	
	<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	10 (-)	A	
5. HCP	<input type="checkbox"/> ..2 <input checked="" type="checkbox"/> ..4	10 (+)	A	
	<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	10 (-)	A	

Result: Compliance.

Direct discharge

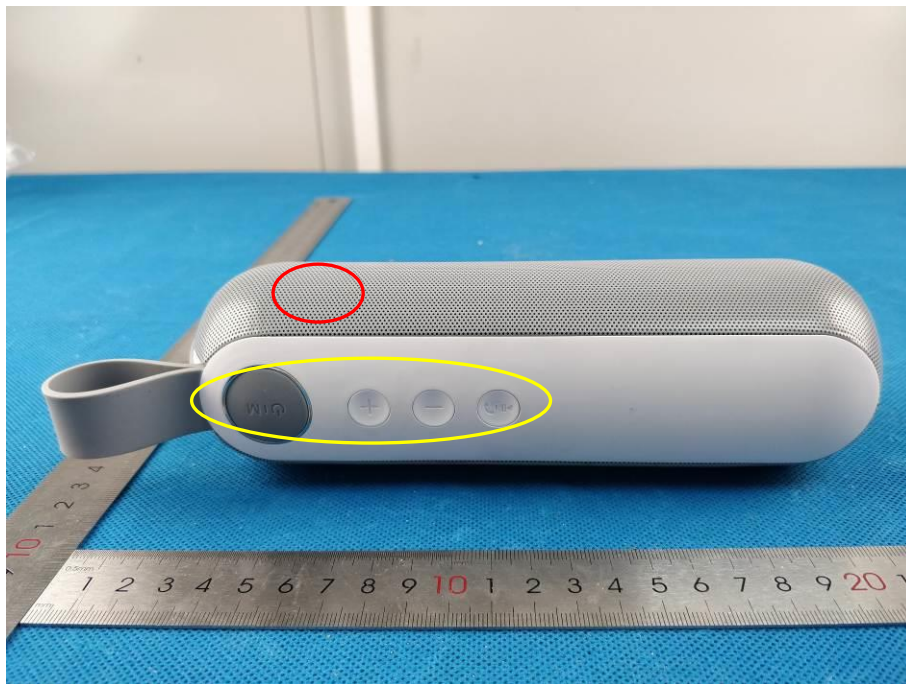
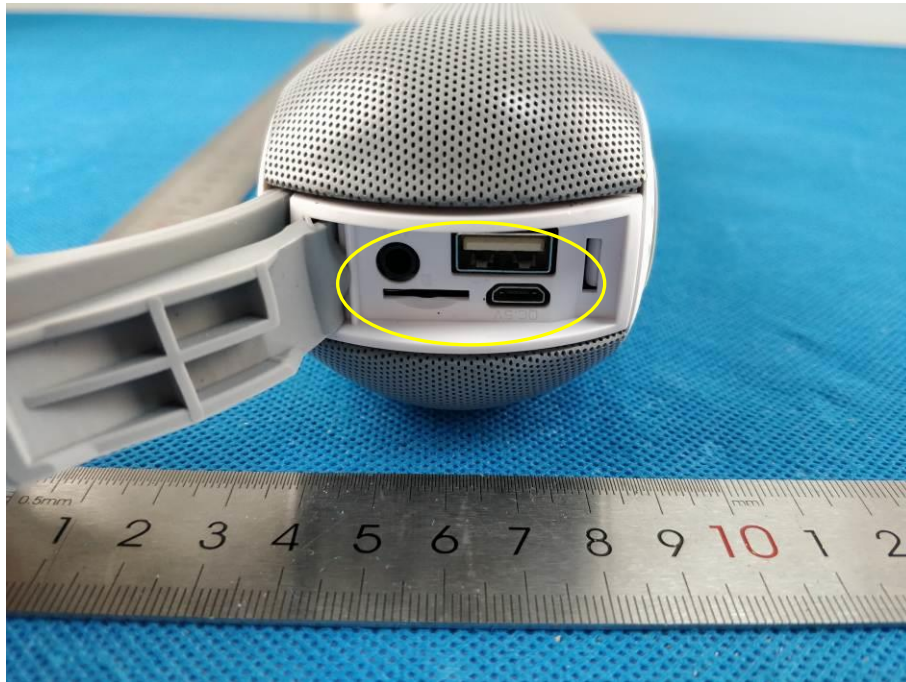
Test Point	Contact discharge level (kV)	Air discharge level (kV)	Number and polarity	Criterion met	Criterion Required
1. Each nonconductive location touchable by hand	<input type="checkbox"/> ..2 <input type="checkbox"/> ..4	<input type="checkbox"/> ..2 <input type="checkbox"/> ..4	10 (+)	A	B
	<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	<input type="checkbox"/> ..6 <input checked="" type="checkbox"/> ..8	10 (-)	A	
1. Each conductive location touchable by hand	<input type="checkbox"/> ..2 <input checked="" type="checkbox"/> ..4	<input type="checkbox"/> ..2 <input type="checkbox"/> ..4	10 (+)	A	
	<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	10 (-)	A	

Result: compliance.

