

EMC TEST REPORT

For

Robotic Vacuum Cleaner

MODEL NUMBER: RRE0VIC

SERIES MODEL NUMBER: RRE0VCM

PROJECT NUMBER: 4791489429

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Prepared for

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Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V0	12/03/2024	Initial Issue	

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Test Summary

According to the specifications of the manufacture, the EUT must complies with the following standards' requirements:

ETSI EN 301 489-1 V2.2.3

ETSI EN 301489-17 V3.3.1

Electromagnetic Interference (EMI)

Test Items	Test Method	Reference Clause	Result
Radiated Emission	EN 55032:2015	ETSI EN 301 489-1 V2.2.3 ETSI EN 301489-17 V3.3.1	PASS
Conducted Emission (AC port and Wired network port)	EN 55032:2015	ETSI EN 301 489-1 V2.2.3 ETSI EN 301489-17 V3.3.1	PASS
Harmonic Emission on AC, 50Hz to 2kHz	EN 61000-3-2:2014	ETSI EN 301 489-1 V2.2.3 ETSI EN 301489-17 V3.3.1	PASS
Flicker Emission on AC	EN 61000-3-3:2013	ETSI EN 301 489-1 V2.2.3 ETSI EN 301489-17 V3.3.1	PASS

Electromagnetic Susceptibility(EMS)

ESD	EN 61000-4-2:2009	ETSI EN 301 489-1 V2.2.3 ETSI EN 301489-17 V3.3.1	PASS
Radiated Immunity	EN 61000-4-3:2006 +A1:2008+A2:2010	ETSI EN 301 489-1 V2.2.3 ETSI EN 301489-17 V3.3.1	PASS
Electrical Fast Transients (EFT)	EN 61000-4-4:2012	ETSI EN 301 489-1 V2.2.3 ETSI EN 301489-17 V3.3.1	PASS
Surge Immunity	EN 61000-4-5:2014 +A1:2017	ETSI EN 301 489-1 V2.2.3 ETSI EN 301489-17 V3.3.1	PASS
Conducted Immunity	EN 61000-4-6:2014	ETSI EN 301 489-1 V2.2.3 ETSI EN 301489-17 V3.3.1	PASS
Voltage Dips and Interruptions	EN 61000-4-11:2004	ETSI EN 301 489-1 V2.2.3 ETSI EN 301489-17 V3.3.1	PASS

Remark:

- 1) N/A is an abbreviation for Not Applicable.
- 2) Pre-test with all operating ranges of voltage and frequency then choose the worst case as result.
- 3) If the highest operating frequency used in the EUT is less than 108 MHz, the measurement shall only be made up to 1 GHz. If the highest clock frequency used in the EUT is between 108 MHz and 500 MHz, the measurement shall only be made up to 2 GHz. If the highest clock frequency used in the EUT is between 500 MHz and 1 GHz, measurement shall only be made up to 5 GHz. If the highest clock frequency used in the EUT is above 1 GHz, the measurement shall be made up to 5 times the highest frequency or 6 GHz, whichever is less.
- 4) The measurement result for the sample received is < Pass > according to < ETSI EN 301 489-1 V2.2.3; ETSI EN 301489-17 V3.3.1 > when < Simple Acceptance > decision rule is applied.

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1 ATTESTATION OF TEST RESULTS

Applicant Information	
Company Name:	Beijing Roborock Technology Co., Ltd.
Address:	Room 1001, Floor 10, Building 3, Yard 17, Anju Road, Changping District, Beijing, P.R. China
Manufacturer Information	
Company Name:	Beijing Roborock Technology Co., Ltd.
Address:	Room 1001, Floor 10, Building 3, Yard 17, Anju Road, Changping District, Beijing, P.R. China
EUT Description	
Product Name:	Robotic Vacuum Cleaner
Model Number:	RRE0VIC
Series Model Number:	RRE0VCM
Model Difference:	The two models have the same technical construction including circuit diagram, PCB Layout, components and component layout. The only difference is model number for marketing purposes. The product has different colors of appearance, such as white and black.
Sample Number:	7782874-S002
Data of Receipt Sample:	Nov. 07, 2024
Date Tested:	Nov. 13, 2024~ Dec. 03, 2024

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
ETSI EN 301 489-1 V2.2.3 ETSI EN 301489-17 V3.3.1	PASS

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2 TEST METHODOLOGY

All tests were performed in accordance with the procedures documented: ETSI EN 301 489-1 V2.2.3, ETSI EN 301489-17 V3.3.1

3 FACILITIES AND ACCREDITATION

Test Location	UL-CCIC Company Limited
Address	No. 2, Chengwan Road, Suzhou Industrial Park, Suzhou 215122, China
Accreditation Certificate	A2LA (Certificate No.: 4829.01) UL-CCIC COMPANY LIMITED has been assessed and proved to be in compliance with A2LA. FCC (FCC Designation No.: CN1247) UL-CCIC COMPANY LIMITED has been recognized to perform compliance testing on equipment subject to the Commission's Declaration of Conformity (DoC) and Certification rules. IC (IC Designation No.: 25056; CAB No.: CN0073) UL-CCIC COMPANY LIMITED has been recognized to perform compliance testing on equipment subject to the Commission's Declaration of Conformity (DoC) and Certification rules.

Note 1: All tests measurement facilities use to collect the measurement data are located at No. 2, Chengwan Road, Suzhou Industrial Park, Suzhou 215122, China.

Note 2: For below 30MHz, lab had performed measurements at test anechoic chamber and comparing to measurements obtained on an open field site. These measurements below 30MHz had been correlated to measurements performed on an OFS.

Note 3: The test anechoic chamber in UL-CCIC COMPANY LIMITED had been calibrated and compared to the open field sites and the test anechoic chamber is shown to be equivalent to or worst case from the open field site.

4 CALIBRATION AND UNCERTAINTY

4.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations and is traceable to recognized national standards.

4.2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus

Test Item	Frequency Range	Measurement Uncertainty	U_{cispr}
Conducted Emission at mains port using AMN	150kHz-30MHz	3.1 dB	3.4 dB
Radiated Emission	30MHz-1000MHz	2.6 dB	6.3 dB
Radiated Emission	1GHz-18GHz	3.0 dB	5.2 dB (1GHz-6GHz)
			5.5 dB (6GHz-18GHz)
Remark: AMN – Artificial Mains Network			

Note: The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

5 EQUIPMENT UNDER TEST

5.1 DESCRIPTION FOR THE EUT

Product Name:	Robotic Vacuum Cleaner
Model No.:	RRE0VIC
Description of EUT:	The EUT is a Robotic Vacuum Cleaner which contains 2.4GHz WiFi module.
Maximum Frequency:	>108MHz
Test Voltage:	AC 230V/50Hz

ekpoint GmbH use on

5.2 TEST MODE

Sample 1	The sample with a design scheme
Sample 2	The sample with another design scheme

Note 1: The Robotic Vacuum Cleaner has two alternative design schemes, both the two sample with different design schemes have been test and recorded in this report.

Note 2: Compare with sample 1 and sample 2, the only difference of sample 3 and sample 4 is the LDS which may affect the normal working mode, so only the normal working mode was evaluated and recorded in this report.

Dock 1	The dock (Model: EWFD26HRR) whose main PCB of power part is provided by Mass Power.
Dock 2	The dock (Model: EWFD26HRR) whose main PCB of power part is provided by SHENZHEN CLICK.
Dock 3	The dock (Model: EWFD30HRR) whose main PCB of power part is provided by Mass Power.
Dock 4	The dock (Model: EWFD30HRR) whose main PCB of power part is provided by SHENZHEN CLICK.

Note 1: The dock has two alternative main PCBs of power part, one is provided by “Mass Power”, the other one is provided by “SHENZHEN CLICK”.

Note 2: Four operation modes (charging robotic vacuum cleaner with dock, collecting dust with dock, washing mop with empty with dock, normal operation) of robotic vacuum cleaner connecting to a router by 2.4GHz WiFi were evaluated and recorded in this report.

Test Mode	Description
Mode 1	Sample 1+Dock 1: Keep EUT charging and drying via empty wash fill dock
Mode 2	Sample 1+Dock 1: Keep EUT working in dust collection condition with empty wash fill dock
Mode 3	Sample 1+Dock 1: Keep EUT working in mop washing condition with empty wash fill dock
Mode 4	Sample 1+Dock 2: Keep EUT charging and drying via empty wash fill dock
Mode 5	Sample 1+Dock 2: Keep EUT working in dust collection condition with empty wash fill dock
Mode 6	Sample 1+Dock 2: Keep EUT working in mop washing condition with empty wash fill dock
Mode 7	Sample 1+Dock 3: Keep EUT charging and drying via empty wash fill dock
Mode 8	Sample 1+Dock 3: Keep EUT working in dust collection condition with empty wash fill dock
Mode 9	Sample 1+Dock 3: Keep EUT working in mop washing condition with empty wash fill dock
Mode 10	Sample 1+Dock 4: Keep EUT charging and drying via empty wash fill dock
Mode 11	Sample 1+Dock 4: Keep EUT working in dust collection condition with empty wash fill dock
Mode 12	Sample 1+Dock 4: Keep EUT working in mop washing condition with empty wash fill dock
Mode 13	Sample 2+Dock 1: Keep EUT charging and drying via empty wash fill dock
Mode 14	Sample 2+Dock 1: Keep EUT working in dust collection condition with empty wash fill dock
Mode 15	Sample 2+Dock 1: Keep EUT working in mop washing condition with empty wash fill dock
Mode 16	Sample 2+Dock 2: Keep EUT charging and drying via empty wash fill dock
Mode 17	Sample 2+Dock 2: Keep EUT working in dust collection condition with empty wash fill dock
Mode 18	Sample 2+Dock 2: Keep EUT working in mop washing condition with empty wash fill dock
Mode 19	Sample 2+Dock 3: Keep EUT charging and drying via empty wash fill dock
Mode 20	Sample 2+Dock 3: Keep EUT working in dust collection condition with empty wash fill dock

Test Mode	Description
Mode 21	Sample 2+Dock 3: Keep EUT working in mop washing condition with empty wash fill dock
Mode 22	Sample 2+Dock 4: Keep EUT charging and drying via empty wash fill dock
Mode 23	Sample 2+Dock 4: Keep EUT working in dust collection condition with empty wash fill dock
Mode 24	Sample 2+Dock 4: Keep EUT working in mop washing condition with empty wash fill dock
Mode 25	Sample 3: Keep EUT working normally and connecting to a router by 2.4GHz WiFi
Mode 26	Sample 4: Keep EUT working normally and connecting to a router by 2.4GHz WiFi

Note 1: The Robotic Vacuum Cleaner has four work modes, three modes need combine with dock, one mode works independently. Four docks with different main PCBs of power part were provided to combine with Robotic Vacuum Cleaner for test. So there are twenty-six work modes that were tested and recorded in this report this time.

Note 2: All the test modes have been tested, only the data of the worst case is recorded in this report.

5.3 MONITORING OF EUT FOR ALL IMMUNITY TEST

Audio	N/A
Visual	Evaluate work status by direct observation

5.4 DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	Description
1	Wireless Router	I-O TATA	WN-AC1600DGR3	Supplied by UL Lab
2	Mobile Phone	Redmi	Note 11 5G	Supplied by UL Lab
3	Empty Wash Fill Dock	roborock	EWFD26HRR	220-240VAC, 50-60Hz; Rated input current: 3A (Dust collection); 5.7A (Hot water mop washing); 0.6A (Charging & drying) Rated output: 20VDC, 1.5A
4	Empty Wash Fill Dock	roborock	EWFD30HRR	Rated Input (Dust collection): 220-240VAC, 50-60Hz, 3A Rated Input (Hot water mop washing): 220-240VAC, 50-60Hz, 5.6A Rated Input (Charging & drying): 220-240VAC, 50-60Hz, 0.6A Rated Output: 20VDC, 1.5A

I/O PORT

No.	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	AC power cable	3pin	/	1.8	/

ACCESSORY

Item	Accessory	Brand Name	Model Name	Description
1	/	/	/	/

5.5 MEASURING INSTRUMENT AND SOFTWARE USED

Conducted Emission

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal.Due date
1	EMI Test Receiver	R&S	ESR3	126700	2024-11-02	2025-11-01
2	LISN	R&S	ENV216	126701	2024-11-02	2025-11-01
3	LISN	AFJ Instruments	LS16C-10	127009	2024-11-02	2025-11-01
4	Shielding Room	Albatross	/	126722	2022-05-30	2025-05-29
5	Temperature and Humidity Datalogger	Omega Engineering Inc.	iTHX-SD-5	211900	2024-10-09	2025-10-08
6	Aneroid barometer	Sunrise Electric Technology Co., Ltd	DYM3	223428	2024-09-24	2025-09-23
Software						
Item	Description	Manufacturer	Name	Version		
1	Test Software for Conducted disturbance	R&S	EMC32	9.25.00		

