
EMC Test Report

Report No.: AGC12440231103ER01

PRODUCT DESIGNATION : WIRELESS SPEAKER

BRAND NAME : N/A

MODEL NAME : M09506

APPLICANT : Mid Ocean Brands B.V.

DATE OF ISSUE : Nov. 23, 2023

STANDARD(S) : ETSI EN 301 489-1 V2.2.3 (2019-11)
ETSI EN 301 489-17 V3.2.4 (2020-09)

REPORT VERSION : V1.0

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Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Nov. 23, 2023	Valid	Initial release

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1. TEST REPORT CERTIFICATION

Applicant	Mid Ocean Brands B.V.
Address	7/F., King Tower, 111King Lam Street, Cheung ShaWan, Kowloon, HongKong.
Manufacturer	Mid Ocean Brands B.V.
Address	7/F., King Tower, 111King Lam Street, Cheung ShaWan, Kowloon, HongKong.
Factory	Mid Ocean Brands B.V.
Address	7/F., King Tower, 111King Lam Street, Cheung ShaWan, Kowloon, HongKong.
Product Designation	WIRELESS SPEAKER
Brand Name	N/A
Test Model	MO9506
Series Model(s)	N/A
Difference Description	N/A
Date of receipt of test item	Nov. 17, 2023
Date of test	Nov. 17, 2023 to Nov. 23, 2023
Deviation	None
Condition of Test Sample	Normal
Test Result	Pass
Report Template	AGCRT-EC-EMC

Note: The test results of this report relate only to the tested sample identified in this report.

Prepared By

Thea Huang

Thea Huang
(Project Engineer)

Nov. 23, 2023

Reviewed By

Calvin Liu

Calvin Liu
(Reviewer)

Nov. 23, 2023

Approved By

Max Zhang

Max Zhang
(Authorized Officer)

Nov. 23, 2023

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2. GENERAL INFORMATION

2.1. DESCRIPTION OF EUT

The EUT is a short range, lower power, Bluetooth device.

Details of technical specification refer to the description in follows:

Transmitter/Receiver (TX/RX)

Operating Frequency	2402MHz to 2480MHz
Bluetooth Version	V5.3
Modulation Type	BR ☒ GFSK 1Mbps; EDR ☒ π /4-DQPSK 2Mbps ☒ 8DPSK 3Mbps BLE ☐ GFSK 1Mbps ☐ GFSK 2Mbps
Number of channels	79 Channels for BR/EDR
Hardware Version	V1.0
Software Version	ac696n_soundbox_sdk_v1.6.0
Antenna Type	PCB Antenna
Antenna Gain	1.2dBi
Power Supply	DC 3.7V by battery or DC 5V by adapter

2.2. OBJECTIVE

Perform Electro Magnetic Interference (EMI) and Electro Magnetic Susceptibility (EMS) tests for CE Marking.

2.3. TEST STANDARDS AND RESULTS

The EUT has been tested according to ETSI EN 301 489-1 V2.2.3 (2019-11) and ETSI EN 301 489-17 V3.2.4 (2020-09).

ETSI EN 301 489-1	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard for ElectroMagnetic Compatibility.
ETSI EN 301 489-17	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems; Harmonised Standard for ElectroMagnetic Compatibility

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2.4. TEST ITEMS AND THE RESULTS

No.	Basic Standard	Test Type	Result
EMISSION (EN 301 489-1 §7.1)			
1	EN 55032	Radiated emission	PASS
2	EN 55032	Conducted emission, AC ports	PASS
3	EN 55032	Conducted emission, Telecom ports	N/A
4	EN 61000-3-2	Harmonic current emissions	PASS
5	EN 61000-3-3	Voltage fluctuations & flicker	PASS
IMMUNITY (EN 301 489-1 §7.2)			
6	EN 61000-4-2	Electrostatic discharge immunity	PASS
7	EN 61000-4-3	Radiated RF electromagnetic field immunity	PASS
8	EN 61000-4-4	Electrical fast transient/burst immunity	PASS
9	ISO 7637-1, -2	Transients and surges, DC ports	N/A
10	EN 61000-4-5	Surge immunity, AC ports, Telecom ports	PASS
11	EN 61000-4-6	Immunity to conducted disturbances induced by RF fields	PASS
12	EN 61000-4-11	Voltage dips and short interruptions immunity	PASS

Note: 1. N/A- Not Applicable.
2. The latest versions of basic standards are applied.

2.5. ENVIRONMENTAL CONDITIONS

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

- Temperature: 15-35°C
- Relative humidity: 30-60%
- Atmospheric pressure: 86-106kPa

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3. TEST MODE DESCRIPTION

TEST MODE DESCRIPTION		
NO.	EMI TEST MODE DESCRIPTION	WORST
1	BT mode with charging	V
2	BT mode	-
NO.	EMS TEST MODE DESCRIPTION	WORST
1	BT mode with charging	V
2	BT mode	-

Note: 1. V means EMI worst mode.
2. All modes have been tested and only the worst mode test data recorded in the test report.

I/O Port Information (☒ Applicable ☐ Not Applicable)

I/O Port of EUT			
I/O Port Type	Number	Cable Description	Tested With
Type-C Port	1	0.45m unshielded	1

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4. MEASUREMENT UNCERTAINTY

The uncertainty is calculated using the methods suggested in the “Guide to the Expression of Uncertainty in measurement” (GUM) published by CISPR and ANSI.

- Uncertainty of Conducted Emission, $U_c = \pm 2.9$ dB
- Uncertainty of Radiated Emission below 1GHz, $U_c = \pm 3.9$ dB
- Uncertainty of Radiated Emission above 1GHz, $U_c = \pm 4.9$ dB

5. SUPPORT EQUIPMENT

Device Type	Manufacturer	Model Name	Data Cable/ specifications
Xiaomi Phone	Xiaomi	MI 10	--
Adapter	Jinbaotong	K-T10E0502000E	AC100-240V,50-60Hz,0.35A,DC5V/2A

Note: 1.“--” means no any support device during testing.

2. All the cables were provided by AGC Lab.

6. IDENTIFICATION OF THE RESPONSIBLE TESTING LOCATION

Site	Attestation of Global Compliance (Shenzhen) Co., Ltd
Location	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

TEST EQUIPMENT OF CONDUCTED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
Test Receiver	R&S	ESPI	101206	Jun. 03, 2023	Jun. 02, 2024
Artificial power network	R&S	ESH2-Z5	100086	Jun. 03, 2023	Jun. 02, 2024
Test software	R&S	ES-K1	Ver.V1.7.1	N/A	N/A

TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
Test Receiver	R&S	ESCI	10096	Feb. 18, 2023	Feb. 17, 2024
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Jun. 01, 2023	May 31, 2024
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	Mar. 23, 2023	Mar. 22, 2024
Preamplifier Assembly	ETS	3117PA	00225134	Sep. 02, 2022	Sep. 01, 2024
Wideband Antenna	SCHWARZBEC K	VULB9168	VULB9168-494	Jan. 05, 2023	Jan. 04, 2025
Test Software	FARA	EZ-EMC(Ver.RA-03A)	N/A	N/A	N/A
Test Software	Tonscend	JS32-RE(Ver.2.5)	N/A	N/A	N/A

TEST EQUIPMENT OF POWER HARMONICS / VOLTAGE FLUCTUATION / FLICKER TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
Signal Conditioning Unit	Schaffner	CCN1000-1	72431	Jun. 08, 2023	Jun. 07, 2024
AC Source	Schaffner	NSG1007	56825	Jun. 02, 2023	Jun. 01, 2024
Test software	TC	4.29.0	/	N/A	N/A

TEST EQUIPMENT OF ESD TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
ESD Simulator	Schaffner	NSG 438	782	Dec. 30, 2022	Dec. 29, 2023

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TEST EQUIPMENT OF SURGE/EFT/DIPS TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
EFT/Surge Generator	Schaffner	Modula 6150	34437	Jun. 08, 2023	Jun. 07, 2024
Test software	TC	2.31	/	N/A	N/A

TEST EQUIPMENT OF RS IMMUNITY TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
Signal Generator	Aglient	N5182A	MY50140530	Feb. 17, 2023	Feb. 16, 2024
Directional coupler	Werlatone	C5571-10	99463	Mar. 10, 2022	Mar. 09, 2024
Directional coupler	Werlatone	C5571-10	99482	Mar. 10, 2022	Mar. 09, 2024
Power Meter	R&S	NRVD	8323781027	Mar. 24, 2022	Mar. 23, 2025
Power Amplifier	KALMUS	7100LC	04-02/17-06-001	N/A	N/A
Power Amplifier	Milmega	AS0104-55_55	1004793	N/A	N/A
Power amplifier	rflight	NTWPA-2560100	17063183	N/A	N/A
Biconilog Antenna	ETS	3142C	00060447	N/A	N/A
Broadband high gain horn antenna	SCHWARZBECK	BBHA 9120 J	00073	N/A	N/A
Test Software	Tonscend	2.0.1.8	N/A	N/A	N/A

TEST EQUIPMENT OF CS IMMUNITY TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
Power Amplifier	AR	75A250	18464	N/A	N/A
CDN	ZHINAN	ZN3751	15004	Aug. 03, 2022	Sep. 02, 2024
6dB attenuator	ZHINAN	E-002	N/A	Aug. 04, 2022	Aug. 03, 2024
Power Probe	R&S	URV5-Z4	100124	Mar. 24, 2023	Mar. 23, 2025
Electromagnetic Injection Clamp	Luthi	EM101	35773	Aug. 12, 2022	Aug. 11, 2024
Power Meter	R&S	NRVD	8323781027	Mar. 24, 2023	Mar. 23, 2025
Signal Generator	Aglient	E4421B	MY43351603	Feb. 17, 2023	Feb. 16, 2024
Test software	Tnscend	JS35-CS	2.0.1.7	N/A	N/A

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7. RADIATED DISTURBANCE MEASUREMENT

7.1. LIMITS OF RADIATED DISTURBANCES

Limits for radiated disturbance 30M to 1 GHz at a measurement distance of 3m

Frequency range (MHz)	Quasi peak limits(dBuV/m), for Class B ITE, at 3m measurement distance
30-230	40
230-1000	47

Limits for radiated disturbance above 1 GHz at a measurement distance of 3m

Frequency range (MHz)	Limits (dBuV/m), Class B ITE	
	Peak	Average
1000-3000	70	50
3000-6000	74	54

- Note:** 1. The lower limit shall apply at the transition frequency.
2. Additional provisions may be required for cases where interference occurs.

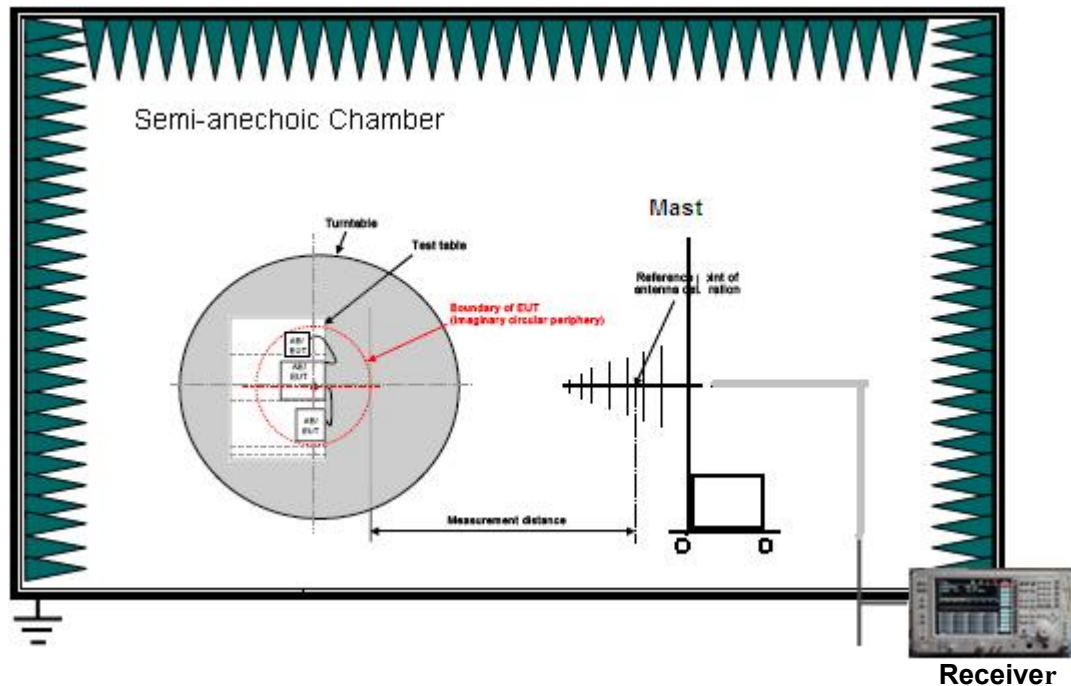
7.2. TEST PROCEDURE

- (1). The EUT was placed on the top of an insulating table 0.8 meters above the ground at a 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 is a broadband antenna, and its height is varied from 1 to 4 meter 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 the heights from 1 to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- (5). The test-receiver system was set to Peak Detector Function and Specified Bandwidth with Maximum Hold Mode. 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 emission that did not have 10dB margin would be retested one by one using the quasi-peak method.

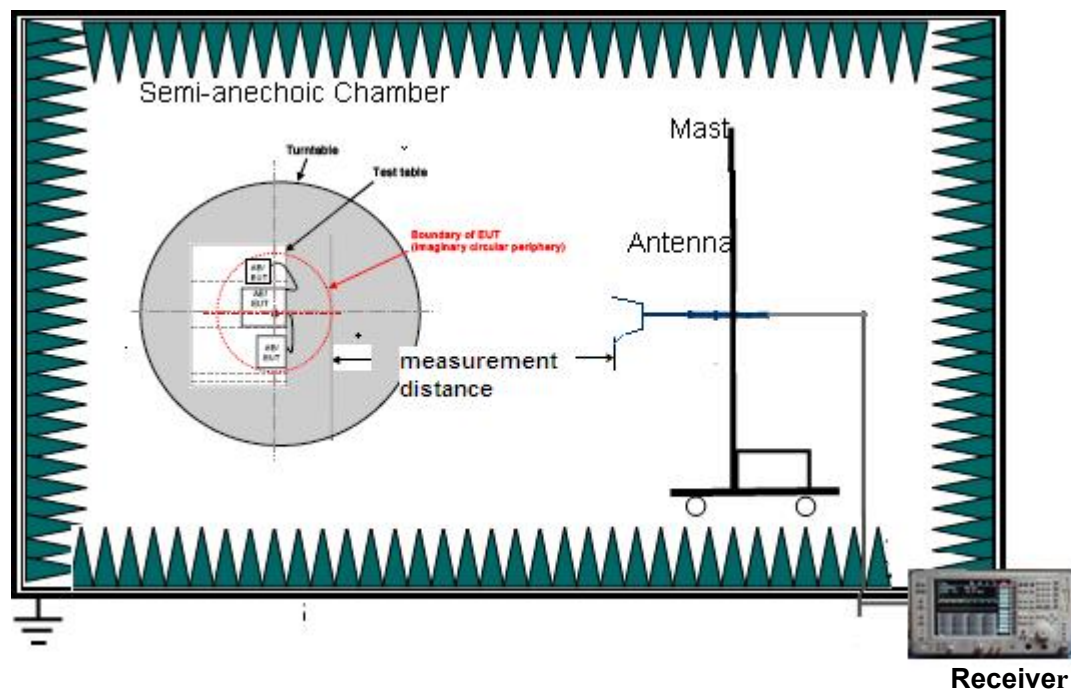
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7.3. BLOCK DIAGRAM OF TEST SETUP

Radiated Disturbance below 1 GHz



Radiated Disturbance above 1 GHz



For the actual test configuration, please refer to the related item-Photographs of the Test Configuration.

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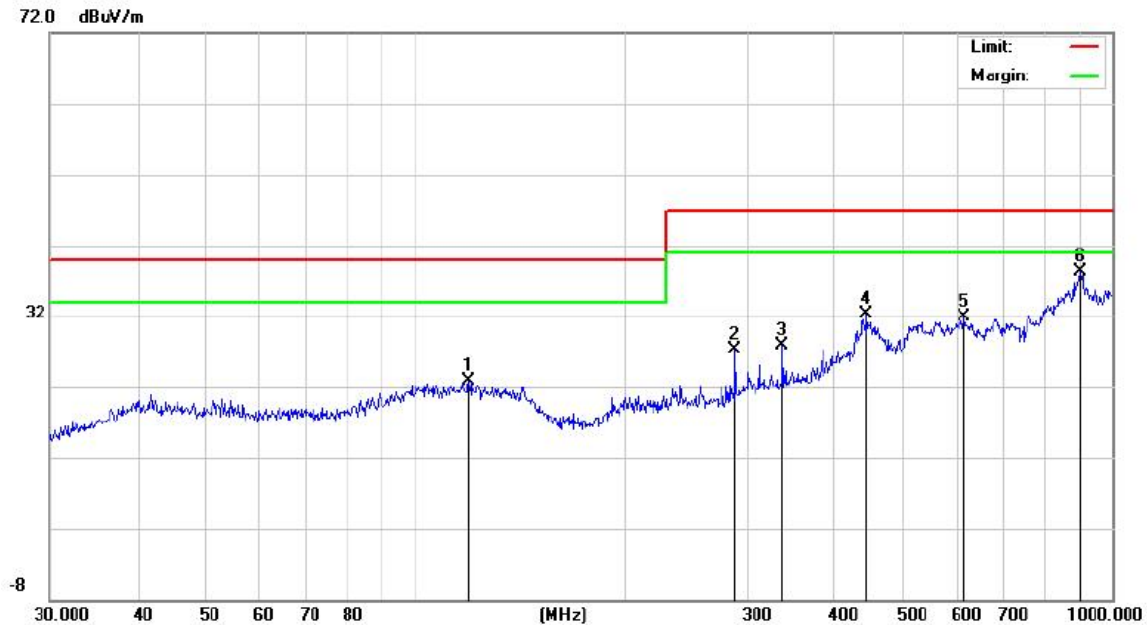
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7.4. TEST RESULT

The test modes were carried out for all modes.

The worst test mode of the EUT was Mode 1, and its test data was showed as the follow:

RADIATED EMISSION BELOW 1GHz– HORIZONTAL



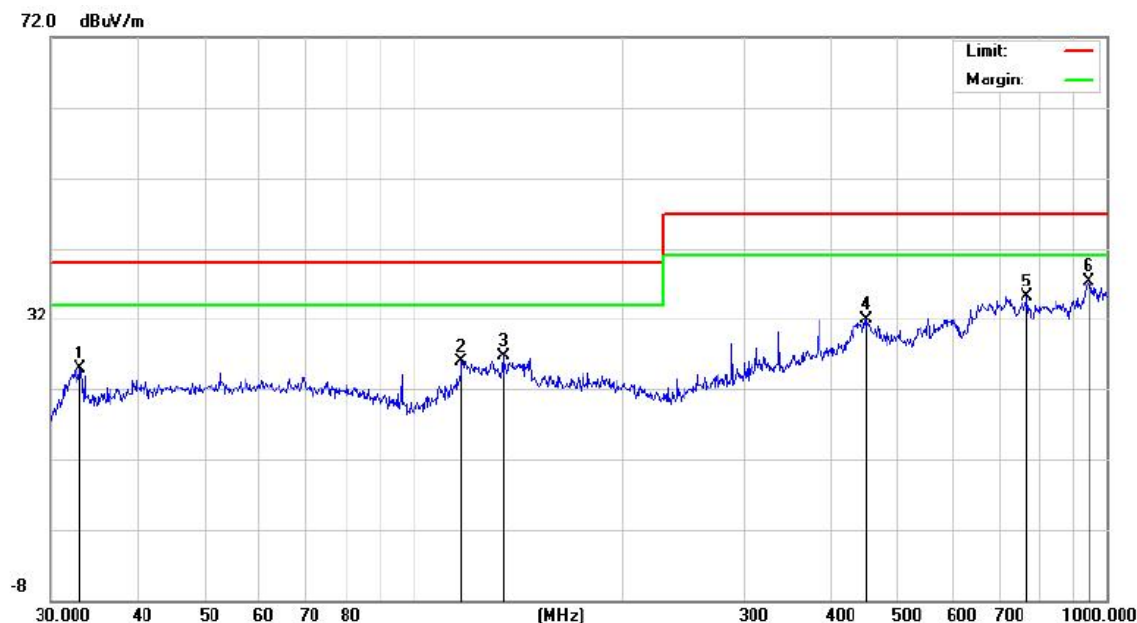
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		119.4361	6.49	16.39	22.88	40.00	-17.12	peak
2		287.9904	11.68	15.54	27.22	47.00	-19.78	peak
3		336.0352	10.91	16.98	27.89	47.00	-19.11	peak
4		444.8514	7.44	24.93	32.37	47.00	-14.63	peak
5		614.2142	6.79	25.17	31.96	47.00	-15.04	peak
6	*	900.1474	6.44	31.78	38.22	47.00	-8.78	peak

RESULT: PASS

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RADIATED EMISSION BELOW 1GHz- VERTICAL



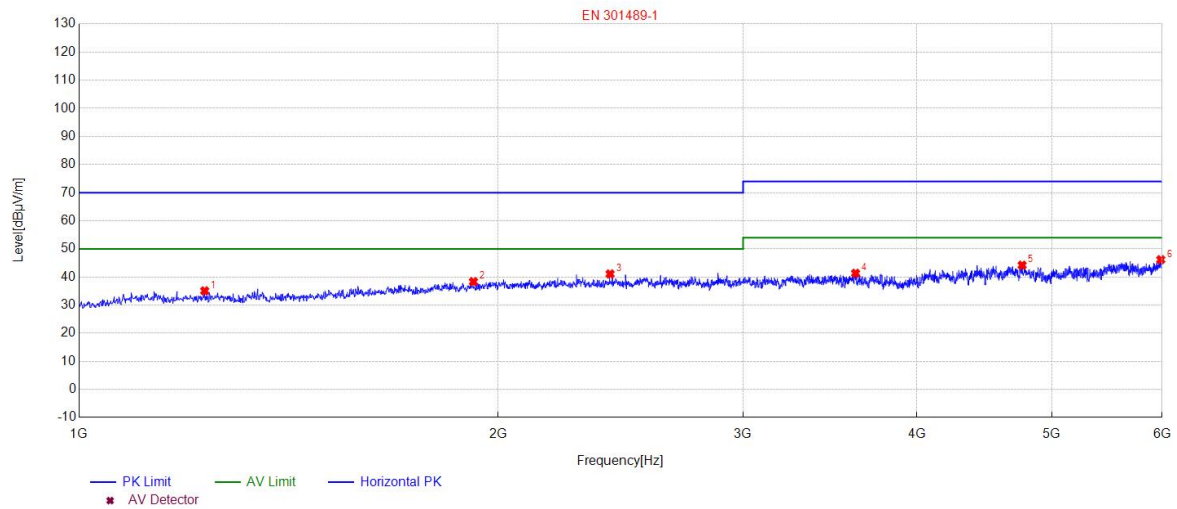
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		32.9791	10.27	14.58	24.85	40.00	-15.15	peak
2		117.3602	8.75	17.24	25.99	40.00	-14.01	peak
3		134.5592	8.60	18.06	26.66	40.00	-13.34	peak
4		451.1349	6.30	25.60	31.90	47.00	-15.10	peak
5		768.7481	7.28	27.85	35.13	47.00	-11.87	peak
6	*	942.1304	6.33	30.91	37.24	47.00	-9.76	peak

RESULT: PASS

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RADIATED EMISSION ABOVE 1GHz – HORIZONTAL



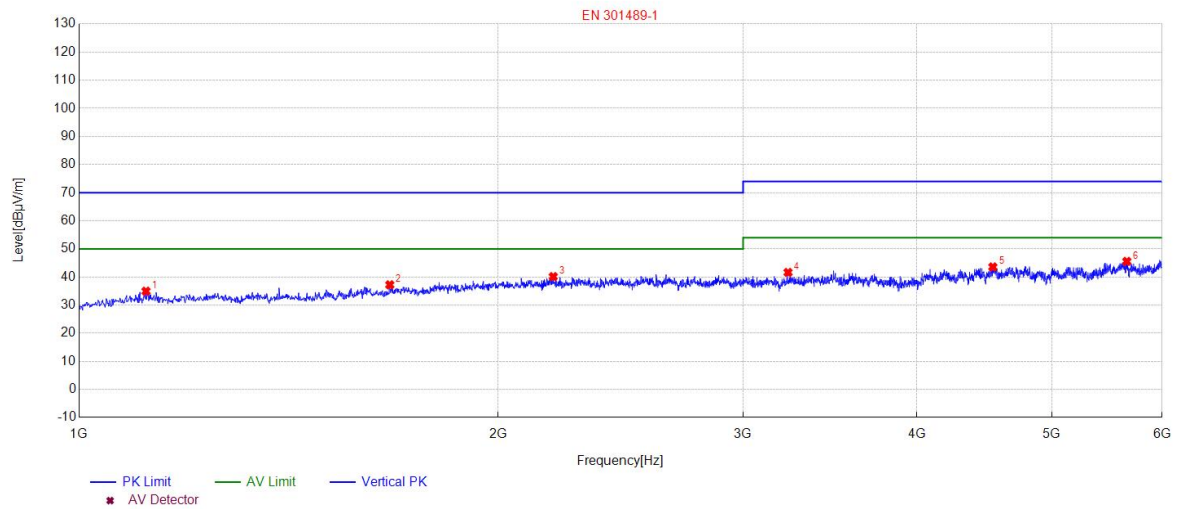
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1231.0462	35.05	-17.97	70.00	34.95	100	250	Horizontal
2	1920.184	38.32	-14.07	70.00	31.68	100	240	Horizontal
3	2407.2815	41.07	-12.42	70.00	28.93	100	200	Horizontal
4	3613.5227	41.31	-10.49	74.00	32.69	100	40	Horizontal
5	4759.752	44.19	-7.82	74.00	29.81	100	160	Horizontal
6	5986.9974	46.16	-5.44	74.00	27.84	100	110	Horizontal

RESULT: PASS

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RADIATED EMISSION ABOVE 1GHz - VERTICAL



NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1117.0234	34.93	-18.15	70.00	35.07	100	30	Vertical
2	1672.1344	37.21	-16.12	70.00	32.79	100	40	Vertical
3	2191.2382	40.12	-12.95	70.00	29.88	100	110	Vertical
4	3231.4463	41.61	-11.35	74.00	32.39	100	80	Vertical
5	4534.7069	43.56	-7.87	74.00	30.44	100	30	Vertical
6	5659.932	45.53	-6.41	74.00	28.47	100	300	Vertical

RESULT: PASS

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8. CONDUCTED EMISSION MEASUREMENT

8.1. LIMITS OF LINE CONDUCTED EMISSION

Frequency range (MHz)	Limits (dBuV) Class B ITE	
	Quasi-peak	Average
0.15-0.50	66 to 56	56 to 46
0.50-5	56	46
5-30	60	50

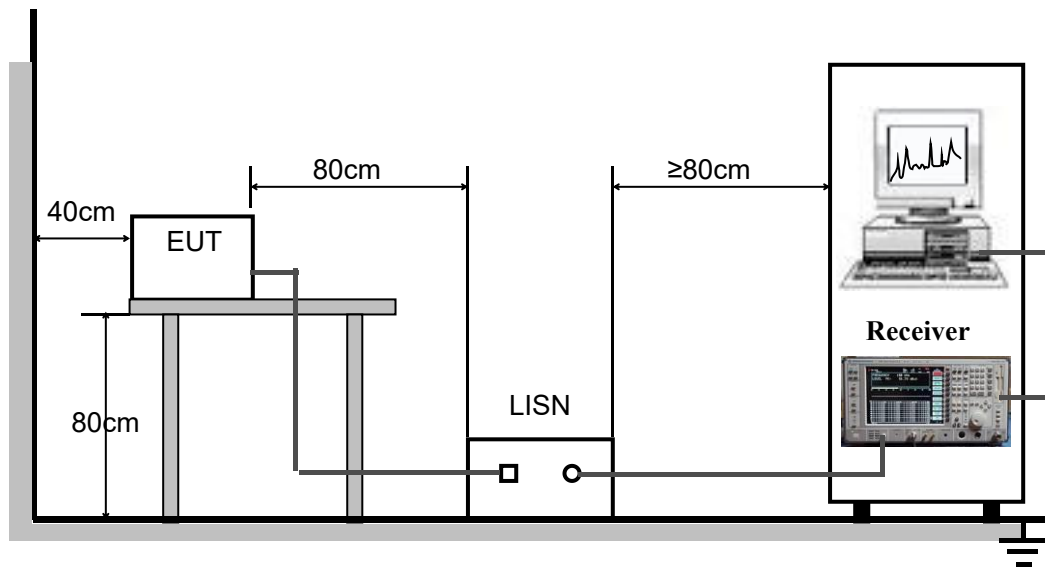
Note: 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

8.2. TEST PROCEDURE

- (1) The equipment was set up as per the test configuration to simulate typical actual 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 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- (2) Support equipment, if needed, was placed as per EN 55032.
- (3) All I/O cables were positioned to simulate typical actual usage as per EN 55032.
- (4) The EUT received DC 5V power from adapter which received AC 230V 50Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- (5) The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the AN powering the EUT. The AN has two monitoring points: Line 1 (Positive) and Line 2 (Negative). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- (6) Analyzer / Receiver scanned from 150 kHz to 30 MHz for emissions in each of the test modes.
- (7) During the above scans, the emissions were maximized by cable manipulation.
- (8) A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions.
- (9) Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less -2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.