Note1: Please see the photographs below about the details of test points.



Test location



Note: Yellow circle for Air Discharge, Red circle for Contact Discharge.



5.2 RF electromagnetic field immunity (RS)

5.2.1 Test Method

The test method shall be in accordance with EN 61000-4-3.

The following requirements and evaluation of test results shall apply:

- the test level shall be 3V/m (measured unmodulated). The test signal shall be amplitude modulated to a depth of 80% by a sinusoidal audio signal of 1000Hz. If the wanted signal is modulated at 1000Hz, then an audio signal of 400Hz shall be used;
- the test shall be performed over the frequency range 80 MHz to 6 000 MHz with the exception of the exclusion band for transmitters, receivers and duplex transceivers, as appropriate;
- for receivers and transmitters the stepped frequency increments shall be 1 % frequency increment of the momentary used frequency,.
- the dwell time of the test phenomena at each frequency shall not be less than the time necessary for the EUT to be exercised and to be able to respond.

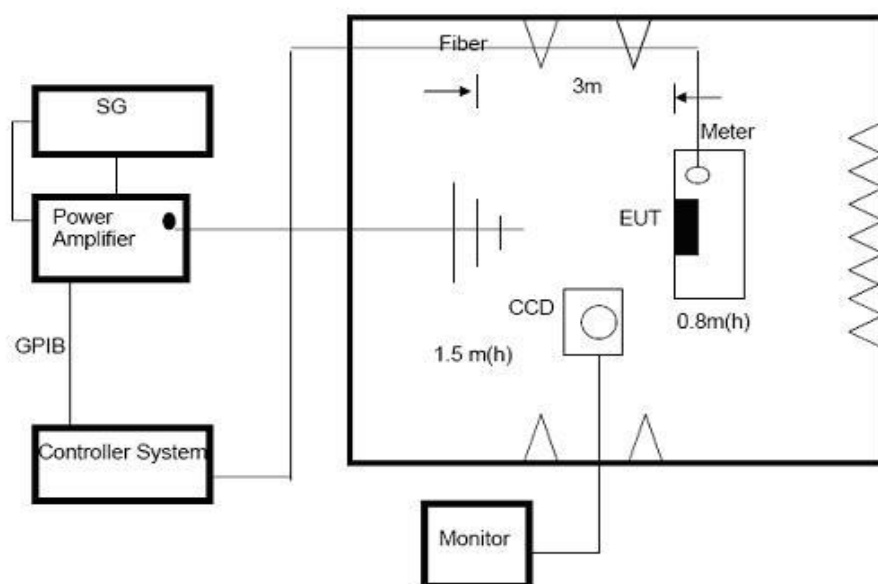
5.2.2 Performance criteria

For transmitters the performance criteria for continuous phenomena for transmitters shall apply.

For receivers the performance criteria for continuous phenomena for receivers shall apply.

For ancillary equipment the pass/failure criteria supplied by the manufacturer shall apply, unless the ancillary equipment is tested in connection with a receiver or transmitter in which case the corresponding performance criteria above shall apply.

5.2.3 Test setup





5.2.4 Test Result

EUT:	6W IPX4 metal speaker	Model Name:	P329.28X
Pressure:	101kPa	Test mode:	Mode 1

Frequency Range (MHz)	RF Field Position	R.F. Field Strength	Azimuth	Criterion met	Criterion Required
80~6000	H / V	3 V/m (rms) AM Modulated 1000Hz, 80%	Front	A	A
			Rear		
			Left		
			Right		

Result: compliance.

Note:

1. The exclusion band has not been tested in 80MHz~6GHz.

The exclusion band for immunity testing of equipment operating in the 2,4 GHz band shall be: •

lower limit of exclusion band = lowest allocated band edge frequency -120 MHz, i.e. 2 280 MHz; •

upper limit of exclusion band = highest allocated band edge frequency +120 MHz, i.e. 2 603,5MHz.