Radiated Emission at Chamber 2#

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal.Due date
1	EMI test receiver	R&S	ESR7	222993	2024-03-23	2025-03-22
2	Hybrid Antenna	Schwarzbeck	VULB 9168	171952	2024-05-20	2027-05-19
3	Chamber B	SAEMC	9*6*6	220350	2022-07-03	2025-06-01
4	Temperature and Humidity Datalogger	Omega Engineering Inc.	iTHX-SD-5	221173	2024-07-02	2025-07-01
5	Aneroid barometer	Sunrise Electric Technology Co., Ltd	DYM3	223428	2024-09-24	2025-09-23
Software						
Item	Description	Manufacturer	Name	Version		
1	Test Software for Radiated Disturbance	JSTONSCEND	JS32-RE	Ver. 5.0.0.2		

Harmonic Current & Flicker

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal.Due date
1	Single phase Harmonic & Flicker test system	California Instruments	PACS-1	190592	2024-11-08	2025-11-07
2	Power Source	California Instruments	5001iX	190670	2024-11-08	2025-11-07
3	Shielding Room	Albatross	/	126722	2022-05-30	2025-05-29
4	Temperature and Humidity Datalogger	Omega Engineering Inc.	iTHX-SD-5	211900	2024-10-09	2025-10-08
5	Aneroid barometer	Sunrise Electric Technology Co., Ltd	DYM3	223428	2024-09-24	2025-09-23
Software						
Item	Description	Manufacturer	Name	Version		
1	Test Software for Harmonics Current & Flicker analyzer	California Instruments	CTS4	V4.29.0		

Electrostatic Discharge

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal.Due date
1	Electrostatic Discharge Simulator	TESEQ	NSG437	137873	2024-09-19	2025-09-18
2	Shielding Room	SAEMC	/	221457	2022-07-04	2025-07-03
3	Temperature and Humidity Datalogger	Omega Engineering Inc.	iTHX-SD-5	221173	2024-07-02	2025-07-01
4	Aneroid barometer	Sunrise Electric Technology Co., Ltd	DYM3	223428	2024-09-24	2025-09-23

Radiated Immunity

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal.Due date
1	Signal Generator	KEYSIGHT	N5171B	155387	2024-03-23	2025-03-22
2	Power Amplifier	BONN	BLWA0810-200/100	137597	2024-03-23	2025-03-22
	Power Amplifier	AMETEK	AS102-001	155390	2024-03-23	2025-03-22
	Power Amplifier	AMETEK	AS1860-100	155391	2024-03-23	2025-03-22
3	Power Meter	DARE	RPR2006C	138150	2024-03-23	2025-03-22
4	Isotropic Electric Field Probe	LUMILOOP	LSProbe 1.2	216730	2024-03-23	2025-03-22
5	EMS Antenna	SCHWARZBECK	STLP9128D	137599	2017-06-17	--
6	EMS Antenna	SCHWARZBECK	STLP 9149	155388	2017-06-17	--
7	Chamber A	Albatross	9*6*6	126721	2022-05-30	2025-05-29
8	Temperature and Humidity Datalogger	Omega Engineering Inc.	iTHX-SD-5	221159	2024-07-02	2025-07-01
9	Aneroid barometer	Sunrise Electric Technology Co., Ltd	DYM3	223428	2024-09-24	2025-09-23
Software						
Item	Description	Manufacturer	Name	Version		
1	Test Software for Radiated Immunity	JSTONSCEND	JS35-RS	Ver. 5.0.0.2		

Electrical Fast Transients/Burst

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal.Due date
1	EMS test generator	TESEQ	NSG3060	137601	2024-03-23	2025-03-22
2	EMS test coupling network	TESEQ	CDN3061	137605	2024-03-23	2025-03-22
3	EUT supply power	TESEQ	VAR3005	137606	2024-03-23	2025-03-22
4	EFT coupling clamp	TESEQ	CDN 3425	137607	2024-03-23	2025-03-22
5	Shielding Room	SAEMC	/	221456	2022-07-04	2025-07-03
6	Temperature and Humidity Datalogger	Omega Engineering Inc.	iTHX-SD-5	221173	2024-07-02	2025-07-01
7	Aneroid barometer	Sunrise Electric Technology Co., Ltd	DYM3	223428	2024-09-24	2025-09-23

Surge

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal.Due date
1	EMS test generator	TESEQ	NSG3060	137601	2024-03-23	2025-03-22
2	EMS test coupling network	TESEQ	CDN3061	137605	2024-03-23	2025-03-22
3	EUT supply power	TESEQ	VAR3005	137606	2024-03-23	2025-03-22
4	Coupling Decoupling Network for surge pulses	TESEQ	CDN118	137609	2024-03-23	2025-03-22
5	Shielding Room	SAEMC	/	221456	2022-07-04	2025-07-03
6	Temperature and Humidity Datalogger	Omega Engineering Inc.	iTHX-SD-5	221173	2024-07-02	2025-07-01
7	Aneroid barometer	Sunrise Electric Technology Co., Ltd	DYM3	223428	2024-09-24	2025-09-23

Conducted Immunity

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal.Due date
1	CI test generator	TESEQ	NSG4070	137614	2024-03-23	2025-03-22
2	Coupling and Decoupling Network	TESEQ	CDN M016	137613	2024-03-23	2025-03-22
3	6dB Attenuator	TESEQ	ATN 6050	137615	2024-03-23	2025-03-22
4	CI coupling clamp	TESEQ	KEMZ 801A	137612	2024-03-23	2025-03-22
5	Shielding Room	SAEMC	/	221456	2022-07-04	2025-07-03
6	Temperature and Humidity Datalogger	Omega Engineering Inc.	iTHX-SD-5	221173	2024-07-02	2025-07-01
7	Aneroid barometer	Sunrise Electric Technology Co., Ltd	DYM3	223428	2024-09-24	2025-09-23

Software						
Item	Description	Manufacturer	Name	Version		
1	Test Software for Conducted Immunity	TESEQ	NSG4070 Control Program	Ver. 1.3.1.2		

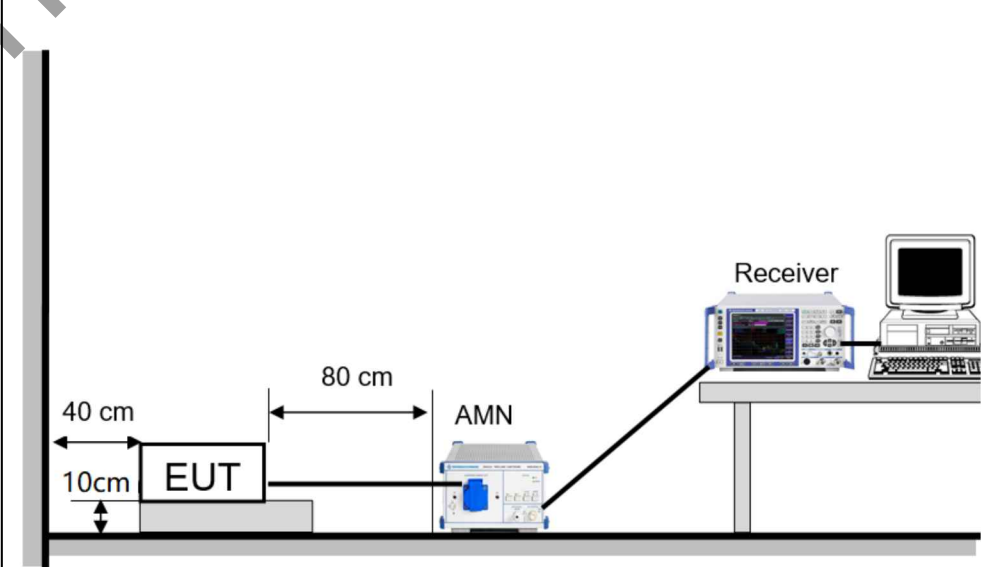
Voltage Dips and Interruptions

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal.Due date
1	EMS test generator	TESEQ	NSG3060	137601	2024-03-23	2025-03-22
2	EMS test coupling network	TESEQ	CDN3061	137605	2024-03-23	2025-03-22
3	EUT supply power	TESEQ	VAR3005	137606	2024-03-23	2025-03-22
4	Shielding Room	SAEMC	/	221456	2022-07-04	2025-07-03
5	Temperature and Humidity Datalogger	Omega Engineering Inc.	iTHX-SD-5	221173	2024-07-02	2025-07-01
6	Aneroid barometer	Sunrise Electric Technology Co., Ltd	DYM3	223428	2024-09-24	2025-09-23

6 ELECTROMAGNETIC COMPATIBILITY (EMC)

6.1 ELECTROMAGNETIC INTERFERENCE (EMI)

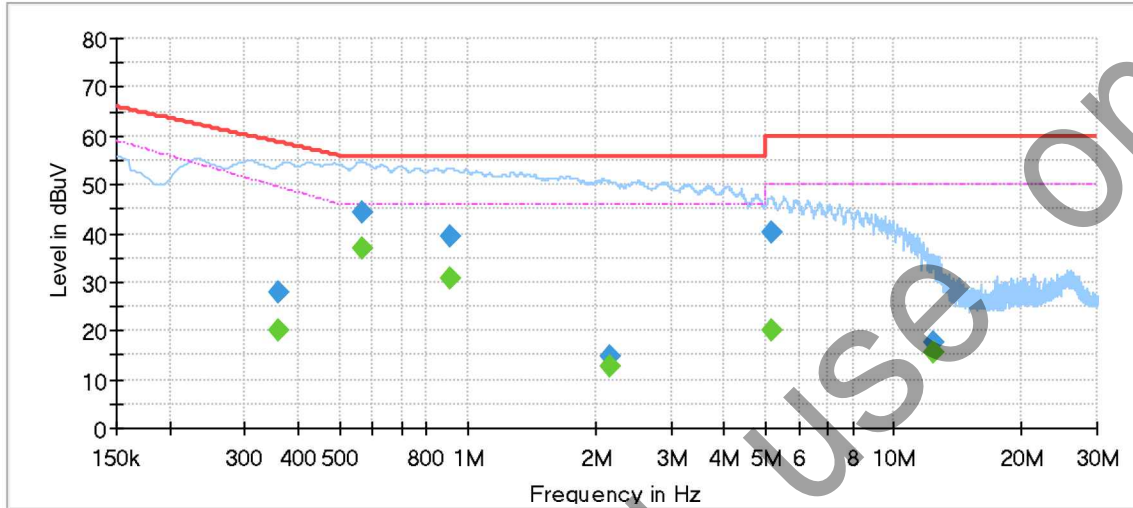
6.1.1 CONDUCTED EMISSION

Reference Clause:	ETSI EN 301 489-1 V2.2.3 ETSI EN 301489-17 V3.3.1	
Test Method:	EN 55032:2015	
Detector:	Peak for pre-scan (9kHz Resolution Bandwidth)	
	Quasi-Peak if maximized peak within 6dB of Quasi-Peak limit	
Test Modes:	Pretest mode 1 to mode 24, the worst case is mode 17	
Test Status:	Pre-scan was performed with peak detected on all ports, Quasi-peak & average measurements were performed at the frequencies at which maximum peak emission level were detected. Please see the attached Quasi-peak and Average test results.	
Limit:	Limits for conducted disturbance at the mains ports of class B	
	Frequency Range (MHz)	Class B Limit (dBuV)
		Quasi-peak Average
	0.15 to 0.50	66 to 56 56 to 46
0.50 to 5	56 46	
5 to 30	60 50	
	NOTE 1: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz. NOTE 2: The lower limit is applicable at the transition frequency.	
	Limits for conducted disturbance at the telecommunication ports of class B (ISN)	
	Frequency Range (MHz)	Class B Limit (dBuV)
		Quasi-peak Average
	0.15 to 0.50	84 to 74 74 to 64
	0.50 to 30	74 64
Test Setup:		

<p>Test Procedure:</p>	<ol style="list-style-type: none"> 1) The mains terminal disturbance voltage test was conducted in a shielded room. 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a $50\Omega/50\mu\text{H} + 5\Omega$ linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded. 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane above 10cm with insulating material. 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
<p>Test Environment</p>	<p>Temperature: 23.1°C</p> <p>Humidity: 43.1%</p> <p>ATM pressure: 1027 mbar</p> <p>Test Date: 11/21/2024</p>