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8.3. TEST SETUP



For the actual test configuration, please refer to the related item - Photographs of the Test Configuration.

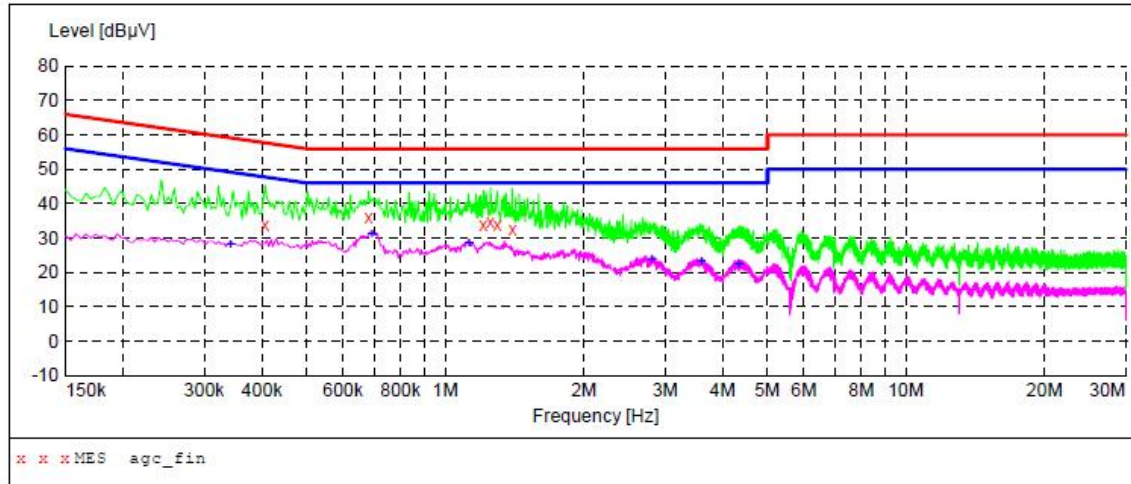
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8.4. TEST RESULT

The test mode of the EUT was Mode 1, and its test data was showed as the follow:

LINE CONCUTED EMISSION TEST-L



MEASUREMENT RESULT: "agc_fin"

2023/11/20 15:22

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line
0.406000	33.70	6.1	58	24.0	QP	L1
0.682000	36.20	6.2	56	19.8	QP	L1
1.210000	34.00	6.2	56	22.0	QP	L1
1.254000	34.50	6.2	56	21.5	QP	L1
1.298000	33.70	6.2	56	22.3	QP	L1
1.398000	32.50	6.2	56	23.5	QP	L1

MEASUREMENT RESULT: "agc_fin2"

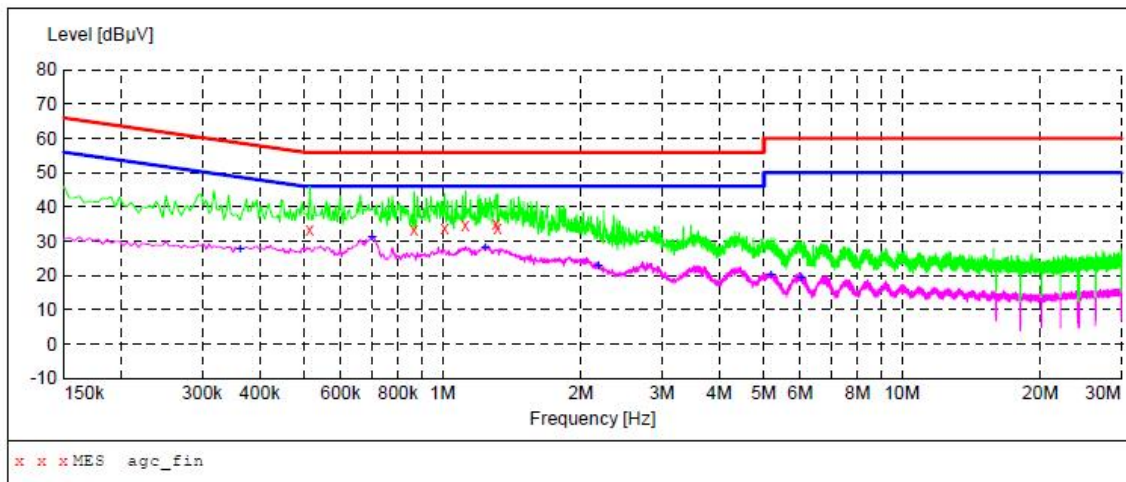
2023/11/20 15:22

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line
0.342000	28.00	6.1	49	21.2	AV	L1
0.694000	31.20	6.2	46	14.8	AV	L1
1.126000	28.40	6.2	46	17.6	AV	L1
2.810000	23.60	6.3	46	22.4	AV	L1
3.594000	23.00	6.3	46	23.0	AV	L1
4.338000	22.40	6.3	46	23.6	AV	L1

RESULT: PASS

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LINE CONDUCTED EMISSION TEST-N



MEASUREMENT RESULT: "agc_fin"

2023/11/20 15:26

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line
0.514000	33.40	6.2	56	22.6	QP	N
0.866000	33.40	6.2	56	22.6	QP	N
1.010000	34.00	6.2	56	22.0	QP	N
1.122000	34.80	6.2	56	21.2	QP	N
1.306000	35.00	6.2	56	21.0	QP	N
1.318000	33.80	6.2	56	22.2	QP	N

MEASUREMENT RESULT: "agc_fin2"

2023/11/20 15:26

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line
0.362000	27.70	6.1	49	21.0	AV	N
0.702000	31.10	6.2	46	14.9	AV	N
1.238000	28.00	6.2	46	18.0	AV	N
2.182000	22.90	6.3	46	23.1	AV	N
5.178000	20.00	6.4	50	30.0	AV	N
6.022000	19.40	6.4	50	30.6	AV	N

RESULT: PASS

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9. HARMONIC CURRENT MEASUREMENT

9.1. LIMITS OF HARMONIC CURRENT

Limits for Class A Equipment	
Harmonics Order n	Max. permissible harmonic current (A)
Odd harmonics	
3	2.30
5	1.14
7	0.77
9	0.40
11	0.33
13	0.21
$15 \leq n \leq 39$	$0.15 \times 15/n$
Even harmonics	
2	1.08
4	0.43
6	0.30
$8 \leq n \leq 40$	$0.23 \times 8/n$

Note: 1. According to section 5 of EN 61000-3-2: 2014, the EUT is Class A equipment.
2. The above limits are for all applications having an active input power > 75W. No limits apply for equipment with an active input power up to and including 75W.

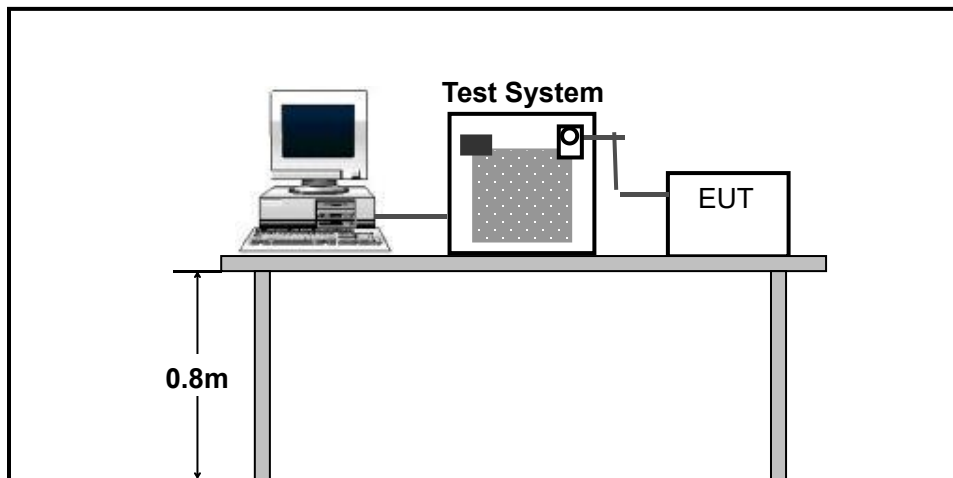
9.2. TEST PROCEDURE

1. 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.
2. The correspondent test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the necessary for the EUT to be exercised.

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9.3. TEST SETUP



For the actual test configuration, please refer to Appendix A: Photographs of the Test Configuration.

9.4. TEST RESULT

Note: Equipment with a rated power less than or equal to 75W is deemed to fulfilled all relevant requirements of this standard without testing.

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10. VOLTAGE FLUCTUATIONS AND FLICK MEASUREMENT

10.1. LIMITS OF VOLTAGE FLUCTUATIONS AND FLICK

Test Item	Limit	Note
P_{st}	1.0	P_{st} means Short-term flicker indicator
P_{lt}	0.65	P_{lt} means long-term flicker indicator
T_{dt}	0.5	T_{dt} means maximum time that d_t exceeds 3%
$d_{max}(\%)$	4%	d_{max} means maximum relative voltage change.
$d_c(\%)$	3.3%	d_c means relative steady-state voltage change.

10.2. TEST PROCEDURE

1. 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 conditions
2. During the flick measurement, the measure time shall include that part of whole operation changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.

10.3. TEST SETUP

Same as 9.3

10.4. TEST RESULT

Test Specification

Test Frequency	50Hz	Test Voltage	230V AC
Waveform	Sine	Test Time	10 minutes(P_{st}); 2 hours (P_{lt})

Test Result

Test Parameter	Measurement Value	Limit	Remarks
P_{st}	0.261	1.0	Pass
P_{lt}	0.114	0.65	Pass
$T_{dt}(s)$	0.0	0.5	Pass
$d_{max}(\%)$	0.26	4%	Pass
$d_c(\%)$	0.00	3.3%	Pass

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11. IMMUNITY TEST

11.1. DESCRIPTION OF PERFORMANCE CRITERIA

The performance criteria are used to take a decision on whether a radio equipment passes or fails immunity tests.

For the purpose of the present document two categories of performance criteria apply:

- Performance criteria for continuous phenomena.
- Performance criteria for transient phenomena.

11.2. GENERAL PERFORMANCE CRITERIA

1. Performance criteria for continuous phenomena

During the test, the equipment shall:

- continue to operate as intended;
- not unintentionally transmit;
- not unintentionally change its operating state;
- not unintentionally change critical stored data.

2. Performance criteria for transient phenomena

For all ports and transient phenomena with the exception described below, the following applies:

- The application of the transient phenomena shall not result in a change of the mode of operation (e.g. unintended transmission) or the loss of critical stored data.
- After application of the transient phenomena, the equipment shall operate as intended.

For surges applied to symmetrically operated wired network ports intended to be connected directly to outdoor lines the following criteria applies:

- For products with only one symmetrical port intended for connection to outdoor lines, loss of function is allowed, provided the function is self-recoverable, or can be otherwise restored. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.
- For products with more than one symmetrical port intended for connection to outdoor lines, loss of function on the port under test is allowed, provided the function is self-recoverable. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

For a 0 % residual voltage dip tests the following performance criteria apply:

- The performance criteria for transient phenomena shall apply.

For a 70 % residual voltage dip and voltage interruption tests, 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 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, when the voltage is restored to nominal;
- in the event of loss of function(s) or in the event of loss of user stored data, this fact shall be recorded.

3. Performance Table

EN 301 489-17 Performance criteria		
Criteria	During Test	After Test (i.e. as a result of the application of the test)
A	Shall operate as intended. (see note). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance. Shall be no loss of function. Shall be no loss of critical stored data.
B	May be loss of function.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no loss of critical stored data.
C	May be loss of function.	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no loss of critical stored data.
The performance criteria A shall apply for continuous phenomena. The performance criteria B shall apply for transient phenomena, except for voltage dips greater than or equal to 100 ms and voltage interruptions of 5 000 ms duration, for which performance criteria C shall apply. Where the EUT is a transmitter in standby mode or receive mode, unintentional transmission shall not occur during the test.		
Note: Operate as intended during the test allows a level of degradation in accordance with the Minimum performance level.		
Minimum performance level		
For equipment that supports a PER or FER, the minimum performance level shall be a PER or FER less than or equal to 10 %. For equipment that does not support a PER or a FER, the minimum performance level shall be no loss of the wireless transmission function needed for the intended use of the equipment.		

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12. ELECTROSTATIC DISCHARGE IMMUNITY TEST

12.1 TEST SPECIFICATION

Basic Standard	EN 61000-4-2
Discharge Impedance	330Ω / 150 pF
Discharge Voltage	Air Discharge ±8kV, Contact Discharge ±4kV
Polarity	Positive / Negative
Number of Discharge for Each Applied Voltage	10
Discharge Mode	Single discharge
Discharge Period	1-second minimum

12.2 TEST PROCEDURE

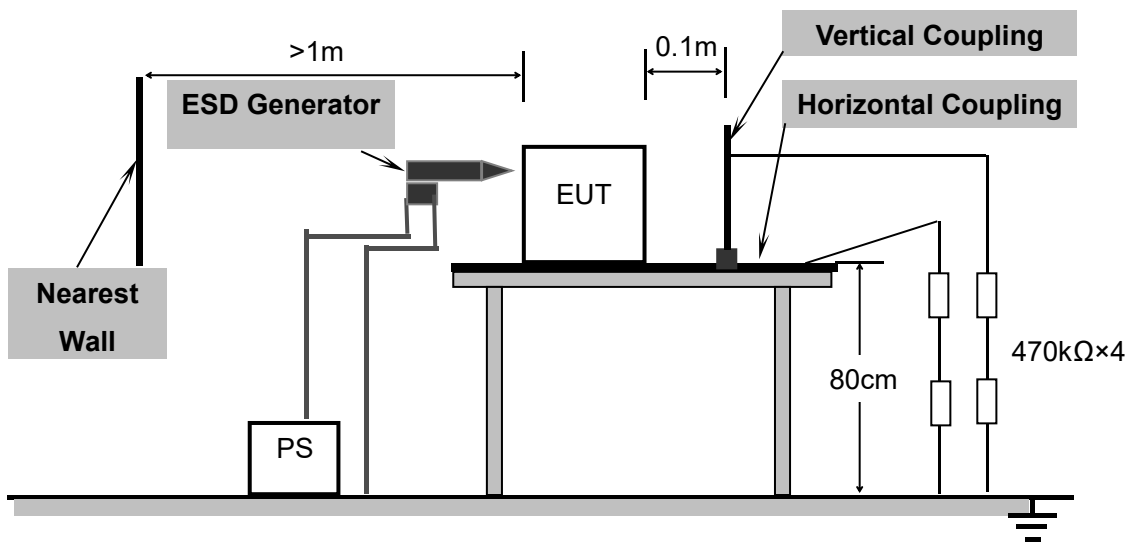
The test procedure was in accordance with EN 61000-4-2:

- Electrostatic discharges were applied only to those points and surfaces of the EUT that are accessible to users during normal operation.
- The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.
- The time interval between two successive single discharges was at least 1 second.
- The ESD generator was held perpendicularly to the surface to which the discharge was applied and the return cable was at least 0.2 meters from the EUT.
- Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.
- Air discharges were applied with the round discharge tip of the discharge electrode approaching the EUT as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator was removed from the EUT and re-triggered for a new single discharge. The test was repeated until all discharges were completed.
- At least ten single discharges (in the most sensitive polarity) were applied to the Horizontal Coupling Plane at points on each side of the EUT. The ESD generator was positioned vertically at a distance of 0.1 meters from the EUT with the discharge electrode touching the HCP.
- At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the Vertical Coupling Plane in sufficiently different positions that the four faces of the EUT were completely illuminated. The VCP (dimensions 0.5m×0.5m) was placed vertically to and 0.1 meters from the EUT.

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12.3 TEST SETUP



For the actual test configuration, please refer to Appendix A: Photographs of the Test Configuration.

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ESD LOCATION:

Blue line: Air discharge

Red line: Contact discharge



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12.4 TEST RESULT

Times of Discharge	Voltage	Coupling	Test Mode	Performance criteria
Mini 20 / Point	±2kV; ±4kV	Contact discharge	Mode 1/2	A
Mini 20 / Point	±2kV; ±4kV; ±8kV	Air Discharge	Mode 1/2	A
Mini 20 / Point	±4kV	Indirect Discharge HCP	Mode 1/2	A
Mini 20 / Point	±4kV	Indirect Discharge VCP	Mode 1/2	A

A: No degradation in the performance of the EUT was observed.

Note: operating mode include all modes of EMS in page 9.

12.5 PERFORMANCE

☒ Criteria A:	The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance.
☐ Criteria B:	The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.
☐ Criteria C:	Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls.

☒ **Compliance** ☐ **Not Compliance**

13. RADIATED, RADIO FREQUENCY ELECTROMAGNETIC FIELD IMMUNITY TEST

13.1. TEST SPECIFICATION

Basic Standard	EN 61000-4-3
Frequency Range	80 MHz – 6000MHzMHz
Field Strength	3V/m
Modulation	1 kHz sine wave, 80%, AM modulation
Frequency Step	1% of fundamental
Polarity of Antenna	Horizontal and Vertical
Test Distance	3m
Antenna Height	1.55m
Dwell Time	3 seconds

13.2. TEST PROCEDURE

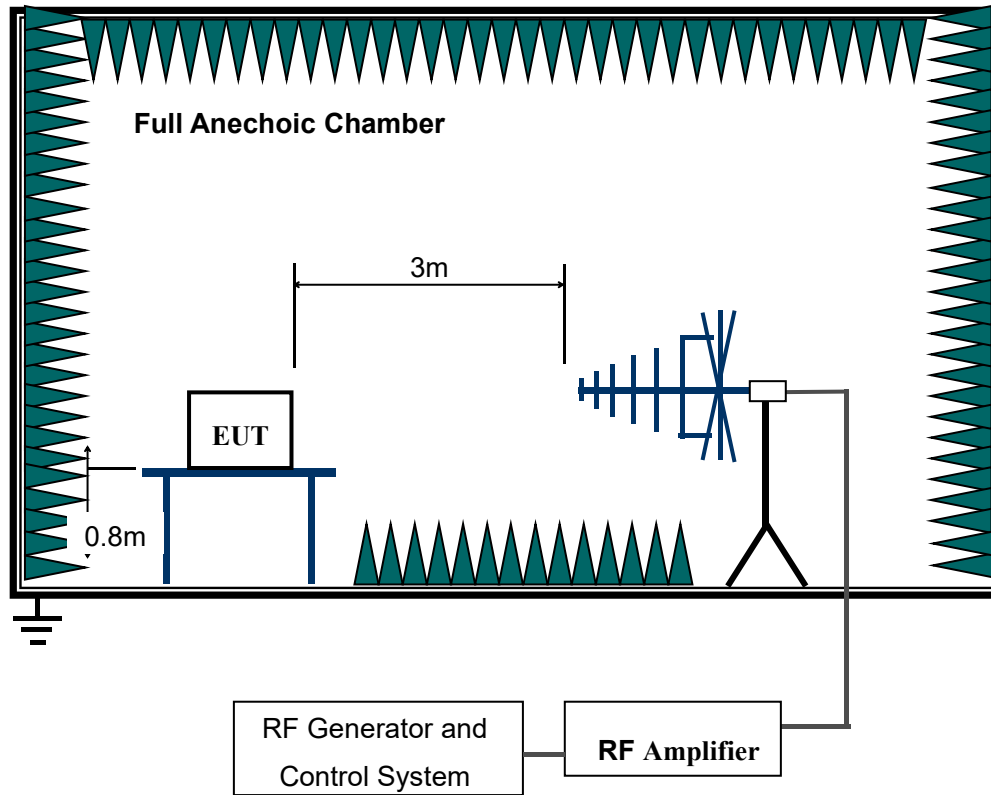
The test procedure was in accordance with EN 61000-4-3.

- The testing was performed in a fully anechoic chamber. The transmit antenna was located at a distance of 3 meters from the EUT.
- The test signal was 80% amplitude modulated with a 1 kHz sine wave.
- The frequency range was swept from 80 MHz to 6000MHz with the exception of the exclusion band for transmitters, receivers and duplex transceivers. The rate of sweep did not exceed 1.5×10^{-3} decade/s. Where the frequency range is swept incrementally, the step size was 1% of fundamental.
- The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.
- The field strength level was 3V/m.
- The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

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13.3. TEST SETUP



For the actual test configuration, please refer to Appendix A: Photographs of the Test Configuration.

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13.4. TEST RESULT

Freq. Range (MHz)	Field	Modulation	Polarity	Position	Test Mode	Performance criteria
80-6000	3V/m	Yes	H	Front	Mode 1/2	A
80-6000	3V/m	Yes	H	Back	Mode 1/2	A
80-6000	3V/m	Yes	H	Left	Mode 1/2	A
80-6000	3V/m	Yes	H	Right	Mode 1/2	A
80-6000	3V/m	Yes	V	Front	Mode 1/2	A
80-6000	3V/m	Yes	V	Back	Mode 1/2	A
80-6000	3V/m	Yes	V	Left	Mode 1/2	A
80-6000	3V/m	Yes	V	Right	Mode 1/2	A

A: No degradation or PER < 10% in the performance of the EUT was observed.

Note: operating mode include all modes of EMS in page 9.

13.5. PERFORMANCE

☒ Criteria A:	The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance.
☐ Criteria B:	The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.
☐ Criteria C:	Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls.

☒ **Compliance** ☐ **Not Compliance**

14. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

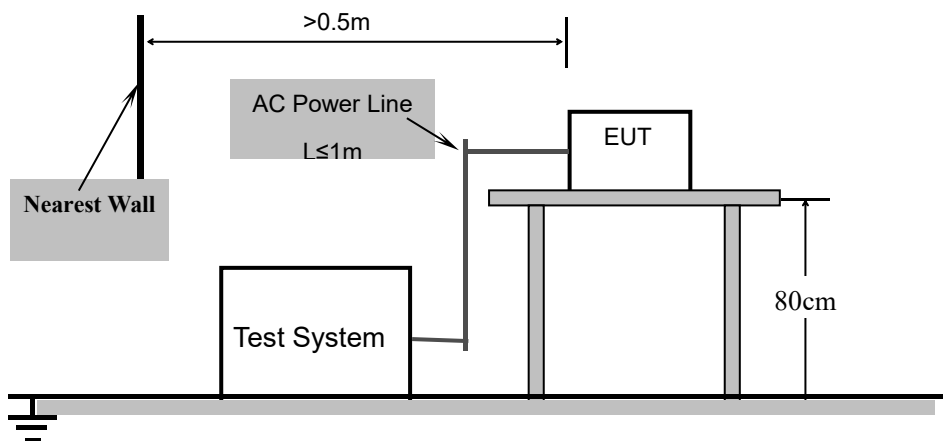
14.1. TEST SPECIFICATION

Basic Standard	EN 61000-4-4
Test Voltage	a.c. power port – 1 kV
Polarity	Positive/Negative
Impulse Frequency	5kHz
Impulse wave shape	5/50ns
Burst Duration	15ms
Burst Period	300ms
Test Duration	Not less than 1 min.

14.2. TEST PROCEDURE

1. The EUT was tested with 1000 volt discharges to the AC power input leads.
2. Both positive and negative polarity discharges were applied.
3. The length of the “hot wire” from the coaxial output of the EFT generator to the terminals on the EUT should not exceed 1 meter.
4. The duration time of each test sequential was 1 minute.
5. The transient/burst waveform was in accordance with IEC 61000-4-4, 5/50ns.

14.3. TEST SETUP



For the actual test configuration, please refer to Appendix A: Photographs of the Test Configuration.

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14.4. TEST RESULT

Test Point	Polarity	Test Level (kV)	Test Mode	Performance criteria
a.c. port, L	+/-	1	Mode 1	A
a.c. port, N	+/-	1	Mode 1	A
a.c. port, L-N	+/-	1	Mode 1	A
a.c. port, L-N	+/-	1	Mode 1	A

A: No degradation in the performance of the EUT was observed.

Note: operating mode include all modes of EMS in page 9.

14.5. PERFORMANCE

☒ Criteria A:	The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance.
☐ Criteria B:	The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.
☐ Criteria C:	Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls.

☒ **Compliance** ☐ **Not Compliance**

15. SURGE IMMUNITY TEST

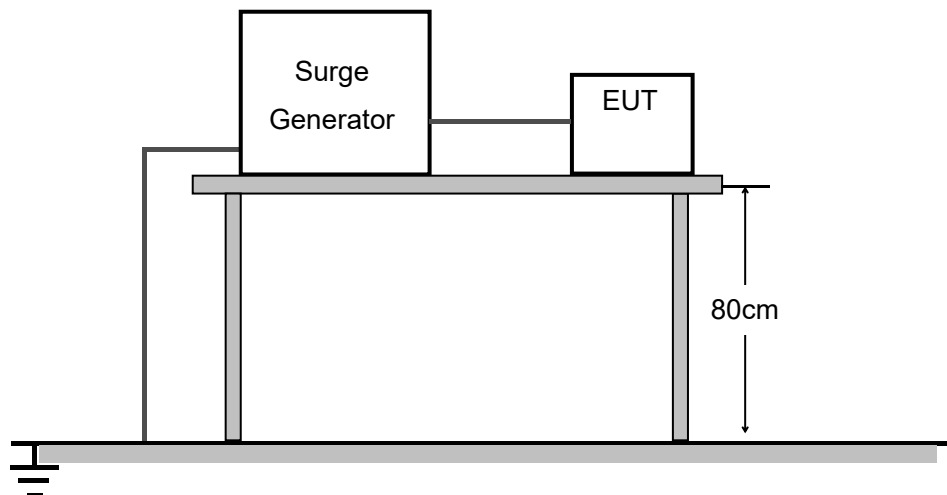
15.1. TEST SPECIFICATION

Basic Standard	EN 61000-4-5
Waveform	Voltage 1.2/50 μ s; Current 8/20 μ s
Test Voltage	a.c. power port, line to line 1.0 kV
Polarity	Positive/Negative
Phase Angle	0°, 90°, 180°, 270°
Repetition Rate	60sec
Times	5 time/each condition.