2. "A" stand for, during test, operate as intended no loss of function, no degradation of performance, no unintentional transmissions and after test, no degradation of performance, no loss of function, no loss of stored data or user programmable functions.



5.3 Fast transients immunity (EFT)

5.3.1 Test Procedures

The test method shall be in accordance with EN 61000-4-4.

The following requirements and evaluation of test results shall apply:

- the test level for signal ports, telecommunication ports, and control ports shall be 0.5kV open circuit voltage at a repetition rate of 5kHz as given in EN 61000-4-4;
- the test level for DC power input ports shall be 0.5kV open circuit voltage as given EN 61000-4-4;
- the test level for AC mains power input ports shall be 1kV open circuit voltage as given EN 61000-4-4.

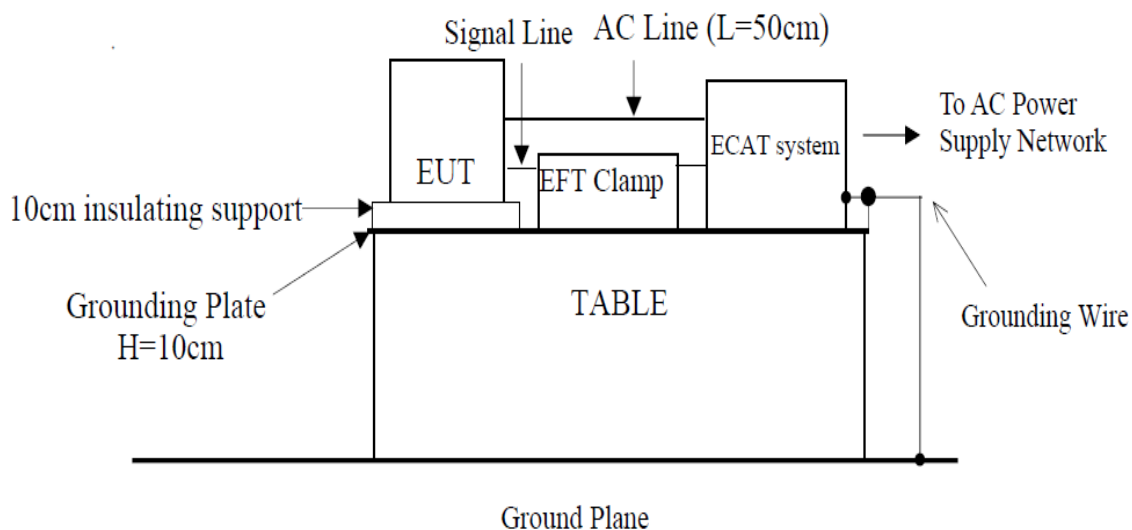
5.3.2 Performance criteria

For transmitters the performance criteria for transient phenomena for transmitter shall apply.

For receivers the performance criteria for transient phenomena for receivers shall apply.

For ancillary equipment the pass/failure criteria supplied by the manufacturer shall apply, unless the ancillary equipment is tested in connection with a receiver or transmitter in which case the corresponding performance criteria shall apply.

5.3.3 Test Setup





5.3.4 Test Result

EUT:	6W IPX4 metal speaker	Model Name:	P329.28X
Pressure:	101kPa	Test mode:	Mode 1

Port Type	Injected Line	Test Voltage	Criterion met	Criterion Required
AC Mains	L	±1kV	A	B
	N	±1kV	A	B
	L+N	±1kV	A	B

Result: compliance.



5.4 Surges immunity

5.4.1 Test Method

The test method shall be in accordance with EN 61000-4-5.

Test method for telecommunication ports directly connected to outdoor cables:

The test level for telecommunications ports, intended to be directly connected to the telecommunications network via outdoor cables, shall be 1kV line to ground as given in EN 61000-4-5, however, in telecommunications centres 0.5kV line to ground shall be used. In this case the total output impedance of the surge generator shall be in accordance with the basic standard EN 61000-4-5. The test generator shall provide the 1.2/50 μ s pulse as defined in EN 61000-4-5.

Test method for telecommunication ports connected to indoor cables:

The test level for telecommunication ports, intended to be connected to indoor cables (longer than 10m) shall be 0.5kV line to ground. In this case the total output impedance of the surge generator shall be in accordance with the basic standard EN 61000-4-5. The test generator shall provide the 1.2/50 μ s pulse as defined in EN 61000-4-5.

