Microtest
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Test Report

Report No.: MTi220613003-02E1

Date of issue: 2022-06-27

Applicant:

Product: RGB Bluetooth speaker

Model(s): P329.42,

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

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Test Result Certification	
Applicant:	
Address:	
Manufacturer:	
Address:	
Product description	
Product name:	RGB Bluetooth speaker
Trademark:	N/A
Model name:	P329.42
Serial Model:	
Standards:	EN 55032:2015+A1:2020 EN 55035:2017+A11:2020 EN IEC 61000-3-2:2019+A1:2021 EN 61000-3-3:2013+A1:2019
Date of Test	
Date of test:	2022-06-17 ~ 2022-06-27
Test result:	Pass

Test Engineer : David. Lee

(David Lee)

Reviewed By: Leon Chen

(Leon Chen)

Approved By: Tom Xue

(Tom Xue)

1 General Description

1.1 Description of the EUT

Product name:	RGB Bluetooth speaker
Model name:	P329.42
Series Model:	
Model difference:	All the models are the same circuit and module, except the model name.
Electrical rating:	Input: DC 5V/1A Battery: DC 3.7V 1200mAh
Accessories:	Cable: USB-A to Micro Cable 50cm

1.2 Description of test modes

All the test modes were carried out with the EUT in normal operation, the final test mode of the EUT was the worst test mode for emission test, which was shown in this report and defined as:

No.	Emission test modes
Mode 1	Charging+TF Playing
Mode 2	Charging+USB Playing
The worst test mode of conducted emissions: Mode 1 **The worst test mode of radiated emissions:** Mode 2	
No.	**Immunity test modes**
Mode 1	Charging+TF Playing
Mode 2	Charging+USB Playing

1.3 Description of support units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Support equipment list			
Description	Model	Serial No.	Manufacturer
Adapter	/	/	SAMSUNG
Memory card	/	/	/
USB flash disk	/	/	/
Support cable list			
Description	Length (m)	From	To
/	/	/	/

1.4 Environmental conditions

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

Temperature:	15ºC~35ºC
Humidity:	20 % RH ~ 75 % RH (30 % RH ~ 60 % RH for ESD test)
Atmospheric pressure:	98 kPa~101 kPa

1.5 Measurement uncertainty

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

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

2 Summary of Test Result

No.	Test Standard	Description of Test	Result
Emission			
1	EN 55032:2015+A1:2020	Conducted emissions	Pass
2		Radiated emissions	Pass
3	EN IEC 61000-3-2:2019+A1:2021	Harmonic current emissions	N/A
4	EN 61000-3-3:2013+A1:2019	Voltage fluctuations & voltage flicker	Pass
Immunity			
1	EN 55035:2017+A11:2020	Electrostatic discharges (ESD)	Pass
2		Radiated, radio-frequency electromagnetic field immunity test (RS)	Pass
3		Conducted radio-frequency field disturbances immunity test (CS)	Pass
4		Power frequency magnetic field immunity test (PFMF)	N/A
5		Electrical fast transients/burst (EFT)	Pass
6		Surges immunity test	Pass
7		Voltage dips & voltage interruptions	Pass
8		Broadband Impulse noise disturbances, repetitive	N/A
9		Broadband Impulse noise disturbances, isolated	N/A

Note: N/A means not applicable.

3 Test Facilities and accreditations

3.1 Test laboratory

Test laboratory:	Shenzhen Microtest Co., Ltd.
Test site location:	101, No. 7, Zone 2, Xinxing Industrial Park, Fuhai Avenue, Xinhe Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Telephone:	(86-755)88850135
Fax:	(86-755)88850136
CNAS Registration No.:	CNAS L5868

4 List of test equipment

No.	Equipment	Manufacturer	Model	Serial No.	Cal. date	Cal. Due
Radiation emissions						
MTI-E043	EMI test receiver	R&S	ESCI7	101166	2022/05/05	2023/05/04
MTI-E044	Broadband antenna	Schwarzbeck	VULB9163	9163-1338	2021/05/30	2023/05/29
MTI-E045	Horn antenna	Schwarzbeck	BBHA9120D	9120D-2278	2021/05/30	2023/05/29
MTI-E047	Pre-amplifier	Hewlett-Packard	8447F	3113A06184	2022/05/05	2023/05/04
MTI-E048	Pre-amplifier	Agilent	8449B	3008A01120	2022/05/05	2023/05/04
MTi-E120	Broadband antenna	Schwarzbeck	VULB9163	9163-1419	2021/05/30	2023/05/29
MTi-E121	Pre-amplifier	Hewlett-Packard	8447D	2944A09365	2022/04/15	2023/04/14
MTi-E123	Pre-amplifier	Agilent	8449B	3008A04723	2022/05/05	2023/05/04
MTi-E122	MXA signal analyzer	Agilent	N9020A	MY54440859	2022/05/05	2023/05/04
MTI-E010S	EMI Measurement Software	Farad	EZ-EMC Ver. EMEC-3A1	/	/	/
Conduction emissions						
No.	Equipment	Manufacturer	Model	Serial No.	Cal. date	Cal. Due
MTi-E001	Artificial Mains Network	R&S	ESH2-Z5	100263	2022/05/05	2023/05/04
MTi-E002	EMI Test Receiver	R&S	ESCI3	101368	2022/05/05	2023/05/04
MTi-E023	Artificial power network	Schwarzbeck	NSLK8127	NSLK8127#841	2022/05/05	2023/05/04
MTi-E025	Artificial power network	Schwarzbeck	NSLK8127	8127183	2022/05/05	2023/05/04
MTi-E026	8-wire Impedance Stabilization Network	Schwarzbeck	NTFM 8158	NTFM 8158 #199	2022/05/05	2023/05/04
MTi-E021	EMI Test Receiver	R&S	ESCS30	100210	2022/05/05	2023/05/04
MTi-E024	Artificial power network	Schwarzbeck	NSLK8127	01001	2022/05/05	2023/05/04
MTI-E011S	EMI Measurement Software	Farad	EZ-EMC Ver. EMEC-3A1	/	/	/
Harmonic current emissions & Voltage fluctuations & voltage flicker						
MTi-E035	Harmonics & Flicker Analyser	Laplace Instruments LTD	AC 2000A	311216	2022/05/05	2023/05/04
MTi-E036	Programmed AC Power Supply	MToni	PHF-5010	/	2022/05/05	2023/05/04
MTI-E003S	Harmonics and flicker test software	TTI	HA-PC Link Plus V3.03	/	/	/

No.	Equipment	Manufacturer	Model	Serial No.	Cal. date	Cal. Due
Electrostatic discharge						
MTi-E113	Electrical Discharge Simulator	3CTEST	EDS 30V	ES031000420021	2022/05/05	2023/05/04
Radiated, radio-frequency electromagnetic field immunity test (RS)						
MTI-E053	Power Amplifier	micotop	MPA-80-1000-250	MPA1903081	2022/05/05	2023/05/04
MTI-E055	Power Amplifier	micotop	MPA-1000-6000-75	MPA1903082	2022/05/05	2023/05/04
MTi-E059	Audio Analyzer	Agilent	U8903A	MY52140004	2022/05/05	2023/05/04
MTi-A060	Electric field probe	Narda	PMM EP-602	711WX90886	2022/05/05	2023/05/04
MTI-E092	Stacked Log. Per. Broadband Antenna	Schwarzbeck	STLP 9129	00113	/	/
MTI-E093	RF Signal Generator	Agilent	N5181A	MY47420567	2022/05/05	2023/05/04
MTi-E094	Power Sensor	Agilent	E9304A H18	MY41497225	2022/05/05	2023/05/04
MTi-E095	Power Sensor	Agilent	E9304A H18	MY41499117	2022/05/05	2023/05/04
MTI-E097	Power Meter	Agilent	E4419B	MY45102877	2022/05/05	2023/05/04
MTI-E007S	RS Test software	EM Trace	EM3 V1.1.10	/	/	/
Conducted radio-frequency field disturbances immunity test (CS)						
No.	Equipment	Manufacturer	Model	Serial No.	Cal. date	Cal. Due
MTI-A001	CONDUCTED DISTURBANCES TEST SYSTEM	Schloder	CDG-6000-A	19902022-0101	2022/05/05	2023/05/04
MTI-A032	Power amplifier	micotop	MP1-0.15-400-300	MPA1904131	2022/05/05	2023/05/04
MTi-E098	Coupled Decoupling Network	Schloder	M2+M3-16A	A2210332/2015	2022/05/05	2023/05/04
MTI-A003S	CS test software	Schloder	HELIA 1.2.0.0	/	/	/
Power frequency magnetic field immunity test (PFMF)						
MTi-E034	power frequency magnetic field generator	HTEC	HPFMF 100	153703	2022/05/05	2023/05/04
Electrical fast transients/burst (EFT)						
MTi-E032	Electrical Fast Transient Generator	HTEC	HEFT 51	153701	2022/05/05	2023/05/04
Surges immunity test						
MTi-E033	Surge Generator	HTEC	HCWG 51	153702	2022/05/05	2023/05/04
Voltage dips & voltage interruptions						
MTi-E037	Cycle Sag Simulator	Prima	DRP61011AG	PR15056303	2022/05/05	2023/05/04

5 Emission test

5.1 Conducted emissions

5.1.1 Limits

Frequency (MHz)	Detector type / Bandwidth	Class A limit dBµV	Class B limit dBµV
0.15 -0.5	Quasi Peak / 9 kHz	79	66 - 56
0.5 -5		73	56
5 -30			60
0.15 -0.5	Average / 9 kHz	66	56 - 46
0.5 -5		60	46
5 -30			50

Note 1: the lower limit applies at the transition frequencies.
Note 2: the limit decreases linearly with the logarithm in the range of 0.15 MHz to 0.5 MHz.

