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Report Template Version: V05
Report Template Revision Date: 2021-11-03

TEST REPORT

Report No. : CQASZ20220500735E

Applicant: AiGDoo(ShenZhen)Technology Co.,Ltd

Address of Applicant: Room 702, Building 1, Jiuzhou Industrial Park, No. 10, No. 19 Road, Tongguan Road, Tianliao Community, Yutang Street, Guangming District, Shenzhen City, Guangdong Province

Equipment Under Test (EUT):

EUT Name: Sonic electric toothbrush

Model No.: PTR-E10, PTR-E10M, PTR-E11

Test Model No.: PTR-E10

Brand Name: N/A

Standards: EN IEC 55014-1:2020

EN IEC 55014-2:2020

EN IEC 61000-3-2:2019

EN 61000-3-3:2013/A1:2019

Date of Receipt: 2022-5-6

Date of Test: 2022-5-6 to 2022-5-13

Date of Issue: 2022-5-17

Test Result : PASS*

*In the configuration tested, the EUT complied with the standards specified above

Tested By:

Timo Lei

(Timo Lei)

Reviewed By:

Rock Huang

(Rock Huang)

Approved By:

Jack Ai

(Jack Ai)



The test report is effective only with both signature and specialized stamp. The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CQA, this report can't be reproduced except in full.

1 Version

Revision History of Report

Report No.	Version	Description	Issue Date
CQASZ20220500735E	Rev.01	Initial report	2022-5-17

2 Test Summary

Electromagnetic Compatibility (EMC) Part				
Electromagnetic Interference (EMI)				
Test	Test Requirement	Test Method	Limit	Result
Magnetic Emission	EN IEC 55014-1:2020	CISPR16-1-4:2010	Table 3&4 of EN 55014-1	N/A ¹⁾
Radiated Emission	EN IEC 55014-1:2020	CISPR16-2-3:2010	Table 9 of EN 55014-1	PASS
Conducted Emission	EN IEC 55014-1:2020	CISPR 14-1:2016 CISPR 32:2015	Table 5& clause 4.3.3.7 of EN 55014-1	PASS
Disturbance power	EN IEC 55014-1:2020	CISPR 14-1:2016	Table 7 & 8 of EN 55014-1	N/A ¹⁾
Discontinuous disturbance	EN IEC 55014-1:2020	CISPR 14-1:2016	Clause 4.4.2 of EN 55014-1	N/A ¹⁾
Harmonic Emission on AC, 50Hz	EN IEC 61000-3-2:2019	EN IEC 61000-3-2:2019	Class A	N/A ²⁾
Flicker Emission on AC	EN 61000-3-3:2013/A1:2019	EN 61000-3-3:2013/A1:2019	Clause 5	PASS
Electromagnetic Susceptibility (EMS)				
ESD (Electrostatic Discharge)		IEC 61000-4-2:2008	Clause 5.1	PASS
Electrical Fast Transients (EFT)	EN IEC 55014-2:2020	IEC 61000-4-4:2012	Clause 5.2	PASS
Injected currents	EN IEC 55014-2:2020	IEC 61000-4-6:2013	Clause 5.3	N/A ¹⁾
Surges on AC	EN IEC 55014-2:2020	IEC 61000-4-5:2014	Clause 5.6	PASS
Voltage dips and interruptions on AC	EN IEC 55014-2:2020	IEC 61000-4-11:2004	Clause 5.7	PASS
Injected currents	EN IEC 55014-2:2020	IEC 61000-4-6:2013	Clause 5.4	PASS
Radiated Immunity	EN IEC 55014-2:2020	IEC 61000-4-3:2006/A2:2010	Clause 5.5	PASS

Remark:

N/A¹⁾: Because this test EUT belong to Category IV; therefore, it is not applicable.

N/A²⁾: Because the rated power of this product is less than 75W.

AC: Alternating Current

DC: Direct Current

Temp: In this whole report Temp means Temperature.

Humid: In this whole report Humid means humidity.

Press: In this whole report Press means Pressure.

N/A: In this whole report is not application.

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4 General Information

4.1 Client Information

Applicant:	AiGDoo(ShenZhen)Technology Co.,Ltd
Address of Applicant:	Room 702, Building 1, Jiuzhou Industrial Park, No. 10, No. 19 Road, Tongguan Road, Tianliao Community, Yutang Street, Guangming District, Shenzhen City, Guangdong Province
Manufacturer:	AiGDoo(ShenZhen)Technology Co.,Ltd
Address of Manufacturer:	Room 702, Building 1, Jiuzhou Industrial Park, No. 10, No. 19 Road, Tongguan Road, Tianliao Community, Yutang Street, Guangming District, Shenzhen City, Guangdong Province
Factory:	AiGDoo(ShenZhen)Technology Co.,Ltd
Address of Factory:	Room 702, Building 1, Jiuzhou Industrial Park, No. 10, No. 19 Road, Tongguan Road, Tianliao Community, Yutang Street, Guangming District, Shenzhen City, Guangdong Province

4.2 General Description of EUT

Product Name:	Sonic electric toothbrush
Model No.:	PTR-E10, PTR-E10M, PTR-E11
Test Model No.:	PTR-E10
Trade Mark:	N/A
Power Supply:	Li-ion Battery: 7.4Wh/3.7V By Charging DC 5V 1A
Test Mode:	
Charging mode	Keep the EUT in Charging mode
Normal working	Keep the EUT in Normal working

Note:

Model No.: PTR-E10, PTR-E10M, PTR-E11.

Only the model PTR-E10 was tested, their electrical circuit design, layout, components used and internal wiring are identical, only the Exterior is different.

4.3 Description of Support Units

The EUT has been tested with associated equipment below.

1) support equipment

Description	Manufacturer	Model No.	Certification	Supplied by
Adapter	/	EP-TA50CBC	/	CQA

4.4 Standards Applicable for Testing

The customer requested EMC tests for Robot Vacuum Cleaner

The standards used were EN 55014-1, EN IEC 61000-3-2, EN 61000-3-3, EN 55014-2.

Table 1 – Application of limits

	Disturbance voltage			Disturbance Voltage ^c Continuous ^{a,f}	Disturbance Power		Radiated dist.	Magnetic field	
	Continuous ^{a,f}		Clicks ^b		Table7	Table8		Table3	Table4
Subclause of EN55014-1	(4.3.2)	(4.3.3)		(4.4.2)	(4.3.4)		(4.3.4)	(4.3.2)	
Limits	Table2	Table5	Table6	Text	Table7	Table8	Table9	Table3	Table4
All equipment not listed below		•		•	•	•	•		
Tools			•	•	•	•	•		
Induction cooking appliances	•			•	•	•	•	•	•
Electric fence Energisers ^d		•		•	•	•	•		
Toys Cat. A ^e									
Toys Cat. B							•		
Toys Cat. C							•		
Toys Cat. D		•		•	•	•	•		
Toys Cat. E	•			•	•	•	•		

a: Limits of Table 5 and Table 6 can also be applicable to discontinuous disturbances (see 4.4.2.2 of EN55014-1).

b: For exemption and exceptions see 5.4.3 of EN55014-1.

c: For mains operated equipment, if certain conditions are met, the disturbance power test may be applied in alternative to the radiated disturbance test (see 4.3.4.2 and Figure 4 of EN55014-2).

d: For electric fence energisers the disturbance voltage test is applied according to 4.3.3.5 of EN55014-1.

e: Toys of category A shall be deemed to comply with the requirements of this standard without testing.

f: For wired network ports, see 4.3.3.7 of EN55014-1

Table 2: Tests Carried Out Under EN IEC 61000-3-2:2019 & EN61000-3-3:2013+A1:2019

Standard		Status
EN IEC 61000-3-2:2019	Harmonic Emissions on AC	✓
EN 61000-3-3:2013+A1:2019	Flicker Emissions on AC	✓

Table 3: Tests Carried Out Under EN 55014-2: 2020 for Category IV

Standard		Cat I	Cat II	Cat III	Cat IV
EN 55014-2: 2020	ESD	o	o	✓	
EN 55014-2: 2020	Fast transients	o			✓
EN 55014-2: 2020	Injection currents up to 230MHz	o			
EN 55014-2: 2020	Surge	o			✓
EN 55014-2: 2020	Voltage dips	o			✓
EN 55014-2: 2020	Injection currents up to 80 MHz				✓
EN 55014-2: 2020	Radio frequency electromagnetic fields			o	✓

o Indicates the testing requirements for each category of equipment

x Indicates that the test is not applicable

✓ Indicates that the test is applicable

Note:

The Test EUT as belong to category IV of EN55014-2, and only the enclosure port was tested. Since the AC power port, which containing no electronic control circuitry, is deemed to fulfil the relevant immunity requirements without testing.

4.5 Test Location

Other than radiated immunity, All tests were performed at:

Shenzhen Huaxia Testing Technology Co., Ltd.

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua District, Shenzhen, China

Radiated immunity test is performed at:

Guangdong Huizhou Quality & Measuring Supervision Testing Institute

Quality Supervision & Test Building No.1, Wenhua 2th Road, Jiangbei, Huizhou, Guangdong, China

4.6 Deviation from Standards

None.

4.7 Abnormalities from Standard Conditions

None.

4.8 Other Information Requested by the Customer

None.

4.9 Monitoring of EUT for the Immunity Test

Visual: Monitor the LED flash and charging of the EUT.

Audio: N/A.