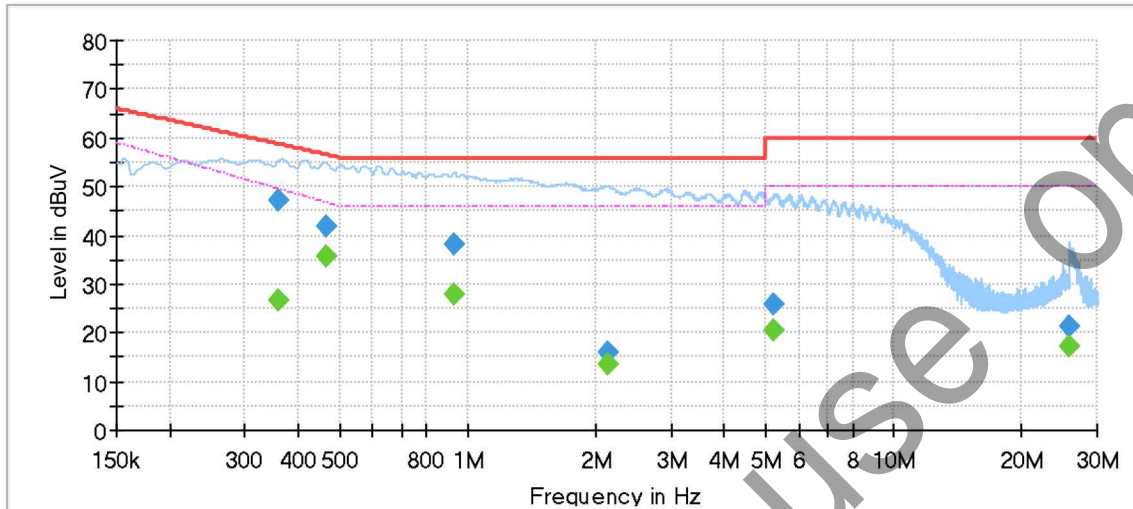
Measurement Data

Test Mode	Phase:	Verdict
Mode 17	L	PASS



Frequency (MHz)	QuasiPeak (dBuV)	Average (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.361438	---	19.90	49.50	29.60	1000.0	9.000	L1	OFF	9.5
0.361438	27.80	---	58.70	30.89	1000.0	9.000	L1	OFF	9.5
0.565413	---	36.93	46.00	9.07	1000.0	9.000	L1	OFF	9.5
0.565413	44.47	---	56.00	11.53	1000.0	9.000	L1	OFF	9.5
0.908688	---	30.67	46.00	15.33	1000.0	9.000	L1	OFF	9.5
0.908688	39.35	---	56.00	16.65	1000.0	9.000	L1	OFF	9.5
2.152438	---	12.91	46.00	33.09	1000.0	9.000	L1	OFF	9.5
2.152438	14.65	---	56.00	41.35	1000.0	9.000	L1	OFF	9.5
5.152363	---	20.27	50.00	29.73	1000.0	9.000	L1	OFF	9.5
5.152363	40.09	---	60.00	19.91	1000.0	9.000	L1	OFF	9.5
12.443225	---	15.51	50.00	34.49	1000.0	9.000	L1	OFF	9.5
12.443225	17.78	---	60.00	42.22	1000.0	9.000	L1	OFF	9.5

Test Mode	Phase:	Verdict
Mode 17	N	PASS



Frequency (MHz)	QuasiPeak (dBuV)	Average (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.361438	---	26.48	49.50	23.03	1000.0	9.000	N	OFF	9.5
0.361438	47.17	---	58.70	11.53	1000.0	9.000	N	OFF	9.5
0.463425	---	35.59	46.82	11.23	1000.0	9.000	N	OFF	9.5
0.463425	41.69	---	56.63	14.94	1000.0	9.000	N	OFF	9.5
0.931075	---	27.80	46.00	18.20	1000.0	9.000	N	OFF	9.4
0.931075	38.19	---	56.00	17.81	1000.0	9.000	N	OFF	9.4
2.135025	---	13.49	46.00	32.51	1000.0	9.000	N	OFF	9.4
2.135025	15.87	---	56.00	40.13	1000.0	9.000	N	OFF	9.4
5.241913	---	20.56	50.00	29.44	1000.0	9.000	N	OFF	9.4
5.241913	25.90	---	60.00	34.10	1000.0	9.000	N	OFF	9.4
25.748863	---	17.35	50.00	32.65	1000.0	9.000	N	OFF	9.4
25.748863	21.18	---	60.00	38.82	1000.0	9.000	N	OFF	9.4

6.1.2 RADIATED EMISSION

Reference Clause:	ETSI EN 301 489-1 V2.2.3 ETSI EN 301489-17 V3.3.1			
Test Method:	EN 55032:2015			
Test Mode	Pretest mode 1 to mode 26, the worst case is mode 18 below 1GHz and mode 9 above 1GHz			
Test Status:	Pre-scan was performed with peak detected on all ports, Quasi-peak measurements was performed at the frequencies at which maximum peak emission level were detected.			
Receive Setup:	Frequency range (MHz)	Detector	RBW	VBW
	30-1000	Quasi-peak	120kHz	300kHz
	Above 1000	Peak	1MHz	3MHz
Limit:	Frequency		Limit at 3m	Remark
	30MHz-230MHz		40dBuV/m	QP value
	230MHz-1GHz		47dBuV/m	QP value
	1GHz-3GHz		50dBuV/m	Average value
	3GHz-6GHz		70dBuV/m	PK value
3GHz-6GHz		54dBuV/m	Average value	
3GHz-6GHz		74dBuV/m	PK value	

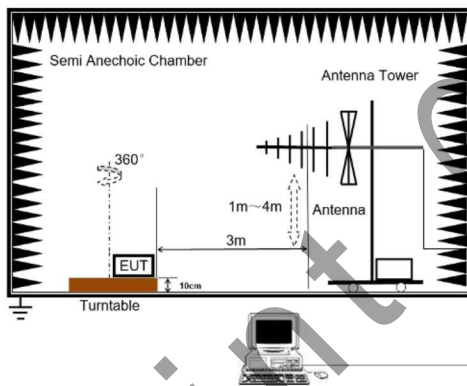
Test Setup:


Figure 1. 30MHz to 1GHz

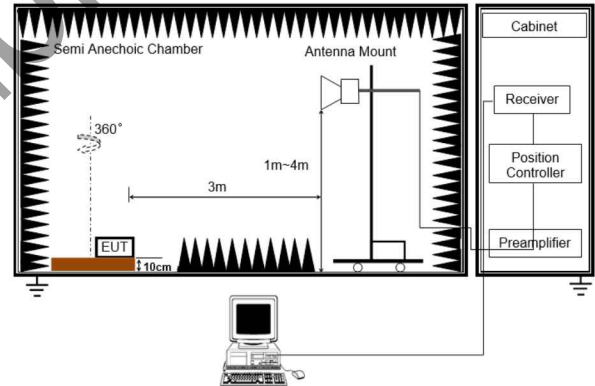


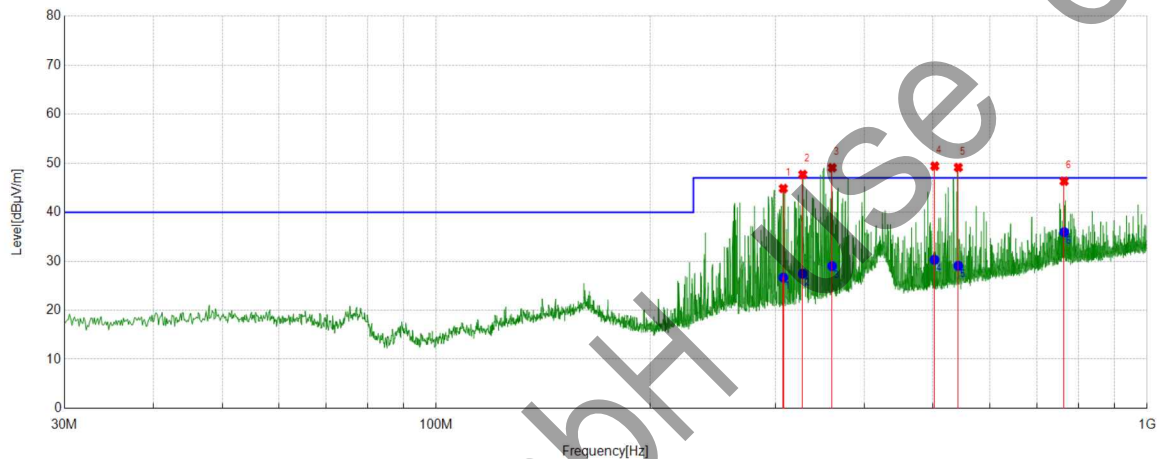
Figure 2. Above 1 GHz

Test Procedure:

1. From 30 MHz to 1GHz test procedure as below:
 - 1) The radiated emissions were tested in a semi-anechoic chamber.
 - 2) The EUT is placed on a non-conductive support, which is 0.1m above ground plane.
 - 3) The non-conductive support shall be rotated for 360 degrees to determine the position of maximum emission level.
 - 4) EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.
 - 5) Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
 - 6) And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
 - 7) Repeat above procedures until the measurements for all frequencies are complete.
2. Above 1GHz test procedure as below:
 - 1) Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber.

Measurement Data
30MHz ~ 1000MHz

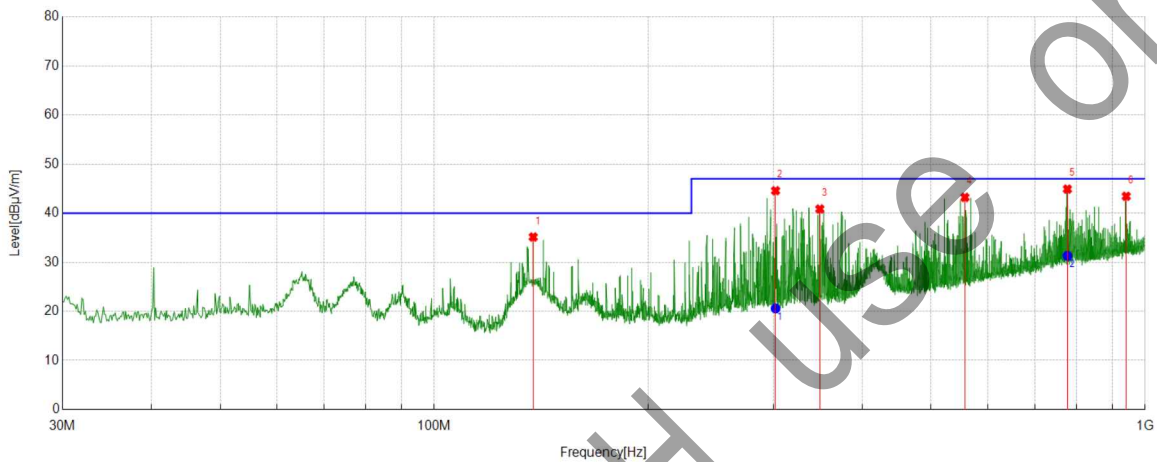
Temperature:	19.1°C
Humidity:	40.7%
ATM pressure:	1021 mbar
Test Date:	11/25/2024
Test Mode:	Mode 18
Polarization:	Horizontal



NO.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Detector
1	307.7514	5.41	21.27	26.68	47.00	20.32	QP
2	327.6423	5.52	21.93	27.46	47.00	19.54	QP
3	360.4126	6.63	22.38	29.01	47.00	17.99	QP
4	502.1967	4.26	26.04	30.30	47.00	16.70	QP
5	542.2505	2.53	26.54	29.07	47.00	17.93	QP
6	764.5396	4.84	31.10	35.94	47.00	11.06	QP

Note: 1. Result Level = Reading Level + Correct Factor.
 2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.

Temperature:	19.1°C
Humidity:	40.7%
ATM pressure:	1021 mbar
Test Date:	11/25/2024
Test Mode:	Mode 18
Polarization:	Vertical

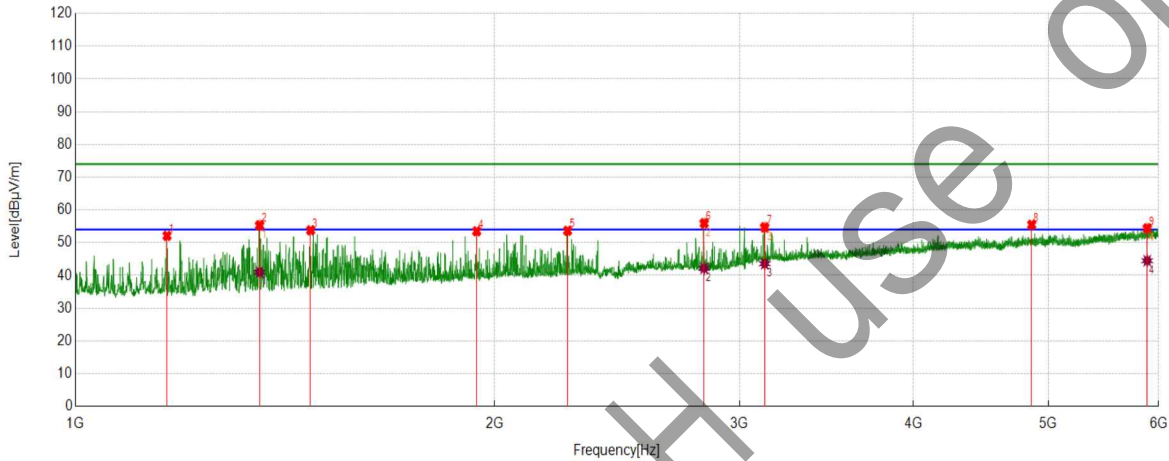


No.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Detector
1	137.8047	15.36	19.78	35.14	40.00	4.86	Peak
2	302.0886	-0.56	21.14	20.58	47.00	26.42	QP
3	348.6848	18.71	22.14	40.85	47.00	6.15	Peak
4	557.8672	16.28	26.93	43.21	47.00	3.79	Peak
5	777.5927	0.16	31.15	31.31	47.00	15.69	QP
6	940.7013	10.57	32.87	43.44	47.00	3.56	Peak

Note: 1. Result Level = Reading Level + Correct Factor.
 2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.