15.2. TEST PROCEDURE

- The EUT and the auxiliary equipment were placed on a table of 0.8m heights above a metal ground reference plane. The size of ground plane is greater than 1m×1m and project beyond the EUT by at least 0.1m on all sides. The ground plane is connected to the protective earth. The length of power cord between the coupling device and the EUT was less than 2 meters (provided by the manufacturer).
- The EUT was connected to the power mains through a coupling device that directly couples the surge interference signal. The surge noise was applied synchronized to the voltage phase at the zero crossing and the peak value of the AC voltage wave (positive and negative).
- The surges were applied line to line and line(s) to earth. All lower levels including the selected test level were tested. The polarity of each surge level included positive and negative test pulses.

15.3. TEST SETUP



For the actual test configuration, please refer to Appendix A: Photographs of the Test Configuration.

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15.4. TEST RESULT

Coupling Line	Polarity	Voltage (kV)	Test Mode	Performance criteria
a.c. power, L-N	+/-	1.0	Mode 1	A
A: No degradation in the performance of the EUT was observed.				

Note: operating mode include all modes of EMS in page 9.

15.5. PERFORMANCE

☒ Criteria A:	The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance.
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☒ Compliance ☐ Not Compliance
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16. IMMUNITY TO CONDUCTED DISTURBANCES INDUCED BY RF FIELDS

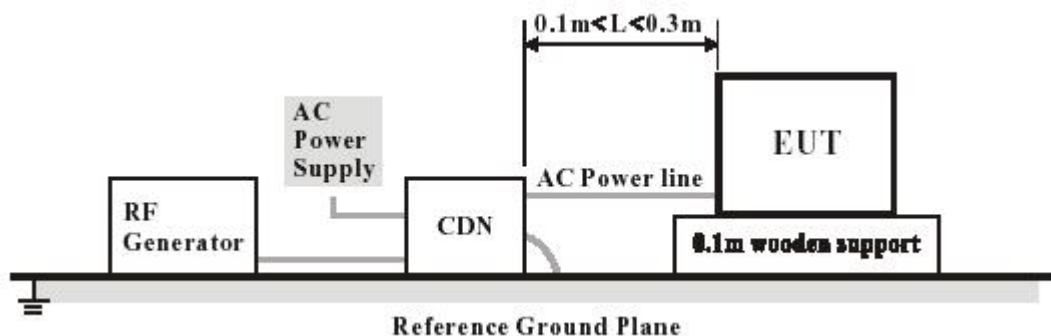
16.1. TEST SPECIFICATION

Basic Standard	EN 61000-4-6
Frequency Range	0.15 MHz – 80 MHz
Field Strength	3Vrms
Modulation	1 kHz Sine Wave, 80% AM
Frequency Step	1% of fundamental
Coupled Cable	a.c. power line
Coupling Device	CDN

16.2. TEST PROCEDURE

1. The EUT shall be tested within its intended operating and climatic conditions.
2. The test shall be performed with the test generator connected to each of the coupling and decoupling devices in turn, while the other non-excited RF input ports of the coupling devices are terminated by a 50-ohm load resistor.
3. The test signal was 80% amplitude modulated with a 1 kHz sine wave
4. The frequency range is swept from 150 kHz to 80 MHz, using the signal level established during the setting process and with a disturbance signal of 80% amplitude. The sweep rate shall not exceed 1.5×10^{-3} decades/s. The step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value where the frequency is swept incrementally.
5. The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised, and able to respond. Sensitive frequencies such as clock frequencies and harmonics or frequencies of dominant interest, shall be analyzed separately.
6. Attempts should be made to fully exercise the EUT during test, and to fully interrogate all exercise modes selected for susceptibility.

16.3. TEST SETUP



For the actual test configuration, please refer to Appendix A: Photographs of the Test Configuration.

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16.4. TEST RESULT

Test Point	Frequency (MHz)	Level (V rms)	Test Mode	Performance criteria
a.c. port	0.15 – 80	3	Mode 1	A

A: No degradation in the performance of the EUT was observed.

Note: operating mode include all modes of EMS in page 9.

16.5. PERFORMANCE

☒ Criteria A:	The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance.
☐ Criteria B:	The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.
☐ Criteria C:	Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls.

☒ **Compliance** ☐ **Not Compliance**

17. VOLTAGE DIPS AND SHORT INTERRUPTIONS IMMUNITY TEST

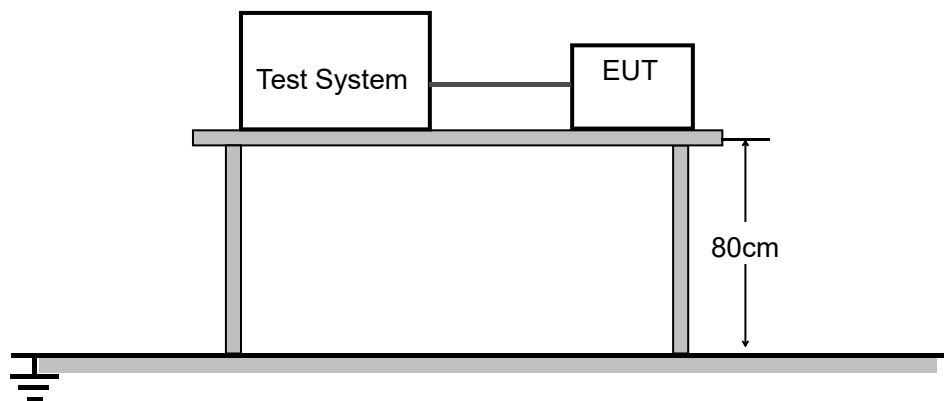
17.1. TEST SPECIFICATION

Basic Standard	EN 61000-4-11
Voltage Dips	100% reduction, 0.5 Cycle 100% reduction, 1.0 Cycle 30% reduction, 25 Cycles
Voltage Interruptions	100% reduction, 250 Cycles
Voltage Phase Angle	0°, 45°, 90°, 135°, 180°, 225°, 270°, 315°

17.2. TEST PROCEDURE

- The power cord was used as supplied by the manufacturer. The EUT was connected to the line output of the Voltage Dips and Interruption Generator.
- The EUT was tested for (1) 100% voltage dip of supplied voltage with duration of 0.5 cycles, (2) 100% voltage dip of supplied voltage and duration 1.0 cycle. (3) 30% voltage dip of supplied voltage and duration 25 cycles. (4) 100% voltage interruption of supplied voltage with duration of 250 Cycles was followed.
- Voltage reductions occur at 0 degree crossover point of the voltage waveform. The performance of the EUT was checked after the voltage dip or interruption.

17.3. TEST SETUP



For the actual test configuration, please refer to Appendix A, Photographs of the Test Configuration.

17.4. TEST RESULT

Test Mode	Voltage Reduction	Duration (cycle)	Times	Interval (Sec)	Test Mode	Performance criteria
Voltage dips	100%	0.5	3	10	Mode 1	A
	100%	1	3	10	Mode 1	A
	30%	25	3	10	Mode 1	A
Voltage interruptions	100%	250	3	10	Mode 1	B

A: No degradation in the performance of the EUT was observed.

B: Stop charging during the test and self-recoverable after test.

C: Lost functions can be recoverable by user or operator.

Note: operating mode include all modes of EMS in page 9.

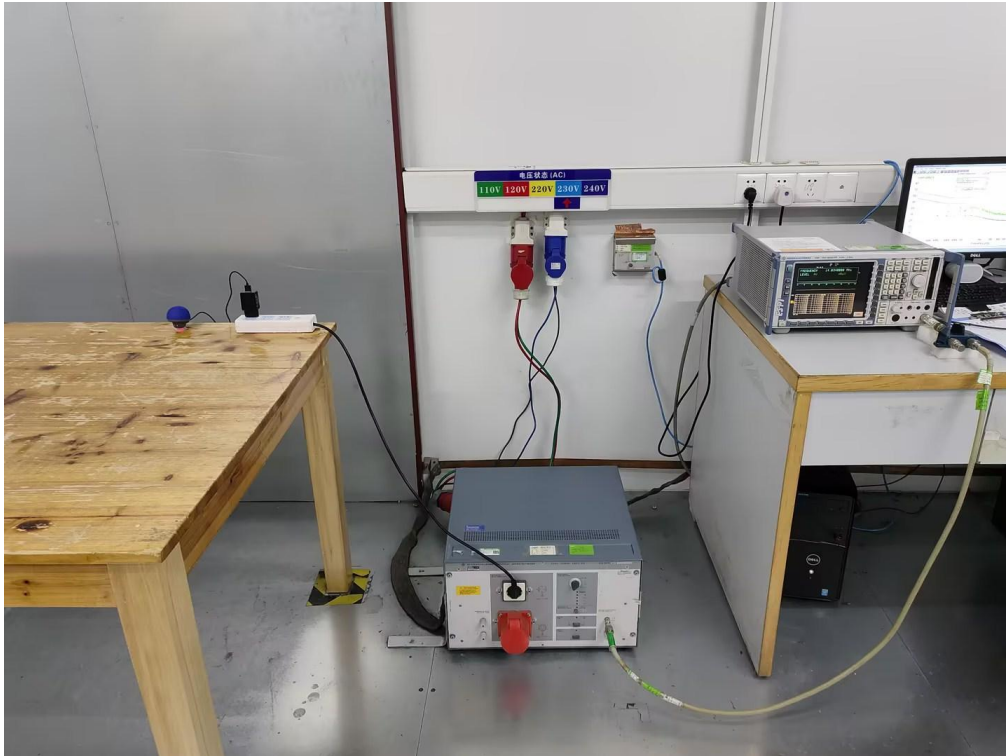
17.5. PERFORMANCE

☒ Criteria A:	The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance.
☒ Criteria B:	The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.
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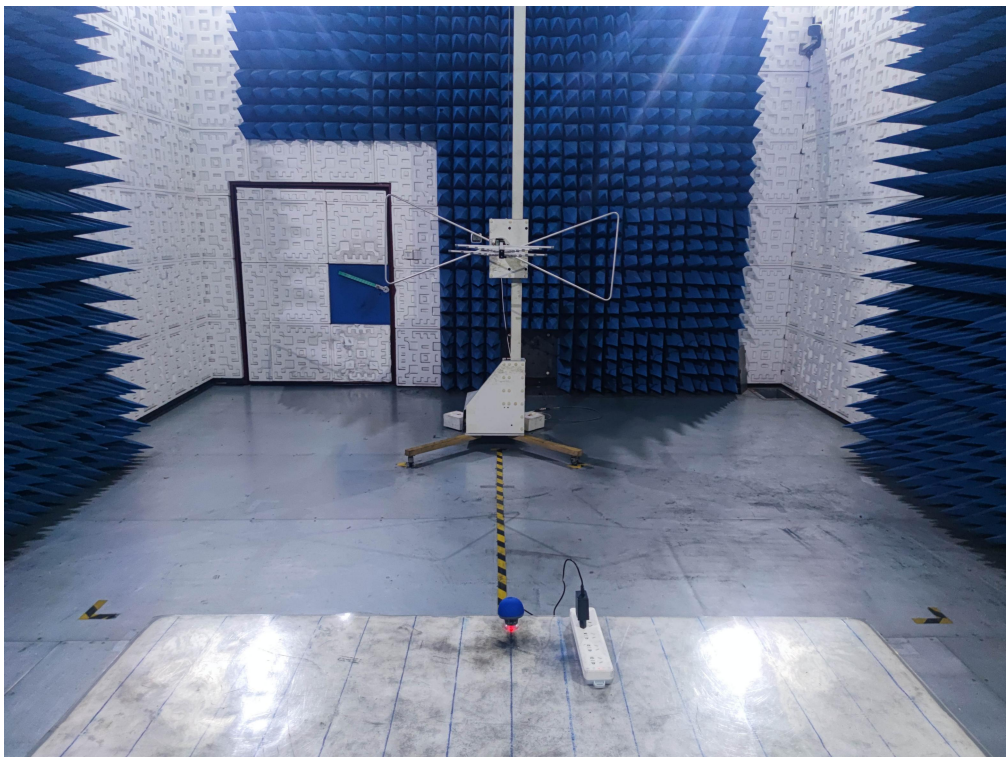
☒ **Compliance** ☐ **Not Compliance**

APPENDIX A: PHOTOGRAPHS OF TEST SETUP

LINE CONDUCTED EMISSION TEST SETUP

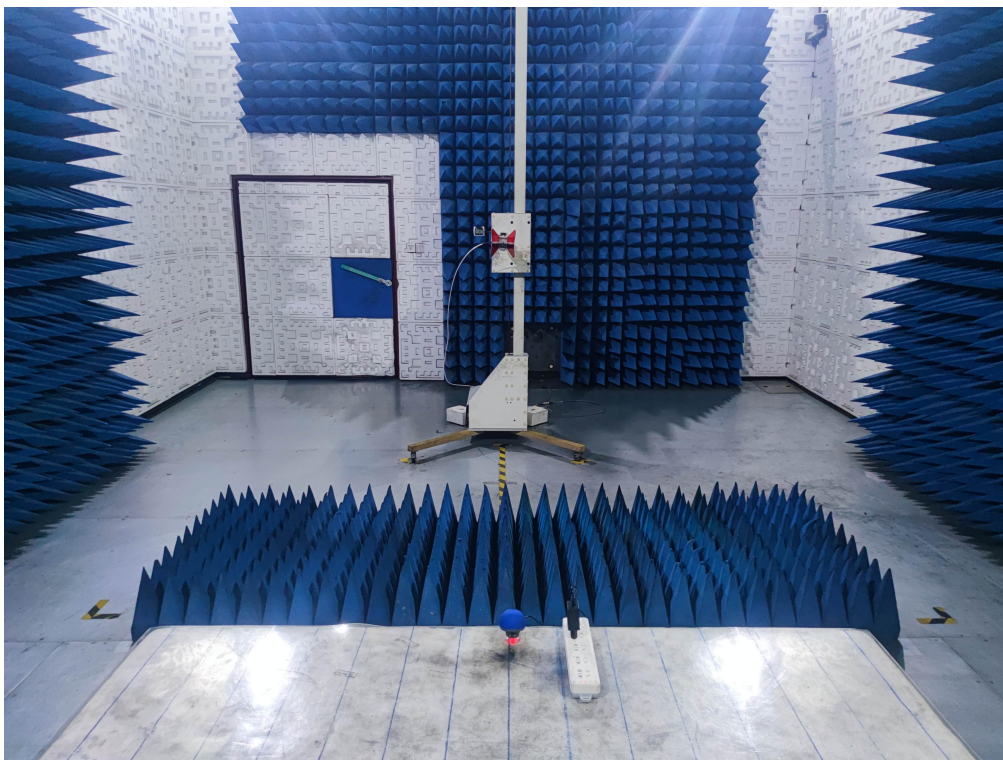


RADIATED EMISSION TEST SETUP BELOW 1GHZ

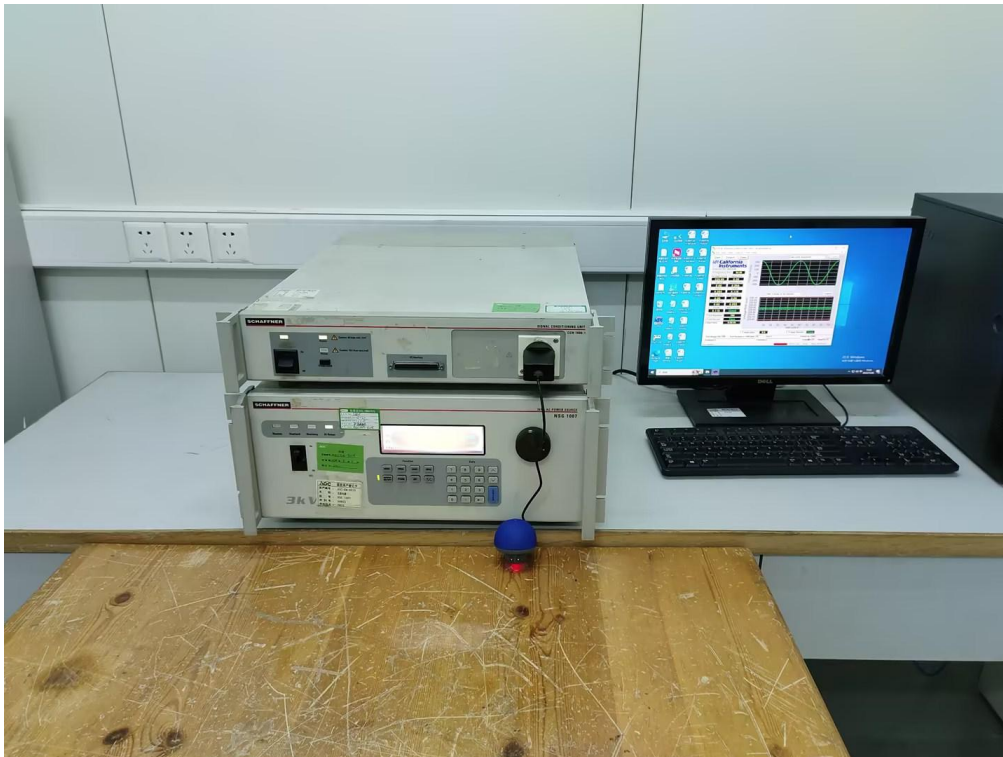


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RADIATED EMISSION TEST SETUP ABOVE 1GHz

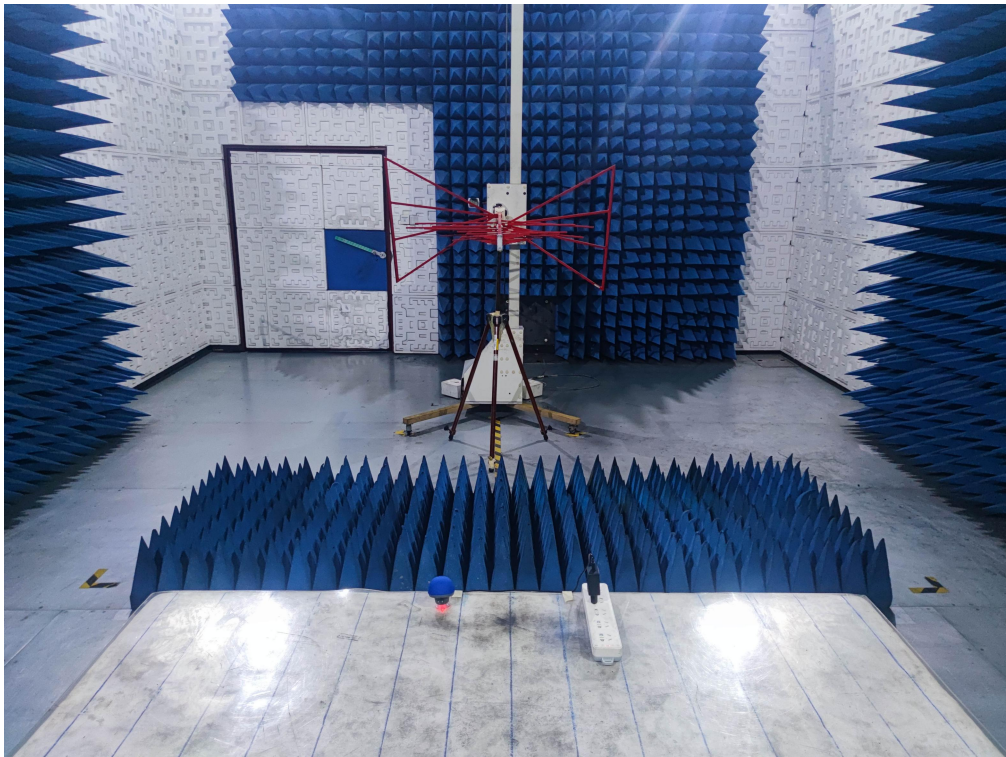


EN 61000-3-3 VOLTAGE FLUCTUATION / FLICKER TEST SETUP



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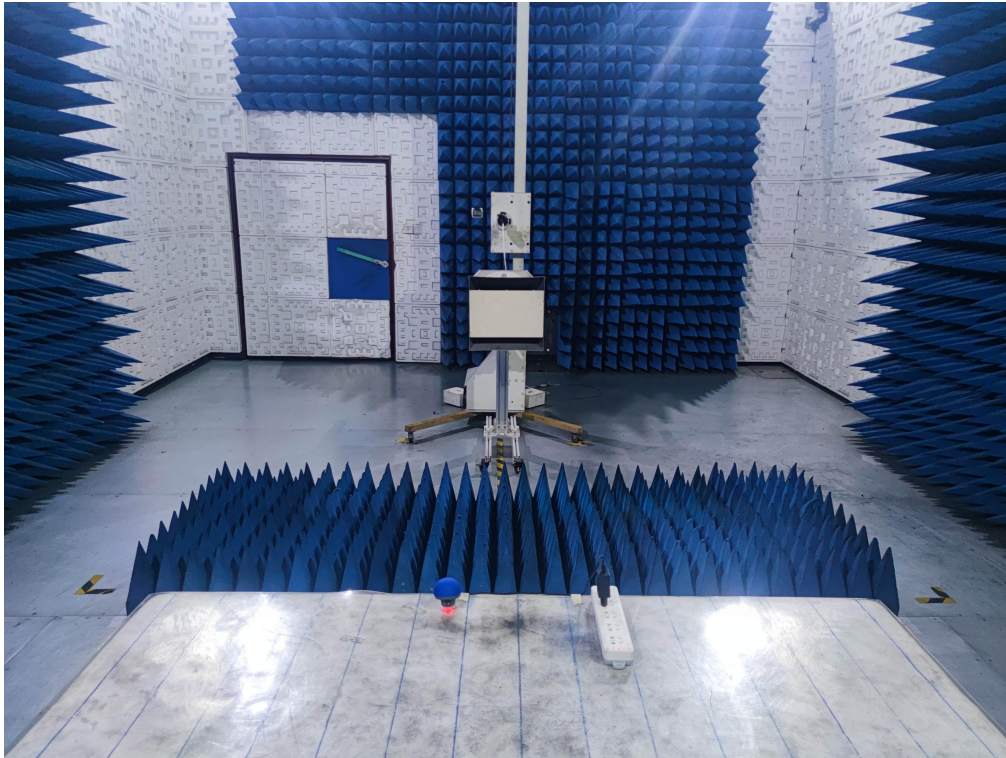
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EN 61000-4-2 ESD TEST SETUP**EN 61000-4-3 RS TEST SETUP BELOW 1GHZ**

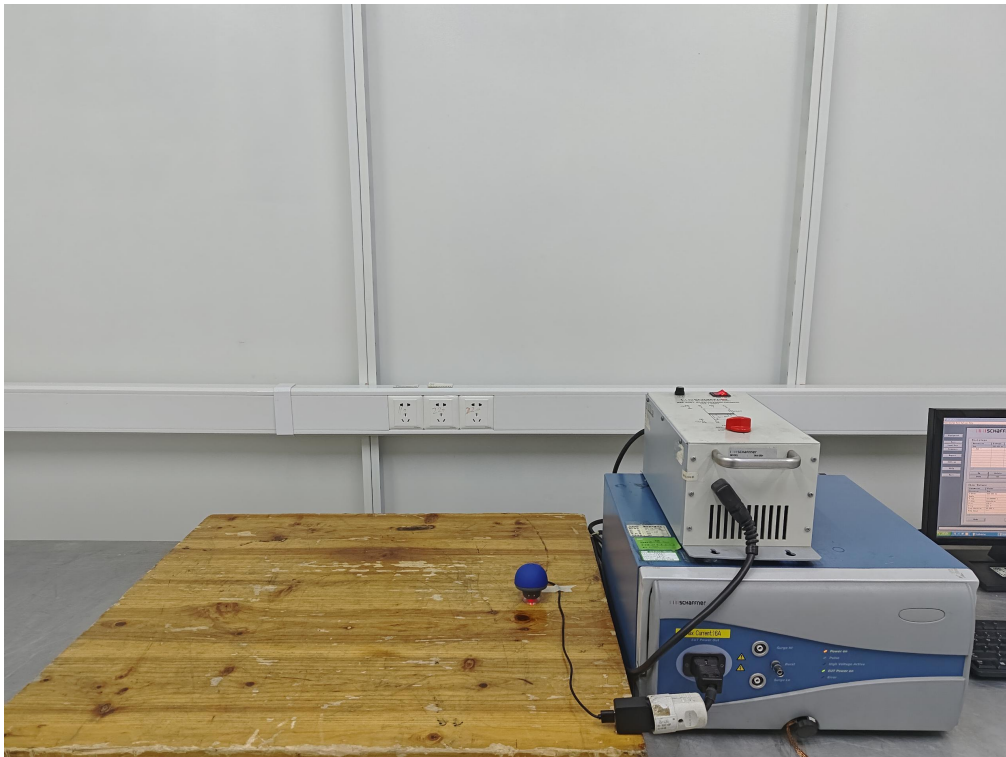
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EN 61000-4-3 RS TEST SETUP ABOVE 1GHZ

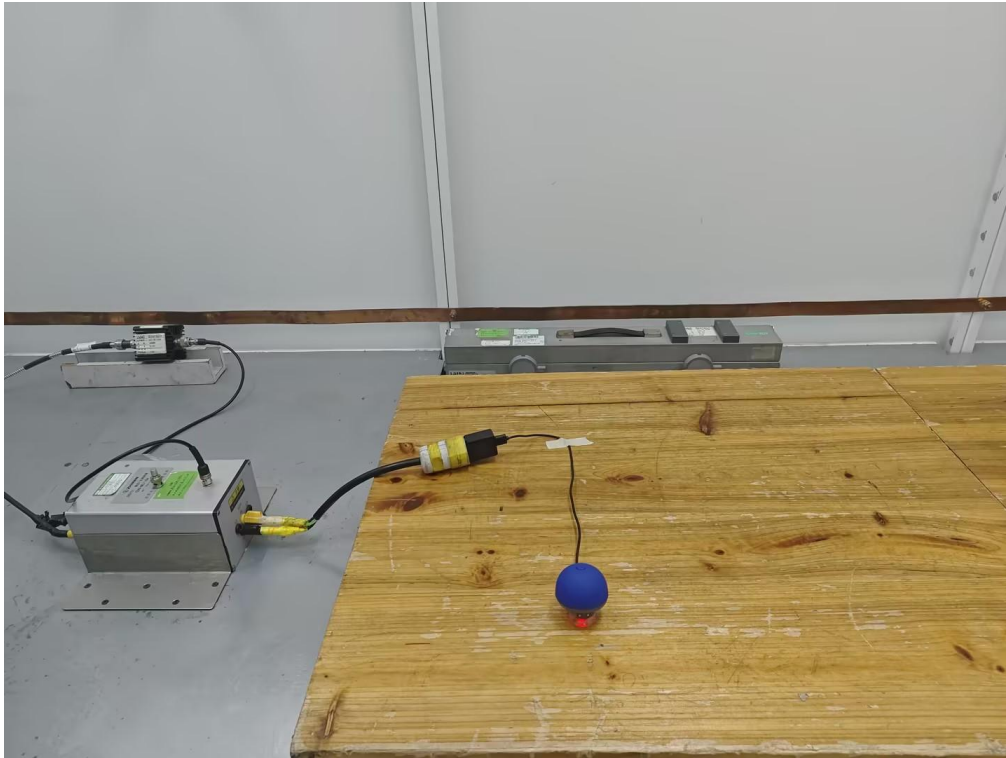


EN 61000-4-4/-5/-11 EFT/SURGE/DIPS IMMUNITY TEST SETUP



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EN 61000-4-6 CS IMMUNITY TEST SETUP

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APPENDIX B: PHOTOGRAPHS OF EUT

Refer to the Report No.: AGC12440231103AP01

----END OF REPORT----

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2. Any report issued by Company as a result of this application for testing services (the “Report”) shall be issued in confidence to the Clients and the Report will be strictly treated as such by the Company. It may not be reproduced either in its entirety or in part and it may not be used for advertising or other unauthorized purposes without the written consent of the Company. The Clients to whom the Report is issued may, however, show or send it, or a certified copy thereof prepared by the Company to its customer, supplier or other persons directly concerned. The Company will not, without the consent of the Clients, enter into any discussion or correspondence with any third party concerning the contents of the Report, unless required by the relevant governmental authorities, laws or court orders.
3. The Company shall not be called or be liable to be called to give evidence or testimony on the Report in a court of law without its prior written consent, unless required by the relevant governmental authorities, laws or court orders.
4. In the event of the improper use of the report as determined by the Company, the Company reserves the right to withdraw it, and to adopt any other additional remedies which may be appropriate.
5. Samples submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.
6. The Company will not be liable for or accept responsibility for any loss or damage however arising from the use of information contained in any of its Reports or in any communication whatsoever about its said tests or investigations.
7. Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.
8. The Company is not responsible for recalling the electronic version of the original report when any revision is made to them. The Client assumes the responsibility to providing the revised version to any interested party who uses them.
9. Subject to the variable length of retention time for test data and report stored hereinto as otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of the test report for a period of six years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after retention period. Under no circumstances shall we be liable for damage of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.