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

No.	Item	Measurement Uncertainty
1	Conduction emission	3.74dB (9kHz to 150kHz)
		3.34dB (150kHz to 30MHz)
2	Radiated emission	5.12dB (30MHz-1GHz)
		4.60dB (1GHz-6GHz)
3	Radiated Immunity	1.61dB
4	Conducted Immunity	0.92dB
5	Temperature test	1°C
6	Humidity test	3%
7	DC power test	0.5 %

5 Equipment List

Conducted Emissions (150kHz-30MHz)					
Equipment	Manufacturer	Model No	Inventory No.	Cal Date	Cal Due Date
EMI Test Receiver	R&S	ESPI3	CQA-013	2021/9/10	2022/9/9
LISN	R&S	ENV216	CQA-003	2021/9/10	2022/9/9
Coaxial cable (9KHz~300MHz)	CQA	N/A	C021	2021/9/10	2022/9/9

Radiated Emissions					
Equipment	Manufacturer	Model No	Inventory No.	Cal Date	Cal Due Date
Loop antenna	SCHWARZBECK	FMZB 1516	CQA-060	2021/9/16	2024/9/15
Horn Antenna	R&S	BBHA 9170	CQA-088	2021/9/16	2024/9/15
Horn Antenna	R&S	HF906	CQA-012	2021/9/16	2024/9/15
Bilog Antenna	R&S	HL562	CQA-011	2021/9/16	2024/9/15
EMI Test Receiver	R&S	ESR7	CQA-005	2021/9/10	2022/9/9
Spectrum analyzer	R&S	FSU26	CQA-038	2021/9/10	2022/9/9
Preamplifier	MITEQ	AMF-6D-02001800-29-20P	CQA-036	2021/9/10	2022/9/9
Coaxial cable (1GHz~40GHz)	CQA	N/A	C007	2021/9/10	2022/9/9
Coaxial cable (9KHz~1GHz)	CQA	N/A	C013	2021/9/10	2022/9/9

Harmonic Current & Voltage Fluctuation and Flicker					
Equipment	Manufacturer	Model No	Inventory No.	Cal Date	Cal Due Date
Harmonic And Flicker Analyzer	CI	PACS-3	CQA-021	2021/9/10	2022/9/9
AC Power Supply	CI	5001 ix	CQA-073	2021/9/10	2022/9/9

Electrostatic Discharge					
Equipment	Manufacturer	Model No	Inventory No.	Cal Date	Cal Due Date
ESD Simulator	EM TEST	DITO	CQA-001	2021/9/13	2022/9/12

Electrical Fast Transients/Burst & Surge & Voltage Dips and Interruptions at Power Port

Equipment	Manufacturer	Model No	Inventory No.	Cal Date	Cal Due Date
EMS test system	HTEC	ECOMPACT 7	CQA-002	2021/9/10	2022/9/9
Communications surge generator	HTEC	HTSG 70	CQA-063	2021/9/10	2022/9/9
Capacitive Coupling Clamp	HTC	H3C	CQA-018	2021/9/10	2022/9/9

Conducted Immunity (150kHz-80MHz)

Equipment	Manufacturer	Model No	Inventory No.	Cal Date	Cal Due Date
RF-Generator	EM TEST	CWS 500	CQA-016	2021/9/10	2022/9/9
6db Attenuator	EM TEST	ATT6/75	CQA-049	2021/9/10	2022/9/9
CDN	SCHWARZBECK	CDN M2/M3PE	CQA-050	2021/9/10	2022/9/9

Guangdong Huizhou Quality & Measuring Supervision Testing Institute:

Radiated Immunity (80MHz-6GHz)

Equipment	Manufacturer	Model No	Inventory No.	Cal Date	Cal Due Date
3m Anechoic Chamber	Albatross	APC13102-SAC	Z-064	2021/9/11	2024/10/10
Signal Generator	R&S	SMB100A	Z-063-01	2021/9/10	2022/9/9
Power amplifier	R&S	BBA150-BC1000	Z-140	2021/9/10	2022/9/9
Power amplifier	R&S	BBA150-D200+E200	Z-144	2021/9/10	2022/9/9
log-periodic antenna	R&S	HL046E	Z-063-18	2021/9/16	2024/9/15
Stacked Double Log-periodic Antenna	Schwarzbeck	STLP 9149	Z-063-19	2021/9/16	2024/9/15
Power Meter	R&S	NRP2	Z-063-06	2021/9/10	2022/9/9
Audio mouth	BK	BK-4227	Z-063-23	2021/9/10	2022/9/9
Audio Box	BK	ACO-B0X	Z-063-24	2021/9/10	2022/9/9
Audio analyzer	R&S	UPL	Z-063-76	2021/9/10	2022/9/9

	Manufacturer	Software brand
Radiated Emissions test software	Audix	e3
Conducted Emissions test software	Audix	e3

6 EMI Requirements Specification in EN 55014-1

6.1 EMI (Emission)

6.1.1 Radiated Emission

Test Requirement: EN 55014-1

Test Method: CISPR 16-2-3

Measurement Distance: 3m

Detector: Peak for pre-scan (120kHz resolution bandwidth)

Quasi-Peak if maximised peak within 6dB of limit

EUT Operation:

Ambient: Temp.: 25.5 °C Humid.: 53% Press.: 1009mbar

Test Mode: Charging mode, Normal working

Test Status: Pretest the EUT at different test mode and found the Normal working which is worst case, the test worst case mode is recorded in the report.

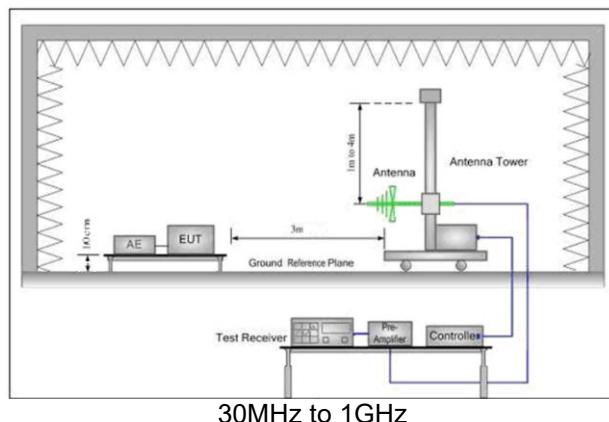
Receive Setup:

	Frequency range (MHz)	Detector	RBW	VBW
	30-1000	Quasi-peak	120kHz	300kHz

Limit:

	Frequency	Limit(@3m)	Remark
	30MHz-230MHz	40dB _V /m	QP value
	230MHz-1GHz	47dB _V /m	QP value

Test Setup:



Below 1GHz test procedure as below:

- 1) The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3-meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- 2) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 3) The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- 4) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table

Test Procedure:

was turned from 0 degrees to 360 degrees to find the maximum reading.

- 5) The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- 6) If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- 7) Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 8) Above 1GHz test procedure as below:
- 9) Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber (Above 18GHz the distance is 1 meter).
- 10) Repeat above procedures until all frequencies measured was complete.

Refer to section 5 for details.

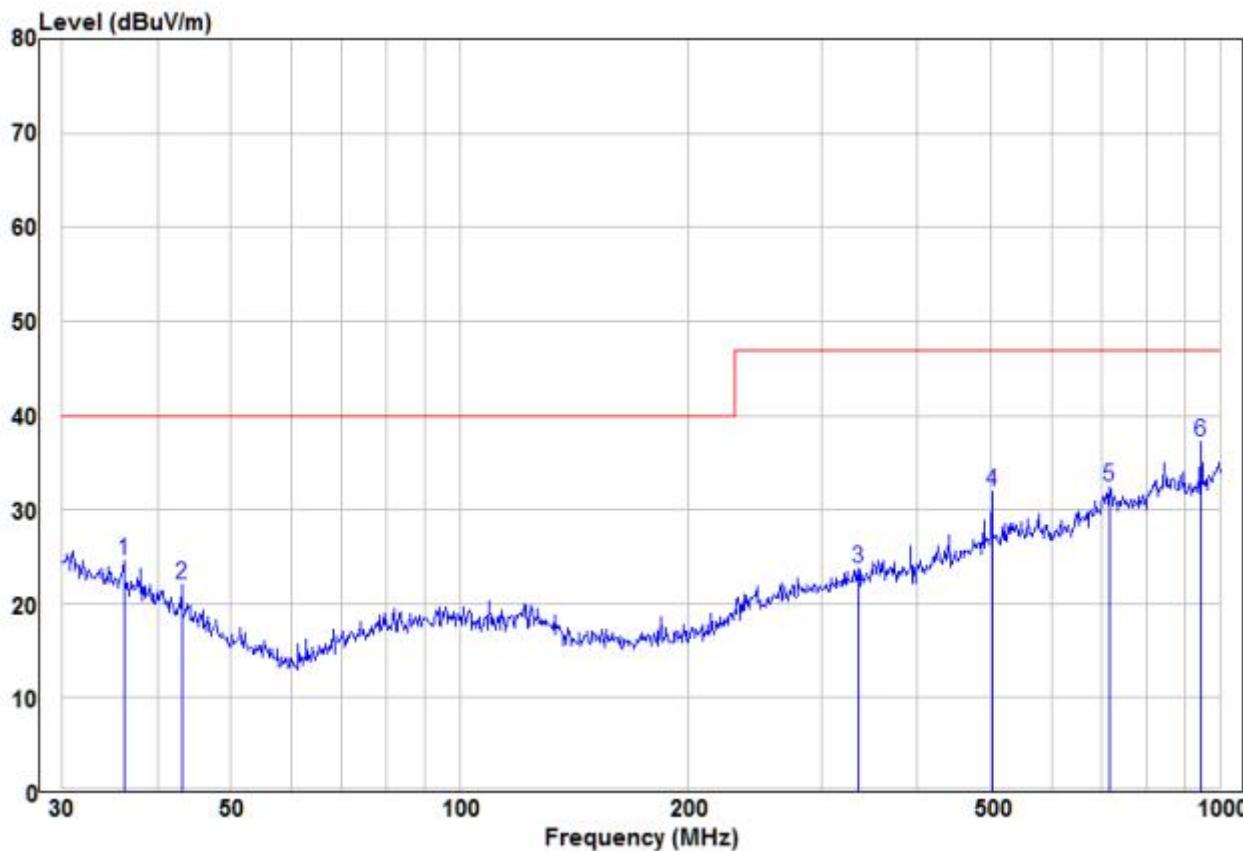
Equipment Used:

Test result:

PASS

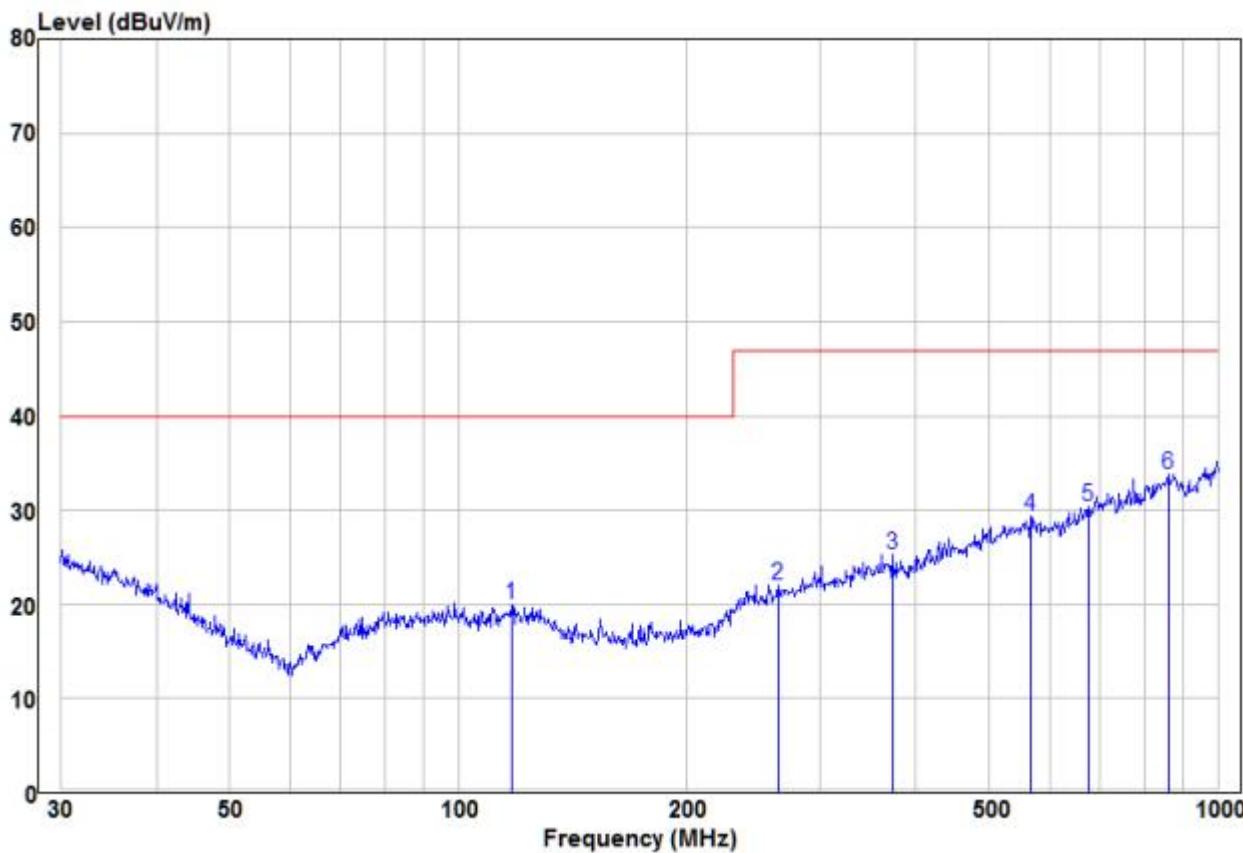
Measurement Data:
Below 1GHz:

Vertical



Freq	Read			Limit Line	Over Limit	Remark	Pol/Phase
	Freq	Level	Factor				
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	
1	36.13	10.32	14.19	24.51	40.00	-15.49	Peak VERTICAL
2	43.05	10.58	11.37	21.95	40.00	-18.05	Peak VERTICAL
3	334.86	9.09	14.58	23.67	47.00	-23.33	Peak VERTICAL
4	501.18	13.64	18.29	31.93	47.00	-15.07	Peak VERTICAL
5	716.68	11.26	21.20	32.46	47.00	-14.54	Peak VERTICAL
6 pp	945.44	13.64	23.62	37.26	47.00	-9.74	Peak VERTICAL

Horizontal



	Read Freq	Read Level	Read Factor	Limit Level	Line Limit	Over Limit	Over Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	117.77	9.41	10.58	19.99	40.00	-20.01	Peak	HORIZONTAL
2	263.82	9.52	12.54	22.06	47.00	-24.94	Peak	HORIZONTAL
3	372.00	10.24	15.08	25.32	47.00	-21.68	Peak	HORIZONTAL
4	566.62	10.35	18.97	29.32	47.00	-17.68	Peak	HORIZONTAL
5	675.21	10.20	20.14	30.34	47.00	-16.66	Peak	HORIZONTAL
6 pp	860.04	9.81	24.01	33.82	47.00	-13.18	Peak	HORIZONTAL

6.1.2 Conducted Emission

Test Requirement: EN 55014-1

Test Method: EN 55014-1

Detector: Peak for pre-scan (9kHz Resolution Bandwidth)

EUT Operation:

Ambient: Temp.: 26 °C Humid.: 59% Press.: 1009mbar

Test Mode: Charging mode

Equipment Used: Refer to section 5 for details.

Receive Setup:

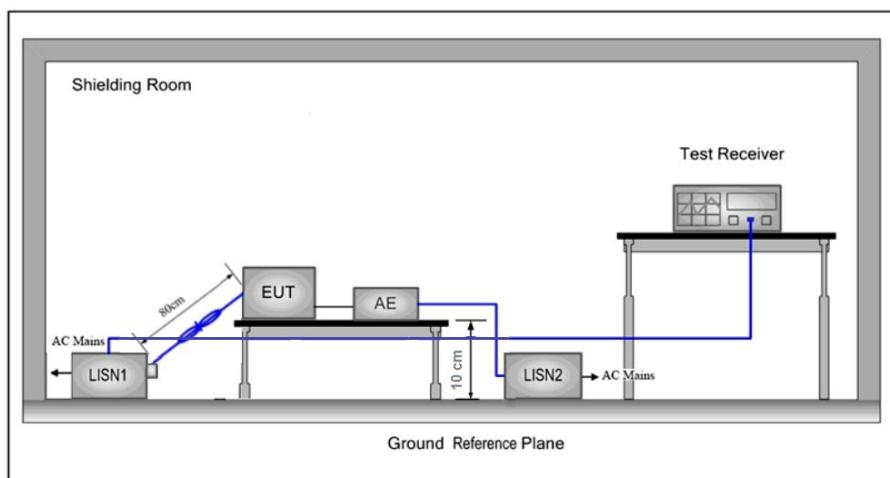
Frequency range (MHz)	RBW	VBW
0.15 - 30	9kHz	30kHz

Limit:

Frequency Range (MHz)	Limit (dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	59 to 46
0.50 to 5	56	46
5 to 30	60	50

NOTE 1: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.
 NOTE 2: The lower limit is applicable at the transition frequency.

Test Setup:



- 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 $50\Omega/50\mu\text{H} + 5\Omega$ 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.

For single-phase equipment with a rated voltage range in the range between:

- 100 V to 127 V, test at one nominal voltage within this range;
- 200 V to 240 V, test at one nominal voltage within this range;
- 100 V to 240 V, test at two voltages within this range, one test in the range 100 V to 127 V and another test in the range 200 V to 240 V.

Final Test power supply:

The recommended test voltages are 120 V for the range 100 V to 127 V; and 230 V for the range 200 V to 240 V.

If the equipment has more than one rated frequency (e.g. 50 Hz to 60 Hz), then the EUT shall be tested at one of these frequencies only.

If the equipment has a rated frequency range (e.g. 50 Hz to 60 Hz), then the EUT shall be tested at one frequency within this range.