Above 1GHz Part

Temperature:	21.4°C
Humidity:	44.4%
ATM pressure:	1021mbar
Test Date:	12/03/2024
Test Mode:	Mode 9
Polarization:	Horizontal



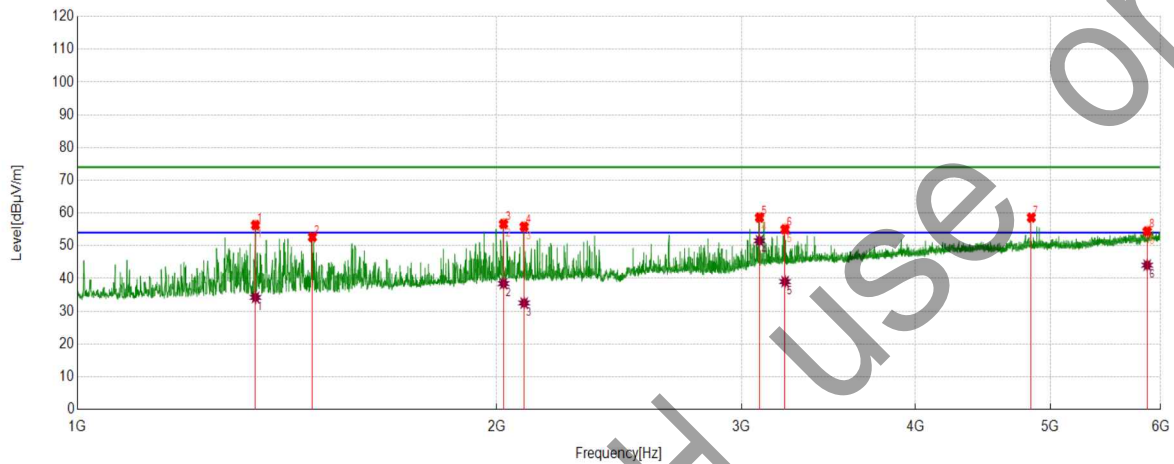
No.	Freq. [MHz]	Reading [dBµV]	Correct Factor [dB/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Detector
1	1163.5164	53.88	-1.78	52.10	74.00	21.90	Peak
2	1356.0356	56.52	-1.22	55.30	74.00	18.70	Peak
		42.24	-1.22	41.02	54.00	12.98	Average
3	1475.5476	53.98	-0.19	53.79	74.00	20.21	Peak
4	1942.0942	50.62	2.87	53.49	74.00	20.51	Peak
5	2257.1257	49.55	4.09	53.64	74.00	20.36	Peak
6	2829.1829	49.46	6.46	55.92	74.00	18.08	Peak
		35.73	6.46	42.19	54.00	11.81	Average
7	3127.2127	45.3	9.32	54.62	74.00	19.38	Peak
		34.25	9.32	43.57	54.00	10.43	Average
8	4863.8864	40.35	15.14	55.49	74.00	18.51	Peak
		36.39	17.92	54.31	74.00	19.69	Peak
9	5887.9888	26.58	17.92	44.50	54.00	9.50	Average

Note: 1. Result Level = Reading Level + Correct Factor.

Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

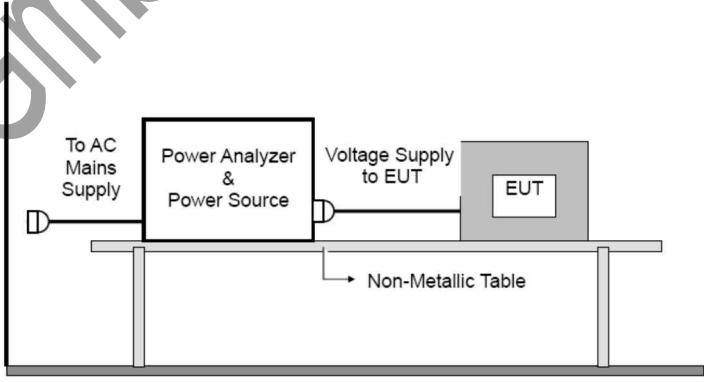
Temperature:	21.4°C
Humidity:	44.4%
ATM pressure:	1021mbar
Test Date:	12/03/2024
Test Mode:	Mode 9
Polarization:	Vertical



No.	Freq. [MHz]	Reading [dBµV]	Correct Factor [dB/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Detector
1	1342.5343	57.47	-1.16	56.31	74.00	17.69	Peak
		35.38	-1.16	34.22	54.00	19.78	Average
2	1475.0475	52.84	-0.20	52.64	74.00	21.36	Peak
3	2023.6024	52.65	4.00	56.65	74.00	17.35	Peak
		34.45	4.00	38.45	54.00	15.55	Average
4	2093.6094	52.13	3.67	55.80	74.00	18.20	Peak
		28.86	3.67	32.53	54.00	21.47	Average
5	3090.2090	49.29	9.28	58.57	74.00	15.43	Peak
		42.26	9.28	51.54	54.00	2.46	Average
6	3223.7224	45.69	9.35	55.04	74.00	18.96	Peak
		29.71	9.35	39.06	54.00	14.94	Average
7	4844.3844	43.30	15.32	58.62	74.00	15.38	Peak
8	5868.4868	36.46	17.90	54.36	74.00	19.64	Peak
		26.17	17.90	44.07	54.00	9.93	Average

- Note: 1. Result Level = Reading Level + Correct Factor.
 Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

6.1.3 HARMONIC EMISSION

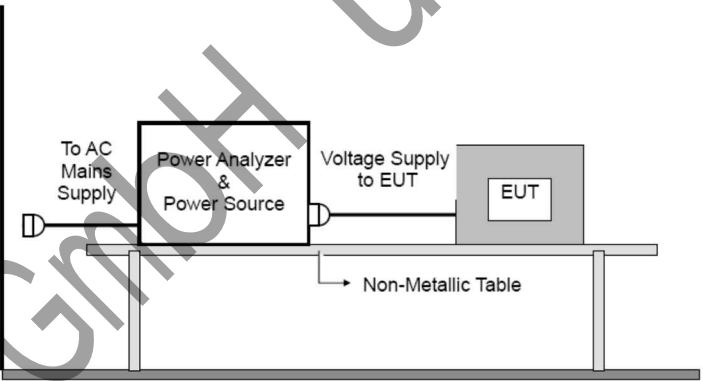
Reference Clause:	ETSI EN 301 489-1 V2.2.3 ETSI EN 301489-17 V3.3.1	
Test Method:	EN 61000-3-2:2014	
Test Mode:	N/A	
Class/Severity:	Class A	
Limits:	Harmonic order n	Maximum permissible harmonic current A
	Odd harmonics	
	3	2.30
	5	1.14
	7	0.77
	9	0.40
	11	0.33
	13	0.21
	15 ≤ n ≤ 39	0.15*15/n
	Even harmonics	
	2	1.08
	4	0.43
	6	0.30
	8 ≤ n ≤ 40	0.23*8/n
Test Setup:		
	<ol style="list-style-type: none"> Measurements were made in a draught-free atmosphere and at an ambient temperature within the range from 20 °C to 27 °C. During measurement the temperature was not vary by more than 1 K. Lamps was aged for at least 100 hat rated voltage. They were operated for at least 15 min before a series of measurements is made. During ageing and measurement, lamps were installed as in normal use. The measurements were carried out under steady conditions. When a piece of EUT is brought into operation or is taken out of operation, manually or automatically, harmonic currents and power are not taken into account at first 10s following the switching event. EUT shall not be in standby mode for more than 10% of any observation period. 	

	<p>4. Harmonics of the fundamental current were measured using a digital power meter with an analogue output and frequency analyser which was integrated in the harmonic & flicker test system.</p> <p>5. For each harmonic order, measure the 1,5 s smoothed r.m.s. harmonic current in each DFT time window and calculate the arithmetic average of the measured values from the DFT time windows, over the entire observation period. Each harmonic order, all 1.5 s smoothed r.m.s. harmonic current values and the average values for the individual harmonic currents, taken over the entire test observation period shall be less than or equal to the applicable limits.</p>
Test Environment:	Temperature: Humidity: ATM pressure: Test Date:

Test Results

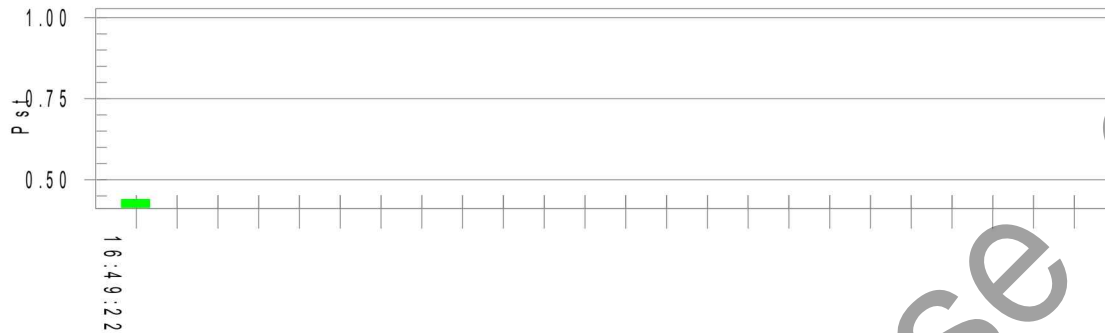
N/A

6.1.4 FLICKER TEST

Reference Clause:	ETSI EN 301 489-1 V2.2.3 ETSI EN 301489-17 V3.3.1		
Test Method:	EN 61000-3-3:2013		
Test Mode	Pretest mode 1 to mode 24, the worst case is mode 15		
Limits:	Test items	Limits(EN 61000-3-3)	Descriptions
	P_{st}	≤1.0, T _p =10min	short-term flicker indicator
	P_{lt}	≤0.65, T _p =2h	long-term flicker indicator
	T_{max}	≤3.3%	relative voltage change characteristic
	d_c	≤3.3%	relative steady-state voltage change
	d_{max}	≤4%(or 6% ^{Note(1)} , 7% ^{Note(2)})	maximum relative voltage change:
	d_(t)	≤3.3%, more than 500ms	relative voltage change characteristic
Test Setup:			
	<ol style="list-style-type: none"> The test supply voltage (open-circuit voltage) was the rated voltage of the EUT. The Test voltage: was maintained within ±2 % of the nominal value. The frequency was 50 Hz ±0.5 %. The voltage fluctuations and flicker were measured at the supply terminals of the EUT. The observation period, T_p, for the assessment of flicker values by flicker measurement, flicker simulation, or analytical method was: <ul style="list-style-type: none"> — for P_{st}, T_p = 10 min; — for P_{lt}, T_p = 2 h. The observation period included that part of the whole operation cycle in which the EUT produces the most unfavorable sequence of voltage changes. 		
Test Environment	Temperature:	23.1°C	
	Humidity:	43.1%	
	ATM pressure:	1027 mbar	
	Test Date:	11/21/2024	

Measurement Data:

Test Mode	Verdict
Mode 15	PASS

Pst_i and limit line
European Limits

Plt and limit line

Parameter values recorded during the test:

Vrms at the end of test (Volt): 230.11

Highest dt (%):

T-max (mS): 0

Highest dc (%): 0.00

Highest dmax (%): 0.00

Highest Pst (10 min. period): 0.439

Highest Plt (2 hr. period): 0.192

Test limit (%):

Test limit (mS): 500.0 Pass

Test limit (%): 3.30 Pass

Test limit (%): 4.00 Pass

Test limit: 1.000 Pass

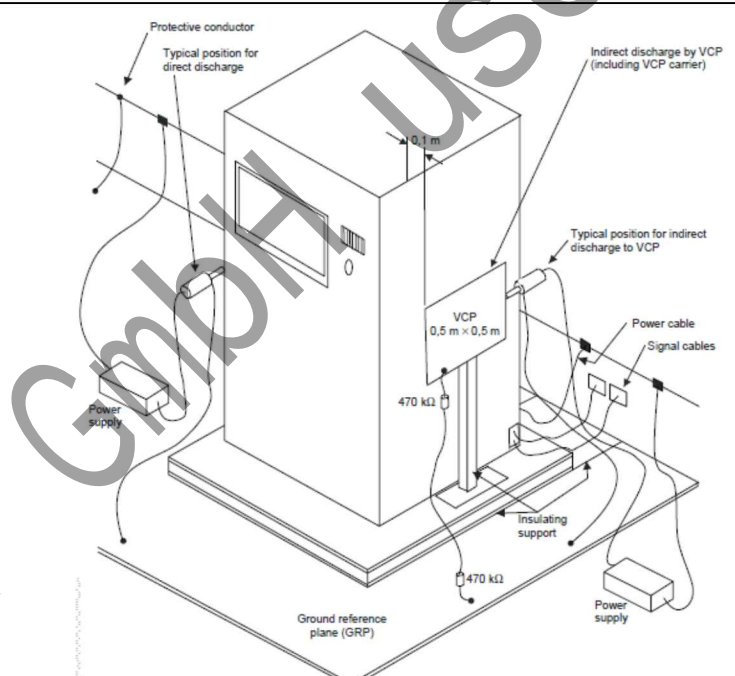
Test limit: 0.650 Pass

6.2 ELECTROMAGNETIC SUSCEPTIBILITY (IMMUNITY)

Performance Criteria of ETSI EN 301489-17 V3.3.1

Class 1 SRD Equipment		
Criteria	During Test	After 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.
Remark: Operate as intended during the test allows a level of degradation in accordance with clause 6.2.2 in the standard.		