Test method for mains ports:

The test level for ac mains power input ports shall be 2kV line to ground, and 1kV line to line, with the output impedance of the surge generator as given in EN 61000-4-5. In telecom centres 1kV line to ground and 0.5kV line to line shall be used. The test generator shall provide the 1.2/50 μ s pulse as defined in EN 61000-4-5.

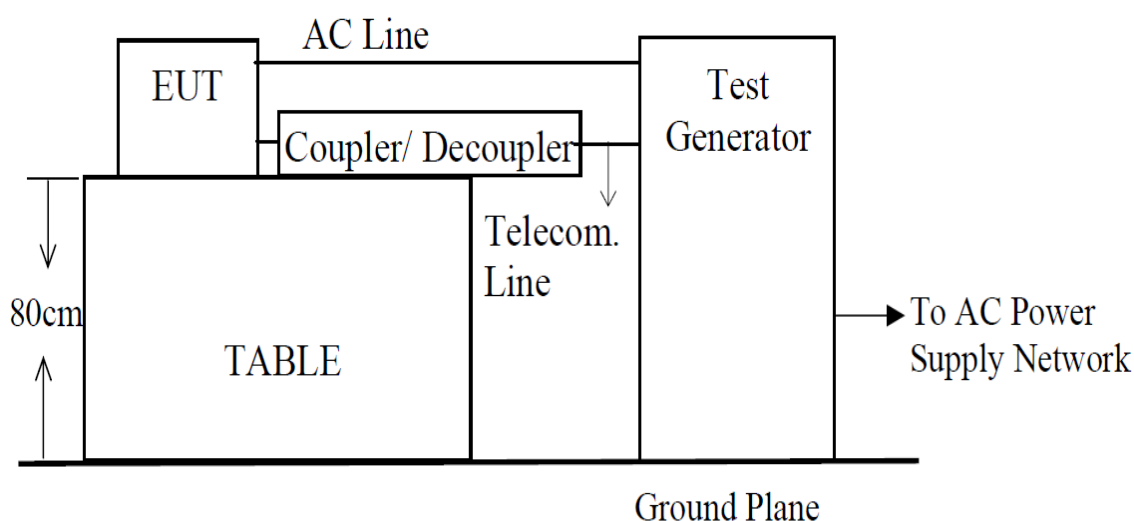
5.4.2 Performance criteria

For transmitters the performance criteria for transient phenomena for transmitters shall apply.

For receivers the performance criteria for transient phenomena for receivers shall apply.

For ancillary equipment the pass/failure criteria supplied by the manufacturer shall apply, unless the ancillary equipment is tested in connection with a receiver or transmitter in which case the corresponding performance criteria above shall apply.

5.4.3 Test Setup





5.4.4 Test Result

EUT:	6W IPX4 metal speaker	Model Name:	P329.28X
Pressure:	101kPa	Test mode:	Mode 1

Port Type	Injected Line	Test Voltage	Criterion met	Criterion Required
AC Mains	L – N	$\pm 0.5\text{kV}$, $\pm 1\text{kV}$	A	A

Result: Compliance.



5.5 Injected current immunity (CS)

5.5.1 Test Method

The test method shall be in accordance with EN 61000-4-6.

The following requirements and evaluation of test results shall apply:

- the test level shall be severity level 2 as given in EN 61000-4-6 corresponding to 3V rms unmodulated. The test signal shall then be amplitude modulated to a depth of 80% by a sinusoidal audio signal of 1000Hz. If the wanted signal is modulated at 1000Hz, then the test signal of 400Hz shall be used;
- the test shall be performed over the frequency range 150kHz to 80MHz with the exception of an exclusion band for transmitters, and for receivers and duplex transceivers;
- for receivers and transmitters the stepped frequency increments shall be 1% frequency increment of the momentary frequency in the frequency range 150kHz to 80MHz;
- the injection method to be used shall be selected according to the basic standard EN 61000-4-6;
- responses on receivers or receiver parts of transceivers occurring at discrete frequencies which are narrow band responses (spurious responses), are disregarded from the test;

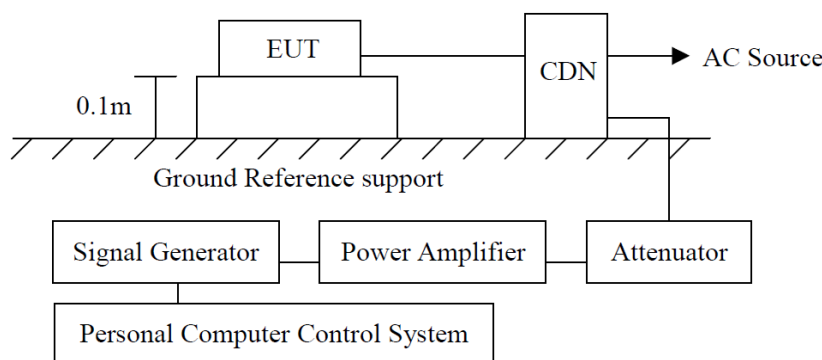
5.5.2 Performance criteria

For transmitters the performance criteria for continuous phenomena for transmitter shall apply.