5.1.2 Test Procedures

a) The EUT and support equipment, if needed, was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per EN 55032. When the EUT is a floor standing equipment, it is placed on the ground plane, which is separated from metallic contact with the ground plane by up to 15 cm of insulation.

b) All I/O cables were positioned to simulate typical actual usage as per EN 55032.

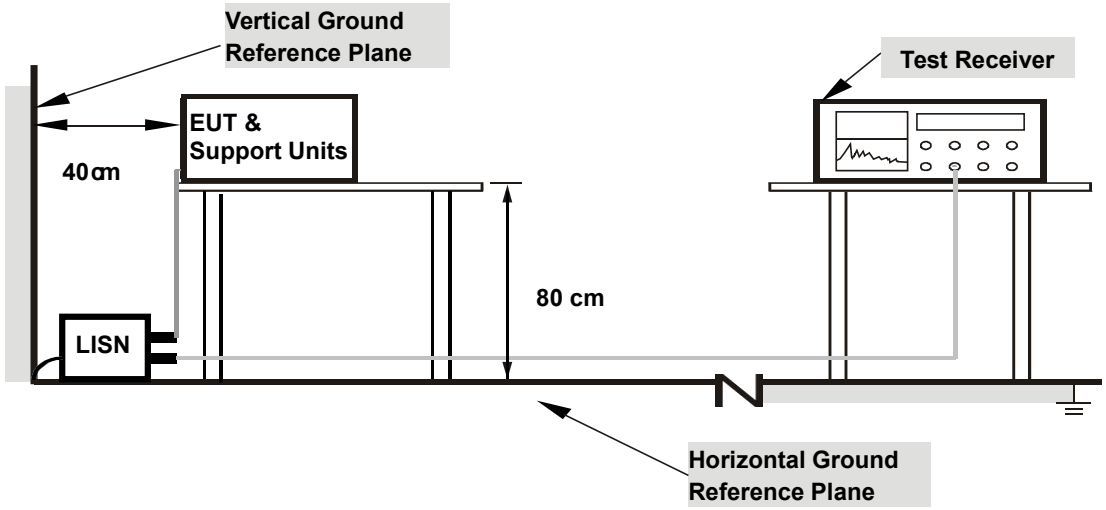
c) The EUT is connected to the main power through a line impedance stabilization network (LISN). All support equipment is powered from additional LISN(s).

d) Emissions were measured on each current carrying line of the EUT using an EMI test receiver connected to the LISN powering the EUT.

e) The test receiver scanned from 150 kHz to 30 MHz for emissions in each of the test modes described in Item 1.2.

f) The test data of the worst-case condition(s) was recorded.

5.1.3 Test setup



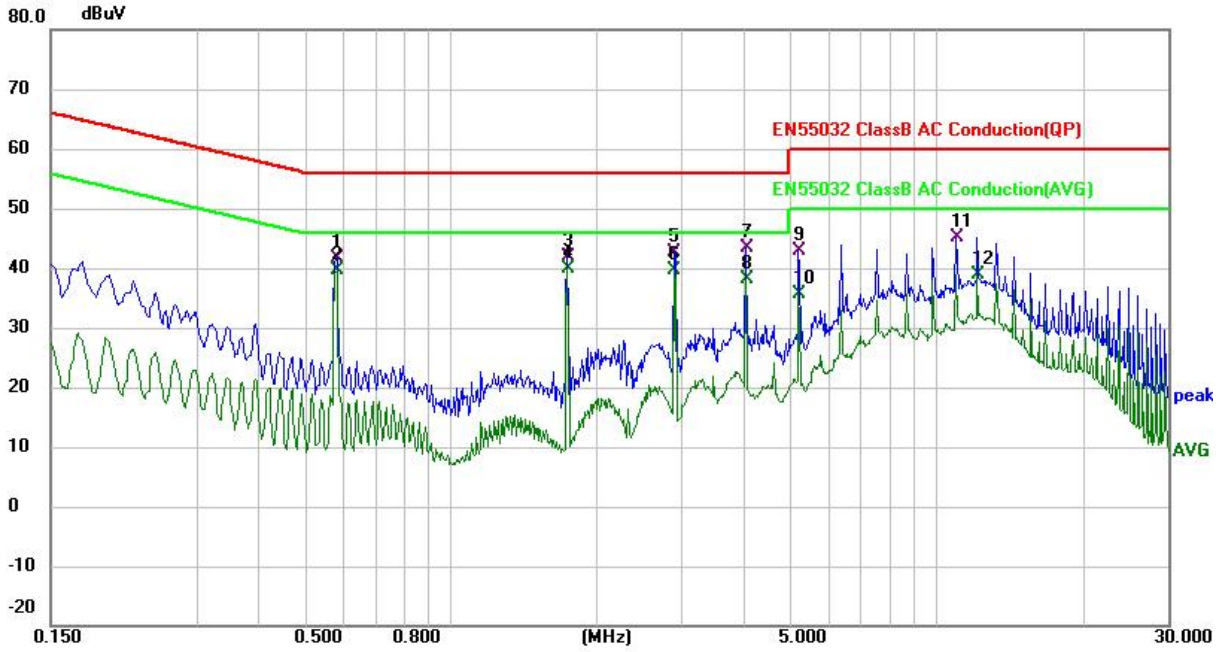
For the actual test configuration, please refer to the related item – Photographs of the test setup.

5.1.4 Test Result

Calculation formula:

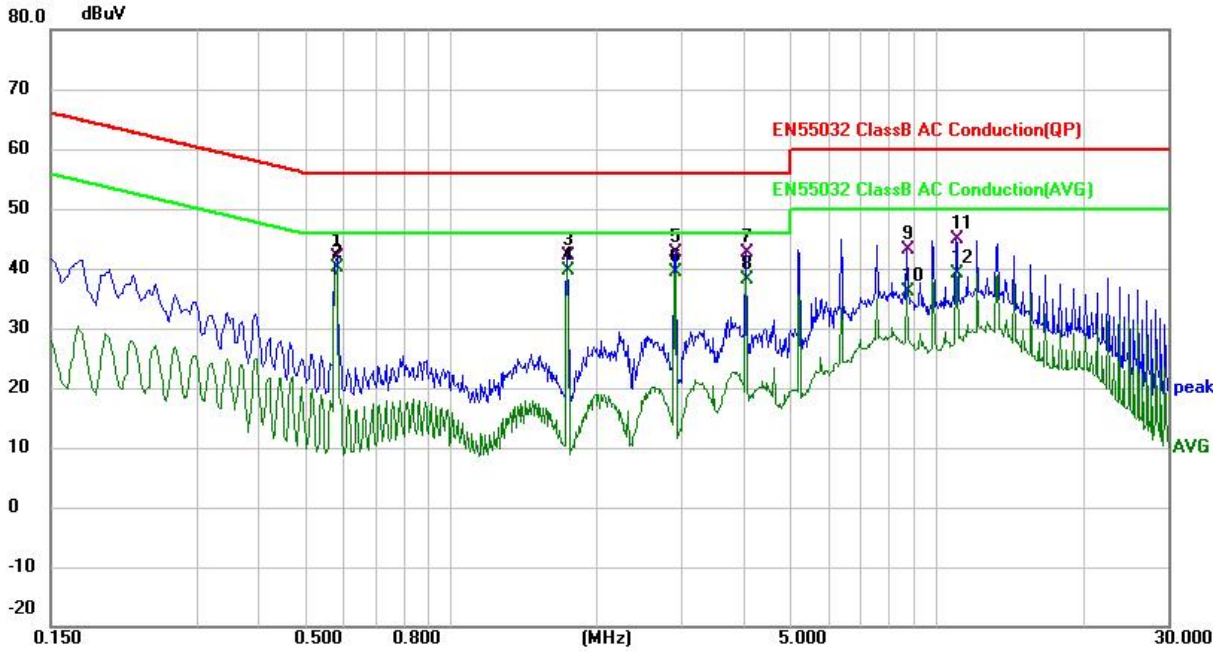
Measurement (dBμV) = Reading Level (dBμV) + Correct Factor (dB)
Over (dB) = Measurement (dBμV) – Limit (dBμV)

Test mode:	Mode 1	Phase:	L
Power supply:	Powered by AC/DC adapter (AC 230V/50Hz)	Test site:	CE chamber 1