6.2.1 ELECTROSTATIC DISCHARGE (ESD)

Reference Clause:	ETSI EN 301 489-1 V2.2.3 ETSI EN 301489-17 V3.3.1
Test Method:	EN 61000-4-2 :2009
Test Mode	Mode 1 to Mode 26
Criterion Required:	B
Discharge Impedance:	330 Ω / 150 pF
Polarity:	Positive & Negative
Number of Discharge:	200 times
Discharge Mode:	Single Discharge
Discharge Period:	1 second minimum
Equipment Used:	Refer to section 5 for details.
Test Setup:	 <p style="text-align: center;">Test set-up for floor-standing equipment</p>
Test Procedure:	<ol style="list-style-type: none"> 1) Contact discharges to the conductive surfaces and to coupling planes: Air discharge at slots and apertures, and insulating surfaces: On those parts of the EUT where it was not possible to perform contact discharge testing, the equipment was investigated to identify user accessible points where breakdown may occur. This investigation was restricted to those areas normally handled by the user. The application of electrostatic discharges to the contacts of open connectors was not required by this standard. 2) The EUT was put on a 0.8m high wooden table for table-top equipment or 0.1m high for floor standing equipment standing on the ground reference plane (GRP). 3) The EUT shall be isolated from the ground reference plane by an insulating support of 0.05 m to 0.15 m thick, The EUT cables shall be isolated from the ground reference plane by an insulating support of (0,5 ± 0,05) mm. The

	<p>VCP 0.5m by 0.5m in size was constructed from the same material type & think mess as that of the GRP and connected to the GRP via a 470kΩ resistor at each end. The distance between EUT and any of the other metallic surfaces excepted the GRP and VCP was greater than 1m.</p> <p>4) During the contact discharges, the tip of the discharge electrode was touch the EUT before the discharge switch is operated. During the air discharges, the round discharge tip of the discharge electrode was approached as fast as possible to touch the EUT.</p> <p>5) After each discharge, the ESD generator was removed from the EUT, the generator was then retriggered for a new single discharge. For ungrounded product, a discharge cable with two resistances was used after each discharge to remove remnant electrostatic voltage. 10 times of each polarity single discharge were applied to HCP and VCP.</p>
Observations:	<p>Test Point:</p> <ol style="list-style-type: none"> 1. All insulated part of indicator lights and seams. 2. All accessible metal parts of the enclosure. 3. All sides.
Test Environment	<p>Temperature: 22.1°C</p> <p>Humidity: 52.9%</p> <p>ATM pressure: 1019 mbar</p> <p>Test Date: 11/13/2024</p>

Test Results:

Direct Application Test Results				
Test Point:				
<ol style="list-style-type: none"> All insulated enclosure & seams. All accessible metal parts of the enclosure 				
Direct Application			Test Results	
Discharge Level (kV)	Pulse No.	Test Point	Contact Discharge	Air Discharge
± 2,4,8	10 for every level	1	N/A	A
± 4	10 for every level	2	A	N/A
Indirect Application for tabletop equipment Test Results				
Test Point:				
<ol style="list-style-type: none"> All sides. 				
Indirect Application			Test Results	
Discharge Level (kV)	Pulse No.		Horizontal Coupling	Vertical Coupling
± 4	10 for every level		N/A	A
Results: Pass				
A: No loss of function was observed during the test.				
The indirect discharging of horizontal coupling is not applicable because the EUT is floor-standing equipment				
N/A: Not Applicable				

6.2.2 RADIATED IMMUNITY

Reference Clause:	ETSI EN 301 489-1 V2.2.3 ETSI EN 301489-17 V3.3.1
Test Method:	EN 61000-4-3:2006+A1:2008+A2:2010
Test Mode	Mode 1 to Mode 26
Criterion Required:	A
Test Setup:	

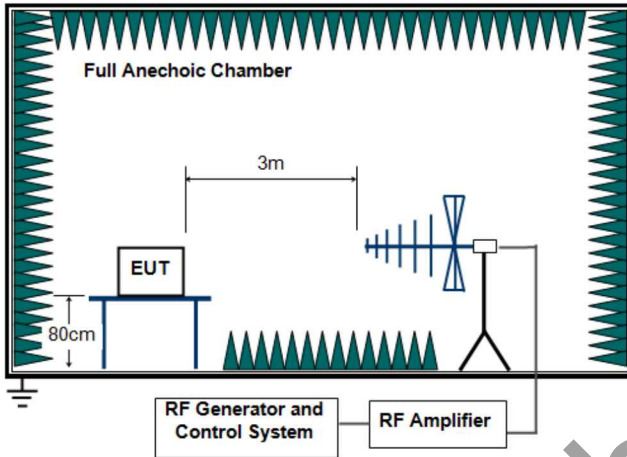


Figure 1. 80MHz to 1GHz

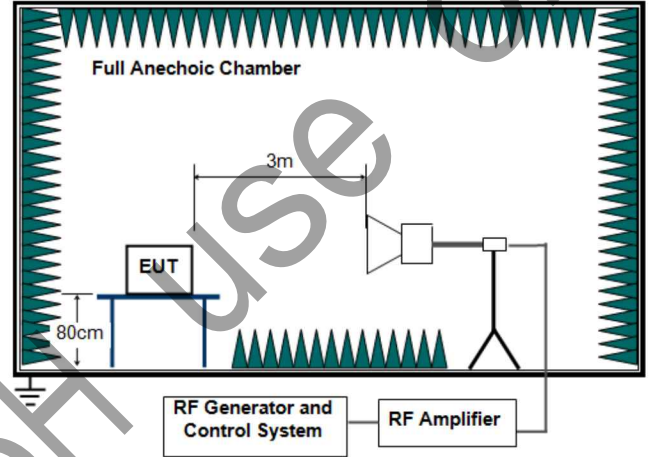


Figure 2. 1GHz to 6GHz

Test Procedure:

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

	the performance of the EUT.
Test Environment	Temperature: 19.1°C Humidity: 40.7% ATM pressure: 1021 mbar Test Date: 11/28/2024

Expoint GmbH use only

Test Results:

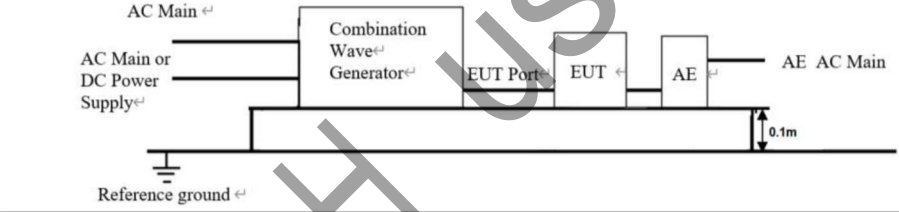
Frequency	Level	Modulation	Dwell Time	Antenna Polarization	EUT Face	Result / Observations
80MHz-6GHz	3 V/m	1 kHz, 80% Amp. 1 % increment	3s	V	Front	A
				H		A
				V	Rear	A
				H		A
				V	Left	A
				H		A
				V	Right	A
				H		A

Results: Pass

Note:

A: No loss of function was observed during the test.
 Exclusion bands: for 2.4GHz: 2280 ~ 2603.5MHz

6.2.3 ELECTRICAL FAST TRANSIENTS (EFT)

Reference Clause:	ETSI EN 301 489-1 V2.2.3 ETSI EN 301489-17 V3.3.1
Test Method:	EN 61000-4-4:2012
Test Level:	±1.0kV on AC port ±0.5kV on Signal port
Polarity:	Positive & Negative
Repetition Frequency:	5kHz
Burst Period:	300ms
Test Duration:	2 minute per level & polarity
Test Mode	Mode 1 to Mode 24
Test Setup:	
Test Procedure:	<ol style="list-style-type: none"> 1) The EUT was placed on a ground reference plane (GRP) insulated by an insulating support 0.1m thick and the GRP was placed on a 0.8m high wooden table for table-top equipment. For floor standing equipment, the EUT was placed on a 0.1m high wooden support above the GRP. 2) The GRP shall project beyond the EUT and the clamp by at least 0.1m on all sides. The distance between the EUT and any other of the metallic surface except the GRP was greater than 0.5m. All cables to the EUT was placed on the insulation support 0.1m above GRP. A cable not subject to EFT was routed as far as possible from cable under test to minimize the coupling between the cables. 3) The length of signal and power cable between the EUT and EFT generator was 0.5m. If the cable is a non-detachable supply cable more than 0.5m, the excess length of this cable shall be folded to avoid a flat coil and situated at a distance of 0.1m above the GRP. 4) The EUT was conducted the below specified test voltages for line and neutral or line, neutral and earth simultaneously (for telecommunication, single, control and DC port line with capacitive coupling clamp), 120 seconds duration. If the equipment contains identical ports, only one was tested; multicopper cables, such as a 50-pair telecommunication cable, were tested as a single cable. Cables did not be split or divided into groups of conductors for this test; interface ports, which were intended by the manufacturer to be connected to data cables not longer than 3 m, did not be tested.
Test Environment	Temperature: 22.1°C Humidity: 52.9% ATM pressure: 1019 mbar Test Date: 11/13/2024

Test Results:

Test Results:			
Lead under Test	Level (±kV)	Coupling Direct/Clamp	Observations (Performance Criterion)
AC power port	1.0	Direct	A

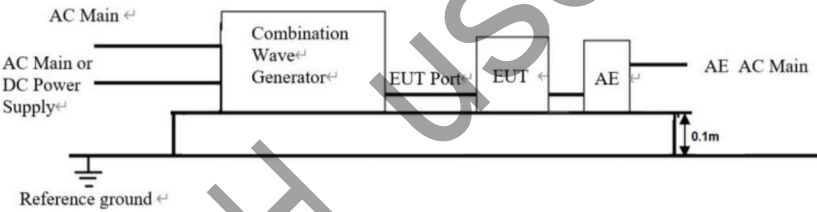
Results: Pass

Note:

A: No loss of function was observed during the test.