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EMC Test Report

Report No.: AGC12440231103EE01

PRODUCT DESIGNATION : WIRELESS SPEAKER

BRAND NAME : N/A

MODEL NAME : M09506

APPLICANT : Mid Ocean Brands B.V.

DATE OF ISSUE : Nov. 23, 2023

STANDARD(S) : EN 55032:2015+A1:2020
EN 55035:2017+A11:2020
EN 61000-3-3:2013+A2:2021
EN IEC 61000-3-2:2019+A1:2021

REPORT VERSION : V1.0



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Tel: +86-755 2523 4088 E-mail: agc@agccert.com Web: <http://www.agccert.com/>



REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Nov. 23, 2023	Valid	Initial release

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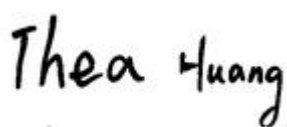
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1. General information

Applicant	Mid Ocean Brands B.V.
Address	7/F., King Tower, 111King Lam Street, Cheung ShaWan, Kowloon, HongKong.
Manufacturer	Mid Ocean Brands B.V.
Address	7/F., King Tower, 111King Lam Street, Cheung ShaWan, Kowloon, HongKong.
Factory	Mid Ocean Brands B.V.
Address	7/F., King Tower, 111King Lam Street, Cheung ShaWan, Kowloon, HongKong.
Product Designation	WIRELESS SPEAKER
Brand Name	N/A
Test Model	MO9506
Series Model(s)	N/A
Difference Description	N/A
Deviation from Standard	No any deviation from the test method
Date of receipt of test item	Nov. 17, 2023
Date of Test	Nov. 17, 2023 to Nov. 23, 2023
Test Result	Pass
Test Report Form No	AGCER-EMC-GEN-V1
Note: The test results of this report relate only to the tested sample identified in this report.	

Prepared By		
	Thea Huang (Project Engineer)	Nov. 23, 2023
Reviewed By		
	Calvin Liu (Reviewer)	Nov. 23, 2023
Approved By		
	Max Zhang (Authorized Officer)	Nov. 23, 2023

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2. Description of Test Configuration

2.1. Technical Description of Product

Categorization of Equipment	Class B equipment
Test arrangements of EUT	Table-top
Hardware Version	V1.0
Software Version	ac696n_soundbox_sdk_v1.6.0
Highest Internal Frequency	Greater than 108MHz
Power Supply	DC 3.7V by battery or DC 5V by adapter
Adapter Information	N/A
Battery Information	3.7V 180mAh 0.66Wh

I/O Port Information (☒ Applicable ☐ Not Applicable)

Port Type	Input / Output	Number	Cable Description
Type-C Port	In	1	0.45m unshielded

2.2. Description of Support Equipment

Device Type	Manufacturer	Model Name	Serial No.	Data Cable	specifications
Adapter	jinbaotong	K-T10E0502000E	--	--	AC100-240V,50-60Hz,0.35A,DC5V/2A

2.3. Description of Test Modes

No.	Test Mode Description
1	Standby mode with charging

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3. Summary of Measurement Results and Uncertainty

3.1. Test Specifications

EN 55032:2015+A1:2020	Electromagnetic compatibility of multimedia equipment - Emission requirements
EN 55035:2017+A11:2020	Electromagnetic compatibility of multimedia equipment - Immunity requirements
EN 61000-3-3:2013+A2:2021	Electromagnetic compatibility (EMC) Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection
EN IEC 61000-3-2:2019+A1:2021	Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current 16 A per phase)

3.2. Description of Measurement Results

Test items	Test Standard(s)	Verdict
Conducted emissions from the AC mains power ports	EN 55032	Pass
Radiated emissions at frequencies up to 1 GHz	EN 55032	Pass
Radiated emissions at frequencies above 1 GHz	EN 55032	Pass
Harmonic current emissions	EN IEC 61000-3-2	Pass
Voltage fluctuations and flicker	EN 61000-3-3	Pass
Electrostatic discharge	IEC 61000-4-2 ^a	Pass
Radio-frequency electromagnetic field	IEC 61000-4-3 ^a	Pass
Fast transients	IEC 61000-4-4 ^a	Pass
Surges	IEC 61000-4-5 ^a	Pass
Radio-frequency common mode (Injected currents)	IEC 61000-4-6 ^a	Pass
Voltage dips and interruptions	IEC 61000-4-11 ^a	Pass

Note:

a. The applicable versions of the basic standards are defined in the standard which listed in the test specification.

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Performance table

Performance Criteria for Immunity	
Performance criterion 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.
Performance criterion 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.
Performance criterion 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.

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3.3. Description of Measurement Uncertainty

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%.

Item	Measurement Uncertainty
Conducted emissions from the AC mains power ports	$U_c = \pm 2.9 \text{ dB}$
Radiated emissions at frequencies up to 1 GHz	$U_c = \pm 3.9 \text{ dB}$
Radiated emissions at frequencies above 1 GHz	$U_c = \pm 4.9 \text{ dB}$

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4. Test Facility

Laboratory name: Attestation of Global Compliance (Shenzhen) Co., Ltd.

Laboratory Address: 1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L5488

Attestation of Global Compliance (Shenzhen) Co., Ltd. is accredited in accordance with the recognized International Standard ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories).

A2LA-Lab Cert. No.: 5054.02

Attestation of Global Compliance (Shenzhen) Co., Ltd. is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. This laboratory also meets the requirements of any additional program requirements in the Electrical field.

FCC-Registration No.: 975832

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files with Registration 975832.

IC-Registration No.: 24842

CAB identifier: CN0063

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the Certification and Engineering Bureau of Industry Canada. The acceptance letter from the IC is maintained in our files with Registration 24842.

VCCI Membership No.: 4112

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered in accordance with VCCI Council Rules.

VCCI Registration No. C-20098 for conducted emissions at AC main power ports

VCCI Registration No. T-20102 for conducted emissions at telecommunication ports

VCCI Registration No. R-20136 for radiated emissions below 1GHz

VCCI Registration No. G-20132 for radiated emissions above 1GHz

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5. Measurement of Conducted Emissions from the AC Mains Power Ports

5.1. Requirements

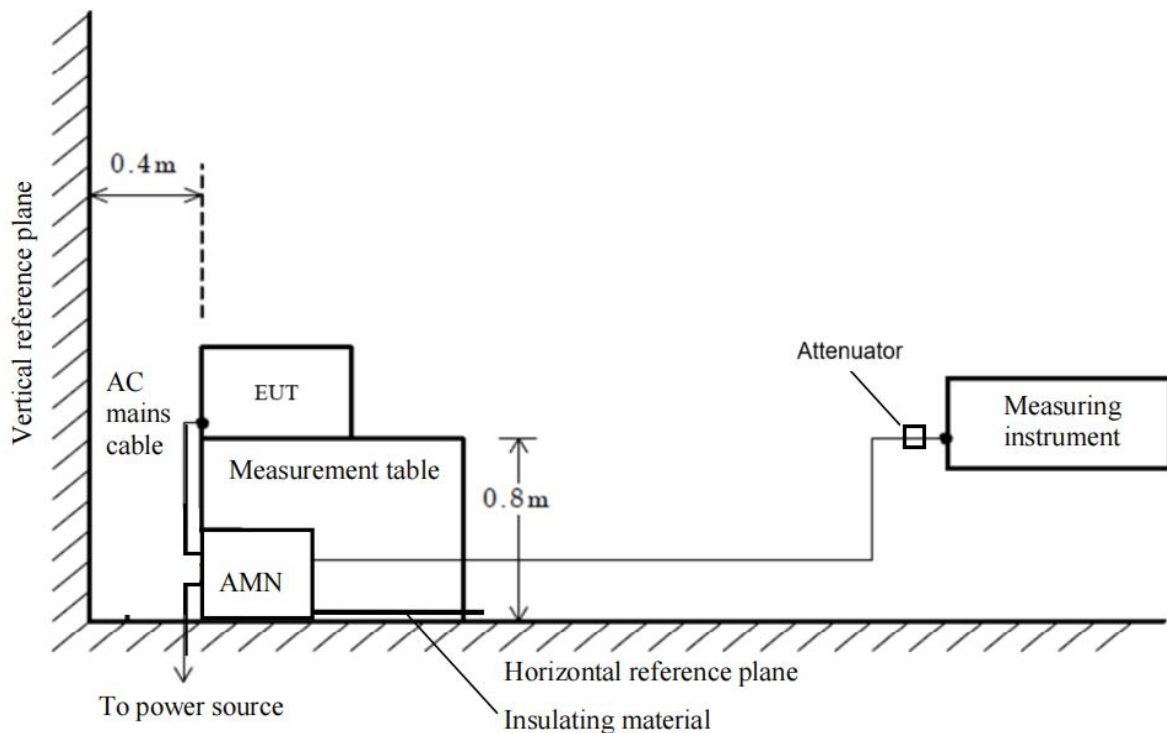
Requirements for conducted emissions, low voltage AC mains port

Network device	Detector type/ bandwidth	Frequency Range (MHz)	Limits dB(μV)	Measurement specifications
AMN	Quasi-peak/ 9kHz	0.15 to 0.5	66 to 56	Instrumentation: CISPR 16-1-1, Clauses 4, 5 and 7
		0.5 to 5	56	
		5 to 30	60	
	Average/ 9kHz	0.15 to 0.5	56 to 46	Networks: CISPR 16-1-2, Clause 4
		0.5 to 5	46	Method: CISPR 16-2-1, Clause 7
		5 to 30	50	Set-up: CISPR 16-2-1, Clause 7

Note:

1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 to 0.5MHz.

5.2. Block Diagram of Test Setup



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5.3. Equipment Details

Measuring Instruments

Instruments	Manufacturer	Model	S/N	Cal. Date	Cal. Due
Test Receiver	R&S	ESPI	101206	Jun. 03, 2023	Jun. 02, 2024
Artificial Mains Network	R&S	ESH2-Z5	100086	Jun. 03, 2023	Jun. 02, 2024
Attenuator	East sheep	LM-XX-6-5W	N/A	Jun. 09, 2023	Jun. 08, 2024

Measuring Software

Software Name	Manufacturer	Details
ES-K1	R&S	For EMC Measurement, Version 1.71

5.4. Configuration of the EUT and method of measurement

- The EUT was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, the EUT was placed on the top surface of a measurement table, 0.8 m high from the horizontal reference plane, and was positioned at a distance of 0.4 m away from the vertical reference plane. When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 10 cm non-conductive covering to insulate the EUT from the ground plane.
- Support equipment, if needed, was placed as per CISPR 16-2-1.
- All I/O cables were positioned to simulate typical actual usage as per CISPR 16-2-1.
- The EMI receiver measured the emission levels emanating from the EUT into the AC Mains through an Artificial Mains Network (AMN) and an attenuator used on the front end of the EMI receiver. Testing included measurements on all live and neutral lines.
- The more description of the tests, the test methods, and the test set-ups are given in the applicable test standard.
- Record at least six highest emissions relative to the limits at each frequency of interest unless the emission is 10 dB or greater below the limit.
- A conducted emission is calculated by the following equation:
 - Measurement Level (dBμV) = Receiver reading (dBμV) + Tansd (dB)
 - Transd(dB)= AMN Factor(dB)+Cable Loss(dB)+Attenuation(dB)
 - Margin= Limit-Level

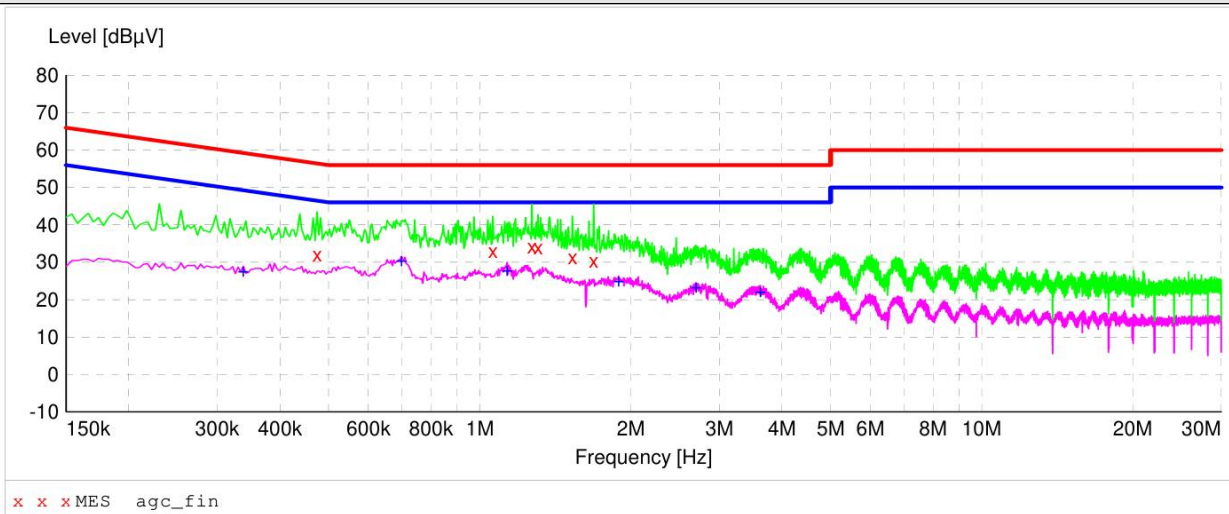
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5.5. Test Summary

Test Engineer	Jimu	Temperature	21.2°C
Test Date	Nov. 20, 2023	Air Pressure	985 Mbar
Worst Mode	Mode 1	Relative Humidity	47.9%
Verdict	Pass		

Test graph and data for Conducted Emission

Test Mode: Mode 1

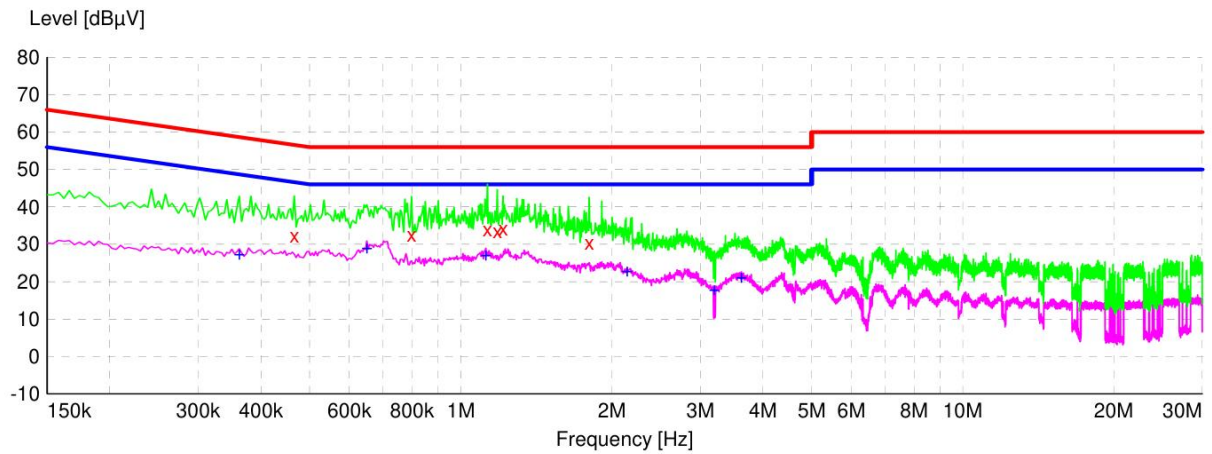


Frequency [MHz]	Level [dBμV]	Factor [dB]	Limit [dBμV]	Margin [dB]	Detector	Line
0.474000	32.1	6.1	56.4	24.3	QP	L1
1.062000	33.0	6.2	56.0	23.0	QP	L1
1.270000	34.1	6.2	56.0	21.9	QP	L1
1.306000	33.9	6.2	56.0	22.1	QP	L1
1.530000	31.4	6.2	56.0	24.6	QP	L1
1.686000	30.5	6.2	56.0	25.5	QP	L1
0.338000	28.0	6.1	49.3	21.3	AV	L1
0.698000	30.9	6.2	46.0	15.1	AV	L1
1.134000	28.2	6.2	46.0	17.8	AV	L1
1.890000	25.5	6.2	46.0	20.5	AV	L1
2.698000	23.7	6.3	46.0	22.3	AV	L1
3.622000	22.5	6.3	46.0	23.5	AV	L1

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Test graph and data for Conducted Emission

Test Mode: Mode 1



x x x MES agc_fin

Frequency [MHz]	Level [dBμV]	Factor [dB]	Limit [dBμV]	Margin [dB]	Detector	Line
0.466000	32.2	6.1	56.6	24.4	QP	N
0.798000	32.5	6.2	56.0	23.5	QP	N
1.130000	33.9	6.2	56.0	22.1	QP	N
1.182000	33.5	6.2	56.0	22.5	QP	N
1.214000	34.2	6.2	56.0	21.8	QP	N
1.802000	30.4	6.2	56.0	25.6	QP	N
0.362000	27.8	6.1	48.7	20.9	AV	N
0.650000	29.4	6.2	46.0	16.6	AV	N
1.122000	27.6	6.2	46.0	18.4	AV	N
2.146000	23.3	6.2	46.0	22.7	AV	N
3.202000	18.3	6.3	46.0	27.7	AV	N
3.622000	21.7	6.3	46.0	24.3	AV	N

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6. Measurement of Radiated Emissions at Frequencies up to 1 GHz

6.1. Requirements

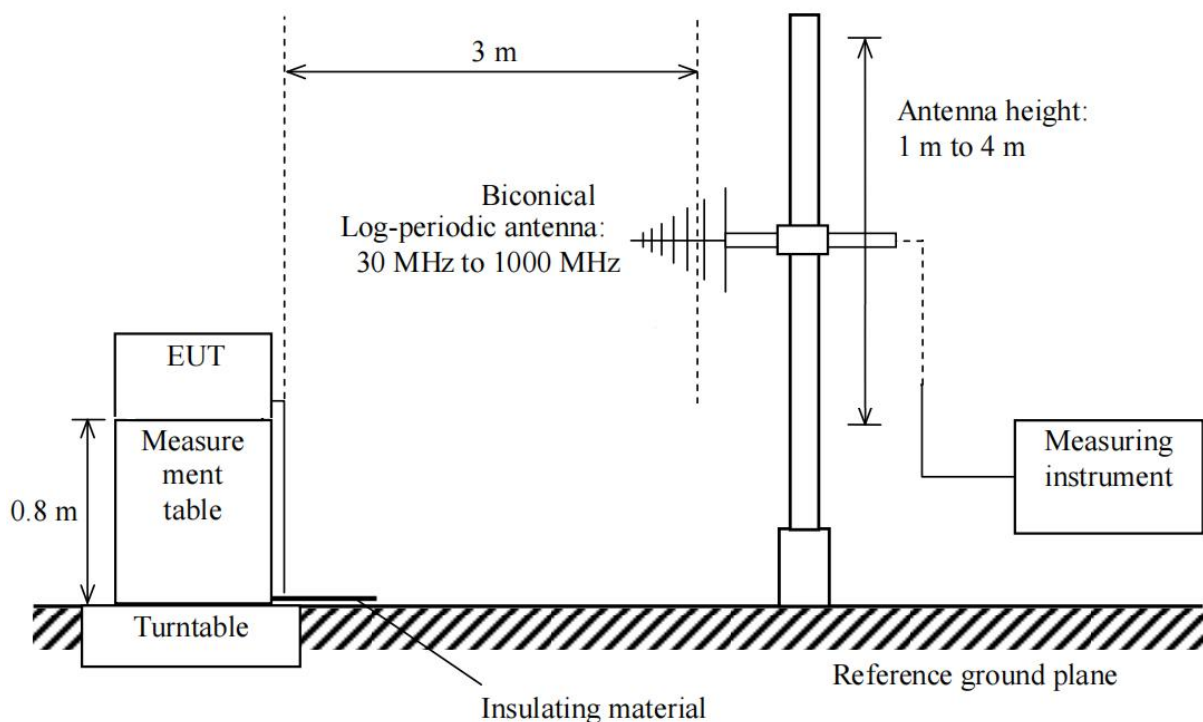
Requirements for radiated emissions at frequencies up to 1 GHz at 3m distance

Test facility	Detector type/ bandwidth	Frequency Range (MHz)	Limits dB(μ V/m)	Measurement specifications
SAC	Quasi-peak/ 120kHz	30 to 230	40	Instrumentation: CISPR 16-1-1, Clauses 4, 5 Antennas: CISPR 16-1-4, Clause 4.5 Test Site: CISPR 16-1-4, Clause 6 Method: CISPR 16-2-3, Clause 7.6
		230 to 1000	47	

Note:

- The lower limit shall apply at the transition frequency.

6.2. Block Diagram of Test Setup



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6.3. Equipment Details

Measuring Instruments

Instruments	Manufacturer	Model	S/N	Cal. Date	Cal. Due
Test Receiver	R&S	ESCI	10096	Feb. 18, 2023	Feb. 17, 2024
Antenna	SCHWARZBECK	VULB9168	D69250	May 11, 2023	May 10, 2025

Measuring Software

Software Name	Manufacturer	Details
EZ-EMC	FARA	For EMC Measurement, Version RA-03A
TS+[JS32-RE]	Tonscend	For EMC measurement, version 4.0.0.0

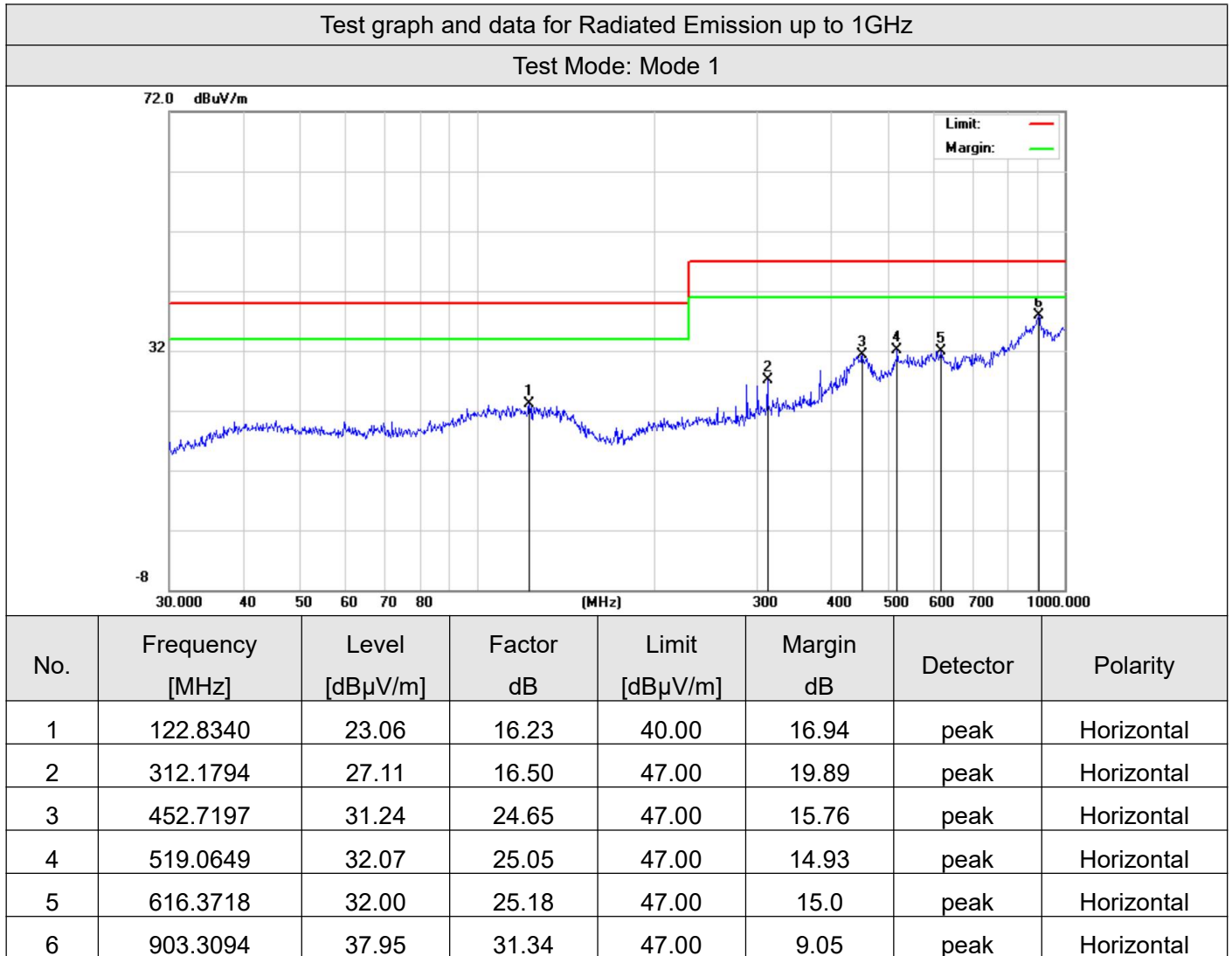
6.4. Configuration of the EUT and method of measurement

- The EUT was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, the EUT was placed on the top surface of a measurement table, 0.8 m high from the horizontal reference plane. When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 10 cm non-conductive covering to insulate the EUT from the ground plane.
- Support equipment, if needed, was placed as per CISPR 16-2-3.
- All I/O cables were positioned to simulate typical actual usage as per CISPR 16-2-3.
- The maximum receiving level of radiated emissions from the EUT was measured while the turntable was rotated from 0° to 360° and the antenna height was scanned between 1 m and 4 m. The cables were laid out to attain the maximum level of radiated emissions.
- The more description of the tests, the test methods, and the test set-ups are given in the applicable test standard.
- Record at least six highest emissions relative to the limits at each frequency of interest unless the emission is 10 dB or greater below the limit.
- A radiated emission is calculated by the following equation:
 - Measurement Level dB(μV/m) = Receiver reading dB(μV) + Factor(dB/m)
 - Factor(dB/m) = Antenna Factor(dB/m) + Cable Loss(dB)
 - Margin= Limit-Level