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.5820	30.58	11.08	41.66	56.00	-14.34	QP
2		0.5820	28.59	11.08	39.67	46.00	-6.33	AVG
3		1.7380	27.02	14.86	41.88	56.00	-14.12	QP
4	*	1.7380	24.99	14.86	39.85	46.00	-6.15	AVG
5		2.8980	31.37	11.38	42.75	56.00	-13.25	QP
6		2.8980	28.17	11.38	39.55	46.00	-6.45	AVG
7		4.0580	32.04	11.43	43.47	56.00	-12.53	QP
8		4.0580	26.69	11.43	38.12	46.00	-7.88	AVG
9		5.2180	31.39	11.50	42.89	60.00	-17.11	QP
10		5.2180	24.13	11.50	35.63	50.00	-14.37	AVG
11		11.0140	33.43	11.61	45.04	60.00	-14.96	QP
12		12.1740	27.32	11.64	38.96	50.00	-11.04	AVG

Test mode:	Mode 1	Phase:	N
Power supply:	Powered by AC/DC adapter (AC 230V/50Hz)	Test site:	CE chamber 1



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.5820	30.79	10.97	41.76	56.00	-14.24	QP
2	*	0.5820	29.08	10.97	40.05	46.00	-5.95	AVG
3		1.7420	27.18	14.83	42.01	56.00	-13.99	QP
4		1.7420	24.87	14.83	39.70	46.00	-6.30	AVG
5		2.9020	31.31	11.36	42.67	56.00	-13.33	QP
6		2.9020	28.11	11.36	39.47	46.00	-6.53	AVG
7		4.0580	31.33	11.38	42.71	56.00	-13.29	QP
8		4.0580	26.70	11.38	38.08	46.00	-7.92	AVG
9		8.6980	31.58	11.49	43.07	60.00	-16.93	QP
10		8.6980	24.69	11.49	36.18	50.00	-13.82	AVG
11		11.0180	33.29	11.59	44.88	60.00	-15.12	QP
12		11.0180	27.46	11.59	39.05	50.00	-10.95	AVG

5.2 Radiated emissions

5.2.1 Limits

Frequency (MHz)	Detector type / bandwidth	Class A limit (3m) (dBμV/m)	Class B limit (3m) (dBμV/m)
30-230	Quasi Peak / 120 kHz	50	40
230-1000		57	47
1000-6000	Average / 1 MHz	60	54
	Peak / 1 MHz	80	74

Note: The lower limit applies at the transition frequencies.

According to EN 55032 Table 1, the measurement frequency range shown in the following table:
Required highest frequency for radiated measurement

Highest internal frequency (F_x)	Highest measured frequency
$F_x \leq 108$MHz	1 GHz
108 MHz ≤ $F_x \leq 500$MHz	2 GHz
500MHz ≤ $F_x \leq 1$ GHz	5 GHz
$F_x > 1$GHz	5 × F_x up to a maximum of 6 GHz

Note: Where Fx is unknown, the radiated emission measurements shall be performed up to 6 GHz.

5.2.2 Test Procedures

a) The EUT and support equipment, if needed, was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a non-conductive table with a height of 0.8 meters is used and is placed on the ground plane as per EN 55032. When the EUT is a floor standing equipment, it is placed on the ground plane, which is separated from metallic contact with the ground plane by up to 15 cm of insulation.

b) All I/O cables were positioned to simulate typical actual usage as per EN 55032.

c) The antenna was placed at 3 away from the EUT as stated in EN 55032. The antenna connected to the EMI test receiver or spectrum analyzer via a cable and at times a pre-amplifier would be used.

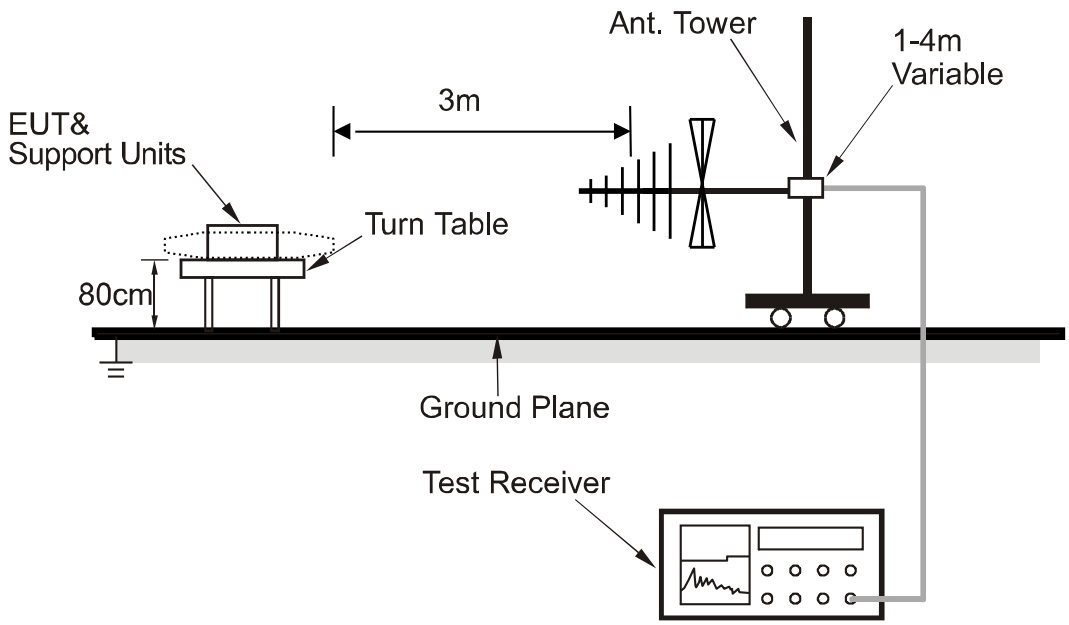
d) Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.

e) The test mode(s) described in Item 1.2 were scanned and measured.

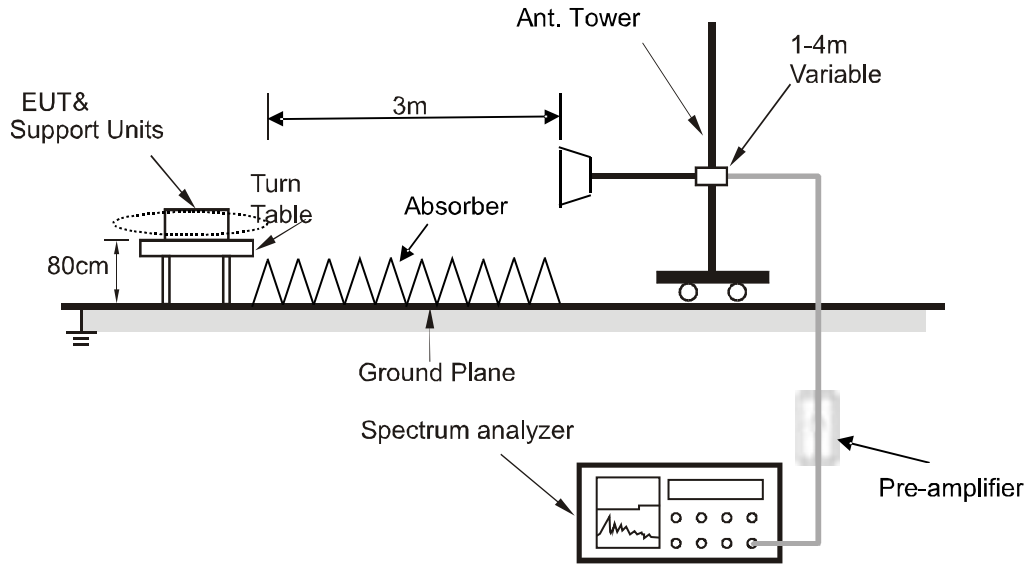
f) The test data of the worst-case condition(s) was recorded.

5.2.3 Test Setup

Below 1GHz:



Above 1GHz:



For the actual test configuration, please refer to the related item – Photographs of the test setup.

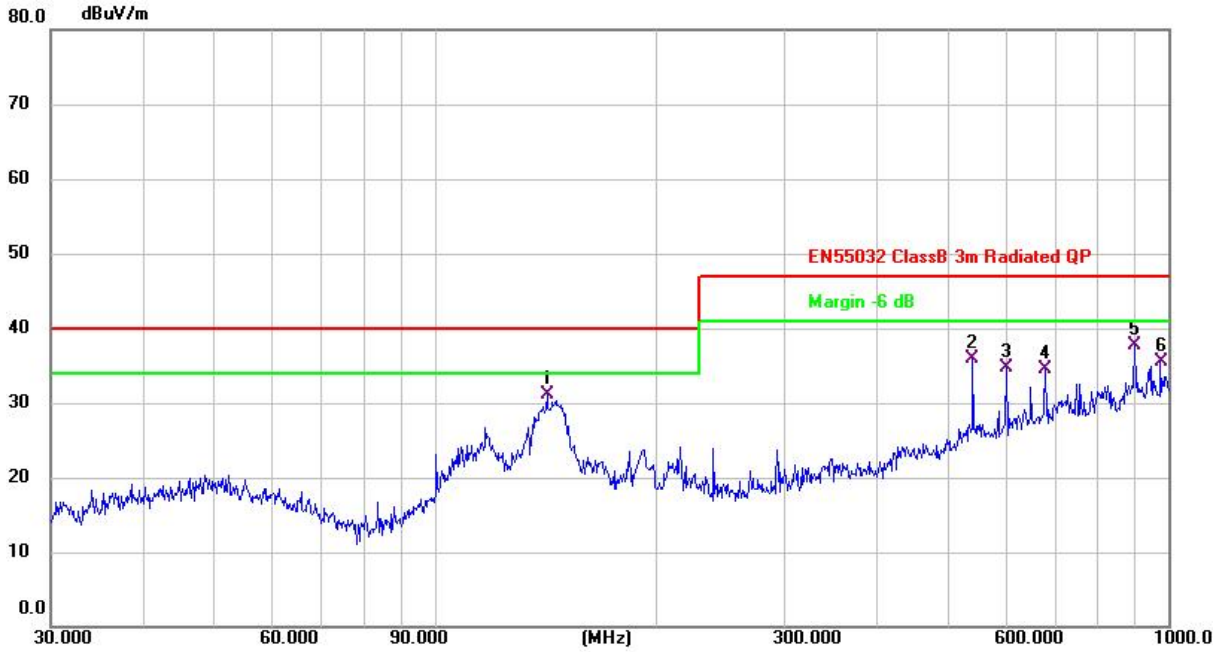
5.2.4 Test result

Calculation formula:

Measurement (dBμV/m) = Reading Level (dBμV) + Correct Factor (dB/m)
Over (dB) = Measurement (dBμV/m) – Limit (dBμV/m)

Note: The highest internal frequency of the EUT is less than 108MHz, the measurement shall only be made up to 1 GHz.