Test result:

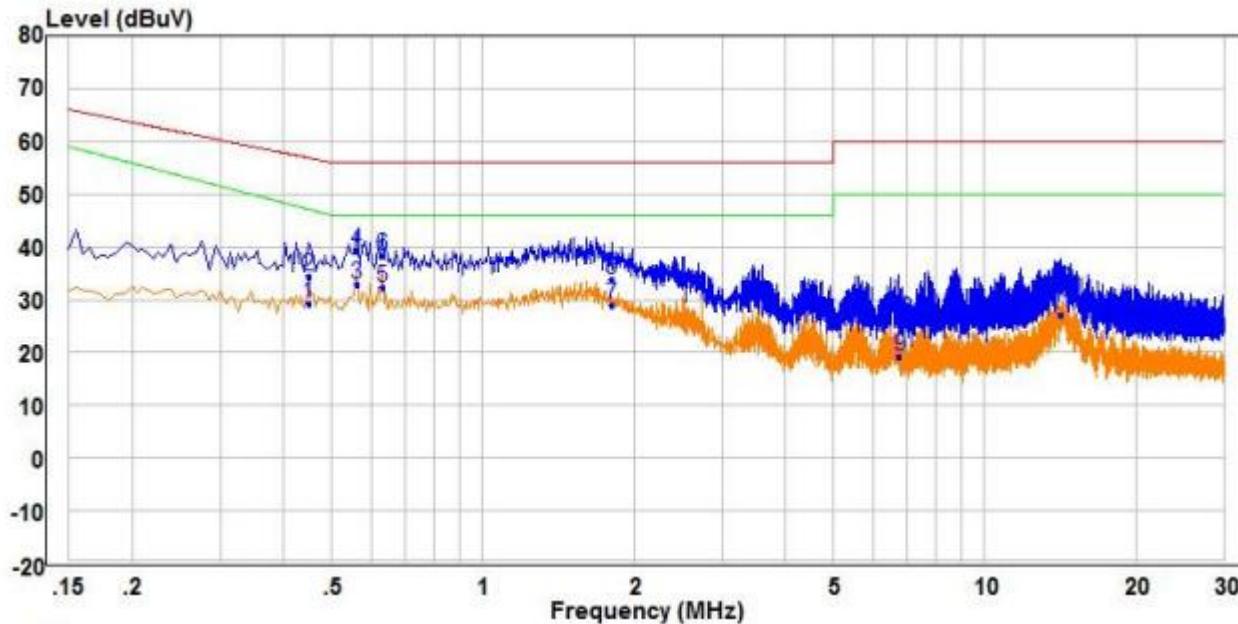
PASS

Measurement Data:

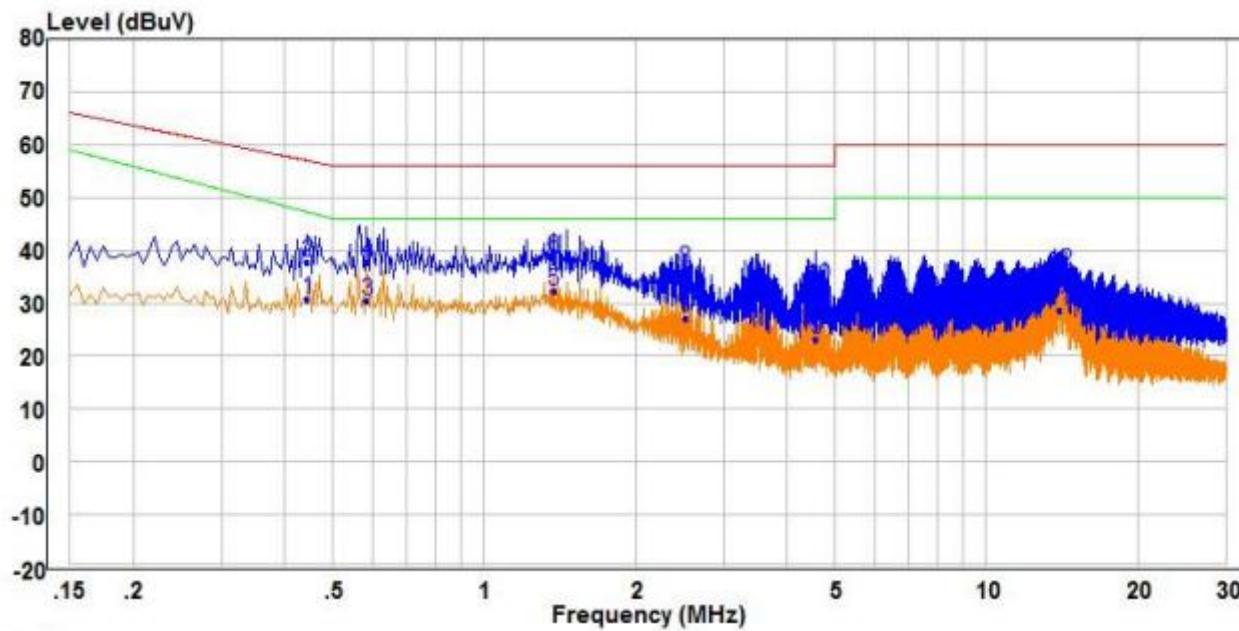
An initial pre-scan was performed on the live and neutral lines with peak detector, Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

An initial survey or scanning of the complete range shall be made. In the case of quasi-peak detector measurement, the registered values shall be given at least at the following frequencies and at all frequencies at which there is a maximum:160 kHz, 240 kHz, 550 kHz, 1 MHz, 1,4 MHz, 2 MHz, 3,5 MHz, 6 MHz, 10 MHz, 22 MHz,30 MHz;

These frequencies are to be subject to a tolerance of ±10 %

Live Line:


	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Over Remark	Pol/Phase
	MHz	dBuV		dB	dBuV		dB	
1	0.450	19.56	9.66	29.22	47.14	-17.92	Average	Line
2	0.450	24.65	9.66	34.31	56.88	-22.57	QP	Line
3 PP	0.560	23.20	9.76	32.96	46.00	-13.04	Average	Line
4 QP	0.560	29.58	9.76	39.34	56.00	-16.66	QP	Line
5	0.630	22.31	9.83	32.14	46.00	-13.86	Average	Line
6	0.630	28.42	9.83	38.25	56.00	-17.75	QP	Line
7	1.810	17.56	11.37	28.93	46.00	-17.07	Average	Line
8	1.810	22.37	11.37	33.74	56.00	-22.26	QP	Line
9	6.755	9.52	9.79	19.31	50.00	-30.69	Average	Line
10	6.755	16.57	9.79	26.36	60.00	-33.64	QP	Line
11	14.170	17.39	9.75	27.14	50.00	-22.86	Average	Line
12	14.170	21.83	9.75	31.58	60.00	-28.42	QP	Line

Neutral Line:


Freq	Read			Limit	Over	Line	Limit	Remark	Pol/Phase
	MHz	dBuV	dB						
1	0.445	21.04	9.65	30.69	47.26	-16.57	Average		Neutral
2	0.445	28.26	9.65	37.91	56.97	-19.06	QP		Neutral
3	0.585	20.60	9.79	30.39	46.00	-15.61	Average		Neutral
4	0.585	27.85	9.79	37.64	56.00	-18.36	QP		Neutral
5 PP	1.375	22.51	9.72	32.23	46.00	-13.77	Average		Neutral
6 QP	1.375	28.93	9.72	38.65	56.00	-17.35	QP		Neutral
7	2.515	17.40	9.76	27.16	46.00	-18.84	Average		Neutral
8	2.515	26.73	9.76	36.49	56.00	-19.51	QP		Neutral
9	4.590	13.39	9.81	23.20	46.00	-22.80	Average		Neutral
10	4.590	23.50	9.81	33.31	56.00	-22.69	QP		Neutral
11	13.975	18.80	9.76	28.56	50.00	-21.44	Average		Neutral
12	13.975	26.31	9.76	36.07	60.00	-23.93	QP		Neutral

6.1.3 Harmonics

Test Requirement: EN IEC 61000-3-2

Test Method: EN IEC 61000-3-2

Measurement Time: 3 min

Class A

Remark:

There is no need for Harmonics test to be performed on this product (rated power is less than 75W) in accordance with EN IEC 61000-3-2.

For further details, please refer to Clause 7 of EN IEC 61000-3-2 which states:

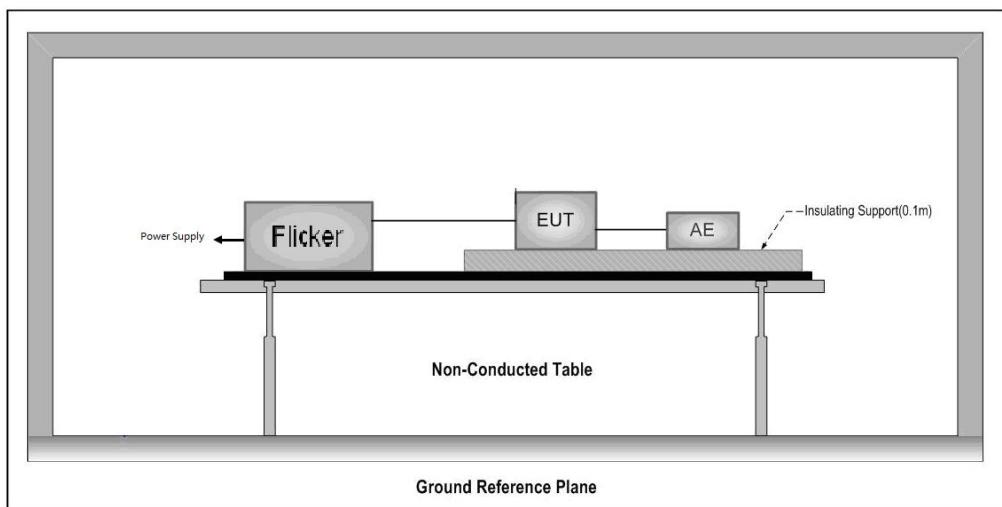
"For the following categories of equipment, limits are not specified in this standard.

- equipment with a rated power of 75W or less, other than lighting equipment."