For receivers the performance criteria for continuous phenomena for receivers shall apply.

For ancillary equipment the pass/failure criteria supplied by the manufacturer shall apply, unless the ancillary equipment is tested in connection with receivers or transmitters in which case the corresponding performance criteria above shall apply.

5.5.3 Test Setup





5.5.4 Test Result

EUT:	6W IPX4 metal speaker	Model Name:	P329.28X
Pressure:	101kPa	Test mode:	Mode 1

Port Type	Frequency (MHz)	Test Voltage	Criterion met	Criterion Required
AC Mains	0.15 to 80	3 V (rms) AM Modulated 1000Hz, 80%	A	A

Result: Compliance.

Note: EUT is used for this calibration, the output of the audio source was adjusted to achieve a reference Level equivalent to a SPL of -5 dB Pa at 1 kHz at the Mouth Reference Point (MRP), the reading of the audio level meter, which was connected to the output of the communication tester, was recorded as a reference level. During the test, the uplink speech output level was monitored, it was confirmed to be at least 35 dB less than the previously- recorded reference level.



5.6 Voltage interruptions voltage Dips

5.6.1 Test Method

The test method shall be in accordance with EN 61000-4-11.

The test levels shall be:

- voltage dip: 0% residual voltage for 0.5 cycle;
- voltage dip: 0% residual voltage for 1 cycle;
- voltage dip: 70% residual voltage for 25 cycles (at 50Hz);
- voltage interruption: 0% residual voltage for 250 cycles (at 50 Hz).

5.6.2 Performance criteria

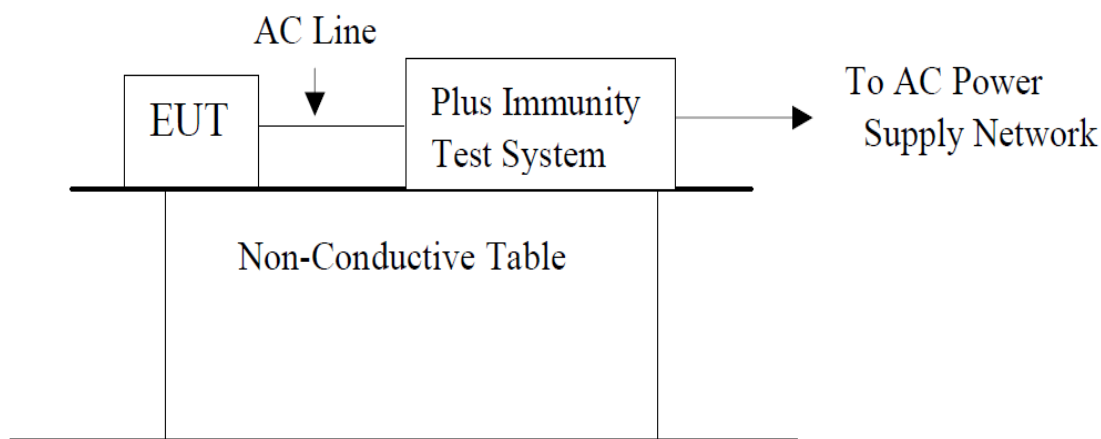
For a voltage dip the following performance criteria apply:

- for transmitters the performance criteria for transient phenomena for transmitter shall apply;
- for receivers the performance criteria for transient phenomena for receiver shall apply;
- for ancillary equipment the pass/failure criteria supplied by the manufacturer shall apply, unless the ancillary equipment is tested in connection with a receiver or transmitter in which case the corresponding performance criteria above shall apply.