Test mode:	Mode 2	Polarization:	Horizontal
Power supply:	Powered by AC/DC adapter (AC 230V/50Hz)	Test site:	RE chamber 2



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1	*	142.3243	41.69	-10.55	31.14	40.00	-8.86	QP
2		541.3725	34.71	1.21	35.92	47.00	-11.08	QP
3		601.4265	31.68	3.10	34.78	47.00	-12.22	QP
4		679.9600	30.42	4.00	34.42	47.00	-12.58	QP
5		900.1474	30.28	7.39	37.67	47.00	-9.33	QP
6		975.7529	27.20	8.34	35.54	47.00	-11.46	QP

Test mode:	Mode 2	Polarization:	Vertical
Power supply:	Powered by AC/DC adapter (AC 230V/50Hz)	Test site:	RE chamber 2

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		100.5806	36.29	-7.05	29.24	40.00	-10.76	QP
2	!	125.4457	43.85	-9.14	34.71	40.00	-5.29	QP
3	*	142.3243	45.16	-10.26	34.90	40.00	-5.10	QP
4		541.3725	36.37	1.33	37.70	47.00	-9.30	QP
5		900.1474	30.61	7.39	38.00	47.00	-9.00	QP
6		993.0114	31.52	9.21	40.73	47.00	-6.27	QP

5.2.5 Harmonics current emissions

5.2.6 Limits

Limits for Class A equipment		Limits for Class D equipment		
Harmonic order	Maximum permissible harmonic current	Harmonic order	Maximum permissible harmonic current per watt	Maximum permissible harmonic current
h	A	*h*	mA/W	A
Odd harmonics		Odd harmonics only		
3	2.30	3	3.4	2.30
5	1.14	5	1.9	1.14
7	0.77	7	1.0	0.77
9	0.40	9	0.5	0.40
11	0.33	11	0.35	0.33
13	0.21	13 ≤ *h* ≤ 39	$\frac{3.85}{h}$	$0.15 \times \frac{15}{h}$
15 ≤ *h* ≤ 39	$0.15 \times \frac{15}{h}$	/		
Even harmonics				
2	1.08			
4	0.43			
6	0.30			
8 ≤ *h* ≤ 40	$0.23 \times \frac{8}{h}$			

Note 1: Class A and Class D are classified according to item 5.3.2.
Note 2: According to section 7 of EN 61000-3-2, the above limits for all equipment except for lighting equipment having an active input power > 75 W and no limits apply for equipment with an active input power up to and including 75 W.

5.2.7 Test Procedures

a) The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under normal operating conditions for each successive harmonic component in turn.

b) The classification of EUT is according to section 5 of EN 61000-3-2.

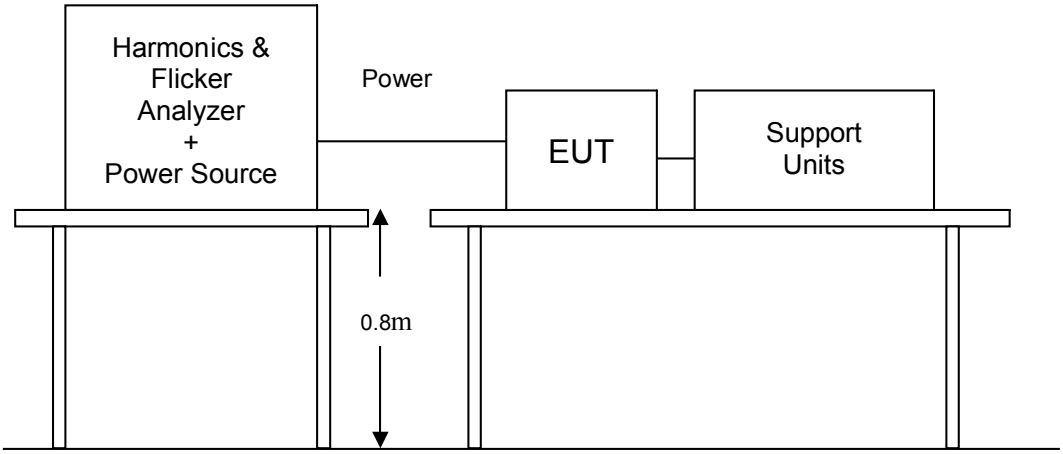
Classification of equipment

Class A: Equipment not specified as belonging to Class B, C or D shall be considered as Class A equipment. Some examples of Class A equipment are:
balanced three-phase equipment; household appliances, excluding those specified as belonging to Class B, C or D; vacuum cleaners; high pressure cleaners; tools, excluding portable tools; independent phase control dimmers; audio equipment; professional luminaires for stage lighting and studios
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 6.3.2, 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)

c) The correspondent test program of test instrument to measure the current harmonics emanated from the EUT. The measure time shall be not less than the time necessary for the EUT to be exercised.

5.2.8 Test Setup



For the actual test configuration, please refer to the related item – Photographs of the test setup.

5.2.9 Test Result

Test mode:	N/A	Power supply:	N/A
Environment conditions:	N/A	Tested by:	N/A

Note: There is no need for harmonics test to be performed on the EUT (rated power is less than 75W).

5.3 Voltage fluctuations and flicker

5.3.1 Limits

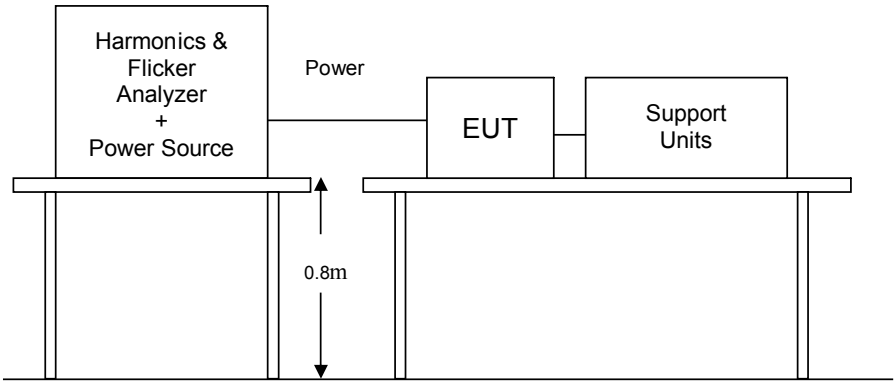
Test item	Limit	Remark
P_{st}	1.0	P_{st}: short-term flicker severity
P_{lt}	0.65	P_{lt}: long-term flicker severity
T_{max}	500 ms	T_{max}: maximum time duration during the observation period that the voltage deviation d(t) exceeds the limit for d_c
d_c	3.3 %	d_c: maximum steady state voltage change during an observation period
d_{max}	4 %	d_{max}: maximum absolute voltage change during an observation period

5.3.2 Test Procedures

a) The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the most unfavorable sequence of voltage changes under normal operating conditions.

b) During the flick measurement, the measure time shall include that part of whole operation cycle in which the EUT produce the most unfavorable sequence of voltage changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.

5.3.3 Test Setup



For the actual test configuration, please refer to the related item – Photographs of the test setup.

5.3.4 Test Result

Test mode:	Mode 1-2	Power supply:	Powered by AC/DC adapter (AC 230V/50Hz)
Environment conditions:	23℃, 48% RH	Tested by:	Vincent

Flicker Measurement	Measurement	Limit	Result
P_{st}	0.0	1.0	Pass
T_{max}	0.014 ms	500 ms	
d_c	0.0 %	3.3 %	
d_{max}	0.0 %	4 %	

6 Immunity test

6.1 General performance criteria description

According to item 8 of EN 55035, the following describes the general performance criteria.