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6.2.4 SURGE IMMUNITY

Reference Clause:	ETSI EN 301 489-1 V2.2.3 ETSI EN 301489-17 V3.3.1
Test Method:	EN 61000-4-5:2014+A1:2017
Test Level:	±1 kV Line-to-Line, ±2 kV Line-to-Ground ± 0.5/1.0 kV Signal port
Criterion Required:	B
Polarity:	Positive & Negative
Interval:	60s between each surge
No. of Surges:	5 positive & 5 negative at 0°, 90°, 180°, 270°.
Test Mode	Mode 1 to Mode 24
Test Setup:	
Test Procedure:	<ol style="list-style-type: none"> 1) The EUT was placed on a ground reference plane (GRP) insulated by an insulating support 0.1 m thick and the GRP was placed on a 0.8m high wooden table for table-top equipment. For floor standing equipment, the EUT was placed on a 0.1m high wooden support above the GRP. 2) The 1.2/50 μs surge was to be applied to the EUT power supply terminals via the capacitive coupling network. Decoupling networks were required in order to avoid possible adverse effects on equipment not under test that may be powered by the same lines and to provide sufficient decoupling impedance to the surge wave so that the specified wave may be applied on the lines under test. 3) The power cord between the EUT and the coupling/decoupling network was not exceed 2 m in length. The interconnection line between the EUT and the coupling/ decoupling network shall not exceed 2 m in length. 4) The EUT was conducted 0.5 kV and 1 kV test voltage for line to line and line to neutral and conducted 0.5 kV, 1 kV and 2 kV test voltage for line to earth and neutral to earth, five positive pulses and five negative pulses each at 0°, 90°, 180° and 270° for a.c. power ports and five positive pulses and five negative surge pulses for d.c. power ports (for telecommunication port, It was 0.5 kV for indoor cable longer than 10m line to ground and 0.5kV, 1kV test voltage for outdoor cable line to ground, five positive pulses and five negative surge pulses), The test levels were applied on the EUT with a 2 Ω generator source impedance for power supply terminals and 40Ω output impedance for interconnection lines. The tests were done at repetition rate one per minute.
Test Environment	Temperature: 22.1°C Humidity: 52.9% ATM pressure: 1019 mbar Test Date: 11/13/2024

Test Results:

Line-Line	Level (kV)	Surge Interval	Phase (deg)	Observation (Performance Criterion)
L-N	±0.5	60 s	0°	A
L-N	±0.5	60 s	90°	A
L-N	±0.5	60 s	180°	A
L-N	±0.5	60 s	270°	A
L-N	±1.0	60 s	0°	A
L-N	±1.0	60 s	90°	A
L-N	±1.0	60 s	180°	A
L-N	±1.0	60 s	270°	A
L-PE	±0.5	60 s	0°	A
L-PE	±0.5	60 s	90°	A
L-PE	±0.5	60 s	180°	A
L-PE	±0.5	60 s	270°	A
L-PE	±1.0	60 s	0°	A
L-PE	±1.0	60 s	90°	A
L-PE	±1.0	60 s	180°	A
L-PE	±1.0	60 s	270°	A
L-PE	±2.0	60 s	0°	A
L-PE	±2.0	60 s	90°	A
L-PE	±2.0	60 s	180°	A
L-PE	±2.0	60 s	270°	A
N-PE	±0.5	60 s	0°	A
N-PE	±0.5	60 s	90°	A
N-PE	±0.5	60 s	180°	A
N-PE	±0.5	60 s	270°	A
N-PE	±1.0	60 s	0°	A
N-PE	±1.0	60 s	90°	A
N-PE	±1.0	60 s	180°	A
N-PE	±1.0	60 s	270°	A
N-PE	±2.0	60 s	0°	A
N-PE	±2.0	60 s	90°	A
N-PE	±2.0	60 s	180°	A
N-PE	±2.0	60 s	270°	A
L-N-PE	±0.5	60 s	0°	A
L-N-PE	±0.5	60 s	90°	A
L-N-PE	±0.5	60 s	180°	A
L-N-PE	±0.5	60 s	270°	A
L-N-PE	±1.0	60 s	0°	A
L-N-PE	±1.0	60 s	90°	A
L-N-PE	±1.0	60 s	180°	A
L-N-PE	±1.0	60 s	270°	A
L-N-PE	±2.0	60 s	0°	A
L-N-PE	±2.0	60 s	90°	A
L-N-PE	±2.0	60 s	180°	A
L-N-PE	±2.0	60 s	270°	A

Results: Pass

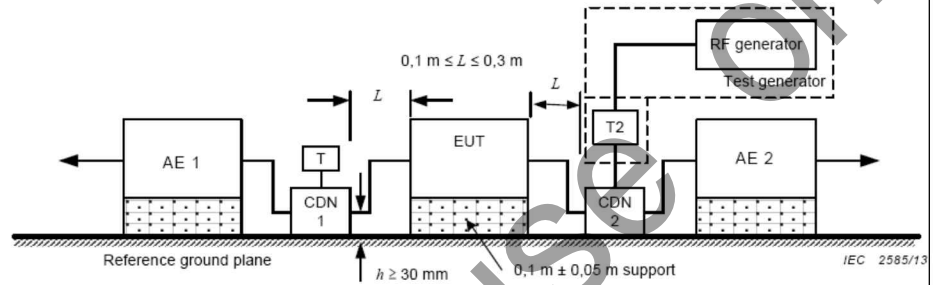
Note:

A: No loss of function was observed during the test.

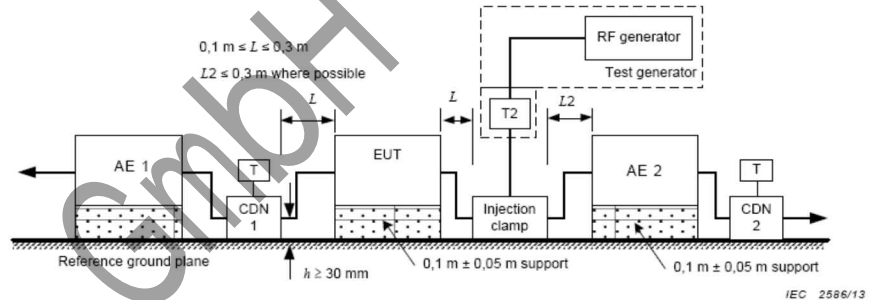
6.2.5 CONDUCTED IMMUNITY

Reference Clause:	ETSI EN 301 489-1 V2.2.3 ETSI EN 301489-17 V3.3.1
Test Method:	EN 61000-4-6:2014
Criterion Required:	A
Test Mode	Mode 1 to Mode 24

Test Setup:



Schematic setup for immunity test used for CDN



Schematic setup for immunity test used for injection clamp

- T Termination 50 Ω
- T2 Power attenuator (6 dB)
- CDN Coupling and decoupling network
- Injection clamp: Current clamp or EM clamp

Test Procedure:

- 1) The EUT was placed on an insulating support of 0.1m height above a ground reference Plane, arranged and connected to satisfy its functional requirement. All cables exiting the EUT was supported at a height of at least 30 mm above the ground reference plane.
- 2) The coupling and decoupling devices were required; they were located between 0.1m and 0.3m from the EUT. This distance was to be measured horizontally from the projection of the EUT on to the ground reference plane to the coupling and decoupling device.
- 3) Each AE, used with clamp injection, shall be placed on an insulating support 0.1m above the ground reference plane. A decoupling network shall be installed on each cable between the EUT and AE except the cable under test. All cables connected to each AE, other than those being connected to the EUT, shall be provided with decoupling networks. The decoupling networks connected to each AE (except those on cables between the EUT and AE) shall be applied no further than 0.3m from the AE. The cable(s) between the AE and the decoupling network (s) or in between the AE and the injection clamp shall not be bundled nor wrapped

	<p>and shall be kept between 30mm and 50mm above the ground reference plane.</p> <p>4) The frequency range was swept from 150 kHz to 80MHz, using the signal levels established during the setting process, and with the disturbance signal 80 % amplitude modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or to change coupling devices as necessary. Where the frequency was swept incrementally, the step size does not exceed 1% of the preceding frequency value. The dwell time of the amplitude modulated carrier at each frequency was not less than the time necessary for the EUT to be exercised and to respond, and was not less than 0.5 s.</p>
<p>Test Environment</p>	<p>Temperature: 22.1 °C</p> <p>Humidity: 52.9%</p> <p>ATM pressure: 1019 mbar</p> <p>Test Date: 11/13/2024</p>

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Test Results:

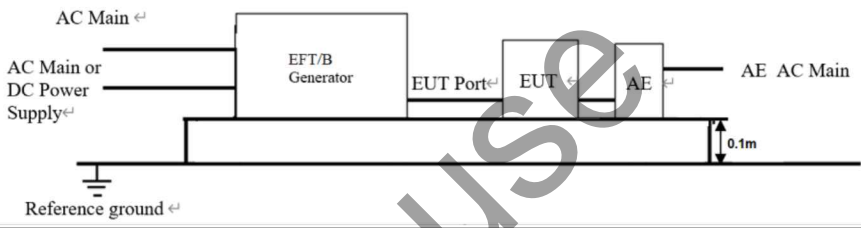
Test Results:						
Frequency	Line	Test Level	Modulation	Step Size	Dwell Time	Observation (Performance Criterion)
150 kHz to 80 MHz	AC power port	3V	1 kHz, 80%, Amp. Mod	1%	3s	A

Results: Pass

Note:

A: No loss of function was observed during the test.

6.2.6 VOLTAGE DIPS AND INTERRUPTIONS

Reference Clause:	ETSI EN 301 489-1 V2.2.3 ETSI EN 301489-17 V3.3.1
Test Method:	EN IEC 61000-4-11:2020
Test Level:	1) Voltage dip: 0 % residual voltage for 0.5 cycle; 2) Voltage dip: 0 % residual voltage for 1 cycle; 3) Voltage dip: 70 % residual voltage for 25 cycles; 4) Voltage interruption: 0 % residual voltage for 250 cycles.
No. of Dips / Interruptions:	3 per Level
Test Mode	Mode 1 to Mode 24
Test Setup:	
Test Procedure:	<ol style="list-style-type: none"> 1) The EUT was placed on a ground reference plane (GRP) insulated by an insulating support 0.1 m thick and the GRP was placed on a 0.8m high wooden table for table-top equipment. For floor standing equipment, the EUT was placed on a 0.1m high wooden support above the GRP. 2) The test was performed with the EUT connected to the test generator with the shortest power supply cable as specified by the EUT manufacturer. 3) The EUT was tested for each selected combination of test level and duration with a sequence of three dips /interruptions with intervals of 10 s minimum. Each representative mode of operation was tested. 4) For EUT with more than one power cord, each power cord was tested individually.
Test Environment	Temperature: 22.1°C Humidity: 52.9% ATM pressure: 1019 mbar Test Date: 11/13/2024

Test Results:

$U_T = 230V/50Hz$					
Test Level % U_T	Phase	Duration of drop out in Periods	No. of drop out	Time between drop out	Observations (Performance Criterion)
0	0° & 180°	0.5	3	10s	A
0	0° & 180°	1	3	10s	A
70	0° & 180°	25	3	10s	A
0	0° & 180°	250	3	10s	B

Results: Pass

Note:

A: No loss of function was observed during the test.

B: During the voltage level 100% interrupted test, after duration of 250 periods, the EUT will recover charging

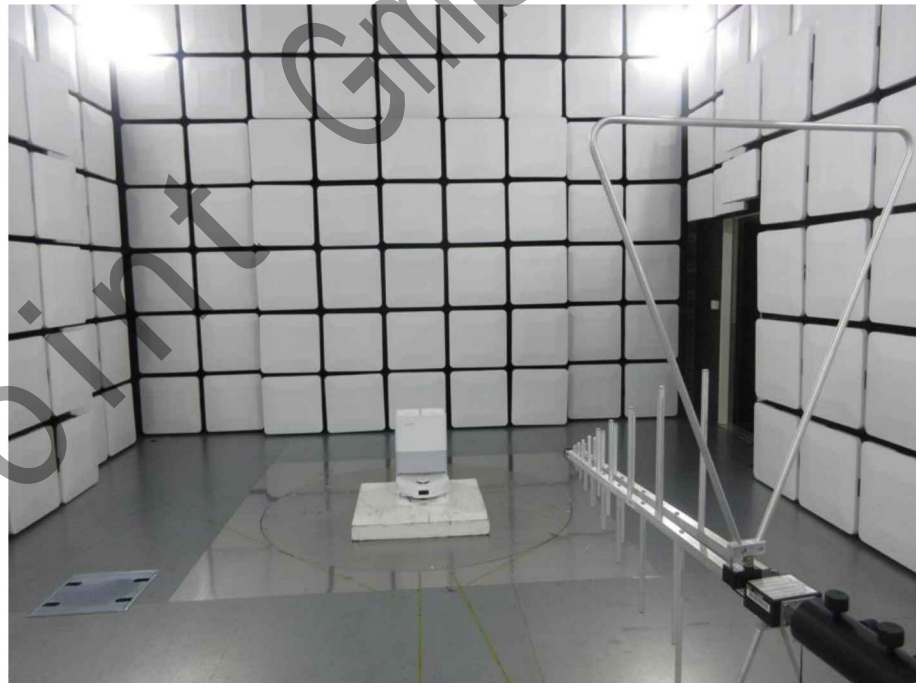
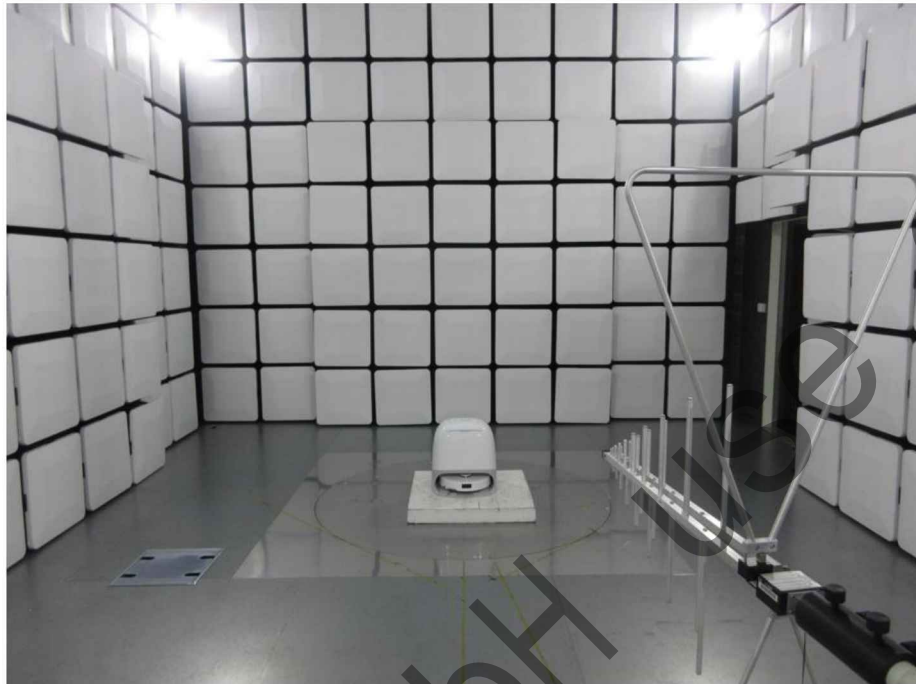
7 PHOTOGRAPHS OF EMC TEST CONFIGURATION