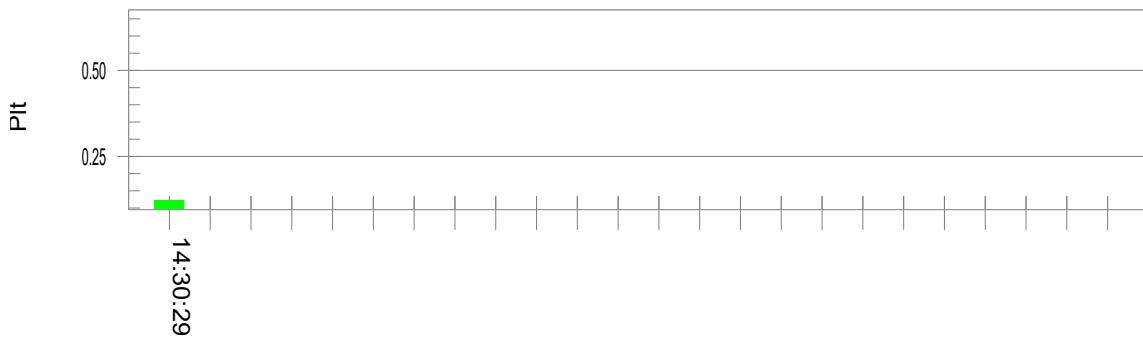
6.1.4 Flicker

Test Requirement:	EN 61000-3-3		
Test Method:	EN 61000-3-3		
Class/Severity:	Clause 5 of EN 61000-3-3		
Measurement Time:	10 min		
Detector:	As per EN 61000-3-3		
EUT Operation:			
Ambient:	Temp.: 26 °C	Humid.: 59%	Press.: 1009mbar
Test Mode:	Charging mode		
Equipment Used:	Refer to section 5 for details.		

Test Setup:



Test result: PASS

Test Result: Pass Status: Test Completed**Pst and limit line****European Limits****Plt and limit line****Parameter values recorded during the test:****Vrms at the end of test (Volt): 229.50****Highest dt (%):****T-max (mS): 0****Highest dc (%): 0.00****Highest dmax (%): 0.00****Highest Pst (10 min. period): 0.279****Highest Plt (2 hr. period): 0.122****Test limit (%):****Test limit (mS): 500.0****Pass****Test limit (%): 3.30****Pass****Test limit (%): 4.00****Pass****Test limit: 1.000****Pass****Test limit: 0.650****Pass**

7 EMS Requirements Specification in EN 55014-2

Performance Criteria of EN 55014-2, sub clause 6.

Criteria	description
A	The apparatus shall continue to operate as intended during the test. No degradation of performance or loss of function is allowed below a performance level(or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. 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 from what the user may reasonably expect from the apparatus if used as intended.
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 (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. During the test, degradation of performance is allowed, however no change of actual operating state or stored data is allowed to persist after the test. 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 from what the user may reasonably expect from the apparatus if used as intended.
C	Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls, or by any operation specified in the instructions for use.
Remark:	This test product belongs to Category IV

7.1.1 Radiated Immunity

Test Requirement: EN 55014-2

Test Method: IEC 61000-4-3

EUT Operation:

Ambient: Temp.: 24°C Humid.: 54%

Press.: 1009mbar

Test Mode: Charging mode, Normal working

Criterion Required: A

Equipment Used: Refer to section 5 for details.

Test Setup:

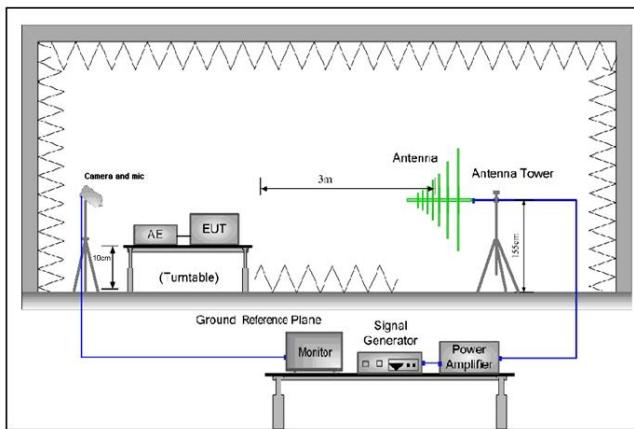


Figure 1. 80MHz to 1GHz

Test Procedure:

- 1) For table-top equipment, the EUT was placed in the chamber on a non-conductive table 0.8m high. For arrangement of floor-standing equipment, the EUT was mounted on a non-conductive support 0.1m above the supporting plane. For human body-mounted equipment, the EUT may be tested in the same manner as table top items.
- 2) If possible, a minimum of 1 m of cable is exposed to the electromagnetic field. Excess length of cables interconnecting units of the EUT shall be bundled low-inductively in the approximate center of the cable to form a bundle 30 cm to 40 cm in length.
- 3) The EUT was initially placed with one face coincident with the calibration plane. The EUT face being illuminated was contained within the UFA (Uniform Field Area).
- 4) The frequency ranges to be considered were swept with the signal modulated and pausing to adjust the RF signal level or to switch oscillators and antennas as necessary. Where the frequency range was swept incrementally, the step size was not exceed 1% of the preceding frequency value.
- 5) The dwell time of the amplitude modulated carrier at each frequency was not be less than the time necessary for the EUT to be exercised and to respond, and was not less than 0.5 s.
- 6) The test normally was performed with the generating antenna facing each side of the EUT.
- 7) The polarization of the field generated by each antenna necessitates testing each selected side twice, once with the antenna positioned vertically and again with the antenna positioned horizontally.
- 8) The EUT was performed in a configuration to actual installation conditions, a video camera and/or an audio monitor were used to monitor the performance of the EUT.

Test result:

PASS

Test Data:

Frequency	Level	Modulation	EUT Face	Antenna Polaxis	Result / Observations
80MHz-1GHz	3V/m	1kHz, 80% Amp. Mod, 1% increment Dwell time: 3 seconds	Front	V	A
				H	A
			Back	V	A
				H	A
			Left	V	A
				H	A
			Right	V	A
				H	A
			Top	V	A
				H	A
			Under	V	A
				H	A

Remark:

A: No performance degradation during test

7.1.2 ESD

Test Requirement:

EN 55014-2

Test Method:

IEC 61000-4-2

EUT Operation:

Ambient:

Temp.: 26 °C

Humid.: 59%

Press.: 1009mbar

Criterion Required:

B

Discharge Impedance:

330 Ω / 150 pF

Polarity:

Positive & Negative

Number of Discharge:

Minimum 10 times at each test point

Discharge Mode:

Single Discharge

Discharge Period:

1 second minimum

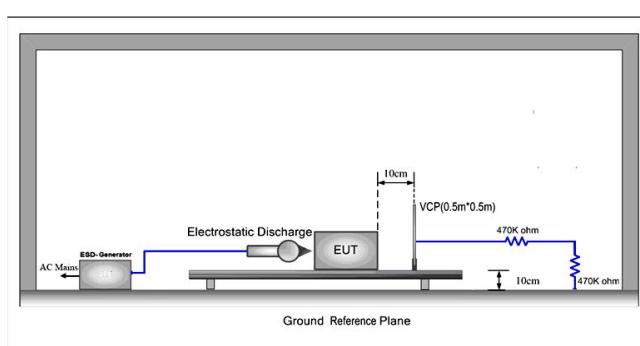
Test Mode:

Charging mode, Normal working

Equipment Used:

Refer to section 5 for details

Test Setup:



Test set-up for floor standing equipment

Test Procedure:

- 1) Contact discharges to the conductive surfaces and to coupling planes:
The EUT was exposed to at least 200 discharges, 100 each at negative and positive polarity, at a minimum of four test points (a minimum of 50 discharges at each point). One of the test points was subjected to at least 50 indirect discharges (contact) to the center of the front edge of the horizontal coupling plane. The remaining three test points shall each receive at least 50 direct contact discharges. If no direct contact test points were available, then at least 200 indirect discharges were applied in the indirect mode. Tests were performed at a maximum repetition rate of one discharge per second.
- 2) Airdischarge at slots and apertures, and insulating surfaces:
On those parts of the EUT where it was not possible to perform contact discharge testing, the equipment was investigated to identify user accessible points where breakdown may occur. This investigation was restricted to those areas normally handled by the user. A minimum of 10 single air discharges were applied to the selected test point for each such area.
The application of electrostatic discharges to the contacts of open connectors was not required by this standard.
- 3) The EUT was put on a 0.8m high wooden table for table-top equipment or 0.1m high for floor standing equipment standing on the ground reference plane (GRP).
- 4) A horizontal coupling plane (HCP) 1.6m by 0.8m in size was placed on the table, and the EUT with its cables were isolated from the HCP by an insulating support thick than 0.5mm. The VCP 0.5m by 0.5m in size & HCP were constructed from the same material type & think mess as that of the GRP and connected to the GRP via a 470kΩ resistor at each end. The distance between EUT and any of the other metallic surface excepted the GRP, HCP and VCP was greater than 1m.
- 5) During the contact discharges, the tip of the discharge electrode was touch the EUT before the discharge switch is operated. During the air discharges, the round

discharge tip of the discharge electrode was approached as fast as possible to touch the EUT.

- 6) After each discharge, the ESD generator was removed from the EUT, the generator was then retriggered for a new single discharge. For ungrounded product, a discharge cable with two resistances was used after each discharge to remove remnant electrostatic voltage. 10 times of each polarity single discharge were applied to HCP and VCP.

Test Results: PASS

Test result:

Observations: Test Point:

1. All insulated enclosure and seams.
2. All accessible metal parts of the enclosure.

Direct Application Test Results

Direct Application			Test Results	
Discharge Level (kV)	Pulse No.	Test Point	Contact Discharge	Air Discharge
± 8	10 for every level	1	N/A	A
± 4	10 for every level	2	A	N/A

Indirect Application for floor standing equipment Test Results

Indirect Application		Test Results	
Discharge Level (kV)	Pulse No.	Horizontal Coupling	Vertical Coupling
± 4	10 for every level	N/A	A

Remark:

A: No performance degradation during test.