Performance criteria	
Criterion	Description
A	The equipment shall continue to operate as intended without operator intervention. No degradation of performance, loss of function or change of operating state is allowed below a performance level specified by the manufacturer when the equipment is used as 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, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.
B	During the application of the disturbance, degradation of performance is allowed. However, no unintended change of actual operating state or stored data is allowed to persist after the test. After the test, the equipment shall continue to operate as intended without operator intervention; no degradation of performance or loss of function is allowed, below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level (or the permissible performance loss), or recovery time, is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.
C	Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. A reboot or re-start operation is allowed. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

6.2 Electrostatic discharges (ESD)

6.2.1 Test specification

Basic standard:	IEC 61000-4-2
Discharge impedance:	330 ohm / 150 pF
Discharge voltage:	Contact discharge: 4 kV (Direct &Indirect) Air Discharge: 8kV (Direct)
Polarity:	Positive / Negative
Number of discharges:	Minimum 10 times at each test point for each polarity
Discharge mode:	Single discharge
Discharge period:	1 second minimum

6.2.2 Test Procedures

a) The basic test procedure was in accordance with IEC 61000-4-2.

b) Direct discharges to the EUT:

Contact discharges were applied only to conductive surfaces of the EUT. Air discharges were applied only to non-conductive surfaces of the EUT. During the test, it was performed with single discharges. For the single discharge time between successive single discharges was at least 1 second. It was at least ten single discharges with positive and negative at the same selected point.

c) Indirect discharges to the EUT:

Vertical Coupling Plane (VCP):

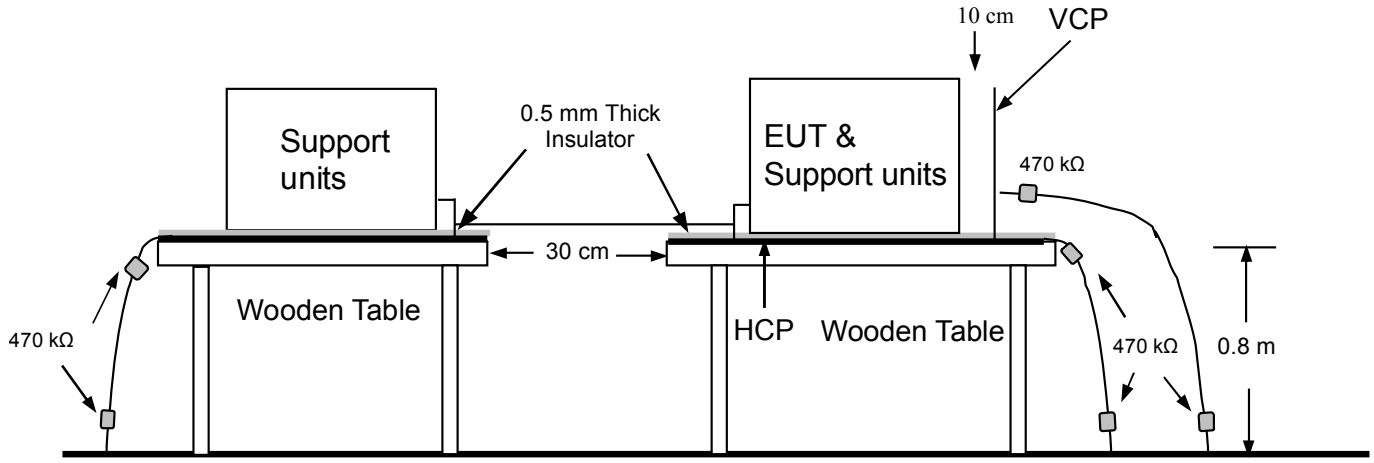
The coupling plane, of dimensions 0.5m x 0.5m, is placed parallel to, and positioned at a distance 0.1 m from the EUT, with the discharge electrode touching the coupling plane. The four faces of the EUT will be performed with electrostatic discharge.

Horizontal Coupling Plane (HCP):

The coupling plane is placed under to the EUT. The generator shall be positioned vertically at a distance of 0.1 m from the EUT, with the discharge electrode touching the coupling plane.

d) Recording the test result in test record form.

6.2.3 Test Setup



For the actual test configuration, please refer to the related item – Photographs of the test setup.

6.2.4 Test Result

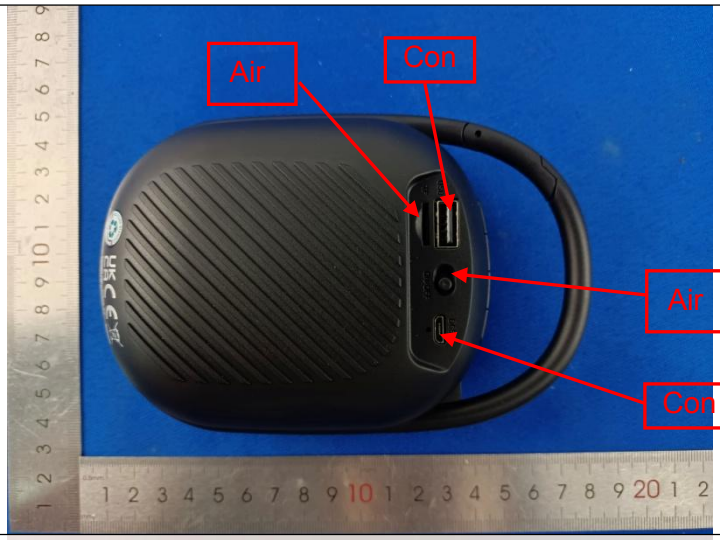
Test mode:	Mode 1-2	Power supply:	Power by AC/DC adapter (AC 230V/50Hz)
Environment conditions:	23℃, 51% RH	Tested by:	Vincent

Indirect Discharge				
Test Points	**Test Level (kV)**	**Performance Criteria**	**Performance Result**	**Observation**
VCP-Front side	± 4	B	A	Note 1
VCP-Rear side	± 4		A	
VCP-Left side	± 4		A	
VCP-Right side	± 4		A	
HCP	± 4		A	

Direct Discharge					
Test Points	**Test Level (kV)**	**Air/Con. discharge**	**Performance Criteria**	**Performance Result**	**Observation**
Each non-conductive location touchable by hand	± 2, ± 4, ± 8	Air-discharge	B	A	Note 1
Each conductive location touchable by hand	± 2, ± 4	Contact-discharge		A	

Note 1: There was no change compared with initial operation during the test.

The photos for discharge points of EUT



Note: Air means air discharge and Con means contact discharge.

6.3 Radiated, radio-frequency electromagnetic field immunity test (RS)

6.3.1 Test specification

Basic standard:	IEC 61000-4-3
Frequency range:	80 MHz – 1000 MHz, 1800MHz, 2600MHz, 3500MHz, 5000MHz
Field strength:	3 V/m
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency step:	1 % of preceding frequency
Polarity of antenna:	Horizontal and Vertical
Antenna Height:	1.5 m
Test Distance:	3 m

6.3.2 Test Procedures

a) The basic test procedure was in accordance with IEC 61000-4-3.

b) The EUT and support units, which were placed on a table that is 0.8 meter above ground and the testing was performed in a fully anechoic chamber. The testing distance from antenna to the EUT was 3 meters.

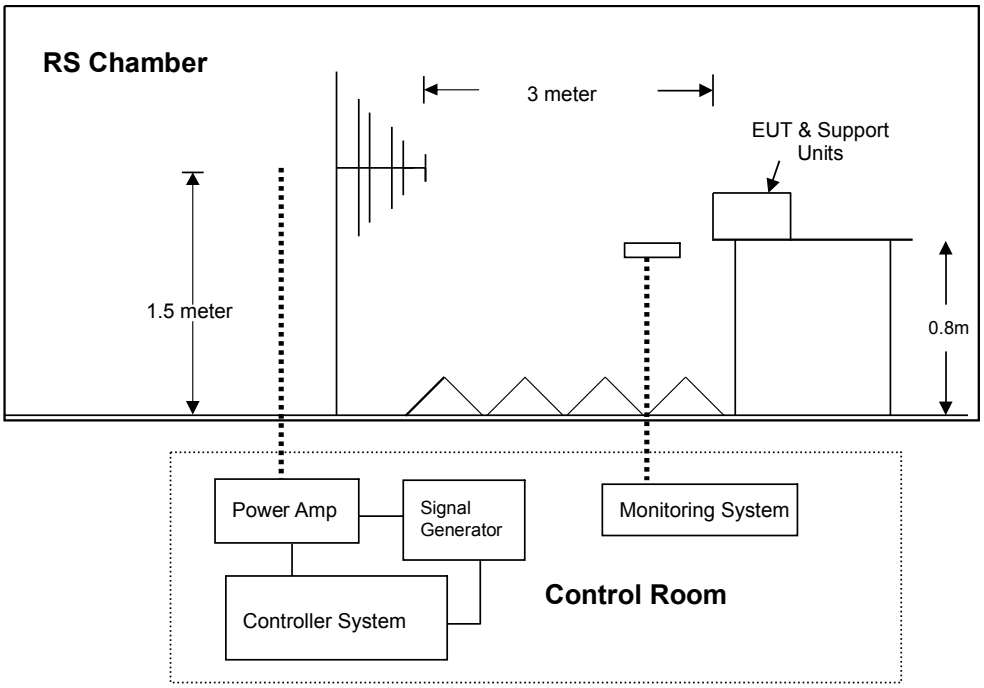
c) The frequency range is swept from 80 MHz to 1000 MHz, 1800 MHz, 2600 MHz, 3500MHz, 5000MHz, with the signal 80% amplitude modulated with a 1 kHz sinewave.

d) The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.

e) The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

f) Recording the test result in test record form.