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6.5. Test Summary

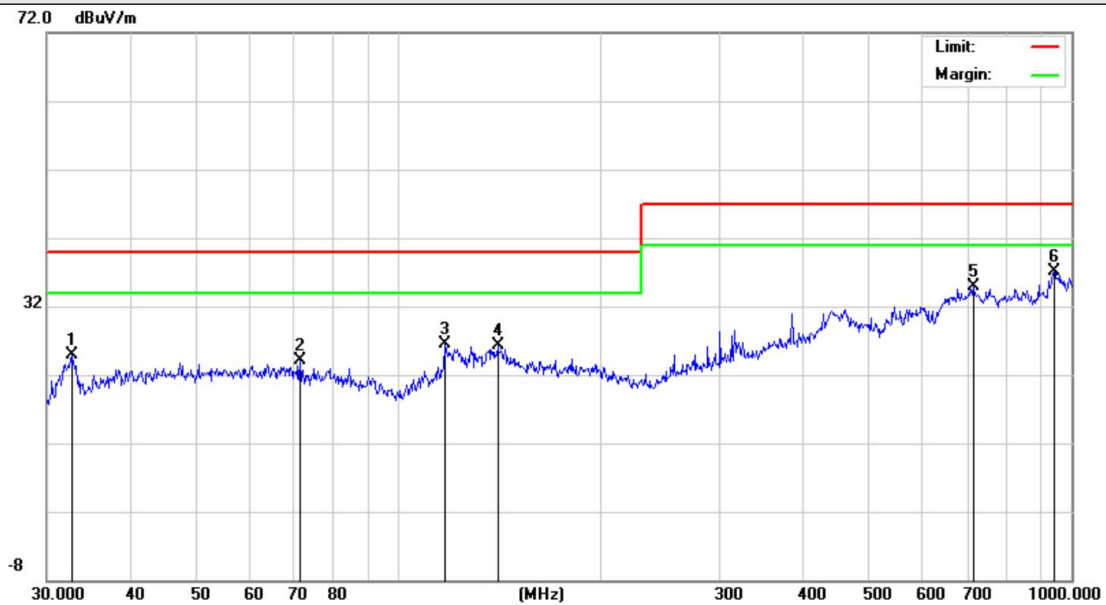
Test Engineer	Alex	Temperature	23.8°C
Test Date	Nov. 20, 2023	Air Pressure	985 Mbar
Worst Mode	Mode 1	Relative Humidity	61.9%
Verdict	Pass		



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Test graph and data for Radiated Emission up to 1GHz

Test Mode: Mode 1



No.	Frequency [MHz]	Level [dBμV/m]	Factor dB	Limit [dBμV/m]	Margin dB	Detector	Polarity
1	32.7486	24.82	14.51	40.00	15.18	peak	Vertical
2	71.3299	24.16	16.99	40.00	15.84	peak	Vertical
3	116.9495	26.44	17.17	40.00	13.56	peak	Vertical
4	140.3420	26.39	18.20	40.00	13.61	peak	Vertical
5	714.1734	34.84	28.60	47.00	12.16	peak	Vertical
6	942.1304	37.12	30.91	47.00	9.88	peak	Vertical

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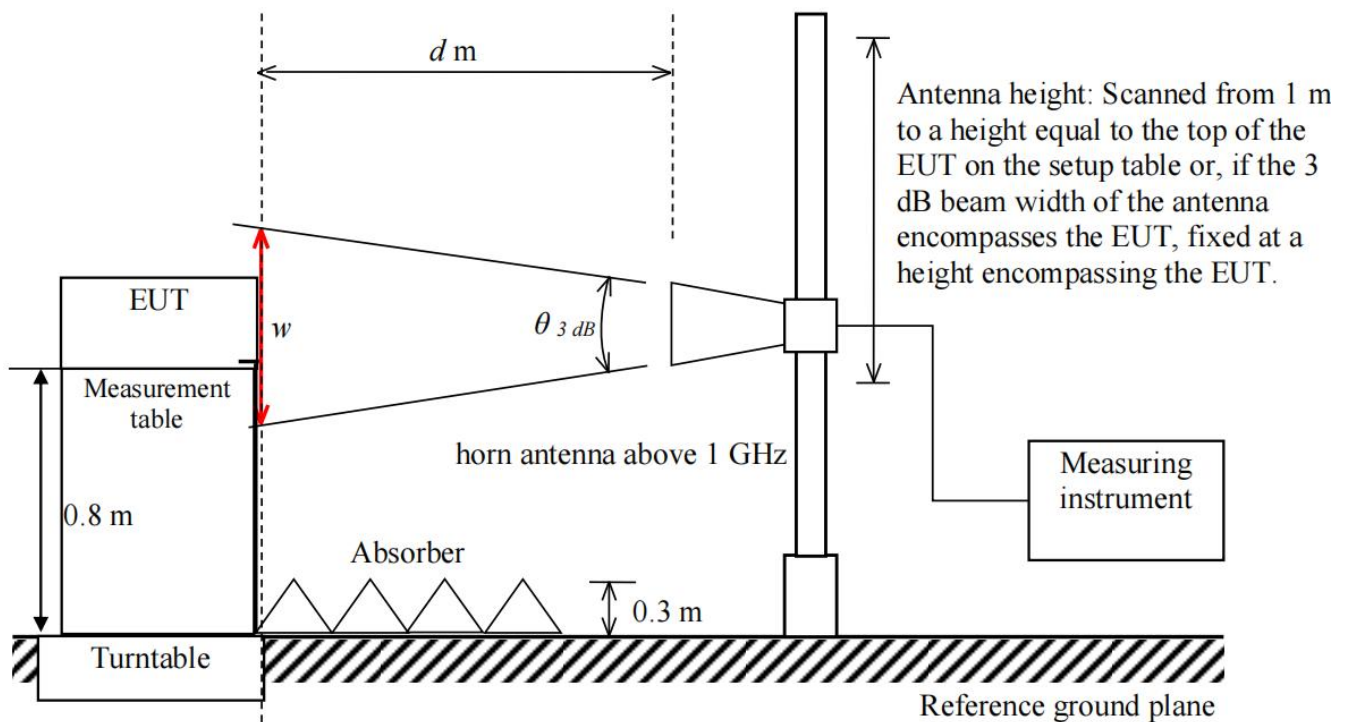
7. Measurement of Radiated Emissions at Frequencies Above 1 GHz

7.1. Requirements

Requirements for radiated emissions at frequencies above 1 GHz at 3m distance

Test facility	Detector type/ bandwidth	Frequency Range (MHz)	Limits dB(μ V/m)	Measurement specifications
FSOATS	Peak/ 1MHz	1000 to 6000	74	Instrumentation: CISPR 16-1-1, Clauses 4, 6, 7 Antennas: CISPR 16-1-4, Clause 4.6 Test Site: CISPR 16-1-4, Clause 7 Method: CISPR 16-2-3, Clause 7.6
	Average/ 1MHz	1000 to 6000	54	

7.2. Block Diagram of Test Setup



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7.3. Equipment Details

Measuring Instruments

Instruments	Manufacturer	Model	S/N	Cal. Date	Cal. Due
Signal Analyzer	Keysight	N9010A	MY53470504	Jun. 01, 2023	May 31, 2024
Antenna	ETS	3117	00154520	Jun. 03, 2023	Jun. 02, 2024
Preamplifier	ETS	3117PA	00246148	Aug. 04, 2023	Aug. 03, 2024

Measuring Software

Software Name	Manufacturer	Details
TS+[JS32-RE]	Tonscend	For EMC measurement, version 4.0.0.0

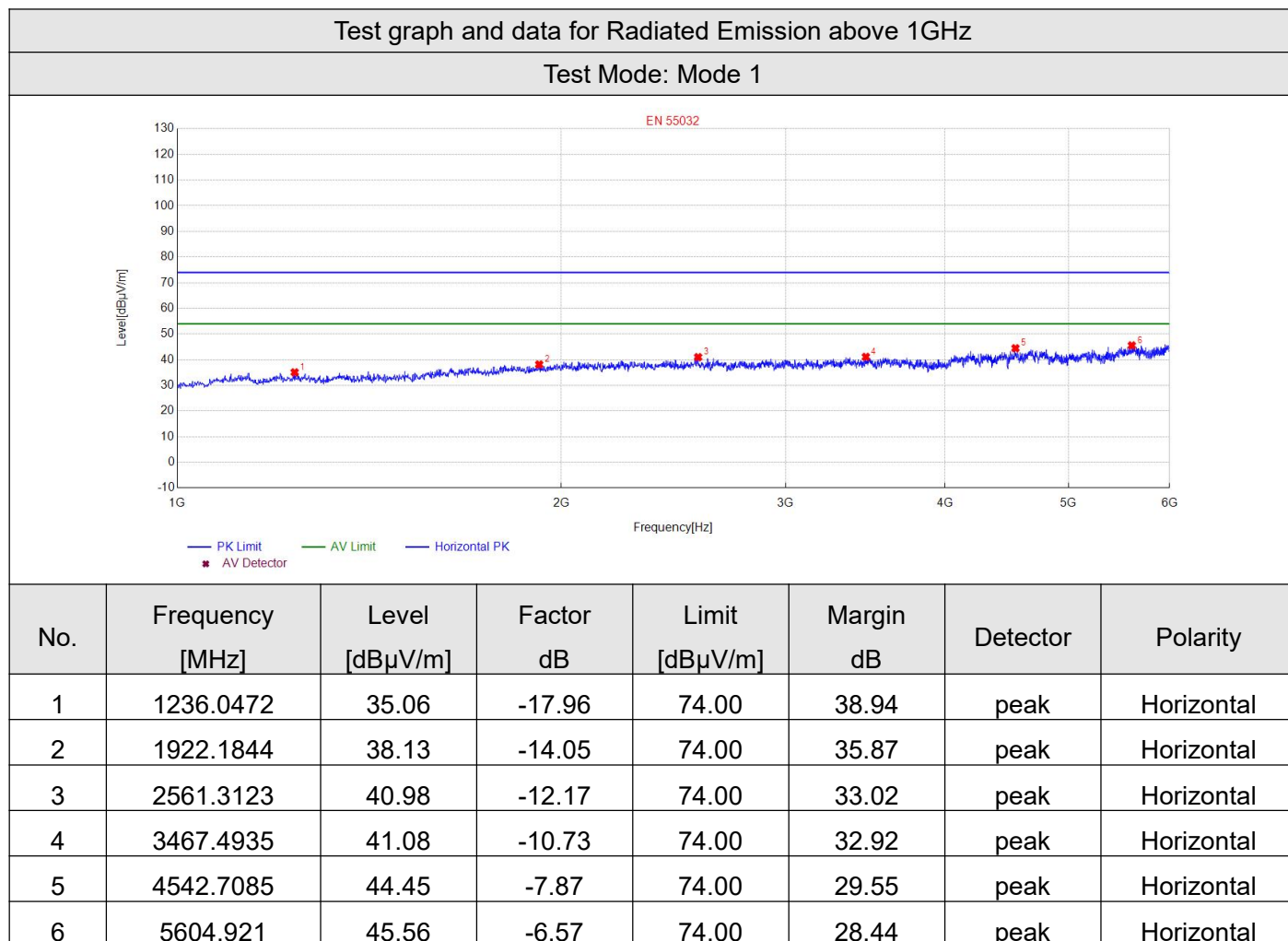
7.4. Configuration of the EUT and method of measurement

- The EUT was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, the EUT was placed on the top surface of a measurement table, 0.8 m high from the horizontal reference plane. When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 10 cm non-conductive covering to insulate the EUT from the ground plane.
- Support equipment, if needed, was placed as per CISPR 16-2-3.
- All I/O cables were positioned to simulate typical actual usage as per CISPR 16-2-3.
- The maximum receiving level of radiated emissions from the EUT was measured while the turntable was rotated from 0° to 360° and the antenna height scanned from 1 m to a height equal to the top of the EUT on the setup table or, if the 3 dB beam width of the antenna encompasses the EUT, fixed at a height encompassing the EUT. The cables were laid out to attain the maximum level of radiated emissions.
- The more description of the tests, the test methods, and the test set-ups are given in the applicable test standard.
- Record at least six highest emissions relative to the limits at each frequency of interest unless the emission is 10 dB or greater below the limit.
- A radiated emission is calculated by the following equation:
 - Measurement Level dB(μV/m) = Receiver reading dB(μV) + Factor(dB/m)
 - Factor(dB/m) = Antenna Factor(dB/m) + Cable Loss(dB) – Amplifier Gain(dB)
 - Margin= Limit-Level

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7.5. Test Summary

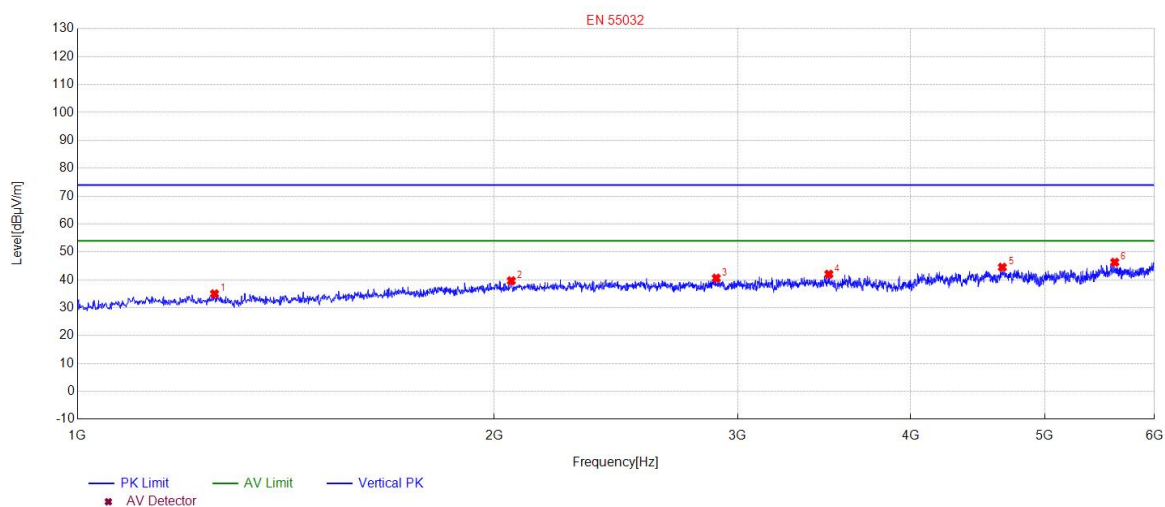
Test Engineer	Alex	Temperature	21.8°C
Test Date	Nov. 20, 2023	Air Pressure	985 Mbar
Worst Mode	Mode 1	Relative Humidity	60.2%
Verdict	Pass		



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Test graph and data for Radiated Emission above 1GHz

Test Mode: Mode 1



No.	Frequency [MHz]	Level [dBμV/m]	Factor dB	Limit [dBμV/m]	Margin dB	Detector	Polarity
1	1256.0512	34.97	-17.93	74.00	39.03	peak	Vertical
2	2058.2116	39.66	-13.27	74.00	34.34	peak	Vertical
3	2894.3789	40.58	-12.02	74.00	33.42	peak	Vertical
4	3490.4981	42.01	-10.67	74.00	31.99	peak	Vertical
5	4658.7317	44.50	-7.85	74.00	29.50	peak	Vertical
6	5616.9234	46.28	-6.53	74.00	27.72	peak	Vertical

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8. Measurement of Harmonic Current Emissions

8.1. Requirements

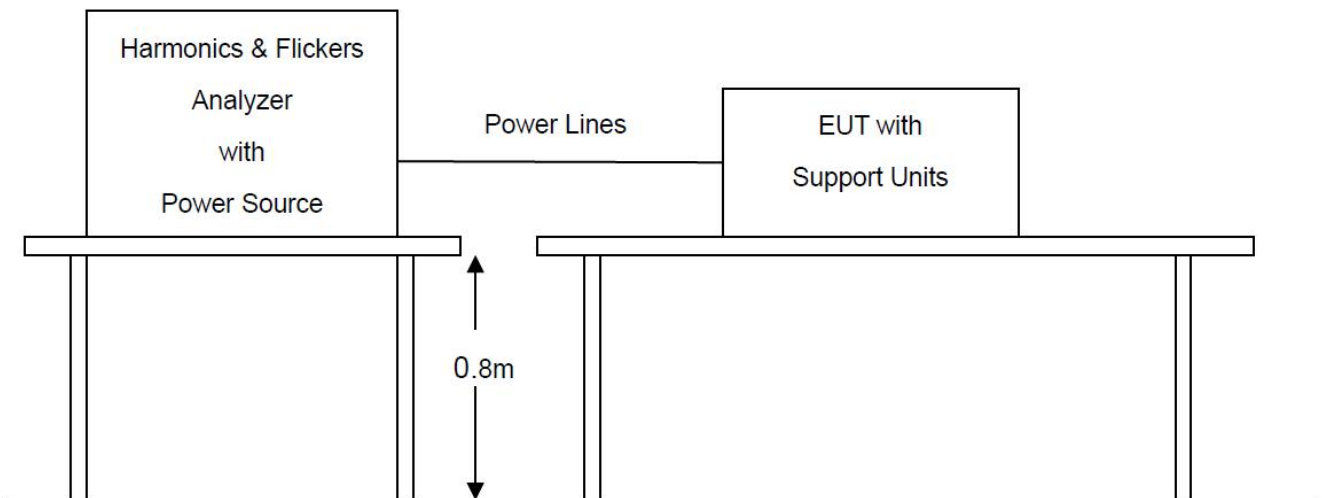
Applicable test standard(s): EN IEC 61000-3-2:2019+A1:2021

Limits of Harmonic Current Emissions

Harmonic order <i>h</i>	Limits				
	Class A	Class B	Class C ^a	Class D	
	Maximum permissible harmonic current (A)		Maximum permissible harmonic current expressed as a percentage of the input current at the fundamental frequency (%)	Maximum permissible harmonic current per watt (mA/W)	Maximum permissible harmonic current (A)
3	2.30	3.45	27 ^b	3.4	2.30
5	1.14	1.71	10	1.9	1.14
7	0.77	1.155	7	1.0	0.77
9	0.40	0.6	5	0.5	0.40
11	0.33	0.495	3	0.35	0.33
13	0.21	0.315	3	3.85/13	0.21
15≤ <i>h</i> ≤39(odd harmonics only)	2.25/ <i>h</i>	3.375/ <i>h</i>	3	3.85/ <i>h</i>	2.25/ <i>h</i>
2	1.08	1.62	2	Not applicable	Not applicable
4	0.43	0.645	Not applicable		
6	0.30	0.45			
8≤ <i>h</i> ≤40(even harmonics only)	1.84/ <i>h</i>	2.76/ <i>h</i>			
Note: (a) For some Class C products, other emission limits apply. (b) The limit is determined based on the assumption of modern lighting technologies having power factors of 0.90 or higher.					

The application of limits had been as defined in the applicable test standard.

8.2. Block Diagram of Test Setup



8.3. Equipment Details

Measuring Instruments

Instruments	Manufacturer	Model	S/N	Cal. Date	Cal. Due
Signal Conditioning Unit	Schaffner	CCN1000-1	72431	Jun. 02, 2023	Jun. 01, 2024
AC Source	Schaffner	NSG 1007	56825	Jun. 02, 2023	Jun. 01, 2024

Measuring Software

Software Name	Manufacturer	Details
CTS 4	AMETEK	For harmonics and flickers measurement, version 4.29.0

8.4. Configuration of the EUT and method of measurement

- The test shall be conducted according to the general requirements given in the applicable test standard. The test duration had been as defined in the applicable test standard.
- The measurement of harmonic currents shall be performed as follows:
 - for each harmonic order, measure the 1.5 s smoothed RMS harmonic current in each discrete Fourier transform (DFT) time window;
 - calculate the arithmetic average of the measured values from the DFT time windows, over the entire observation period.
- The value of the active input power to be used for the calculation of limits shall be determined as follows:
 - measure the 1.5 s smoothed active input power in each DFT time window;
 - determine the maximum of the measured values of active power from the DFT time windows over the entire duration of the test.

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- d. The harmonic currents and the active input power shall be measured under the same test conditions but need not be measured simultaneously.

8.5. Test Summary

Equipment with a rated power less than or equal to 75W is deemed to fulfil all relevant requirements of this standard without testing.

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9. Measurement of Voltage Fluctuations and Flicker

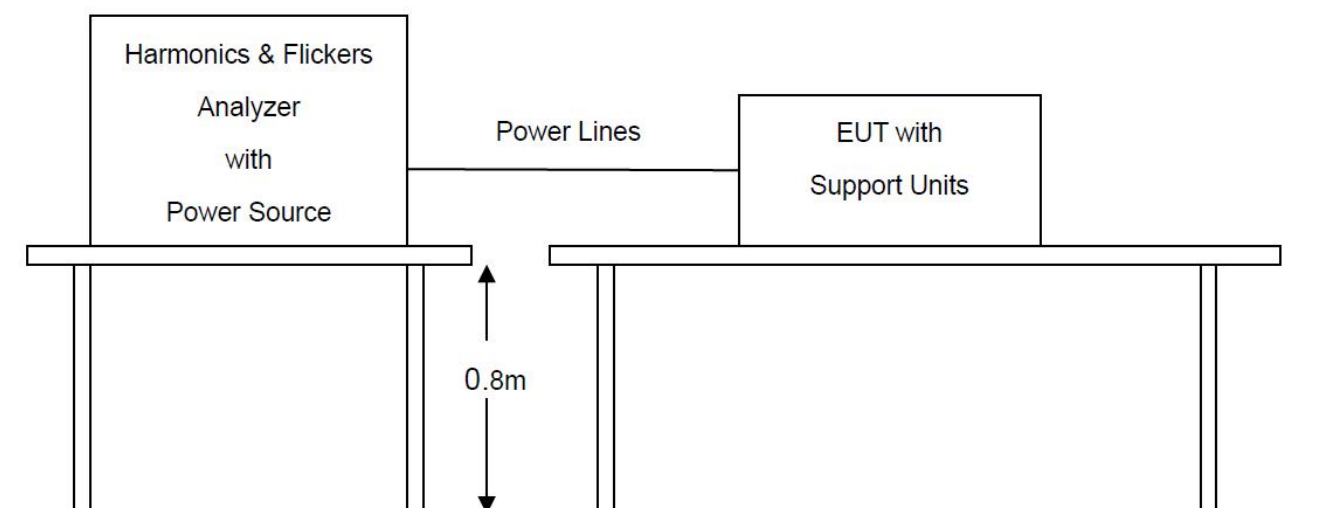
9.1. Requirements

Applicable test standard(s): EN 61000-3-3:2013+A2:2021

Limits of Voltage Fluctuations and Flicker

Parameters	Definitions	Limits
T_{max}	the accumulated time value of $d(t)$ with a deviation exceeding 3.3 % during a single voltage change at the EUT terminals	≤ 500 ms
d_c	the maximum relative steady-state voltage change	$\leq 3.3\%$
d_{max}	the maximum relative voltage change	☒ $\leq 4\%$ ☐ $\leq 6\%$ ☐ $\leq 7\%$
☒ P_{st}	short-term flicker severity	≤ 0.65
☐ P_{lt}	long-term flicker severity	≤ 1.0

9.2. Block Diagram of Test Setup



9.3. Equipment Details

Measuring Instruments

Instruments	Manufacturer	Model	S/N	Cal. Date	Cal. Due
Signal Conditioning Unit	Schaffner	CCN1000-1	72431	Jun. 02, 2023	Jun. 01, 2024
AC Source	Schaffner	NSG 1007	56825	Jun. 02, 2023	Jun. 01, 2024

Measuring Software

Software Name	Manufacturer	Details
CTS 4	AMETEK	For harmonics and flickers measurement, version 4.29.0

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9.4. Configuration of the EUT and method of measurement

- a. The test shall be conducted according to the general requirements given in the applicable test standard.
The test duration and test condition had been as defined in the applicable test standard.
- b. All types of voltage fluctuations would been assessed by direct measurement using a flicker meter which complies with the specification given in IEC 61000-4-15:2010.

9.5. Test Summary

Test Engineer	Jimu	Temperature	21.4℃
Test Date	Nov. 20, 2023	Air Pressure	985 Mbar
Worst Mode	Mode 1	Relative Humidity	47.5%
Verdict	Pass		

Parameters	Measurement Value	Limits
T_{max}	0	≤ 500 ms
d_c	0.00	$\leq 3.3\%$
d_{max}	0.00	$\leq 4\%$
P_{st}	0.119	≤ 0.65

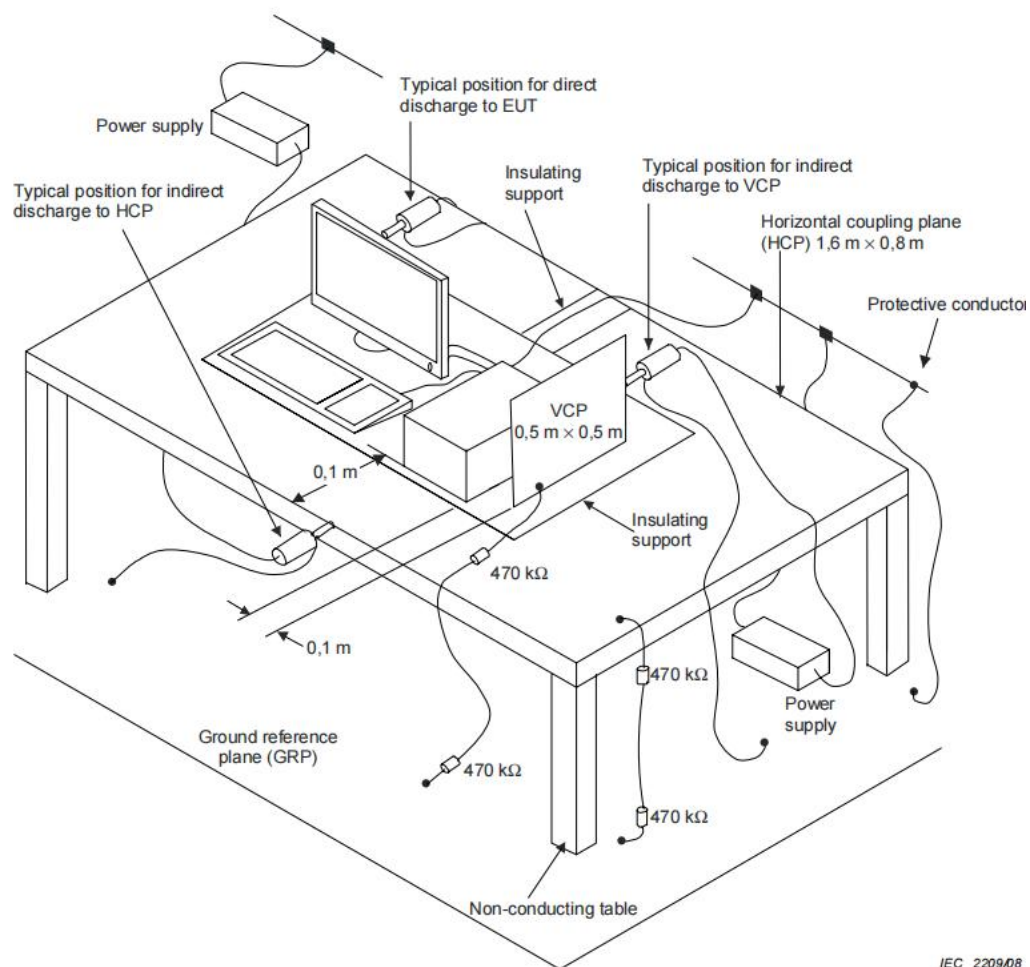
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10. Measurement of Electrostatic discharge

10.1. Requirements

Port	Enclosure
Basic Standard	IEC 61000-4-2
Test Level	±8.0 kV (Air Discharge) ±4.0 kV (Contact Discharge) ±4.0 kV (Indirect Discharge)
Required Performance Criterion	B
Time Between Each Discharge:	1 second
Number of Discharge for Each Applied Voltage	10

10.2. Block Diagram of Test Setup



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10.3. Equipment Details

Measuring Instruments

Instruments	Manufacturer	Model	S/N	Cal. Date	Cal. Due
ESD Simulator	Schaffner	NSG 438	782	Dec. 30, 2022	Dec. 29, 2023

Measuring Software

Software Name	Manufacturer	Details
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10.4. Configuration of the EUT and method of measurement

- Electrostatic discharges were applied only to those points and surfaces of the EUT that are accessible to users during normal operation.
- The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.
- The time interval between two successive single discharges was at least 1 second.
- The ESD generator was held perpendicularly to the surface to which the discharge was applied and the return cable was at least 0.2 meters from the EUT.
- Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.
- Air discharges were applied with the round discharge tip of the discharge electrode approaching the EUT as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator was removed from the EUT and re-triggered for a new single discharge. The test was repeated until all discharges were completed.
- At least ten single discharges (in the most sensitive polarity) were applied to the Horizontal Coupling Plane at points on each side of the EUT. The ESD generator was positioned vertically at a distance of 0.1 meters from the EUT with the discharge electrode touching the HCP.
- At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the Vertical Coupling Plane in sufficiently different positions that the four faces of the EUT were completely illuminated. The VCP (dimensions 0.5m×0.5m) was placed vertically to and 0.1 meters from the EUT.
- The test results shall be classified in terms of the loss of function or degradation of performance of the equipment under test, relative to a performance criterion defined in the report.