N/A: Not applicable

7.1.3 Electrical Fast Transients (EFT)

Test Requirement:	EN 55014-2		
Test Method:	IEC 61000-4-4		
Test Level:	$\pm 1\text{KV}$ (peak) on AC		
Polarity:	Positive & Negative		
Tr /Td	5/50ns		
Repetition Frequency:	5kHz		
Burst Period:	300ms		
Test Duration:	2 minute per level & polarity		
Criterion Required:	B		
EUT Operation:			
Ambient:	Temp.: 26 °C	Humid.: 59%	Press.: 1009mbar
Test Mode:	Charging mode		
Equipment Used:	Refer to section 5 for details.		
Test Setup:			

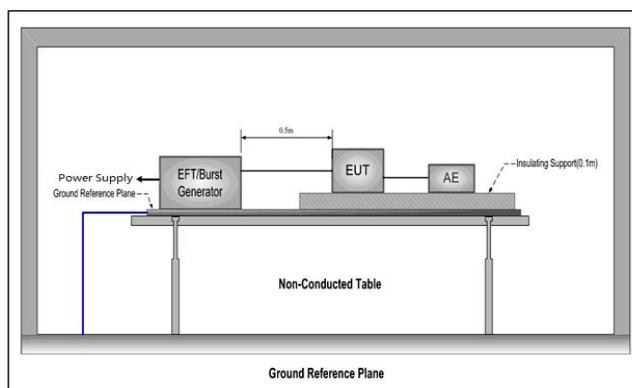


Figure 1. For AC port

- Test Procedure:**
- 1) The EUT was placed on a ground reference plane (GRP) insulated by an insulating support 0.1 m thick and the GRP was placed on a 0.8m high wooden table for table-top equipment. For floor standing equipment, the EUT was placed on a 0.1m high wooden support above the GRP.
 - 2) The GRP shall project beyond the EUT and the clamp by at least 0.1m on all sides. The distance between the EUT and any other of the metallic surface except the GRP was greater than 0.5m. All cables to the EUT was placed on the insulation support 0.1m above GRP. A cable not subject to EFT was routed as far as possible from cable under test to minimize the coupling between the cables.
 - 3) The length of signal and power cable between the EUT and EFT generator was 0.5m. If the cable is a non-detachable supply cable more than 0.5m, the excess length of this cable shall be folded to avoid a flat coil and situated at a distance of 0.1m above the GRP.
 - 4) The EUT was conducted the below specified test voltages for line and neutral or line, neutral and earth simultaneously (for single, control, AC and DC port line with capacitive coupling clamp), 120 seconds duration. If the equipment contains identical ports, only one was tested; multicomputer cables, such as a 50-pair telecommunication cable, were tested as a single cable. Cables did not be split or divided into groups of conductors for this test; interface ports, which were intended by the manufacturer to be connected to data cables not longer than 3 m, did not be tested.

Test result: PASS

Lead under Test	Level (kV)	Coupling Direct/Clamp	Observations (Performance Criterion)
For the AC port			
Live, Neutral	±1.0	Direct	A

Remark:

A: No performance degradation during test.

7.1.4 RF Common Mode 0.15MHz to 80MHz

Test Requirement: EN 55014-2

Test Method: IEC 61000-4-6

Test Level: Input and output a.c. power ports: 3V rms (unmodulated emf into 150Ω)

Modulation: 80%, 1kHz Amplitude Modulation

Test Port : AC port.

Criterion Required: A

EUT Operation:

Ambient: Temp.: 26 °C Humid.: 59% Press.: 1009mbar

Test Mode: Charging mode

Equipment Used: Refer to section 5 for details.

Test Setup:

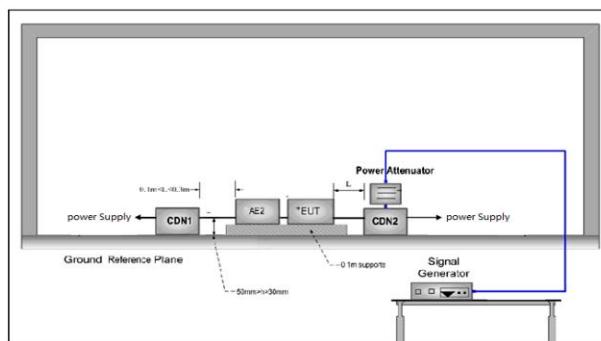


Figure 1. For AC port

Test Procedure:

- 1) The EUT was placed on an insulating support of 0.1m height above a ground reference Plane, arranged and connected to satisfy its functional requirement. All cables exiting the EUT was supported at a height of at least 30 mm above the ground reference plane.
- 2) The coupling and decoupling devices were required, they were located between 0.1 m and 0.3 m from the EUT. This distance was to be measured horizontally from the projection of the EUT on to the ground reference plane to the coupling and decoupling device.
- 3) Each AE, used with clamp injection, shall be placed on an insulating support 0.1 m above the ground reference plane. A decoupling network shall be installed on each cable between the EUT and AE except the cable under test. All cables connected to each AE, other than those being connected to the EUT, shall be provided with decoupling networks. The decoupling networks connected to each AE (except those on cables between the EUT and AE) shall be applied no further than 0.3 m from the AE. The cable(s) between the AE and the decoupling network(s) or in between the AE and the injection clamp shall not be bundled nor wrapped and shall be kept between 30 mm and 50 mm above the ground reference plane
- 4) The frequency range was swept from 150 kHz to 230 MHz, using the signal levels established during the setting process, and with the disturbance signal 80 % amplitude modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or to change coupling devices as necessary. Where the frequency was swept incrementally, the step size does not exceed 1 % of the preceding frequency value. The dwell time of the amplitude modulated carrier at each frequency was not less than the time necessary for the EUT to be exercised and to respond, and was not less than 0.5 s.

Test result:

PASS

Test result:

Frequency	Line	Test Level	Modulation	Step Size	Dwell Time	Observation (Performance Criterion)
150kHz to 80MHz	AC port (2 Line)	3Vrms	80%, 1kHz Amp. Mod.	1%	2 S	A

Remark:

A: No performance degradation during test.

7.1.5 Surge

Test Requirement: EN 55014-2

Test Method: IEC 61000-4-5

Test Level: For AC port
± 1kV Live to Neutral

Criterion Required: B

Polarity: Positive & Negative

Tr /Td 1.2/50(8/20) ns

Interval: 60s between each surge

No. of Surges: 5 positive, 5 negatives at 0° , 90° , 180° , 270° .

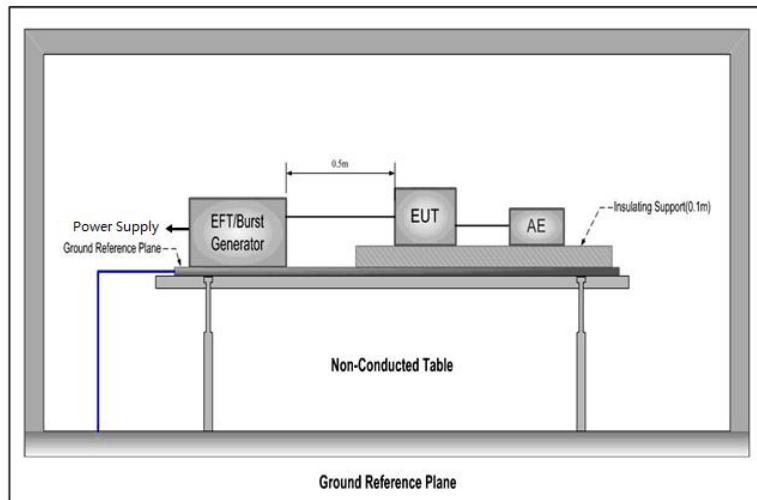
EUT Operation:

Ambient: Temp.: 26 °C Humid.: 59% Press.: 1009mbar

Test Mode: **Charging mode**

Equipment Used: Refer to section 5 for details.

Test Setup:



Test Procedure:

- 1) The EUT was placed on a ground reference plane (GRP) insulated by an insulating support 0.1 m thick and the GRP was placed on a 0.8m high wooden table for table-top equipment. For floor standing equipment, the EUT was placed on a 0.1m high wooden support above the GRP.
 - 2) The 1.2/50 μ s surge was to be applied to the EUT power supply terminals via the capacitive coupling network. Decoupling networks were required in order to avoid possible adverse effects on equipment not under test that may be powered by the same lines and to provide sufficient decoupling impedance to the surge wave so that the specified wave may be applied on the lines under test.
 - 3) The power cord between the EUT and the coupling/decoupling network was not exceed 2 m in length. The interconnection line between the EUT and the coupling/decoupling network shall not exceed 2 m in length.
 - 4) The EUT was conducted 1 kV test voltage for line to line and line to neutral and conducted 2 kV test voltage for line to earth and neutral to earth, five positive pulses and five negative pulses each at 0°, 90°, 180° and 270° for a.c. power ports

Test result:

PASS

Test Results:

For AC port (2 line)					
Pulse No	Line-Line	Level (kV)	Surge interval	phase (deg)	Observation (Performance Criterion)
1-5	L-N	+1	60s	90°	A
6-10	L-N	-1	60s	270°	A

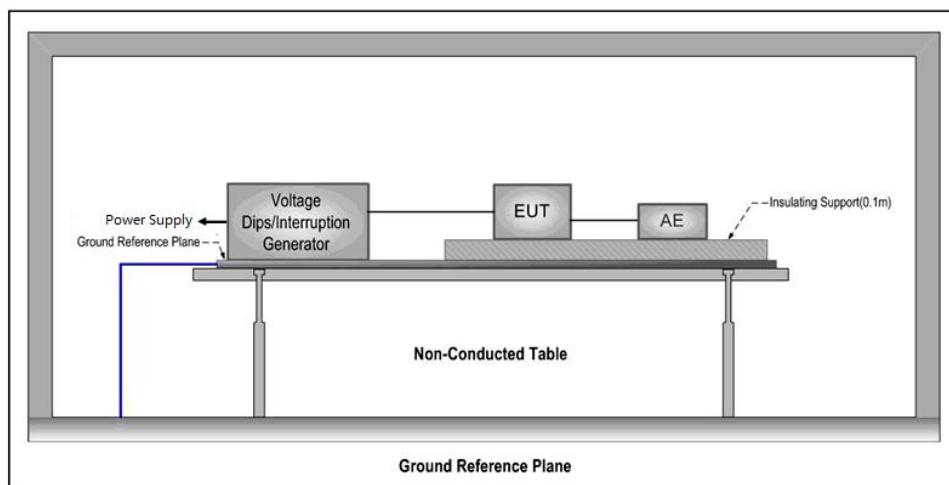
Remark:

A: No performance degradation during test.