For a voltage interruption the following performance criteria apply:

- in the case where the equipment is fitted with or connected to a battery back-up, the performance criteria for transient phenomena for transmitters or for receivers shall apply;
- in the case where the equipment is powered solely from the AC mains supply (without the use of a parallel battery back-up) volatile user data may have been lost and if applicable the communication link need not to be maintained and lost functions should be recoverable by user or operator;
- no unintentional responses shall occur at the end of the test; • in the event of loss of function(s) or in the event of loss of user stored data, this fact shall be recorded in the test report;
- for ancillary equipment the pass/failure criteria supplied by the manufacturer shall apply, unless the ancillary equipment is tested in connection with

5.6.3 Test Setup





5.6.4 Test Result

EUT:	6W IPX4 metal speaker	Model Name:	P329.28X
Pressure:	101kPa	Test mode:	Mode 1

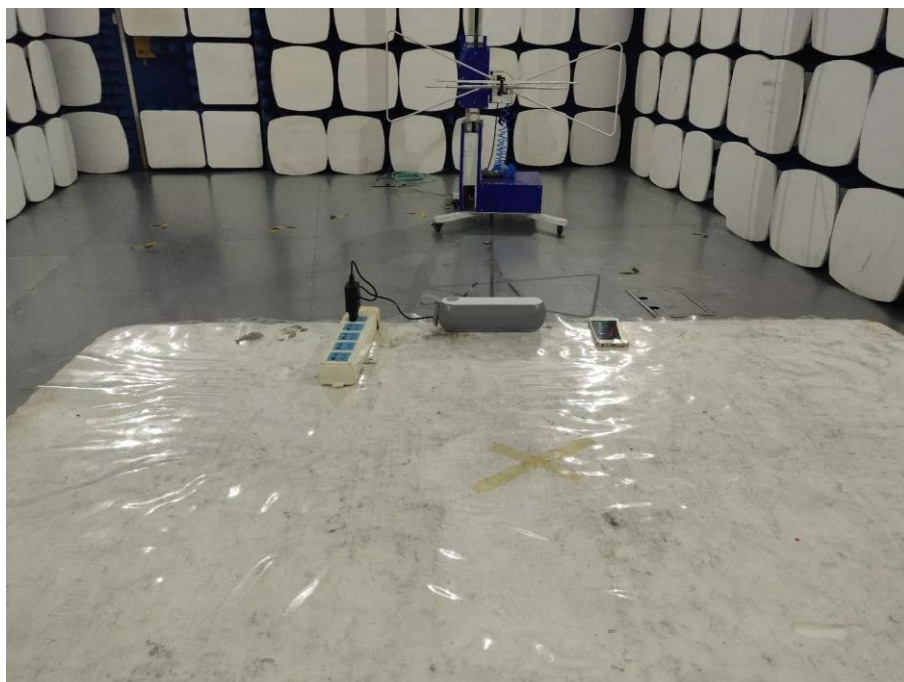
Test Level in %U _T	Duration (Period)	Criterion Required	Criterion met
0%	0.5	B	A
0%	1	B	A
70%	25	C	B
0%	250	C	C

Result: Compliance.