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10.5. Test Summary

Test Engineer	Sam	Temperature	22.0°C
Test Date	Nov. 21, 2023	Air Pressure	985 Mbar
Test Mode(s)	Mode 1	Relative Humidity	43.0 %
Verdict	Pass		

Voltage	Coupling	Observation	Performance
±4kV	Contact Discharge	No degradation of performance	A
±2KV, ±4kV, ±8kV	Air Discharge	No degradation of performance	A
±4kV	Indirect Discharge HCP	No degradation of performance	A
±4kV	Indirect Discharge VCP	No degradation of performance	A

ESD LOCATION:

Blue line: Air discharge

Red line: Contact discharge



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Attestation of Global Compliance(Shenzhen)Co., Ltd

Attestation of Global Compliance(Shenzhen)Std & Tech Co., Ltd

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11. Measurement of Radio-Frequency Electromagnetic Field

11.1. Requirements

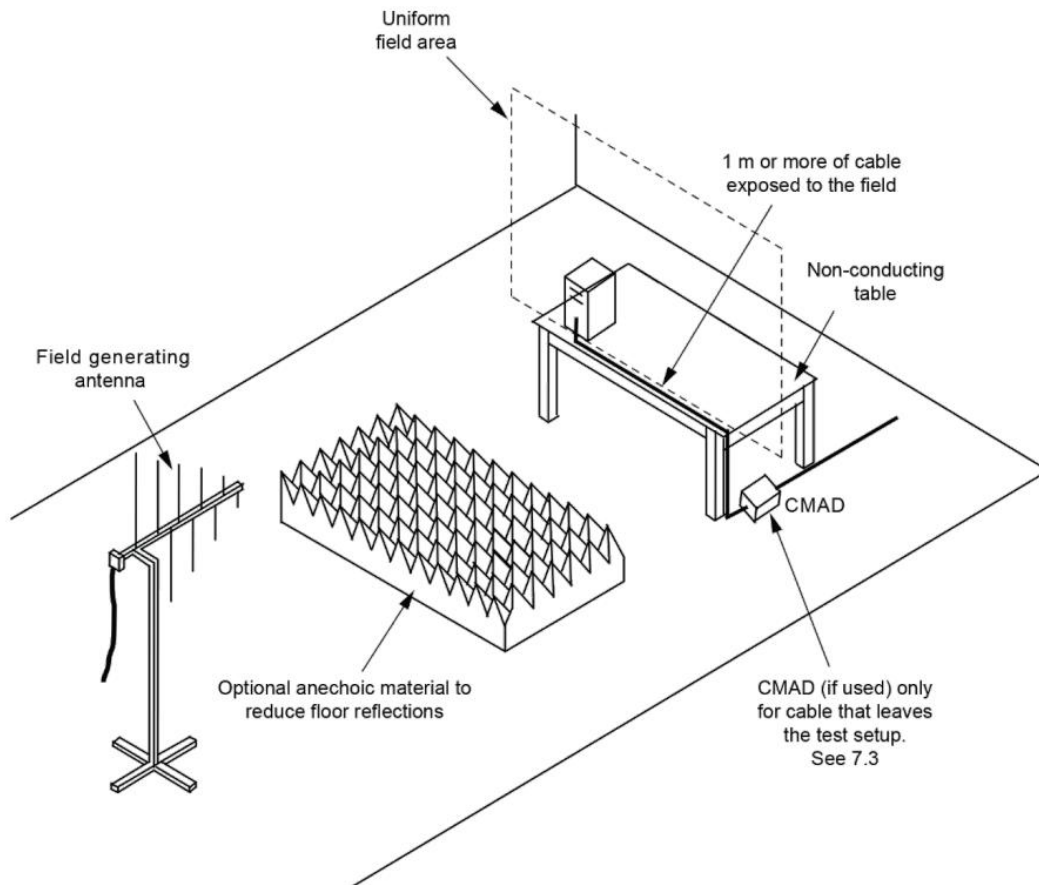
Port	Enclosure
Basic Standard	IEC 61000-4-3
Test Level	Swept test: 3V/m with 80% AM. 1kHz Modulation at 80 to 1000MHz Spot test (Frequency ($\pm 1\%$)): 3V/m with 80% AM. 1kHz Modulation at 1800, 2600, 3500, 5000MHz
Required Performance Criterion	A
Antenna polarization	Vertical and Horizontal
Step size increment ^a	1%
Dwell time ^b	≤ 5 seconds
Test Distance	3m
EUT position facing antenna	Front side, back side, left side and right side

Notes:

- Recognizing that a 1% step size is preferred, the frequency range can be swept incrementally with a step size not exceeding 4% of the previous frequency with a test level of twice the value of the specified test level in order to reduce the testing time for equipment requiring testing in multiple configurations and/or long cycle times.
- The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised and to be able to respond. However, the dwell time shall not exceed 5 seconds at each of the frequencies during the scan. The time to exercise the EUT is not interpreted as a total time of a program or a cycle but related to the reaction time in case of failure of the EUT.

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11.2. Block Diagram of Test Setup



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11.3. Equipment Details

Measuring Instruments

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
Signal Generator	Aglient	N5182A	MY50140530	Feb. 17, 2023	Feb. 16, 2024
Directional coupler	Werlatone	C5571-10	99463	Mar. 10, 2022	Mar. 09, 2024
Directional coupler	Werlatone	C5571-10	99482	Mar. 10, 2022	Mar. 09, 2024
Power Meter	R&S	NRVD	8323781027	Mar. 24, 2022	Mar. 23, 2025
Power Amplifier	KALMUS	7100LC	04-02/17-06-001	N/A	N/A
Power Amplifier	Milmega	AS0104-55_55	1004793	N/A	N/A
Power amplifier	rflight	NTWPA-2560100	17063183	N/A	N/A
Biconilog Antenna	ETS	3142C	00060447	N/A	N/A
Broadband high gain horn antenna	SCHWARZBEC K	BBHA 9120 J	00073	N/A	N/A
Test Software	Tonscend	2.0.1.8	N/A	N/A	N/A

Measuring Software

Software Name	Manufacturer	Details
TS+[JS35-RS]	Tonscend	For EMC measurement, version 2.0.1.8

11.4. Configuration of the EUT and method of measurement

- The Equipment Under Test (EUT) was positioned within the Uniform Field Area (UFA) on a supporting table, ensuring a 3-meter separation from the transmitting antenna. This setup aligns with the calibrated square area, guaranteeing field uniformity during testing. The supporting units were strategically located outside the UFA to avoid any potential interference. Nonetheless, the cables connected to the EUT were intentionally exposed to the precisely calibrated field within the UFA.
- Before testing, it will verify the proper operation of the test equipment/system. This verification will involve measuring the field strength at one point within the Uniform Field Area (UFA) at various frequencies.
- The test shall be performed according to the above requirements and block diagram which shall specify the test setup.
- The test results shall be classified in terms of the loss of function or degradation of performance of the equipment under test, relative to a performance criterion defined in the report.

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11.5. Test Summary

Test Engineer	Alex	Temperature	21.8°C
Test Date	Nov. 20, 2023	Air Pressure	985 Mbar
Test Mode(s)	Mode 1	Relative Humidity	60.2 %
Verdict	Pass		

Swept test:

Frequency	Exposed Side	Field Strength (V/m)	Observation	Performance
80MHz to 6GHz	Front	3V/m (rms)	No degradation of performance	A
80MHz to 6GHz	Left	3V/m (rms)	No degradation of performance	A
80MHz to 6GHz	Rear	3V/m (rms)	No degradation of performance	A
80MHz to 6GHz	Right	3V/m (rms)	No degradation of performance	A

Spot test (Frequency (±1 %)):

Frequency	Exposed Side	Field Strength (V/m)	Observation	Performance
1800, 2600, 3500, 5000MHz	Front	3V/m (rms)	No degradation of performance	A
1800, 2600, 3500, 5000MHz	Left	3V/m (rms)	No degradation of performance	A
1800, 2600, 3500, 5000MHz	Rear	3V/m (rms)	No degradation of performance	A
1800, 2600, 3500, 5000MHz	Right	3V/m (rms)	No degradation of performance	A

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12. Measurement of Radio-frequency common mode

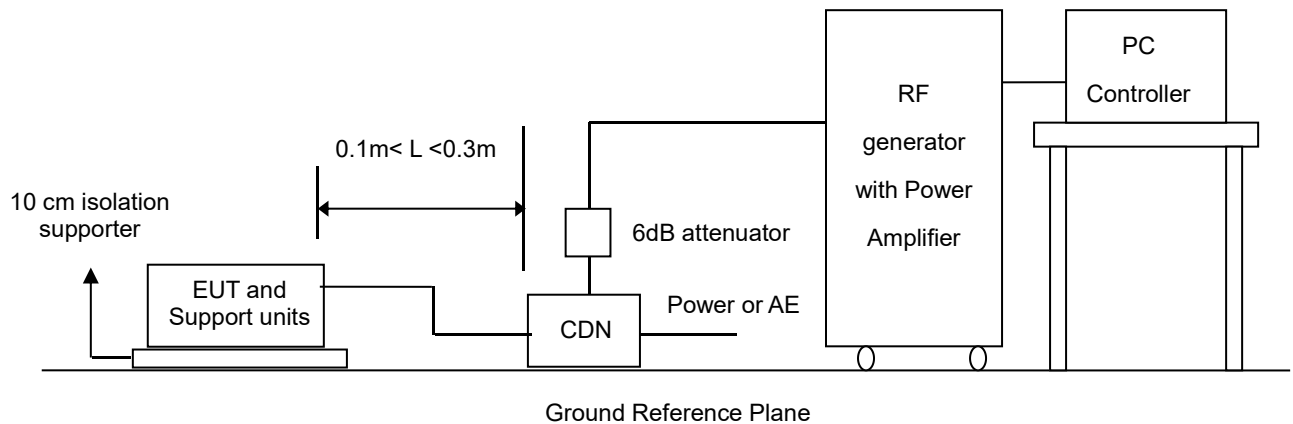
12.1. Requirements

Port	☒ AC mains power ports	☐ Analogue/digital data ports ^a	☐ DC network power ports ^a
Basic Standard	IEC 61000-4-6		
Required Performance Criterion	A		
Test Level	0.15 to 10 MHz, 3 V RMS (unmodulated), 80 % AM (1 kHz) 10 to 30 MHz, 3 to 1 V RMS (unmodulated), 80 % AM (1 kHz) 30 to 80 MHz, 1 V RMS (unmodulated), 80 % AM (1 kHz)		
Step size increment ^b	1%		
Dwell time ^c	≤5 seconds		

Notes:

- Applicable only to ports which, according to the manufacturer's specification, supports cable lengths greater than 3 m.
- Recognizing that a 1% step size is preferred, the frequency range can be swept incrementally with a step size not exceeding 4% of the previous frequency with a test level of twice the value of the specified test level in order to reduce the testing time for equipment requiring testing in multiple configurations and/or long cycle times.
- The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised and to be able to respond. However, the dwell time shall not exceed 5 seconds at each of the frequencies during the scan. The time to exercise the EUT is not interpreted as a total time of a program or a cycle but related to the reaction time in case of failure of the EUT.

12.2. Block Diagram of Test Setup



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12.3. Equipment Details

Measuring Instruments

Instruments	Manufacturer	Model	S/N	Cal. Date	Cal. Due
Power Amplifier	AR	75A250	18464	N/A	N/A
CDN	ZHINAN	ZN3751	15004	Aug. 03, 2022	Sep. 02, 2024
6dB attenuator	ZHINAN	E-002	N/A	Aug. 04, 2022	Aug. 03, 2024
Power Probe	R&S	URV5-Z4	100124	Mar. 24, 2023	Mar. 23, 2025
Electromagnetic Injection Clamp	Luthi	EM101	35773	Aug. 12, 2022	Aug. 11, 2024
Power Meter	R&S	NRVD	8323781027	Mar. 24, 2023	Mar. 23, 2025
Signal Generator	Keysight	E4421B	MY43351603	Feb. 17, 2023	Feb. 16, 2024

Measuring Software

Software Name	Manufacturer	Details
TS+[JS35-CS]	Tonscend	For EMC measurement, version 2.0.1.7

12.4. Configuration of the EUT and method of measurement

- The Equipment Under Test (EUT) shall be tested within its intended operating and climatic conditions.
- The test generator and the coupling/decoupling network shall be placed directly on, and bonded to, the ground reference plane. The test shall be performed with the test generator connected to each of the coupling devices (CDN, EM clamp, current clamp) in turn. All other cables not under test shall either be disconnected (when functionally allowed) or provided with decoupling networks or unterminated CDNs only.
- The test shall be performed according to the above requirements and block diagram which shall specify the test setup.
- The test results shall be classified in terms of the loss of function or degradation of performance of the equipment under test, relative to a performance criterion defined in the report.

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12.5. Test Summary

Test Engineer	Sam	Temperature	22.0°C
Test Date	Nov. 21, 2023	Air Pressure	985 Mbar
Test Mode(s)	Mode 1	Relative Humidity	43.0 %
Verdict	Pass		

Test port	Test Level	Coupling method	Observation	Performance
AC Mains Input	0.15 to 10 MHz: 3 V	CDN	No degradation of performance	A
	10 to 30 MHz: 3 to 1 V			
	30 to 80 MHz, 1 V			

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13. Measurement of Fast Transients

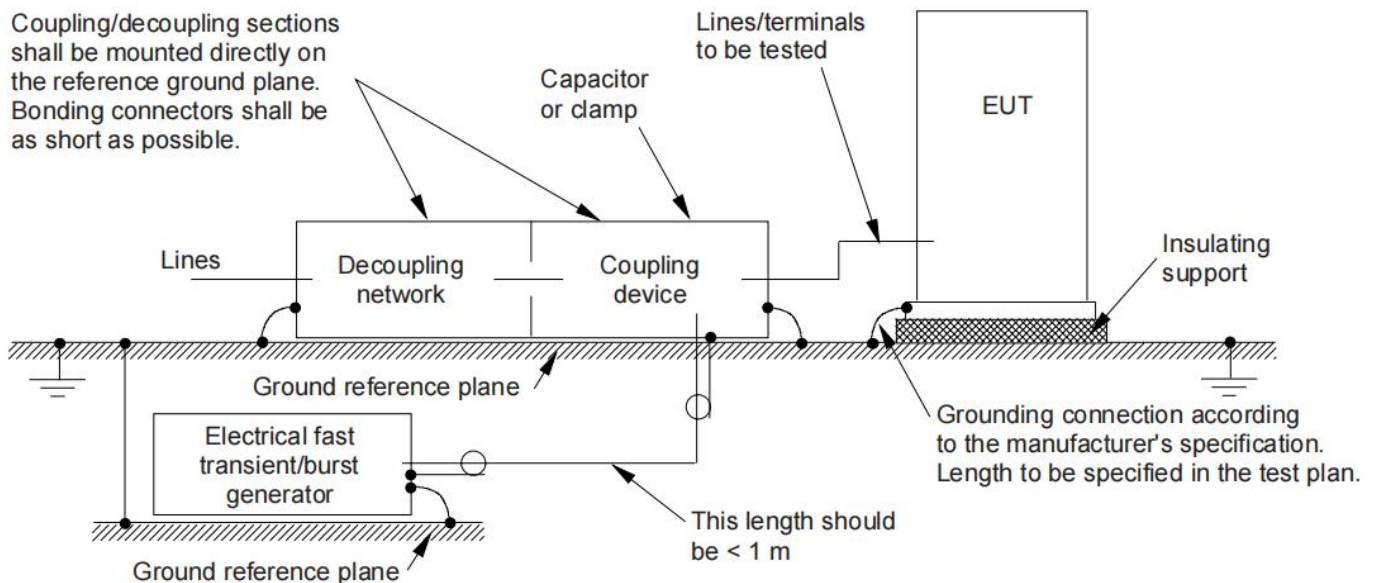
13.1. Requirements

Port	☒ AC mains power ports	☐ Analogue/digital data ports ^a	☐ DC network power ports ^a
Basic Standard	IEC 61000-4-4		
Required Performance Criterion	B		
Test Level	1 kV (peak)	0.5 kV (peak)	0.5 kV (peak)
Polarity	Positive/Negative		
Impulse Frequency	5kHz		
Impulse wave shape	5/50ns		
Burst Duration	15ms		
Burst Period	300ms		

Notes:

a. Applicable only to ports which, according to the manufacturer's specification, supports cable lengths greater than 3 m.

13.2. Block Diagram of Test Setup



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13.3. Equipment Details

Measuring Instruments

Instruments	Manufacturer	Model	S/N	Cal. Date	Cal. Due
EFT/Surge/DIPS Generator	Schaffner	Modula 6150	34437	Jun. 08, 2023	Jun. 07, 2024

Measuring Software

Software Name	Manufacturer	Details
WinModula	Schaffner	For EFT/Surge/Dips measurement, version 2.31 c

13.4. Configuration of the EUT and method of measurement

- The Equipment Under Test (EUT), whether stationary floor-mounted or table top, and equipment designed to be mounted in other configurations, shall be placed on a ground reference plane and shall be insulated from it by an insulating support 0,1 m $\pm$ 0,01 m thick.
- The test generator and the coupling/decoupling network shall be placed directly on, and bonded to, the ground reference plane.
- The EUT shall be arranged and connected to satisfy its functional requirements, according to the equipment installation specifications. The minimum distance between the EUT and all other conductive structures (e.g. the walls of a shielded room), except the ground reference plane shall be more than 0,5 m. All cables to the EUT shall be placed on the insulation support 0,1 m above the ground reference plane. Cables not subject to electrical fast transients shall be routed as far as possible from the cable under test to minimize the coupling between the cables.
- The test voltages shall be coupled to all of the EUT ports including those between two units of equipment involved in the test, unless the length of the interconnecting cable makes it impossible to test.
- Either a direct coupling network or a capacitive clamp shall be used for the application of the test voltages.
- The test results shall be classified in terms of the loss of function or degradation of performance of the equipment under test, relative to a performance criterion defined in the report.

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13.5. Test Summary

Test Engineer	Sam	Temperature	22.0°C
Test Date	Nov. 21, 2023	Air Pressure	985 Mbar
Test Mode(s)	Mode 1	Relative Humidity	45.0 %
Verdict	Pass		

Inject Line	Voltage(kV)	Inject Method	Observation	Performance
AC Lines	0.5, 1	Direct	No degradation of performance	A

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14. Measurement of Surges

14.1. Requirements

Port	☒ AC mains power ports ^a	☐ Analogue/digital data ports ^{b, c, d and e}		☐ DC network power ports ^f
		☐ Unshielded symmetrical	☐ Coaxial or shielded	
Basic Standard	IEC 61000-4-5			
Required Performance Criterion	B	C	B	B
Test Level	Line to line: 1 kV; Line to ground: 2 kV	primary protection is intended: 1 and 4 kV (line to ground); primary protection is not intended: 1 kV (line to ground)	shield to ground: 0.5 kV	Line to ground: 0.5 kV
Tr/Th	1.2/50 (8/20) μ s	10/700 (5/320) μ s	1.2/50 (8/20) μ s	1.2/50 (8/20) μ s
Number of impulses	Five positive and five negative impulses			
Time between successive impulses	1 min			

Notes:

- The number of pulses applied shall be as follows:
 - Five positive pulses line-to-neutral at 90° phase.
 - Five negative pulses line-to-neutral at 270° phase.

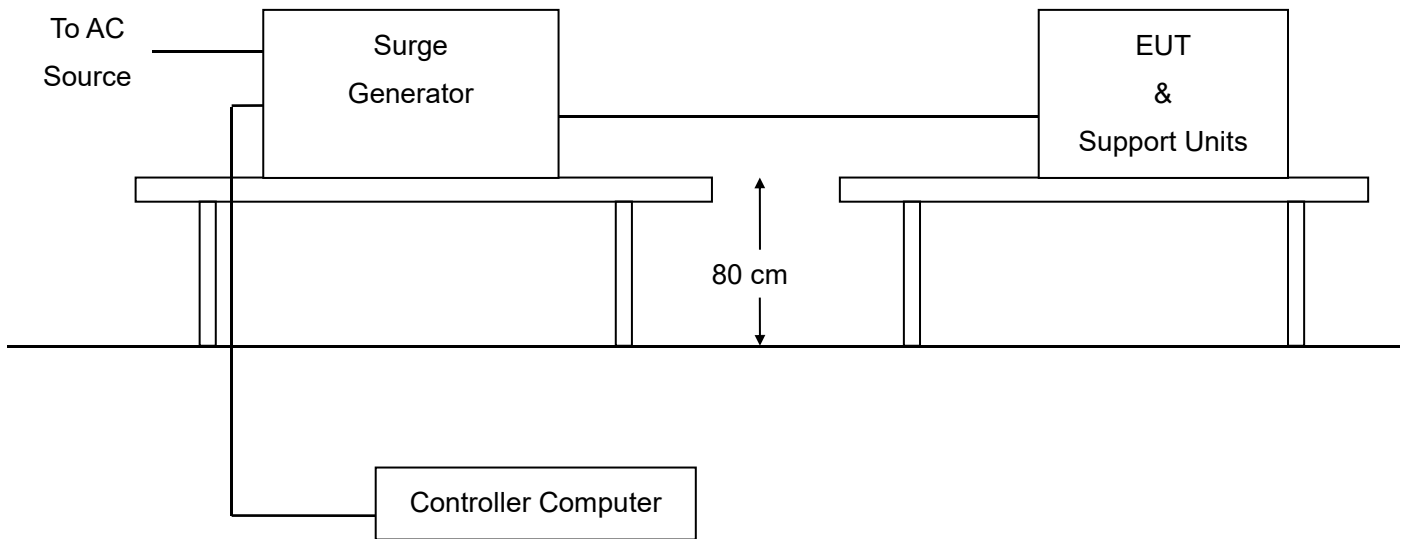
The following additional pulses are required only if the EUT has an earth connection or if the EUT is earthed via any AE:

 - Five positive pulses line-to-earth at 90° phase.
 - Five negative pulses line-to-earth at 270° phase.
 - Five negative pulses neutral-to-earth at 90° phase.
 - Five positive pulses neutral-to-earth at 270° phase.
- Applicable only to ports which, according to the manufacturer's specification, supports cable lengths greater than 3 m.
- Surges are applied with primary protection fitted. Where possible, use the actual primary protector intended to be used in the installation.
- Where the surge coupling network for the 10/700 (5/320) μ s waveform affects the functioning of high speed data ports, the test shall be carried out using a 1.2/50 (8/20) μ s waveform and appropriate coupling network.
- Surges are applicable to ports which satisfy all of the following conditions:
 - May connect directly to cables that leave the building structure.
 - Defined as an antenna port, a wired network port, or a broadcast receiver tuner port.

Typical ports covered include xDSL, PSTN, CATV, antenna and similar. Excluded ports are LAN and similar.
- Applicable only to ports which, according to the manufacturer's specification, may connect directly to outdoor cables.

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14.2. Block Diagram of Test Setup



14.3. Equipment Details

Measuring Instruments

Instruments	Manufacturer	Model	S/N	Cal. Date	Cal. Due
EFT/Surge/DIPS Generator	Schaffner	Modula 6150	34437	Jun. 08, 2023	Jun. 07, 2024

Measuring Software

Software Name	Manufacturer	Details
WinModula	Schaffner	For EFT/Surge/Dips measurement, version 2.31 c

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14.4. Configuration of the EUT and method of measurement

- a. Verification shall be performed. It is preferable to perform the verification prior to the test.
- b. The test shall be performed according to the above requirements and block diagram which shall specify the test setup.
- c. When testing line-to-ground, the lines are tested individually in sequence, if there is no other specification.
- d. The test procedure shall also consider the non-linear current-voltage characteristics of the equipment under test. Therefore, all lower test levels including the selected test level shall be tested.
- e. The test results shall be classified in terms of the loss of function or degradation of performance of the equipment under test, relative to a performance criterion defined in the report.

14.5. Test Summary

Test Engineer	Sam	Temperature	22.0°C
Test Date	Nov. 21, 2023	Air Pressure	985 Mbar
Test Mode(s)	Mode 1	Relative Humidity	45.0 %
Verdict	Pass		

Test port	Coupling	Voltage(kV)	Observation	Performance
AC Mains Input	line-to-neutral	0.5, 1	No degradation of performance	A
	line-to-earth	0.5, 1, 2	No degradation of performance	A
	neutral-to-earth	0.5, 1, 2	No degradation of performance	A

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15. Measurement of Voltage dips and interruptions

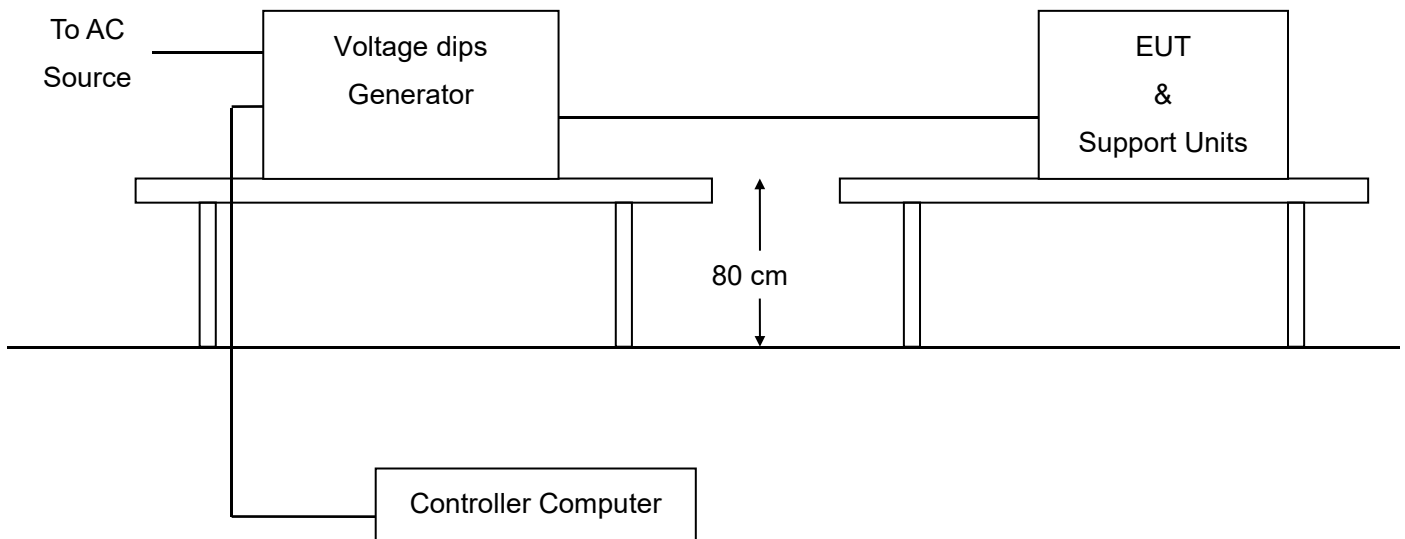
15.1. Requirements

Port	AC mains power ports		
Basic Standard	IEC 61000-4-11		
Required Performance Criterion	B	B	C
Residual voltage ^a	< 5 %	70 %	< 5 %
Number of cycles ^b	0.5	25 for 50 Hz 30 for 60 Hz	250 for 50 Hz 300 for 60 Hz
Variation/dip repetition	Sequence of three dips/interruptions with an interval of 10 seconds between each test		

Notes:

- Changes to occur at 0 degree crossover point of the voltage waveform. If the EUT does not demonstrate compliance when tested with 0 degree switching, the test shall be repeated with the switching occurring at both 90 degrees and 270 degrees. If the EUT satisfies these alternative requirements, then it fulfils the requirements.
- Apply at only one supply frequency of the EUT.