7.1.6 Voltage Dips

Test Requirement:	EN 55014-2		
Test Method:	IEC 61000-4-11		
Test Level:	Voltage dip:0 % residual voltage for 0.5 cycle(50Hz) and 0.5 cycle (60Hz); Voltage dip:40 % residual voltage for 10 cycle; (50Hz) and 12 cycle (60Hz) Voltage dip: 70 % residual voltage for 25 cycles (50Hz) and 30 cycle (60Hz);		
No. of Dips / Interruptions:	3 per Level		
Criterion Required:	C		
EUT Operation:			
Ambient:	Temp.: 26 °C	Humid.: 59%	Press.: 1009mbar
Test Mode:	Charging mode		

Test Setup:



Test Procedure:

- 1) The EUT was placed on a ground reference plane (GRP) insulated by an insulating support 0.1 m thick and the GRP was placed on a 0.8m high wooden table for table-top equipment. For floor standing equipment, the EUT was placed on a 0.1m high wooden support above the GRP.
- 2) The test was performed with the EUT connected to the test generator with the shortest power supply cable as specified by the EUT manufacturer.
- 3) The EUT was tested for each selected combination of test level and duration with a sequence of three dips /interruptions with intervals of 10 s minimum. Each representative mode of operation was tested.
- 4) For EUT with more than one power cord, each power cord was tested individually.

Equipment Used:

Refer to section 5 for details.

Test result:

PASS

Test Results:

EUT operating mode	% U _T	Phase	Duration of dropout in Periods	No. of dropout	Time between dropout	Observations (Performance Criterion)
Above modes	0	90° &270°	0.5(50Hz&60Hz)	3	10s	A
Above modes	40	90° &270°	10(50Hz)&12(60Hz)	3	10s	A
Above modes	70	90° &270°	25(50Hz)&30(60Hz)	3	10s	A

Remark:

A: No performance degradation during test.

APPENDIX 1 PHOTOGRAPHS OF TEST SETUP

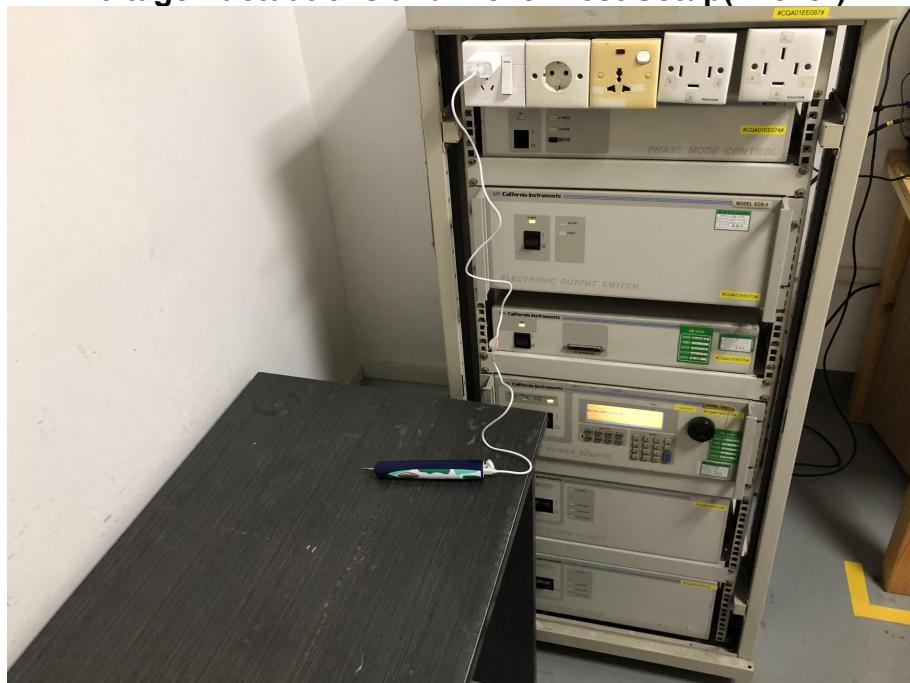
Radiated emission Test Setup (30MHz~1GHz)



Conducted emission Test Setup



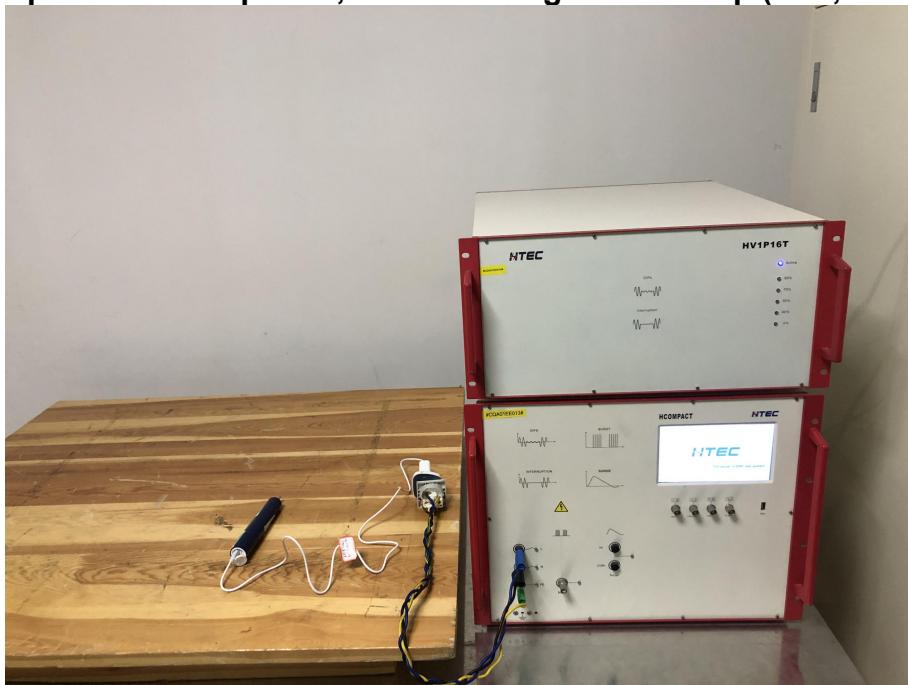
Voltage fluctuations and flicker Test Setup(Flicker)



Electrostatic discharge Test Setup (ESD)



Voltage dips and interruptions, EFT and Surge Test Setup (EFT, DIPS, Surge)

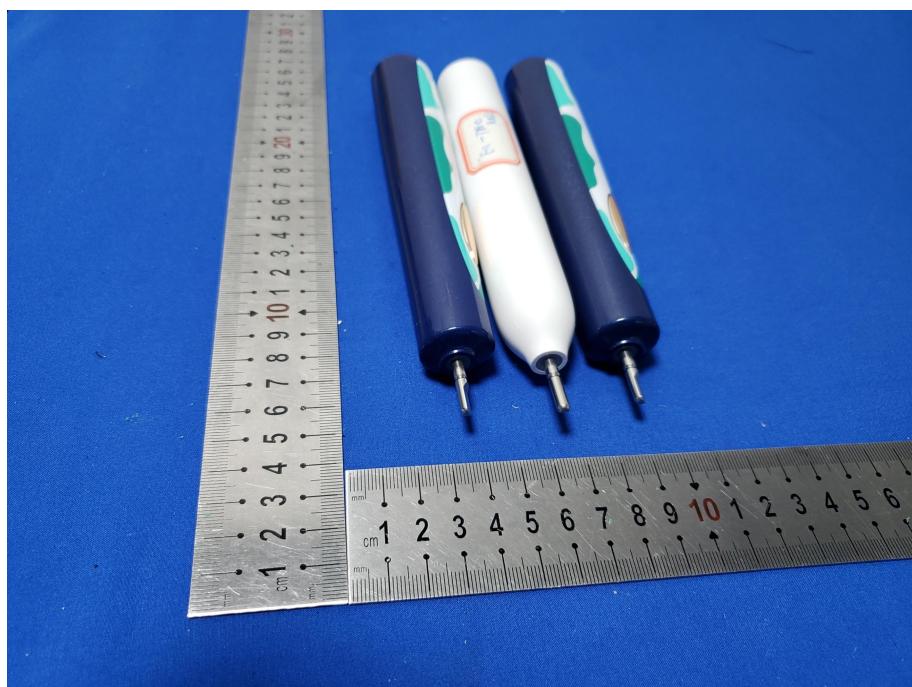
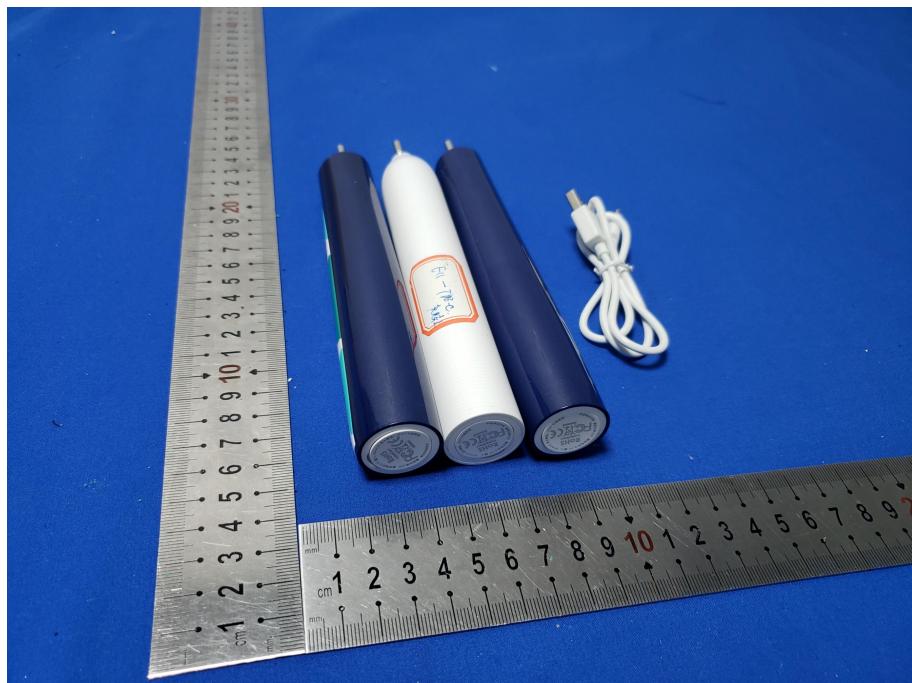