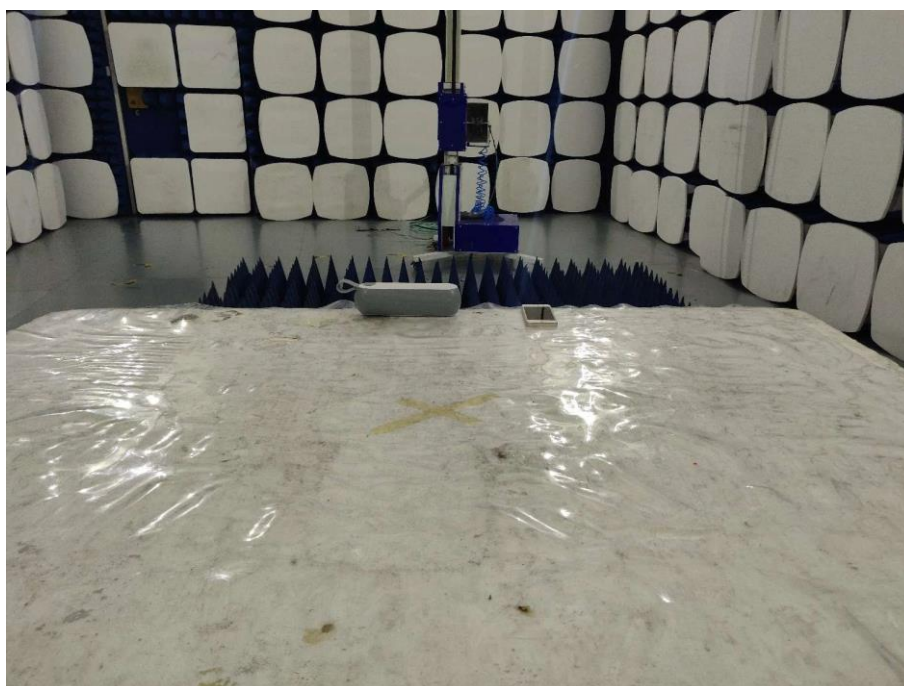


Photographs of the Test Setup

Radiated Emission Below 1G

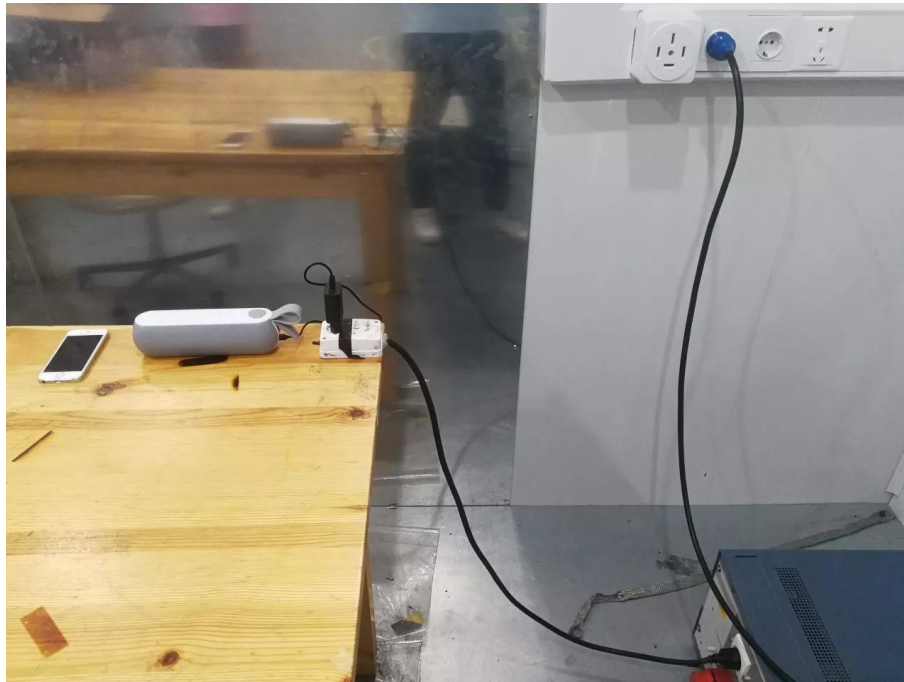


Radiated Emission Above 1G





Conducted emission



Flicker

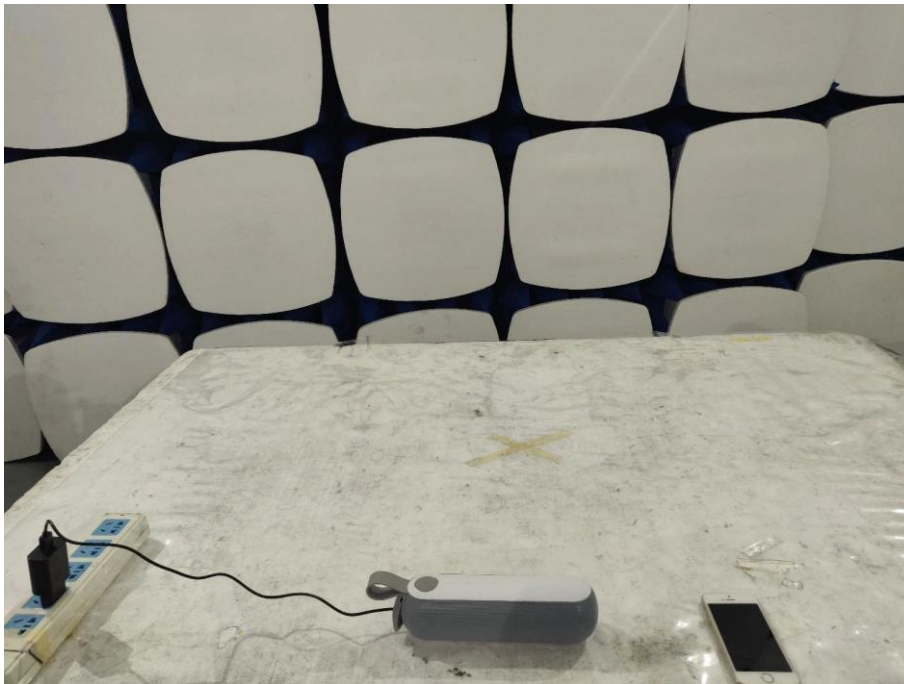