15.2. Block Diagram of Test Setup



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15.3. Equipment Details

Measuring Instruments

Instruments	Manufacturer	Model	S/N	Cal. Date	Cal. Due
EFT/Surge/DIPS Generator	Schaffner	Modula 6150	34437	Jun. 08, 2023	Jun. 07, 2024

Measuring Software

Software Name	Manufacturer	Details
WinModula	Schaffner	For EFT/Surge/Dips measurement, version 2.31 c

15.4. Configuration of the EUT and method of measurement

- The test shall be performed according to the above requirements and block diagram which shall specify the test setup.
- The test results shall be classified in terms of the loss of function or degradation of performance of the equipment under test, relative to a performance criterion defined in the report.

15.5. Test Summary

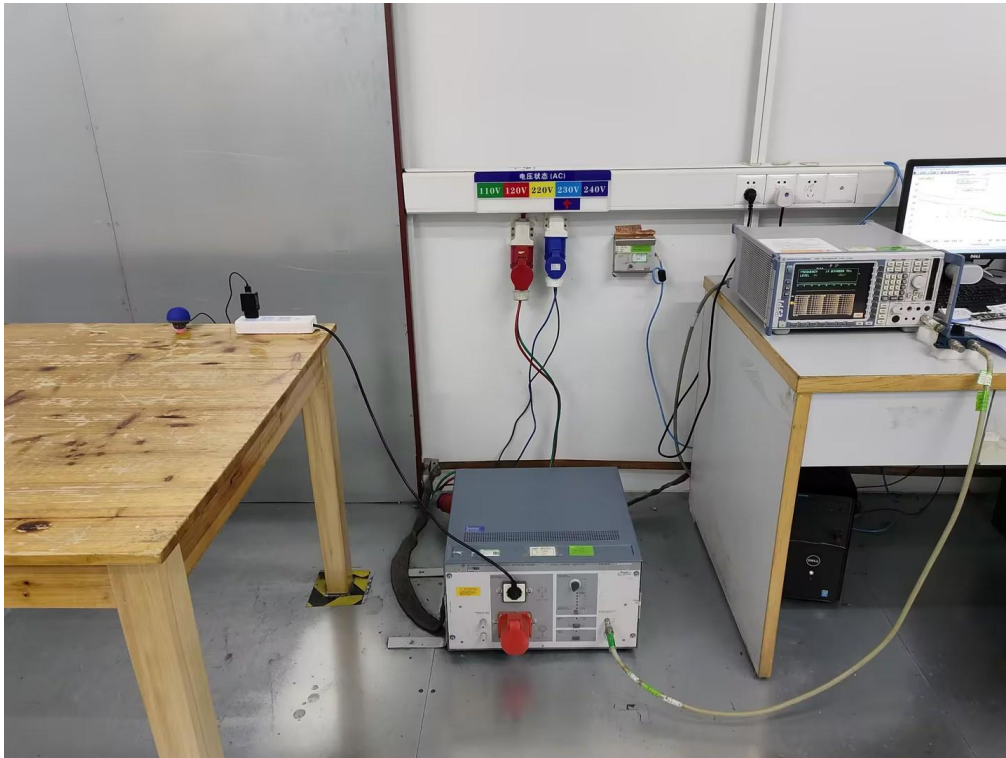
Test Engineer	Sam	Temperature	22.0°C
Test Date	Nov. 21, 2023	Air Pressure	985 Mbar
Test Mode(s)	Mode 1	Relative Humidity	45.0 %
Verdict	Pass		

Test port	Residual voltage (%)	Cycles	Observation	Performance
AC Mains Input	< 5	0.5	No degradation of performance	A
	70	25	No degradation of performance	A
	< 5	250	EUT power cycled	B

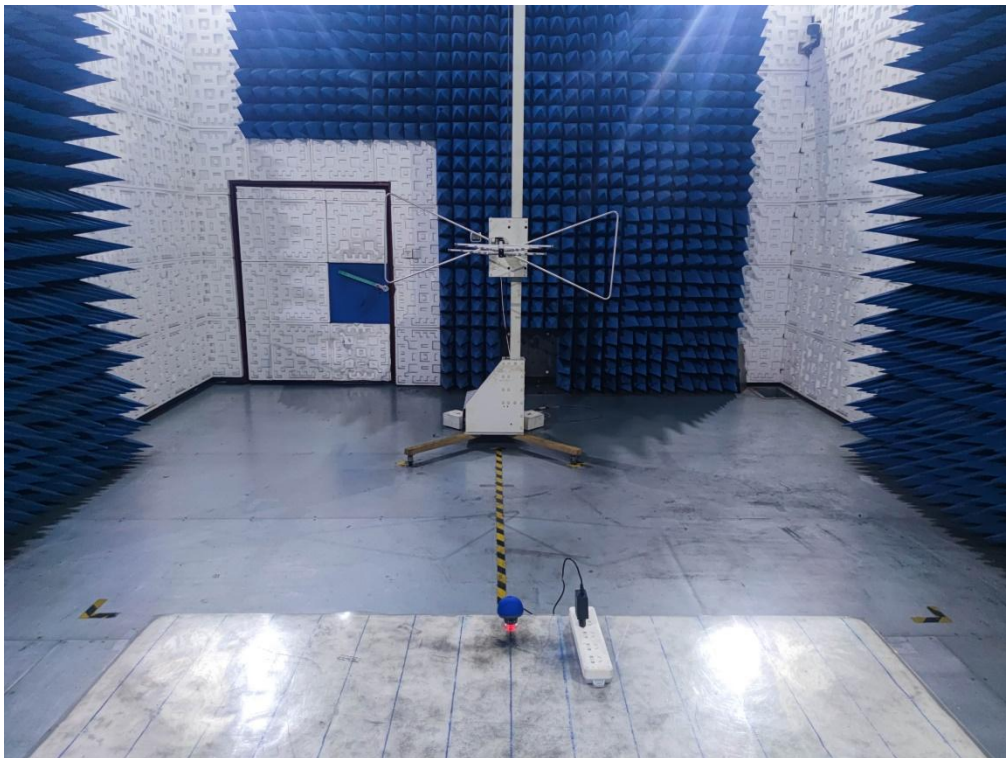
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16. Photographs of Test Setup

Conducted emissions from the AC mains power ports



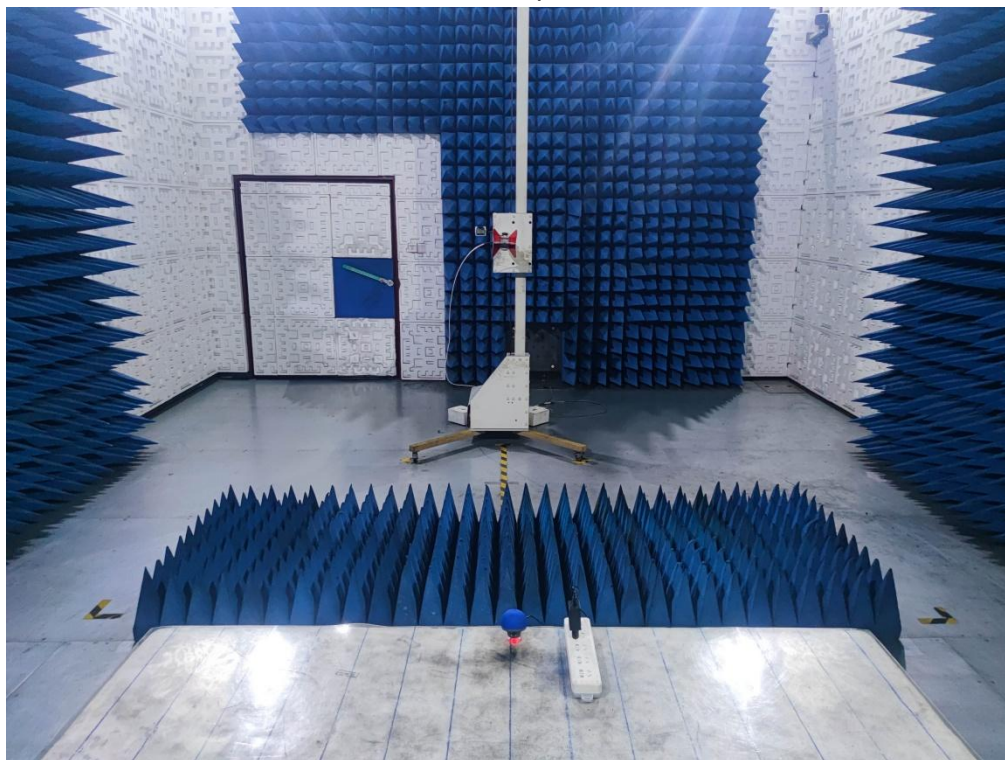
Radiated emissions at frequencies up to 1 GHz



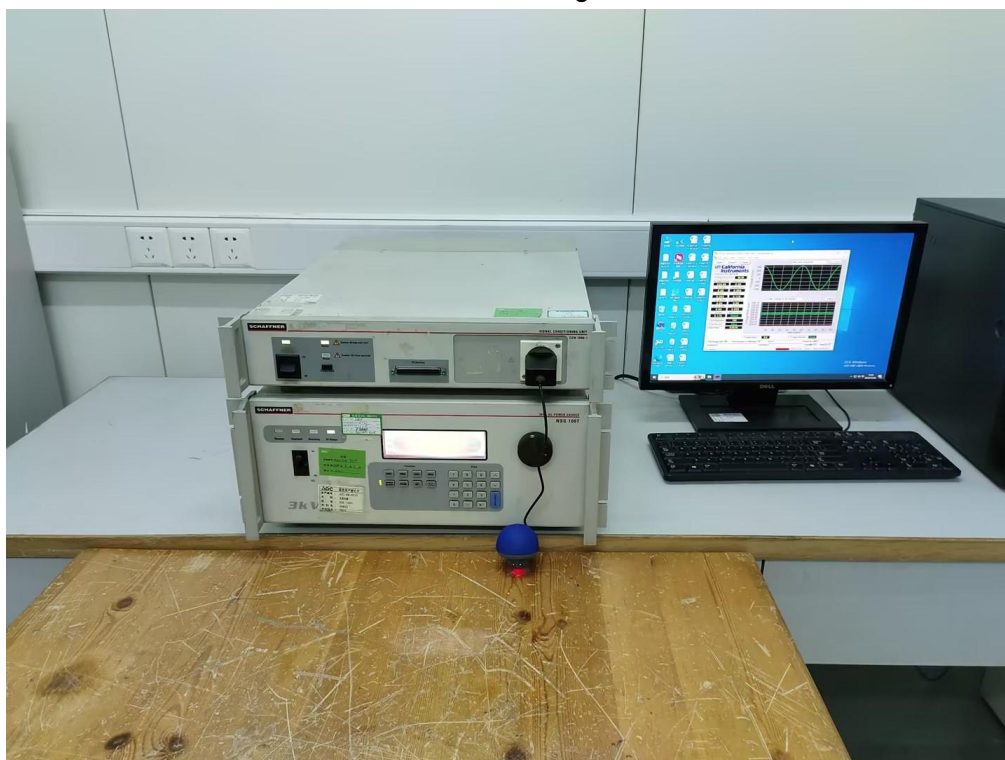
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Radiated emissions at frequencies above 1 GHz



Harmonic current emissions & Voltage fluctuations and flicker

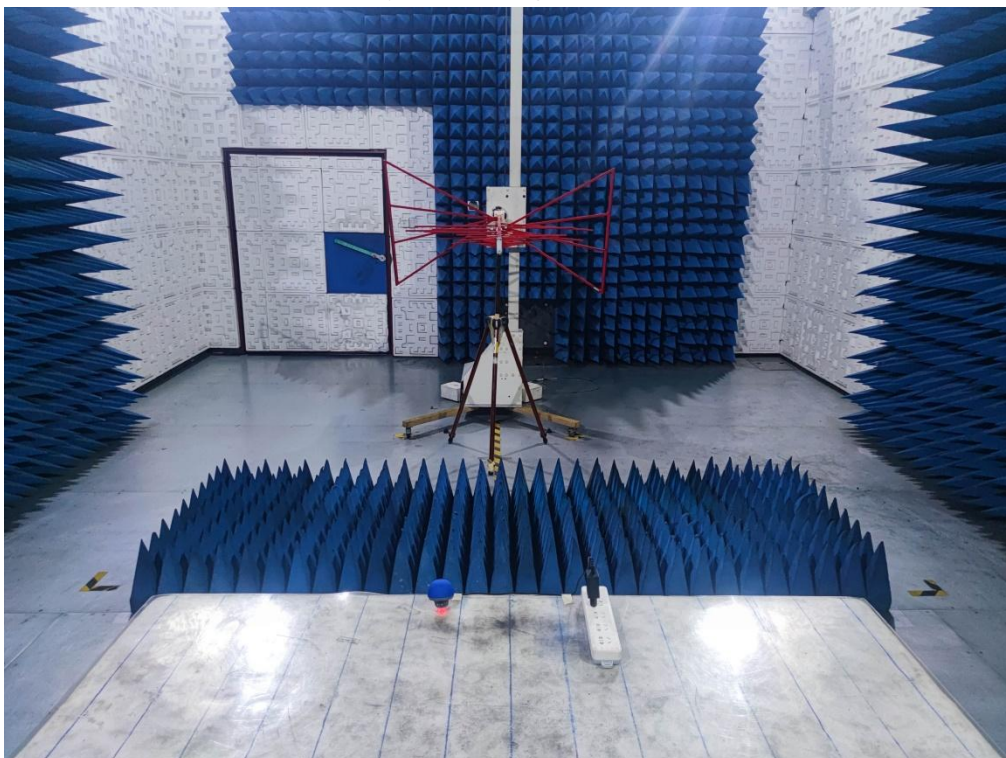


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Electrostatic discharge

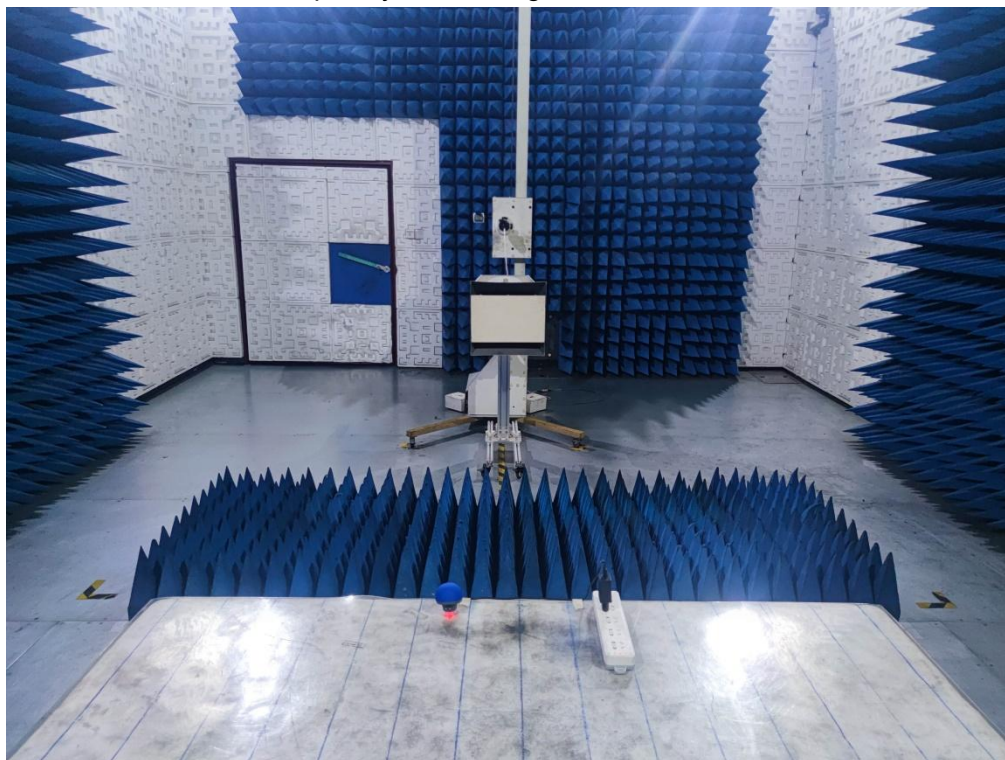


Radio-frequency electromagnetic field up to 1 GHz

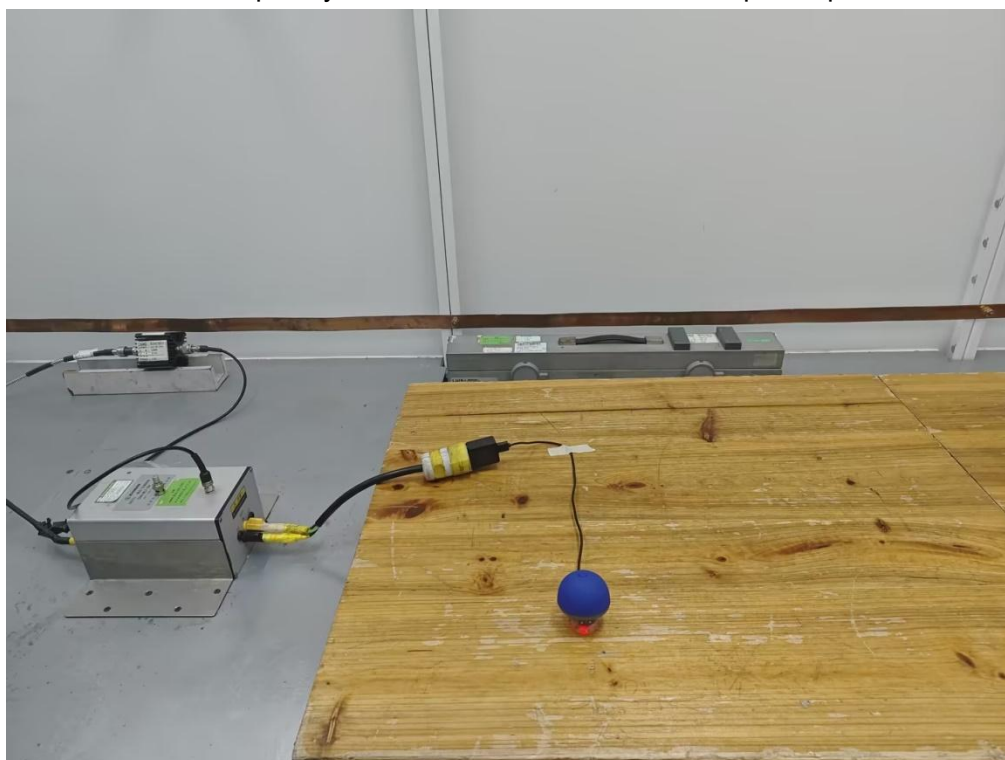


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Radio-frequency electromagnetic field above 1 GHz

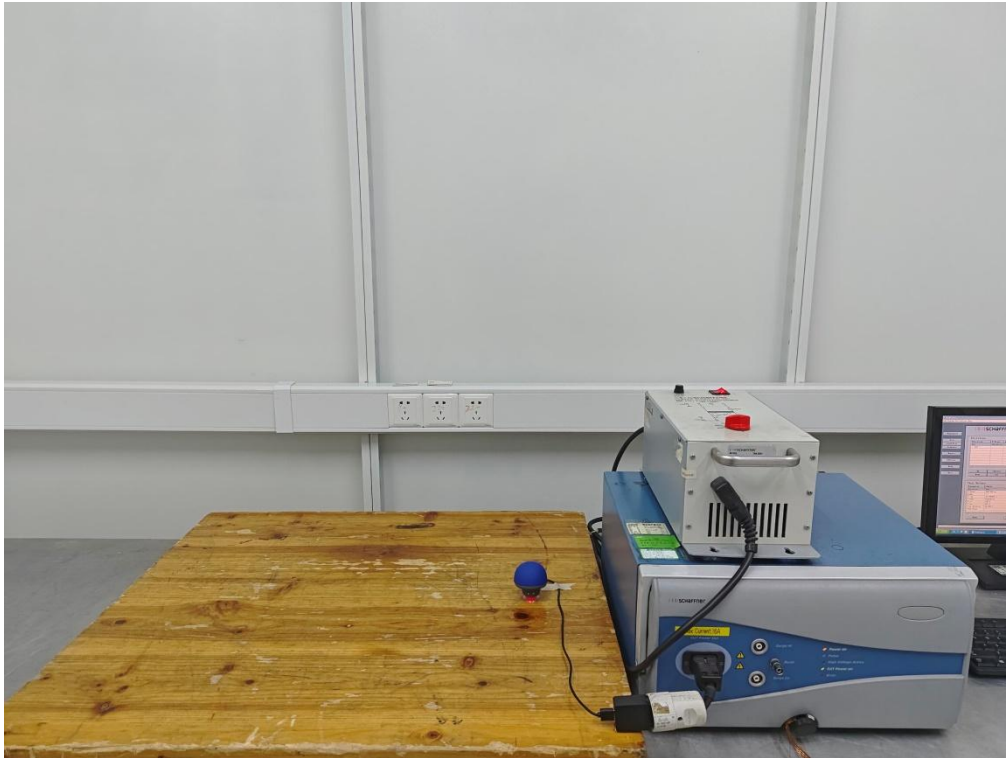


Radio-frequency common mode at the AC mains power ports



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Fast transients/Surges/ Voltage dips at the AC mains power ports

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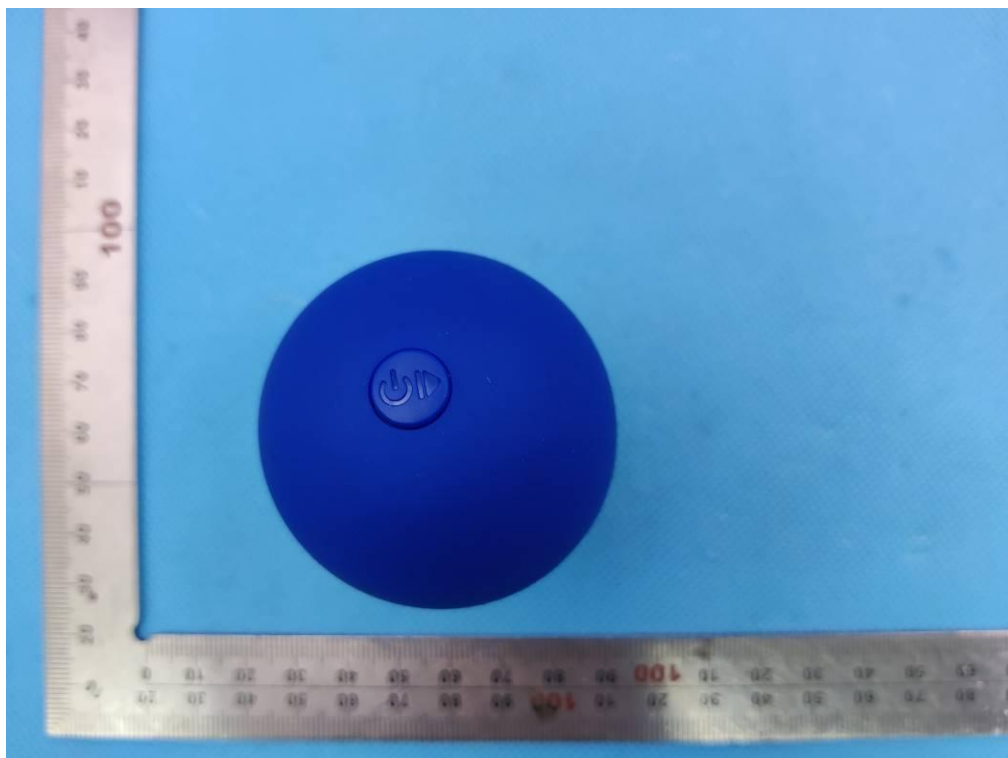
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17. Photographs of EUT