6.3.3 Test setup



For the actual test configuration, please refer to the related item – Photographs of the test setup.

6.3.4 Test Result

Test mode:	Mode 1-2	Power supply:	Powered by AC/DC adapter (AC 230V/50Hz)
Environment conditions:	23℃, 47% RH	Tested by:	Vincent

Frequency (MHz)	Polarity	Field Strength	Azimuth	Performance Criteria	Performance Result	Observation
80- 1000 1800 2600 3500 5000	H & V	3 V/m (rms) AM Modulated 1 kHz, 80%	Front	A	A	Note 1
			Rear			
			Left			
			Right			

Note 1: There was no change compared with initial operation during the test.

6.4 Conducted radio-frequency field disturbances immunity test (CS)

6.4.1 Test specification

Basic standard:	IEC 61000-4-6
Frequency range:	0.15 MHz – 80 MHz
Field strength:	3 Vrms (0.15 MHz – 10 MHz), 3 Vrms to 1 Vrms (10 MHz – 30 MHz), 1 Vrms (30 MHz – 80MHz)
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency step:	1 % of preceding frequency

6.4.2 Test Procedures

a) The basic test procedure was in accordance with IEC 61000-4-6.

b) The EUT are placed on an insulating support 0.1m high above a ground reference plane. The CDN (coupling and decoupling device) shall be located between 0.1 m to 0.3 m from EUT.

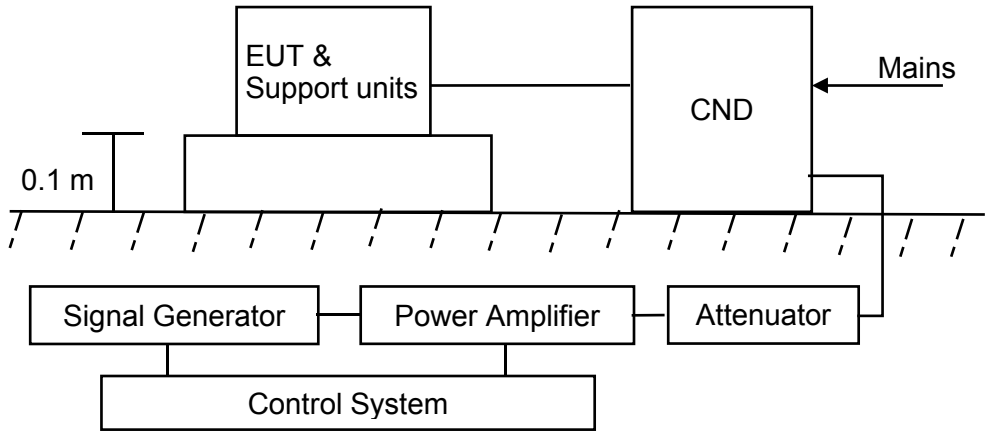
c) The disturbance signal described below is injected to EUT through CDN.

d) The frequency range is swept from 0.15 MHz to 80 MHz with the disturbance signal 80% amplitude modulated with a 1 kHz sinewave

e) The dwell time at each frequency was less than the time necessary for the EUT to be exercised, and able to respond.

f) Recording the test result in test record form.

6.4.3 Test Setup



For the actual test configuration, please refer to the related item – Photographs of the test setup.

6.4.4 Test Result

Test mode:	Mode 1-2	Power supply:	Powered by AC/DC adapter (AC 230V/50Hz)
Environment conditions:	23℃, 47% RH	Tested by:	Vincent

Port Type	Frequency (MHz)	Test Voltage	Performance Criteria	Performance Result	Observation
AC Mains	0.15 to 10	3 V (rms) AM Modulated 1 kHz, 80%	A	A	Note 1
AC Mains	10 to 30	3 to 1 V (rms) AM Modulated 1 kHz, 80%	A	A	Note 1
AC Mains	30 to 80	1 V (rms) AM Modulated 1 kHz, 80%	A	A	Note 1

Note 1: There was no change compared with initial operation during the test.

6.5 Power frequency magnetic field immunity test (PFMF)

6.5.1 Test specification

Basic standard:	IEC 61000-4-8
Frequency:	50Hz
Field strength:	1 A/m
Observation time:	1 minute
Inductance coil:	Rectangular type, 1 m x 1 m

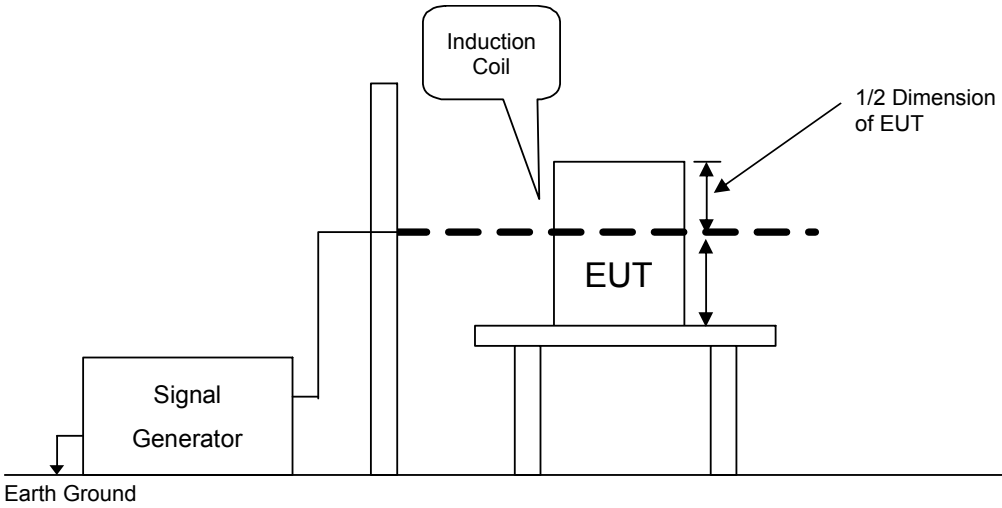
6.5.2 Test Procedures

a) The basic test procedure was in accordance with IEC 61000-4-8.

b) The test magnetic field shall be applied 1 minute by the immersion method to the EUT, and the induction coil shall be rotated by 90° to expose the EUT to the test field with different orientation (X, Y, Z Orientation)

c) Recording the test result in test record form.

6.5.3 Test Setup



6.5.4 Test Result

Test mode:	N/A	Test Voltage:	N/A
Environment conditions:	N/A	Tested by:	N/A

Orientation	Filed Strength (A/m)	Performance Criteria	Performance Result	Observation
X	1	A	/	/
Y	1	A	/	/
Z	1	A	/	/

Note: There is no need for PFMF test to be performed on the EUT.

6.6 Electrical fast transients/burst (EFT)

6.6.1 Test specification

Basic standard:	IEC 61000-4-4
Impulse frequency:	5 kHz
Impulse Wave-Shape:	5/50 ns
Burst duration:	15 ms
Burst period:	300 ms
Polarity:	Positive / Negative
Number of tests:	Not less than 1 minute

6.6.2 Test Procedures

a) The basic test procedure was in accordance with IEC 61000-4-4.

The EUT is connected to the power mains through a coupling device that directly couples the EFT/B interference signal. Each of the line conductors is impressed with burst noise for 1 minute. The length of the power lines between lines between the coupling device and the EUT is (0.5 ± 0.1) m for tabletop equipment testing.

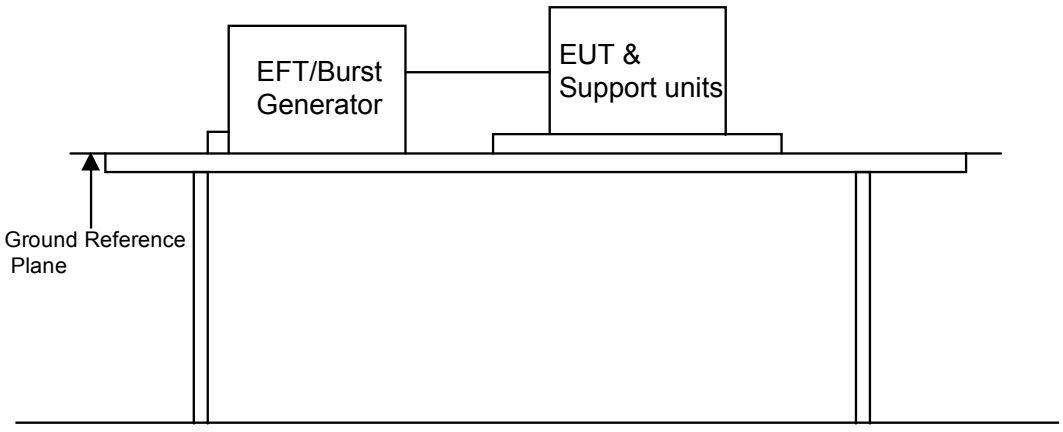
b) For signal lines and control lines ports:

The EFT interference signal is through a coupling clamp device couple to the signal of the EUT with burst noise for 1 minute. The length of the signal lines between lines between the coupling device and the EUT is (0.5 ± 0.1) m for tabletop equipment testing.

c) Each representative mode of operation shall be tested, the test modes are described in Item 1.2.

d) Recording the test result in test record form.