ESD



RS

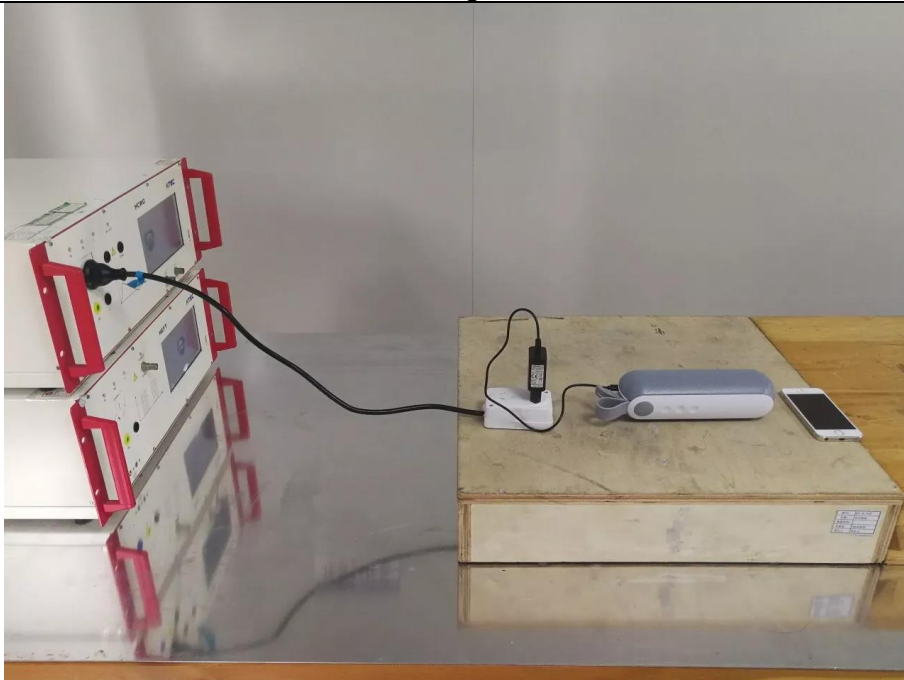




EFT

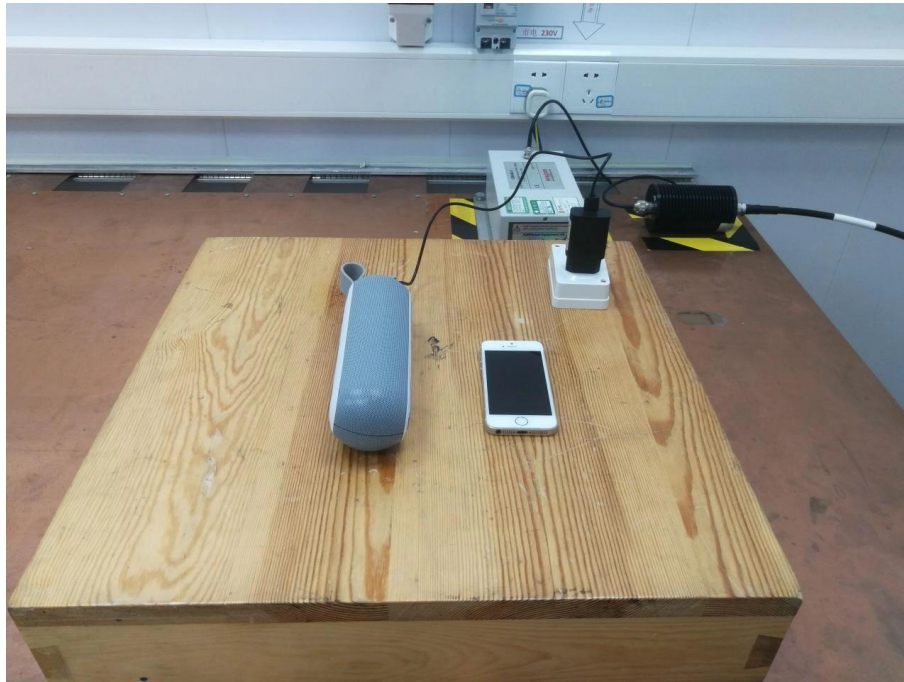


Surge





CS



Dip





Photographs of the Test EUT

See the APPENDIX 1: EUT PHOTO in the report No.: MTi19090403-3E1-1.

----END OF REPORT----