WHOLE VIEW OF EUT

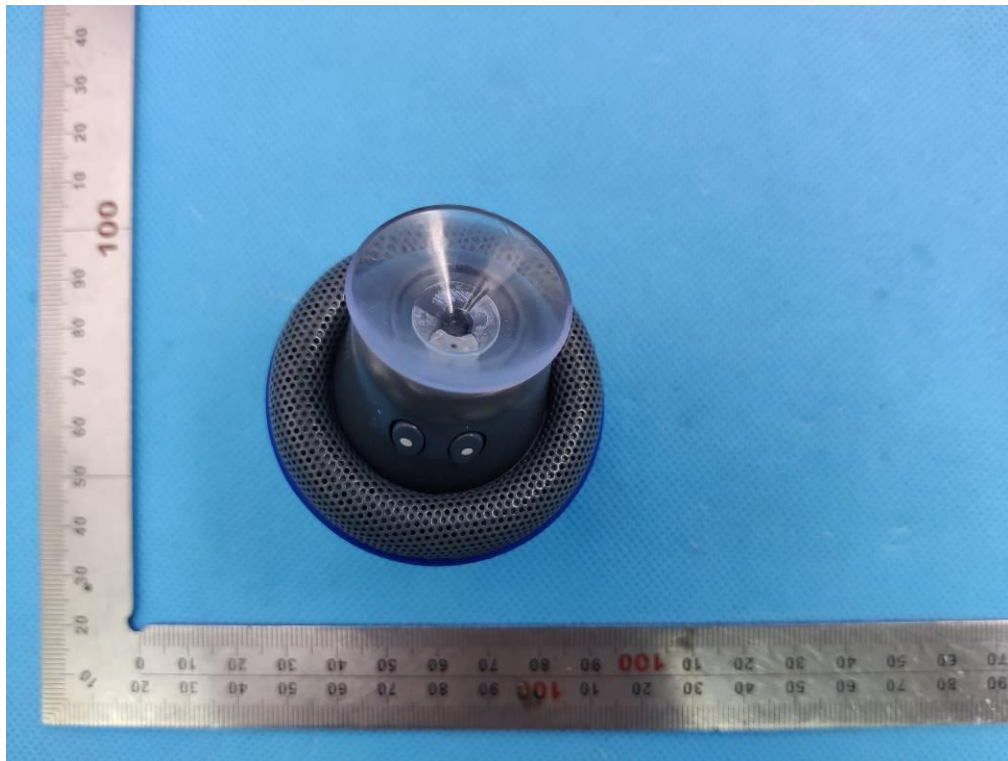


TOP VIEW OF EUT

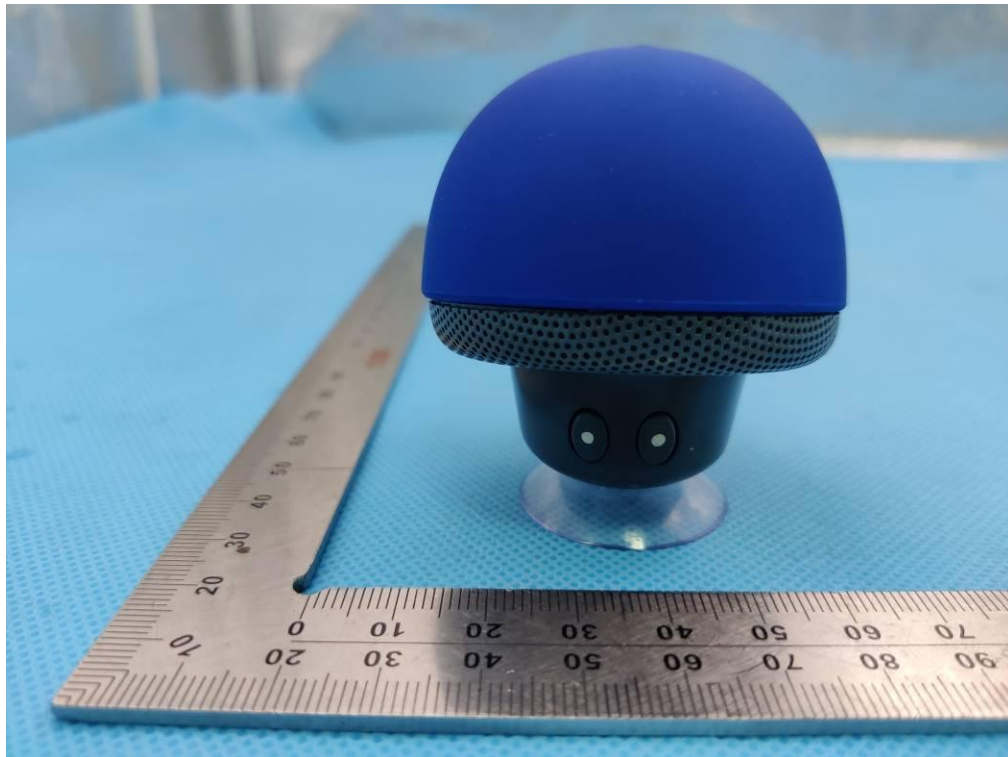


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BOTTOM VIEW OF EUT



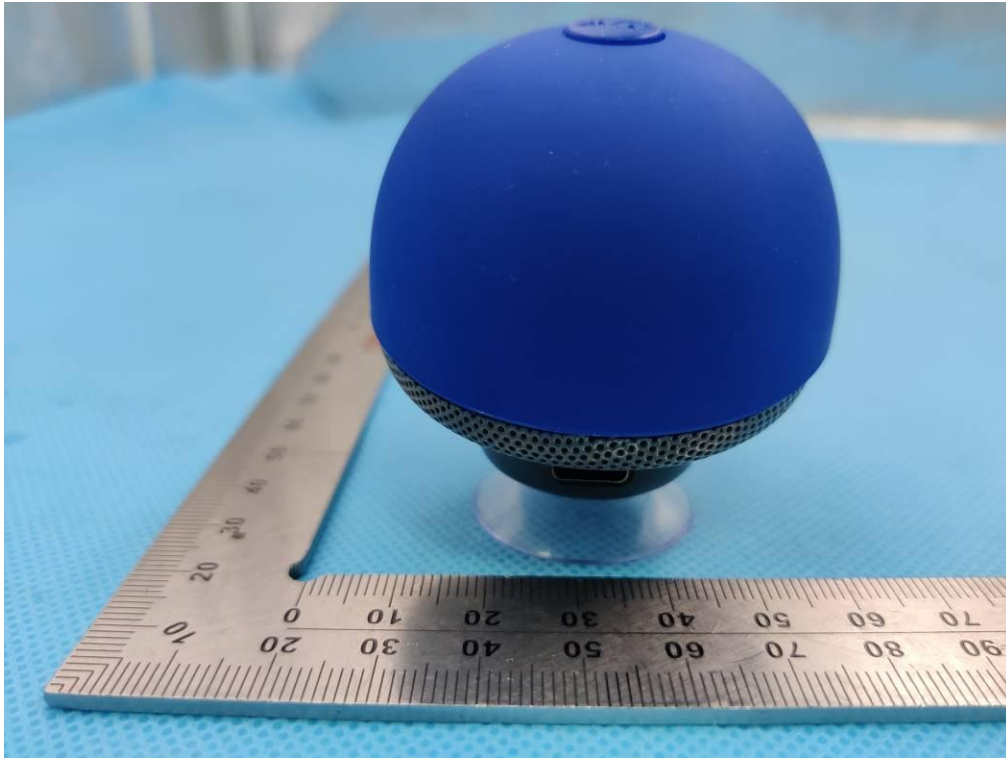
FRONT VIEW OF EUT



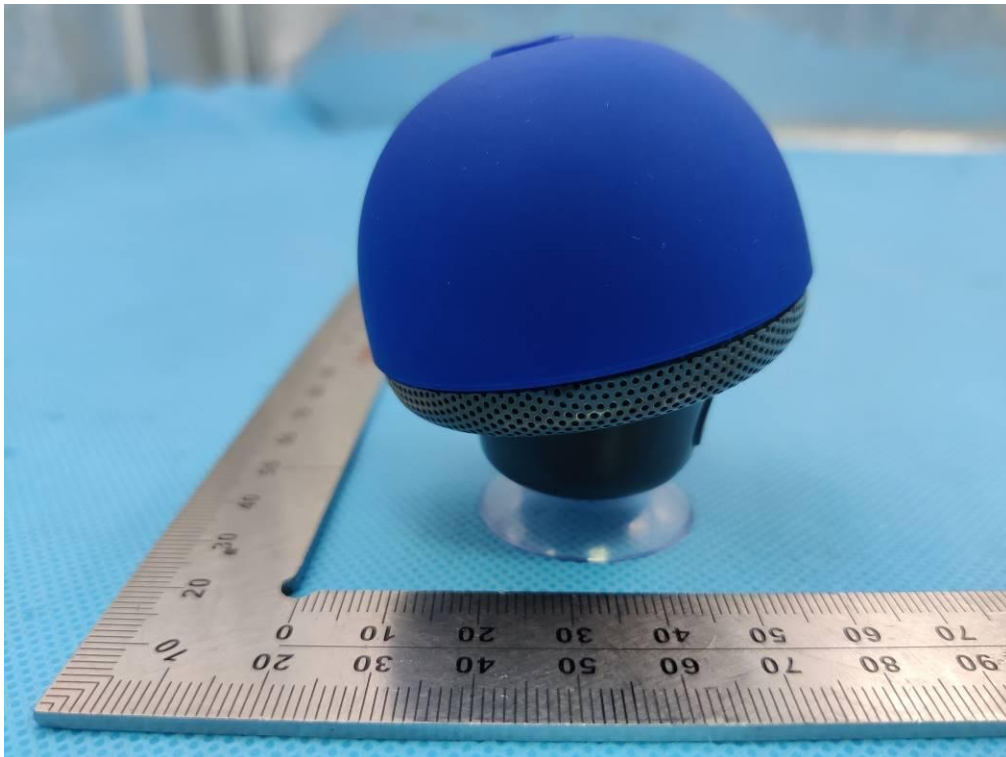
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BACK VIEW OF EUT

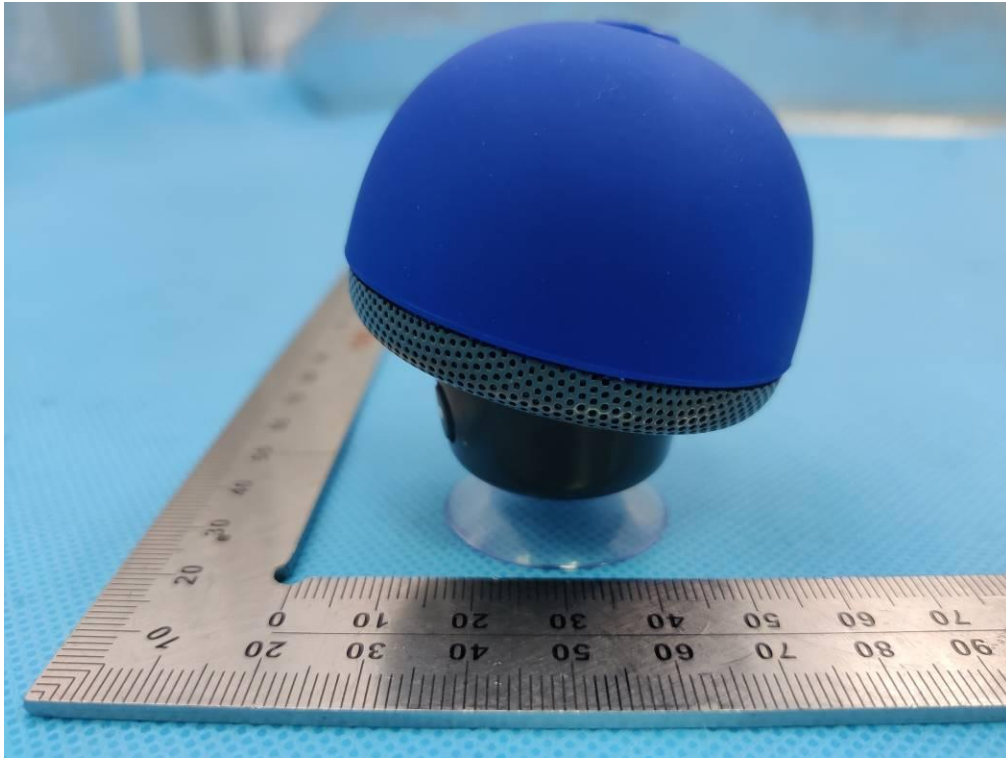


LEFT VIEW OF EUT



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RIGHT VIEW OF EUT

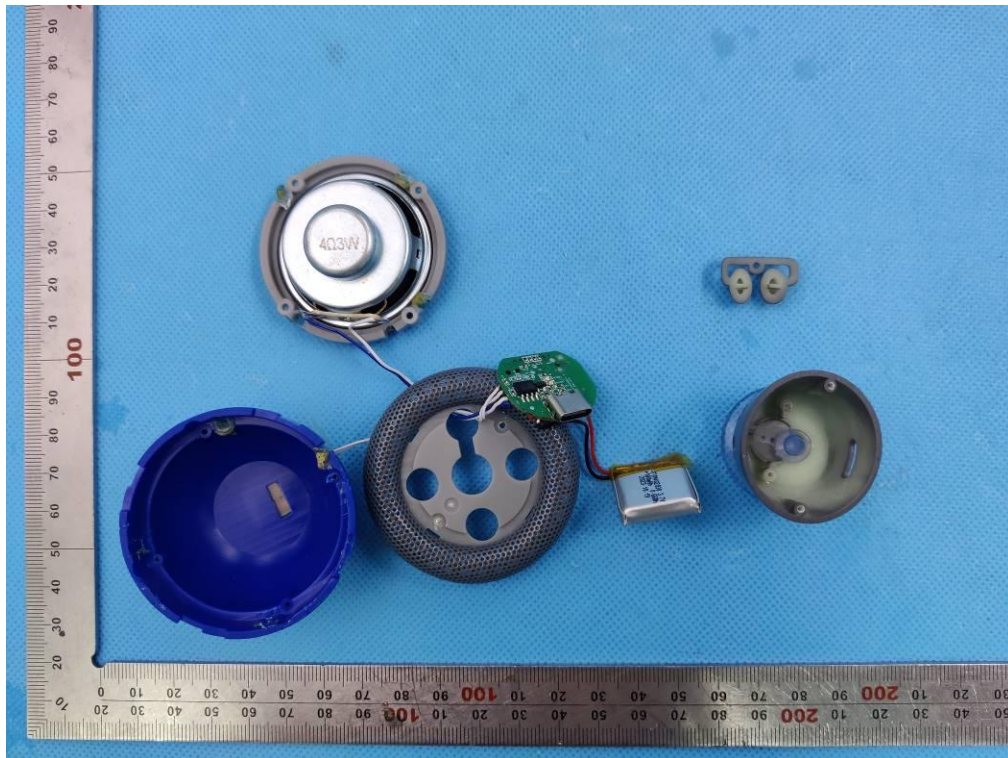


VIEW OF EUT(PORT)

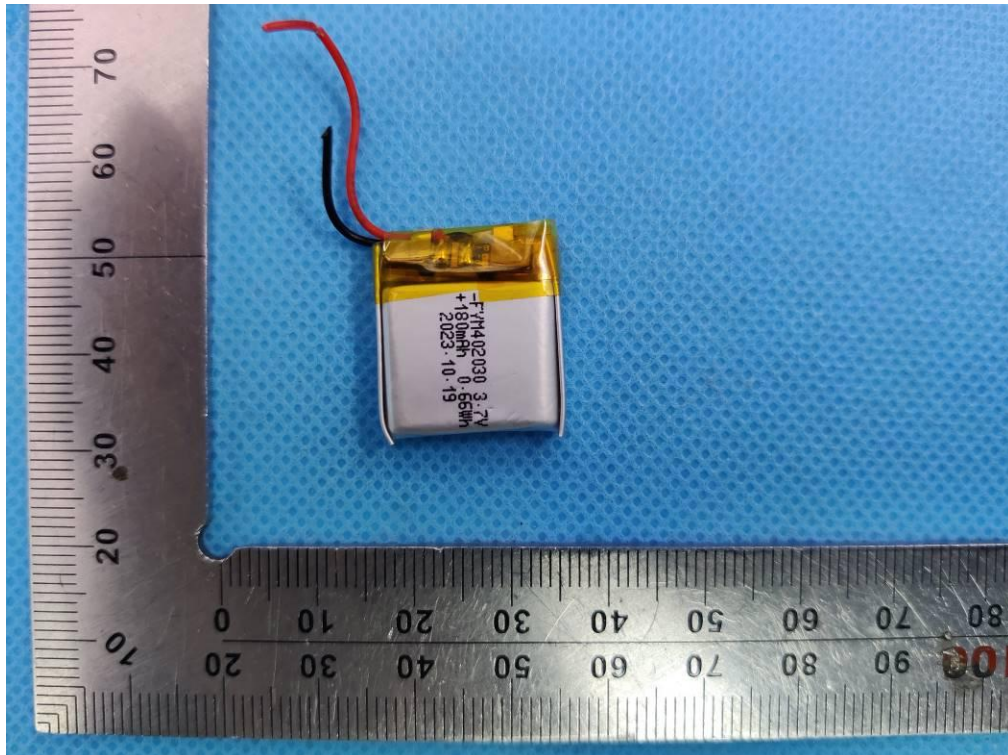


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OPEN VIEW OF EUT

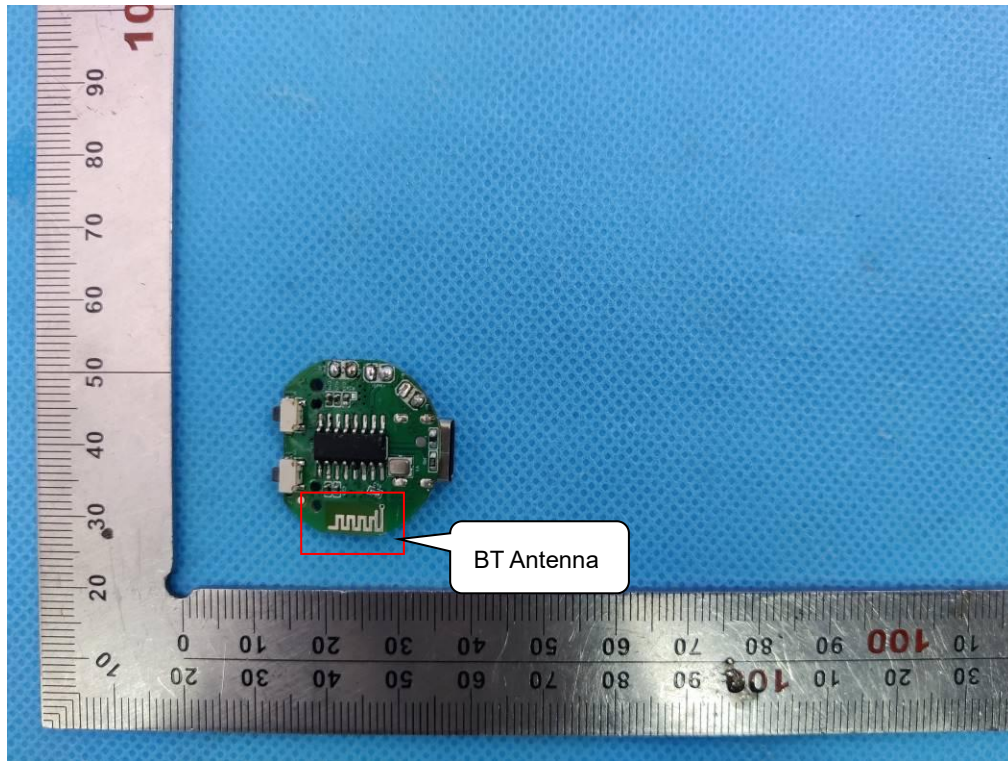


VIEW OF BATTERY

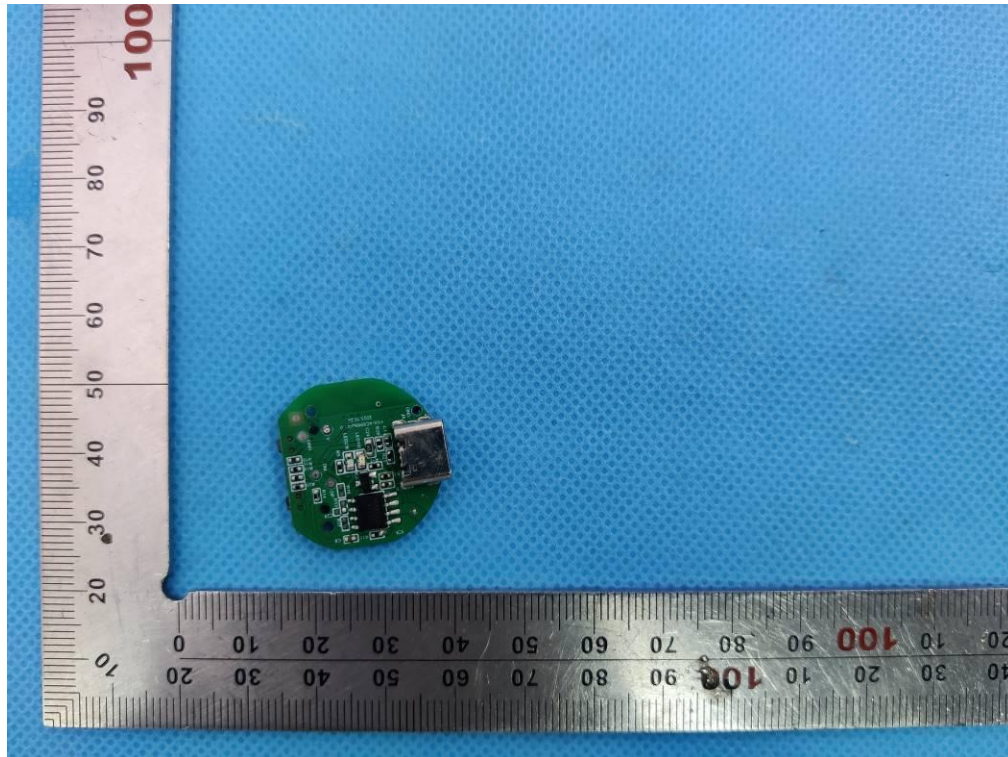


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INTERNAL VIEW OF EUT (FIGURE 1)

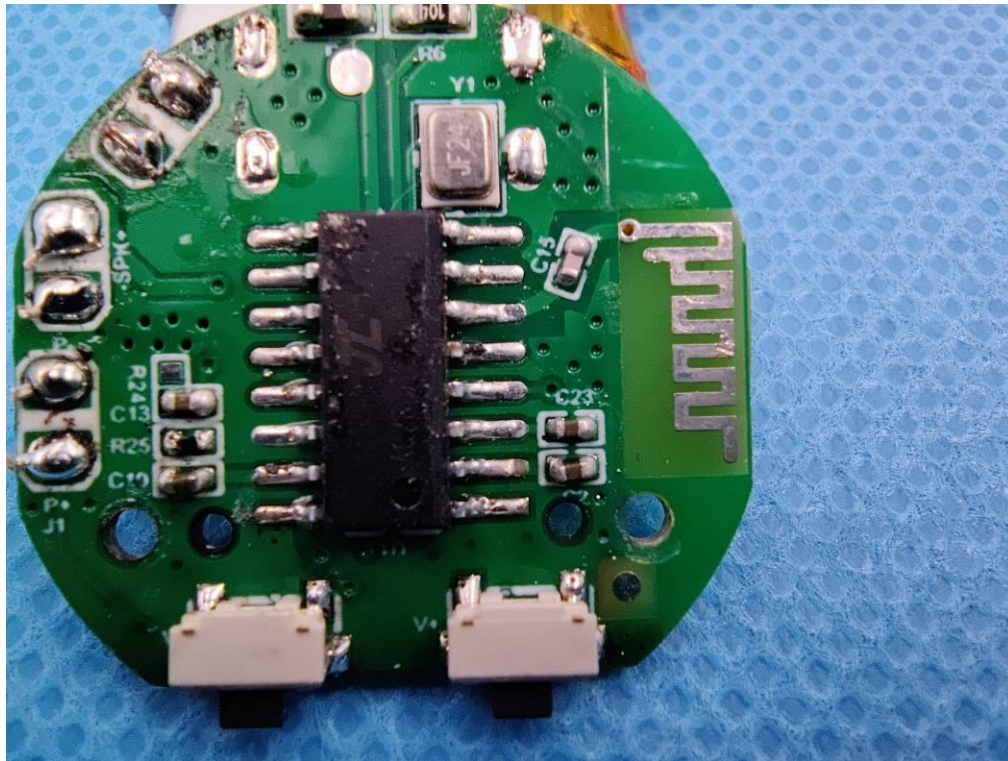


INTERNAL VIEW OF EUT (FIGURE 2)

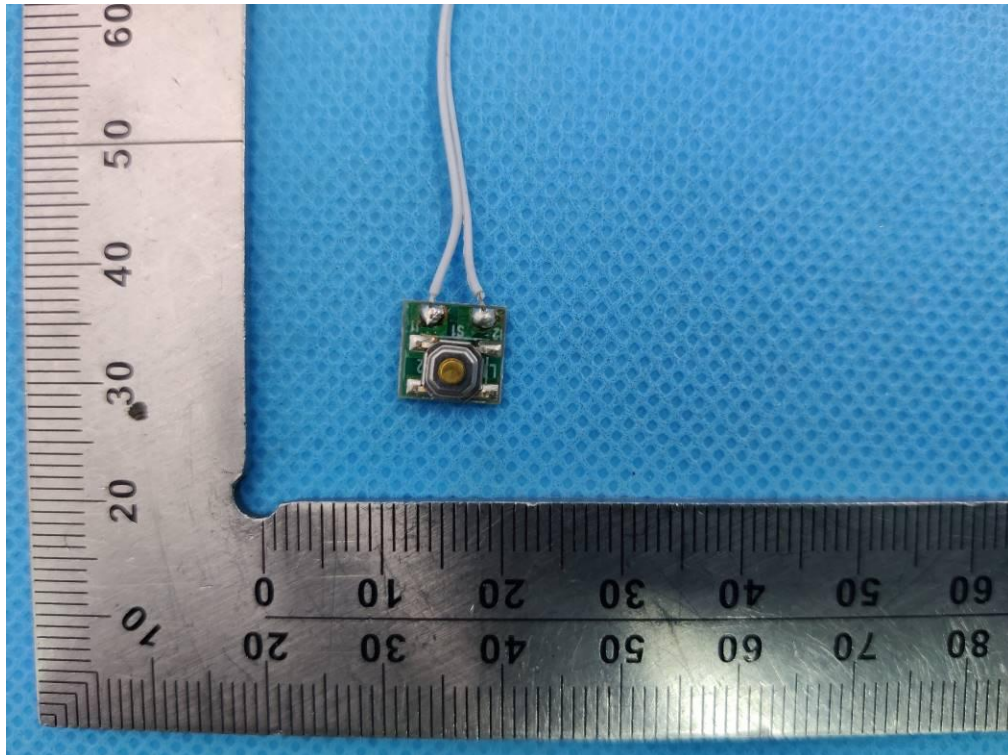


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INTERNAL VIEW OF EUT (FIGURE 3)

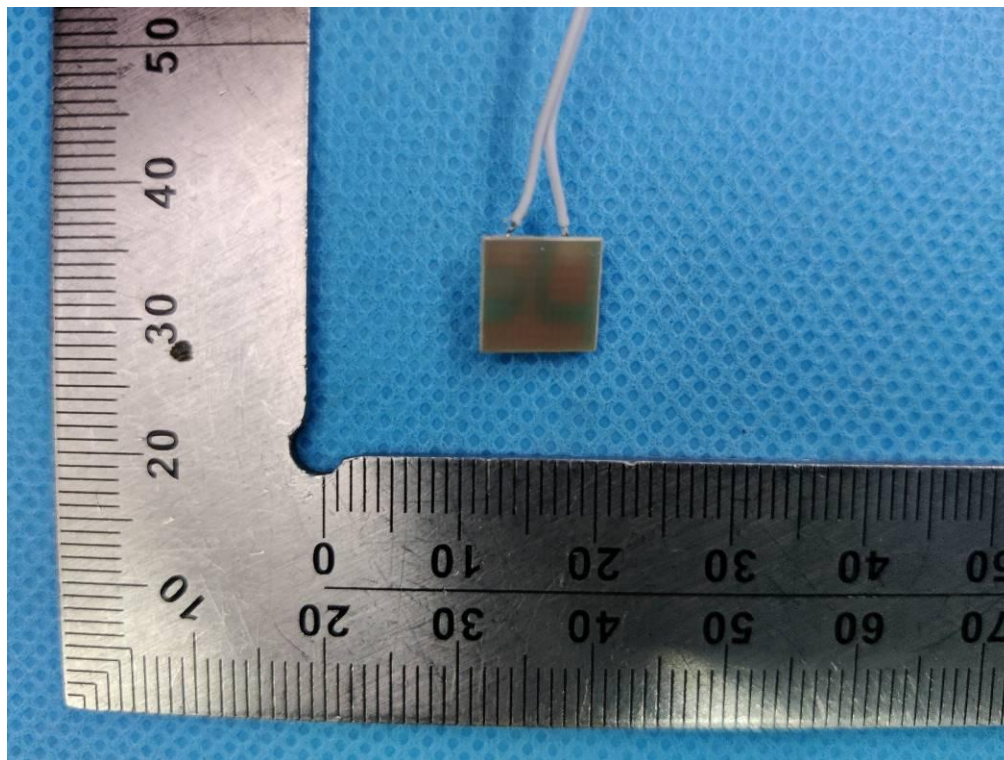


INTERNAL VIEW OF EUT (FIGURE 4)



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INTERNAL VIEW OF EUT (FIGURE 5)



----End of Report----

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Conditions of Issuance of Test Reports

1. All samples and goods are accepted by the Attestation of Global Compliance (Shenzhen) Co., Ltd (the “Company”) solely for testing and reporting in accordance with the following terms and conditions. The company provides its services on the basis that such terms and conditions constitute express agreement between the company and any person, firm or company requesting its services (the “Clients”).
2. Any report issued by Company as a result of this application for testing services (the “Report”) shall be issued in confidence to the Clients and the Report will be strictly treated as such by the Company. It may not be reproduced either in its entirety or in part and it may not be used for advertising or other unauthorized purposes without the written consent of the Company. The Clients to whom the Report is issued may, however, show or send it, or a certified copy thereof prepared by the Company to its customer, supplier or other persons directly concerned. The Company will not, without the consent of the Clients, enter into any discussion or correspondence with any third party concerning the contents of the Report, unless required by the relevant governmental authorities, laws or court orders.
3. The Company shall not be called or be liable to be called to give evidence or testimony on the Report in a court of law without its prior written consent, unless required by the relevant governmental authorities, laws or court orders.
4. In the event of the improper use of the report as determined by the Company, the Company reserves the right to withdraw it, and to adopt any other additional remedies which may be appropriate.
5. Samples submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.
6. The Company will not be liable for or accept responsibility for any loss or damage however arising from the use of information contained in any of its Reports or in any communication whatsoever about its said tests or investigations.
7. Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.
8. The Company is not responsible for recalling the electronic version of the original report when any revision is made to them. The Client assumes the responsibility to providing the revised version to any interested party who uses them.
9. Subject to the variable length of retention time for test data and report stored hereinto as otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of the test report for a period of six years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after retention period. Under no circumstances shall we be liable for damage of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.

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