6.6.3 Test Setup



For the actual test configuration, please refer to the related item – Photographs of the test setup.

6.6.4 Test Result

Test mode:	Mode 1-2	Power supply:	Powered by AC/DC adapter (AC 230V/50Hz)
Environment conditions:	22℃, 49% RH	Tested by:	Vincent

Port Type	Injected Line	Test level	Performance Criteria	Performance Result	Observation
AC Mains	L	±1kV	B	A	Note 1
	N	±1kV	B	A	Note 1
	L+N	±1kV	B	A	Note 1
	PE	±1kV	/	/	/
	L+PE	±1kV	/	/	/
	N+PE	±1kV	/	/	/
	L+N+PE	±1kV	/	/	/

Note 1: There was no change compared with initial operation during the test.

6.7 Surges immunity test

6.7.1 Test specification

Basic standard:	IEC 61000-4-5
Wave-Shape:	Combination wave: 1.2/50 μs open circuit voltage, 8/20 μs short circuit current for analogue/digital data ports: 10/700μs open circuit voltage, 5/320μs short circuit current
Phase angle:	90°, 270°
Polarity:	Positive / Negative
Number of tests:	5

6.7.2 Test Procedures

a) The basic test procedure was in accordance with IEC 61000-4-5.

The EUT is connected to the power mains through a coupling device that directly couples the surge interference signal. The surge noise shall be applied synchronized to the voltage phase at 90°, 270°.Each of line to line and line to earth is impressed with a sequence of five surge voltages with interval of 1 minute.

b) For analogue/digital data ports:

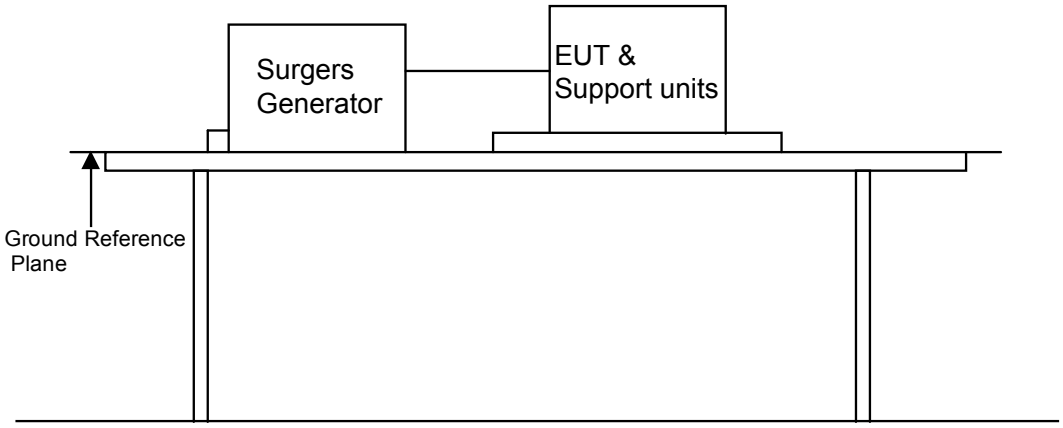
The signal line of EUT is connected to coupling de decoupling network that directly couples the surge interference signal.

Only line to ground is impressed with a sequence of five surge voltages with interval of 1 minute.

c) Each representative mode of operation shall be tested, the test modes are described in Item 1.2.

d) Recording the test result in test record form.

6.7.3 Test Setup



For the actual test configuration, please refer to the related item – Photographs of the test setup.

6.7.4 Test Result

Test mode:	Mode 1-2	Power supply:	Powered by AC/DC adapter (AC 230V/50Hz)
Environment conditions:	23℃, 48% RH	Tested by:	Vincent

Port Type	Injected Line	Test level	Performance Criteria	Performance Result	Observation
AC Mains	L – N	±1kV	B	A	Note 1
	L – PE	±2kV	B	/	/
	N – PE	±2kV	B	/	/

Note 1: There was no change compared with initial operation during the test.

6.8 Voltage dips & voltage interruptions

6.8.1 Test specification

Basic standard:	IEC 61000-4-11
Test duration time:	Minimum three test events in sequence
Interval between event:	Minimum 10 seconds
Phase angle:	0° (If the EUT does not demonstrate compliance when tested with 0°switching, the test shall be repeated with the switching occurring at both 90° and 270°.)

6.8.2 Test procedures

a) The basic test procedure was in accordance with IEC 61000-4-11.

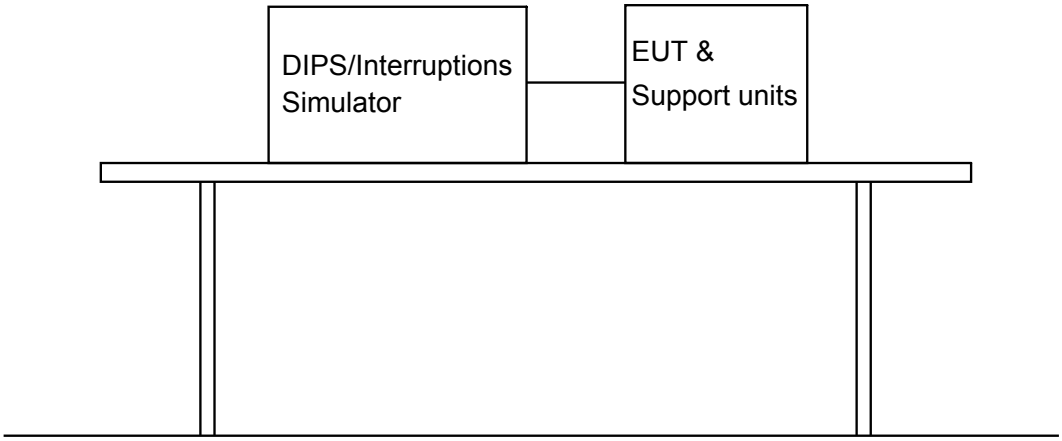
b) The test shall be performed with the EUT connected to the test generator with the shortest power supply cable as specified by the EUT manufacturer. If no cable length is specified, it shall be the shortest possible length suitable to the application of the EUT.

c) The EUT shall be tested for each selected combination of test levels and duration with a sequence of three dips/interruptions with intervals of 10 s minimum (between each test event).

d) Each representative mode of operation shall be tested, the test modes are described in Item 1.2.

e) Recording the test result in test record form.

6.8.3 Test setup



For the actual test configuration, please refer to the related item – Photographs of the test setup.

6.8.4 Test result

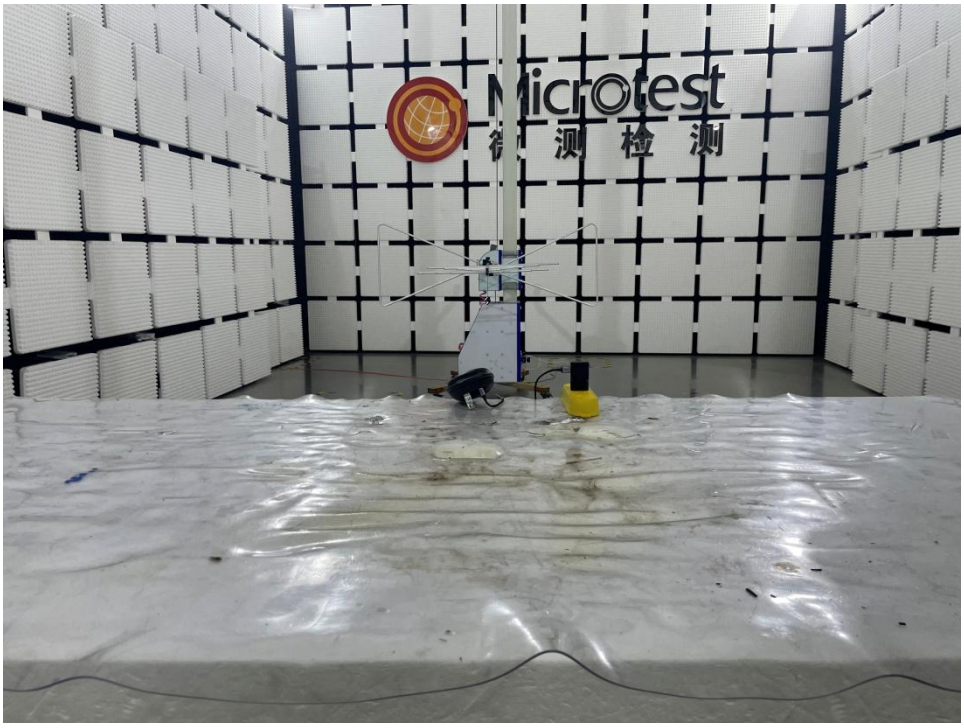
Test mode:	Mode 1-2	Power supply:	Powered by AC/DC adapter (AC 230V/50Hz)
Environment conditions:	22℃, 49% RH	Tested by:	Vincent

Voltage (% Residual)	Duration (Period)	Performance Criteria	Performance Result	Observation
< 5 %	0.5	B	A	Note 1
70 %	25	C	A	Note 1
< 5 %	250	C	B	Note 2

Note 1: There was no change compared with initial operation during the test.
Note 2: The EUT stopped operation during the test, but it can be recovered automatically after test.