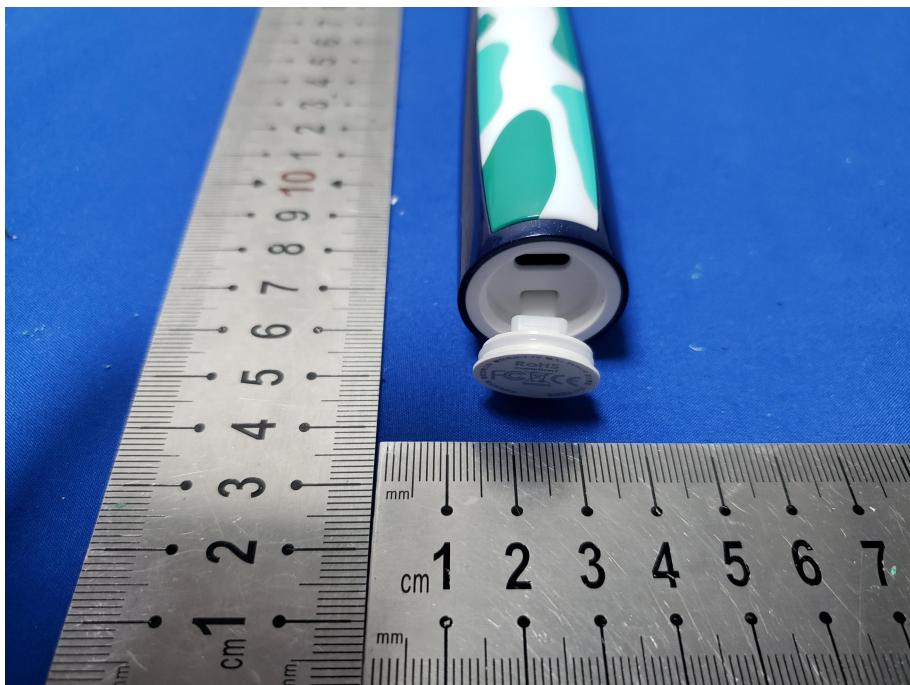
RF common mode Test Setup (CS)

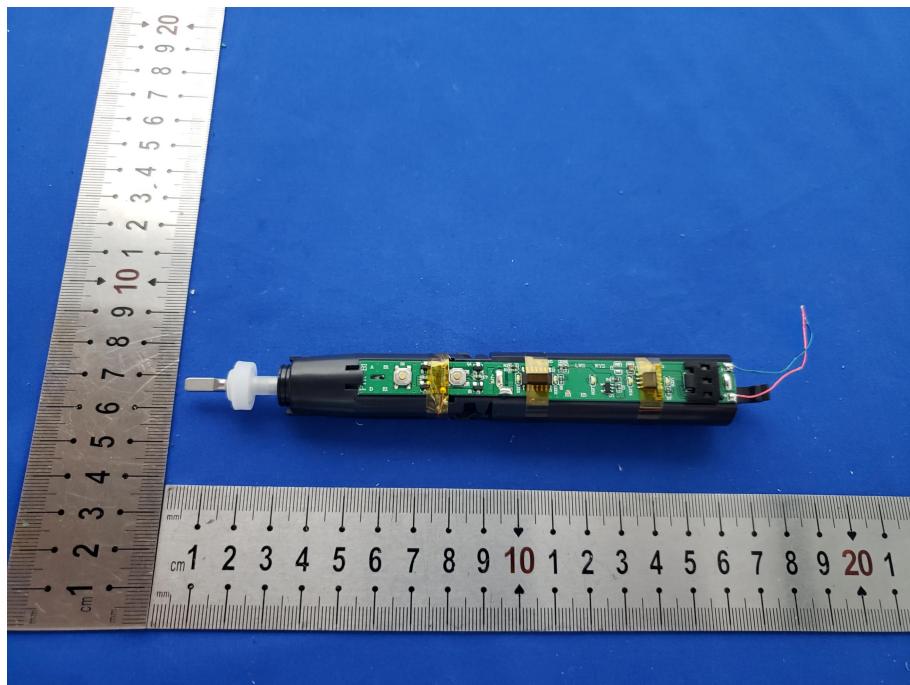


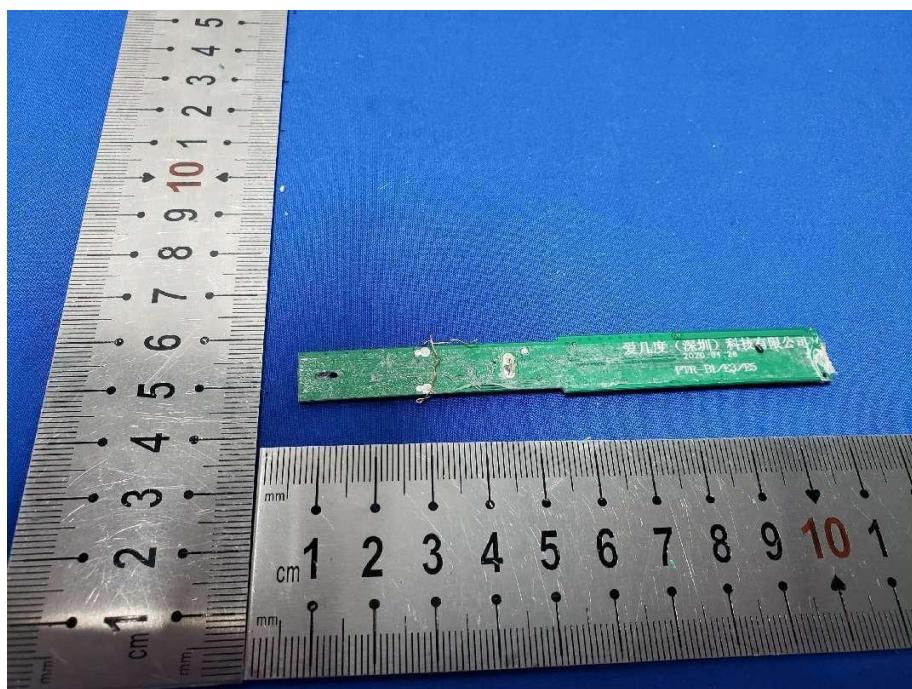
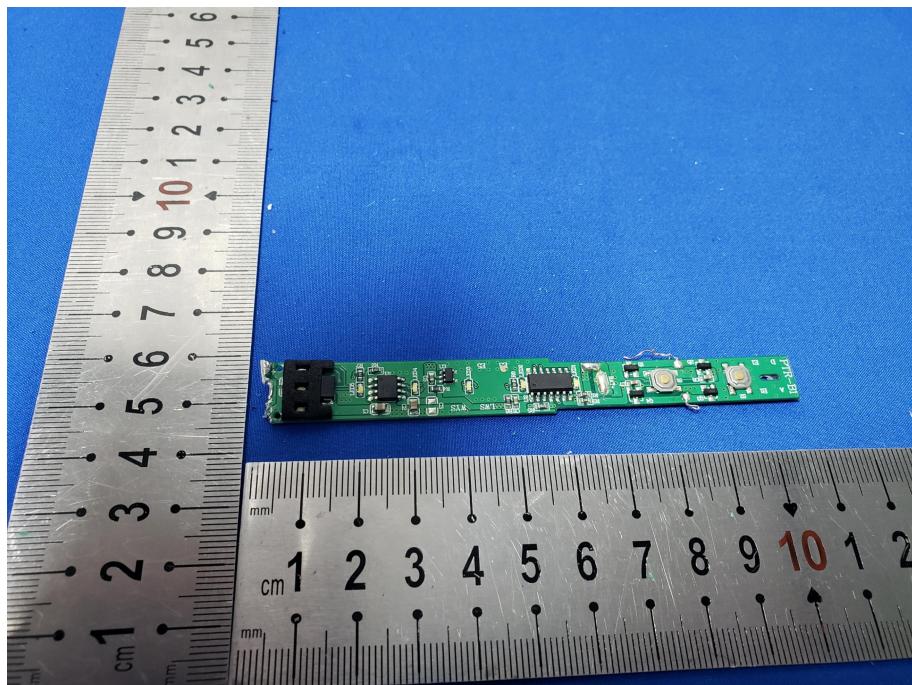
APPENDIX 2 PHOTOGRAPHS OF EUT













*** END OF REPORT ***