Photographs of the test setup

Radiated emissions below 1GHz



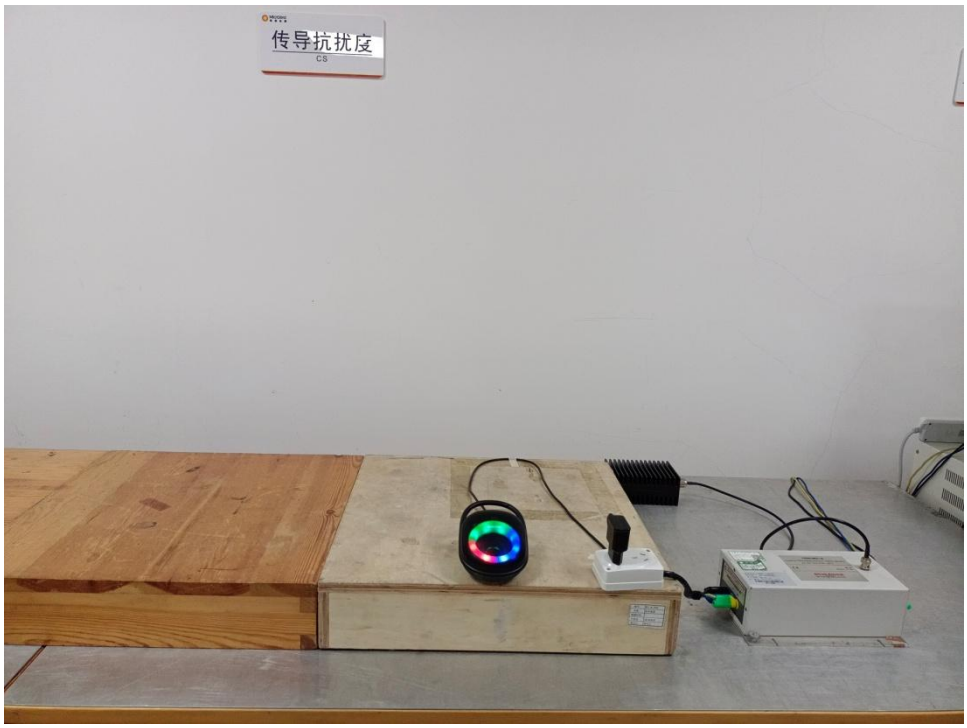
Conducted emissions

Flicker

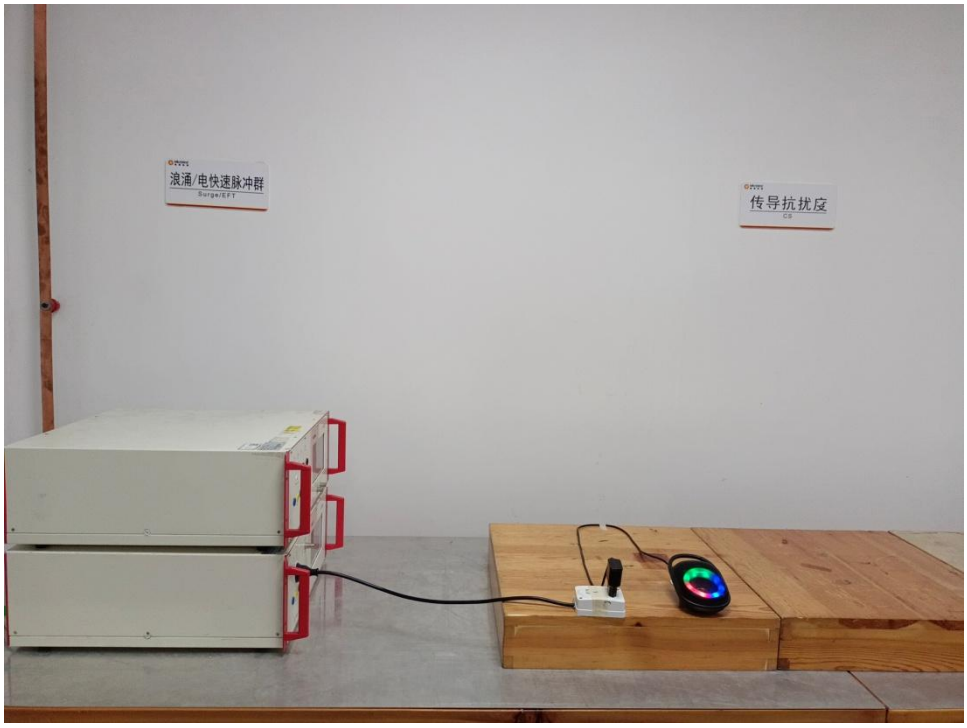
ESD

RS

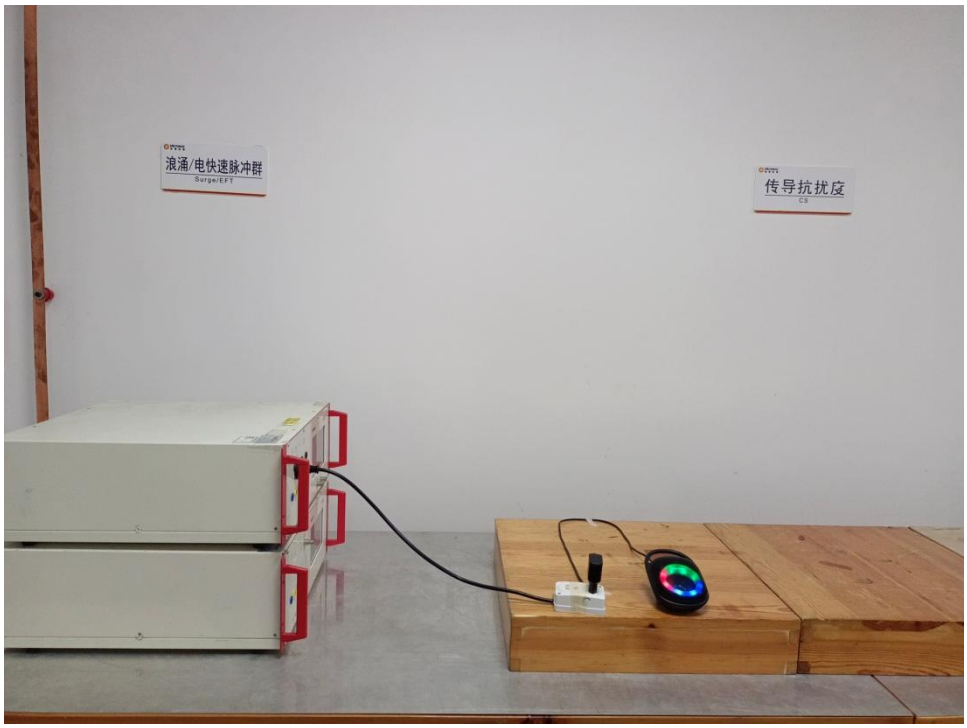
CS



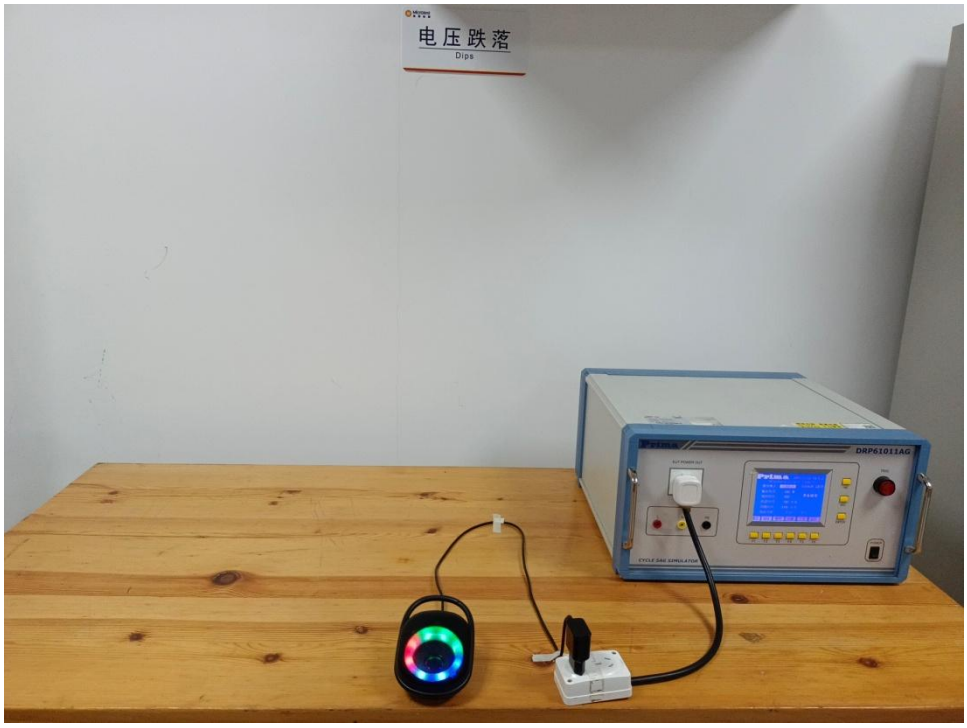
EFT



Surges



Dips



Photographs of the EUT

See the Appendix - EUT Photos.

----End of Report----