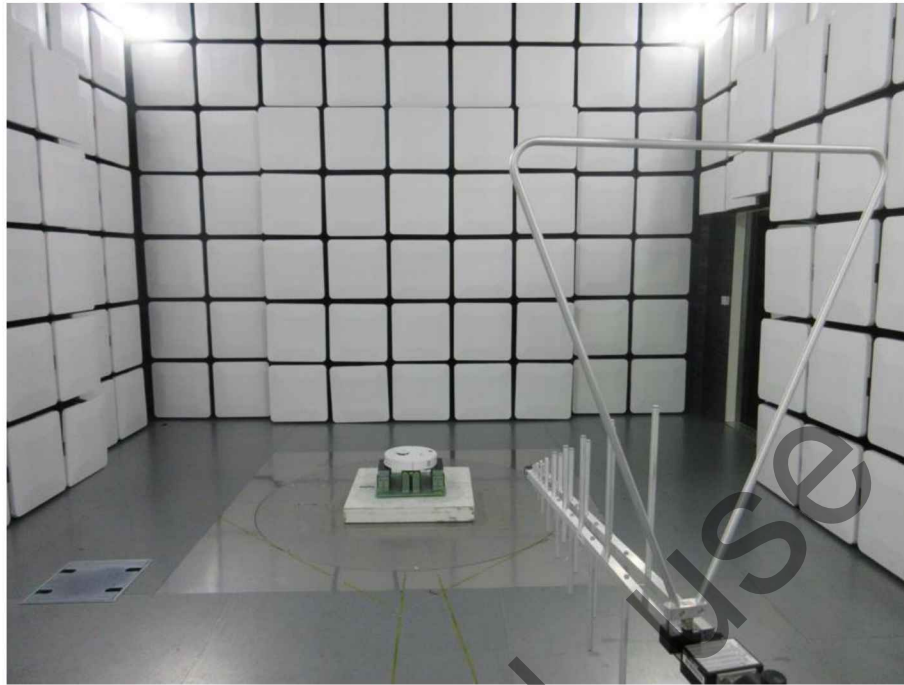
7.1 CONDUCTED EMISSION TEST SETUP



7.2 RADIATED EMISSION TEST SETUP

30MHz ~ 1000MHz

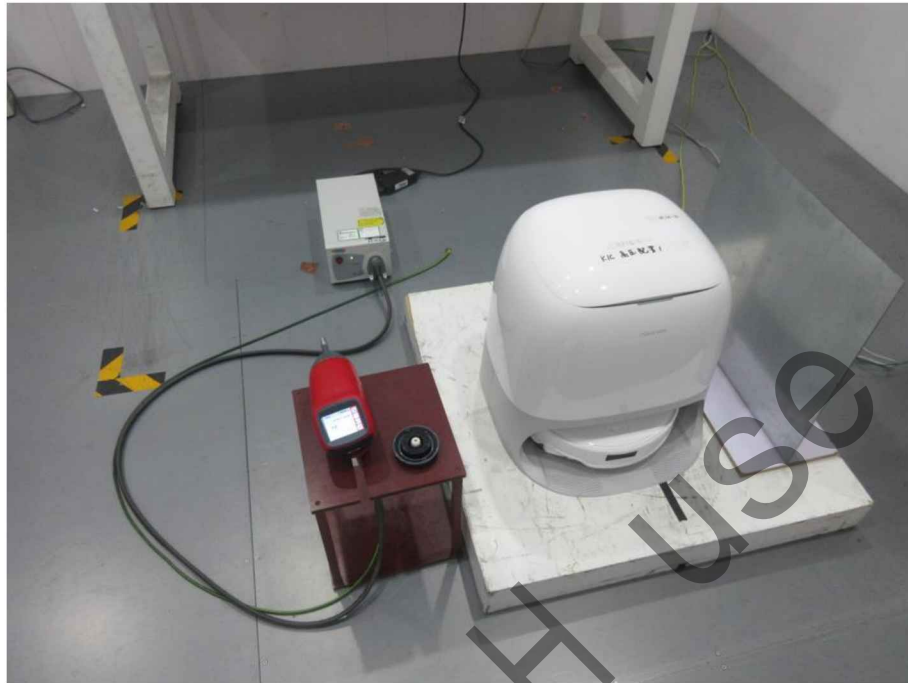


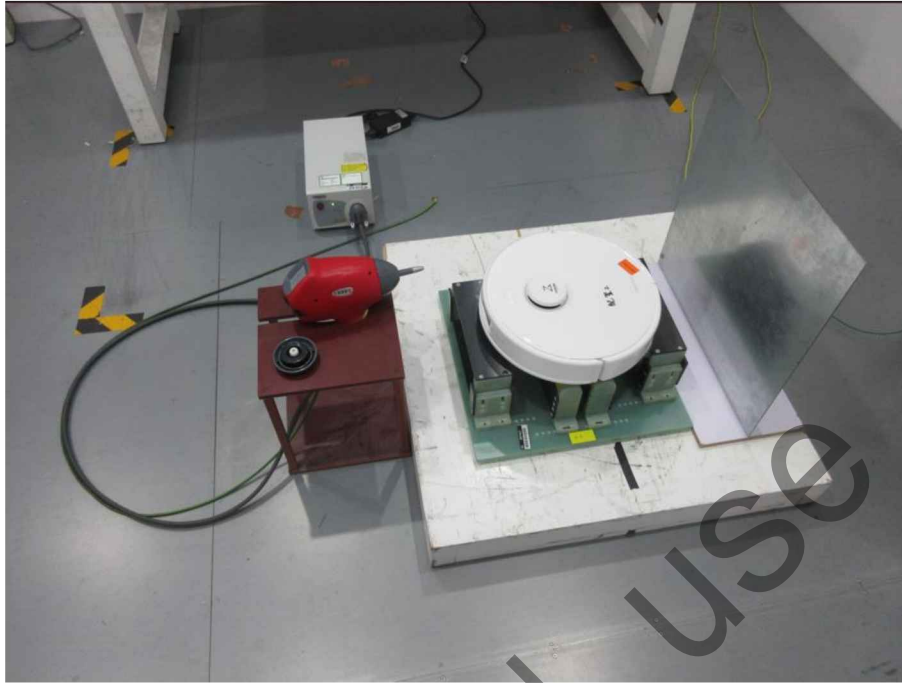


7.3 HARMONIC CURRENT & VOLTAGE FLUCTUATION AND FLICK MEASUREMENT



7.4 ESD

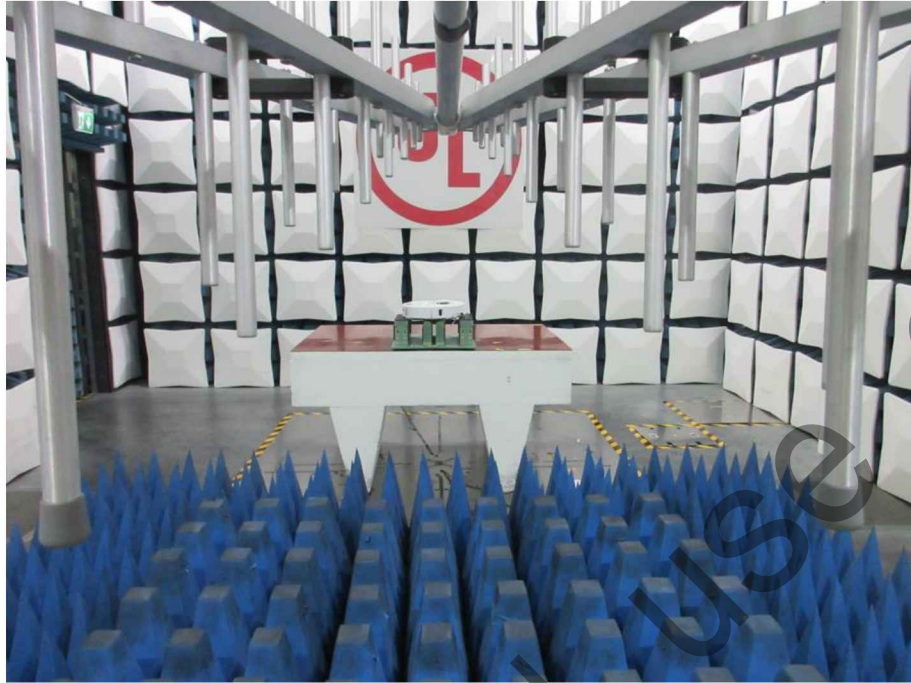




7.5 RADIO FREQUENCY ELECTROMAGNETIC FIELD IMMUNITY

Below 1GHz





ekpoint GmbH use on,

Above 1GHz





7.6 ELECTRICAL FAST TRANSIENT/BURST/SURGE/DIPS



7.7 CONDUCTED IMMUNITY



8 PHOTOGRAPHS OF THE EUT

Sample 1 (EUT with a design scheme)

External Photo:

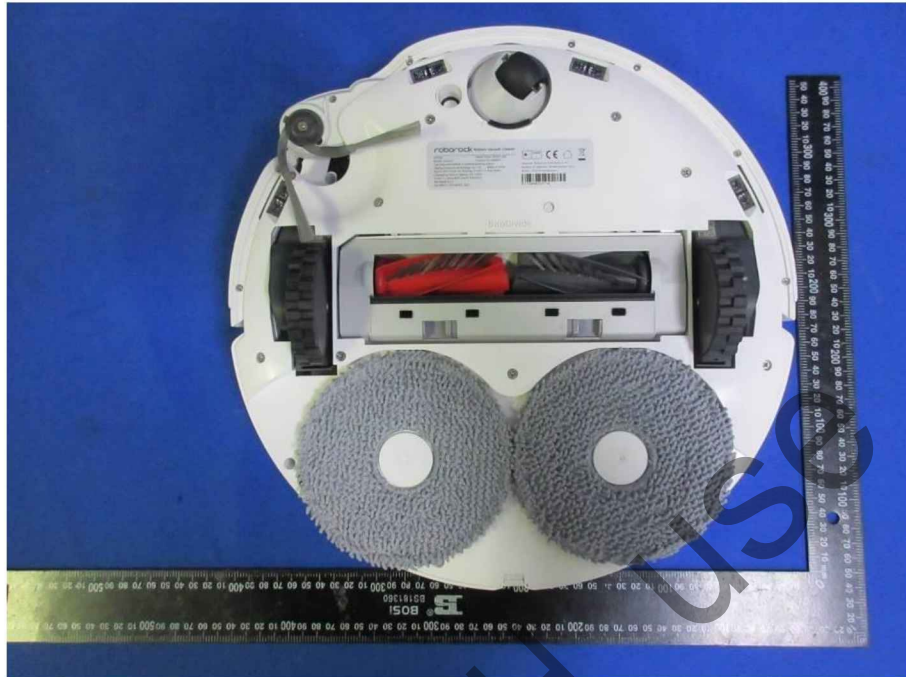
All View of EUT



Top View of EUT



Bottom View of EUT



Front View of EUT



Back View of EUT



Left View of EUT

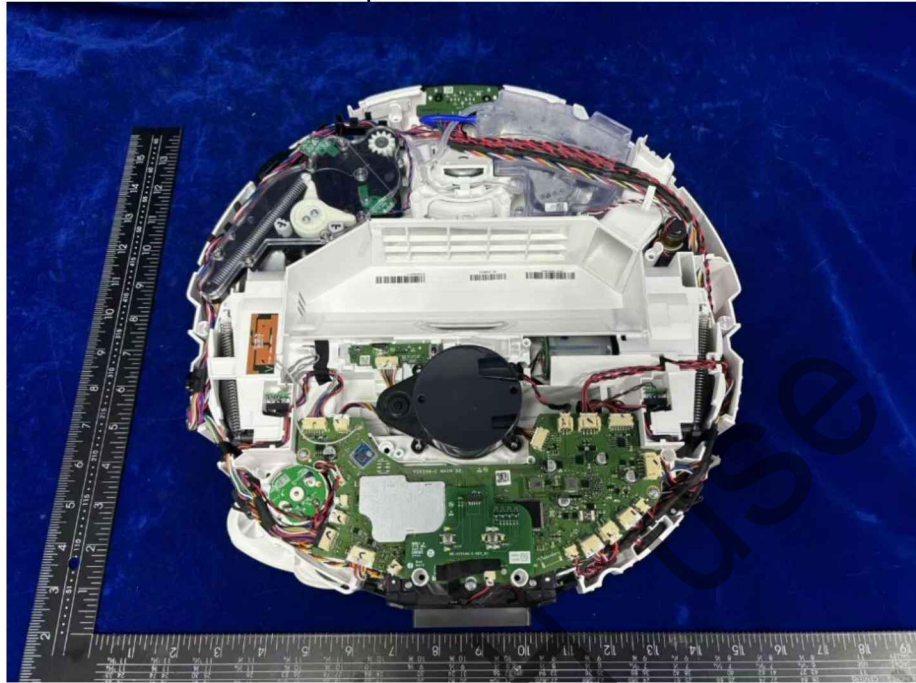


Right View of EUT

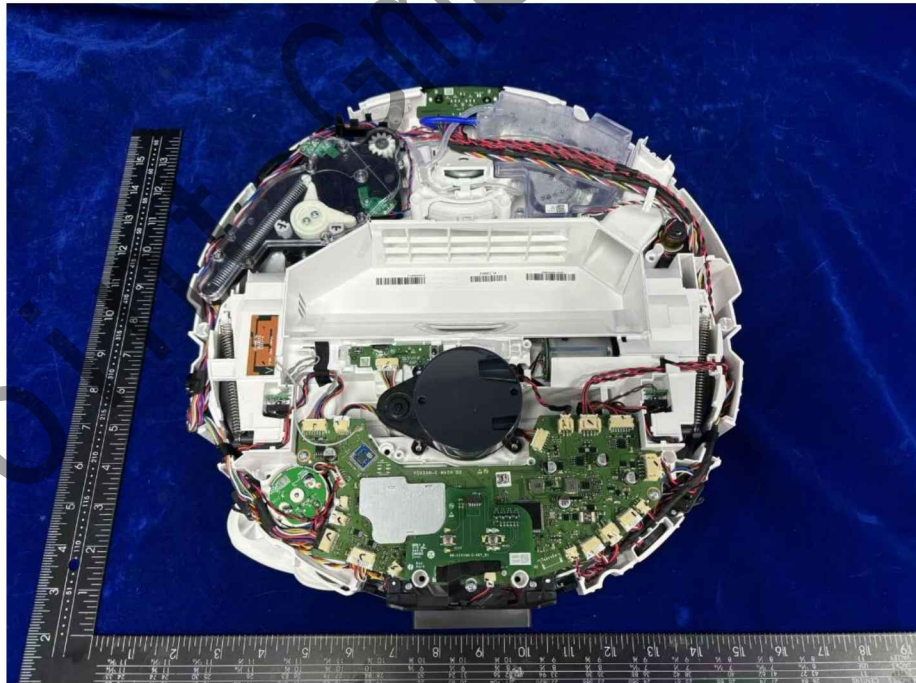


Internal Photo:

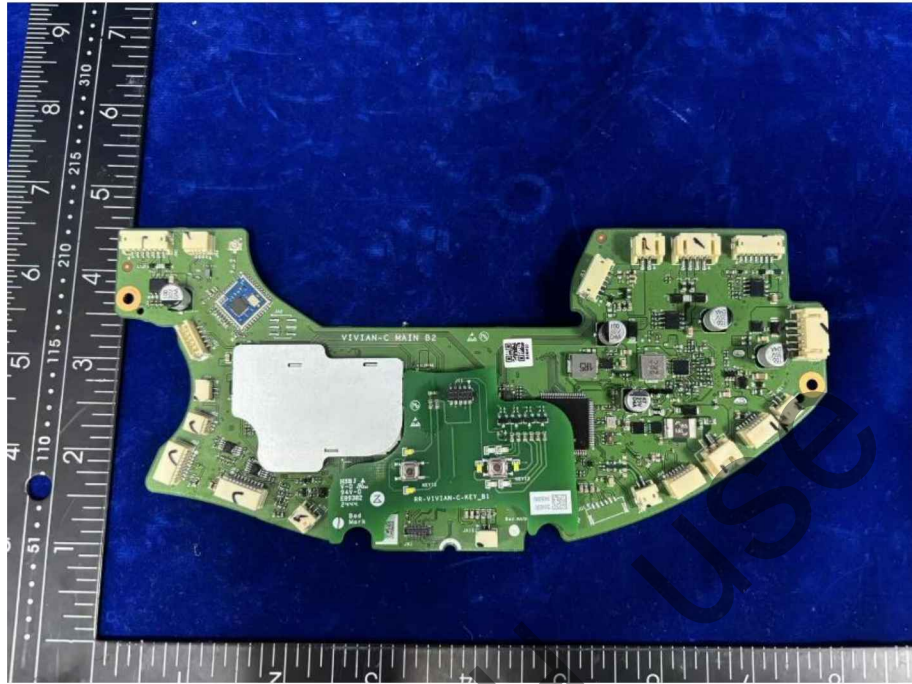
Open View of EUT



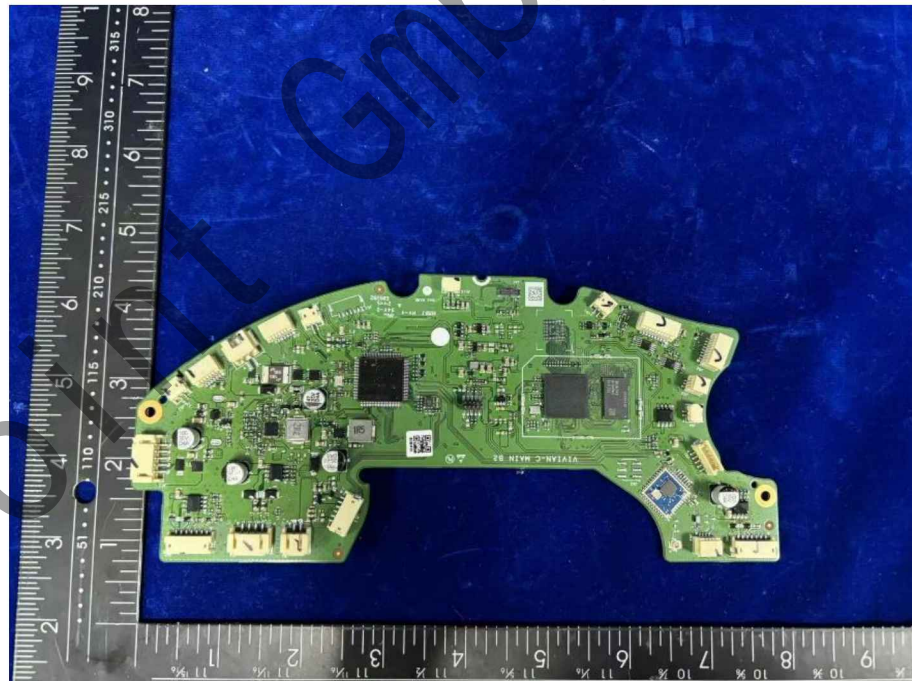
Internal View of EUT-1



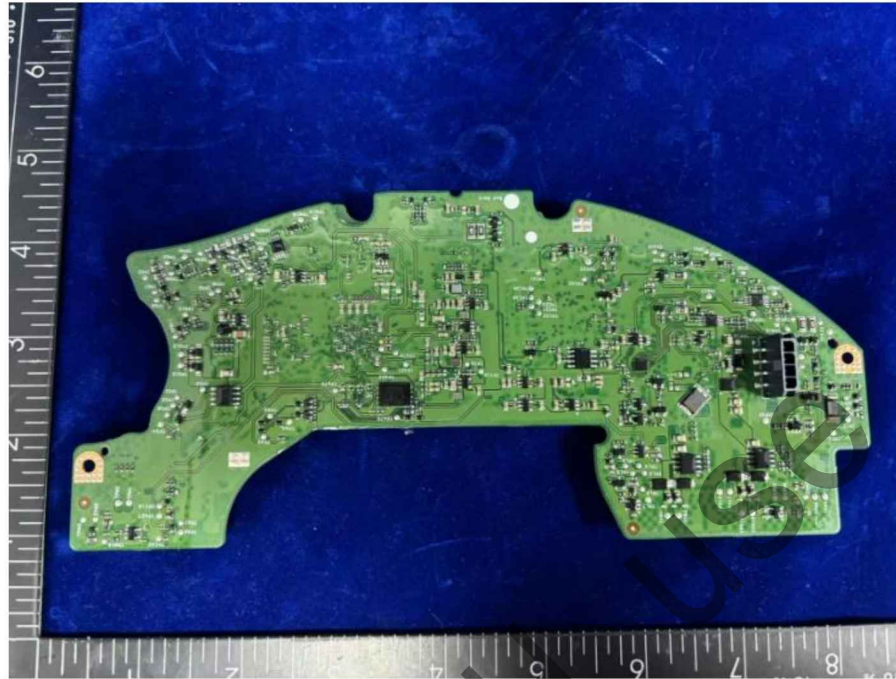
Internal View of EUT-2



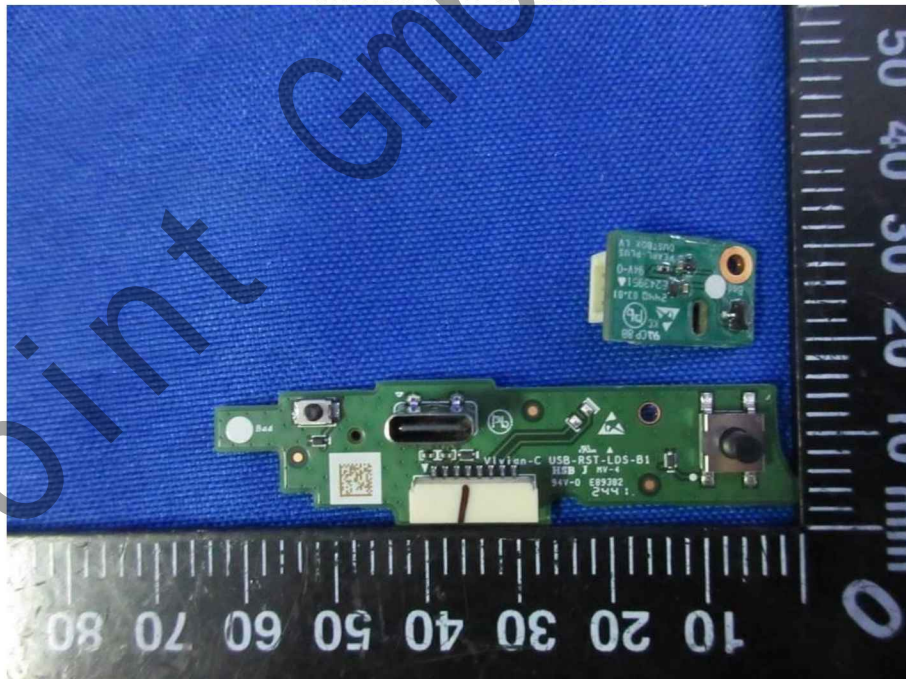
Internal View of EUT-3



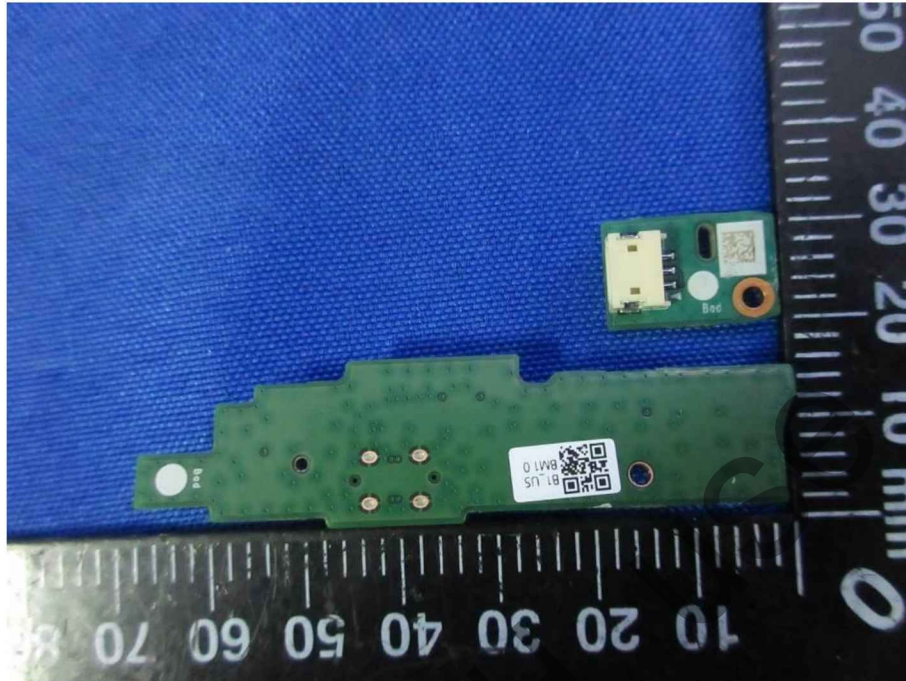
Internal View of EUT-4



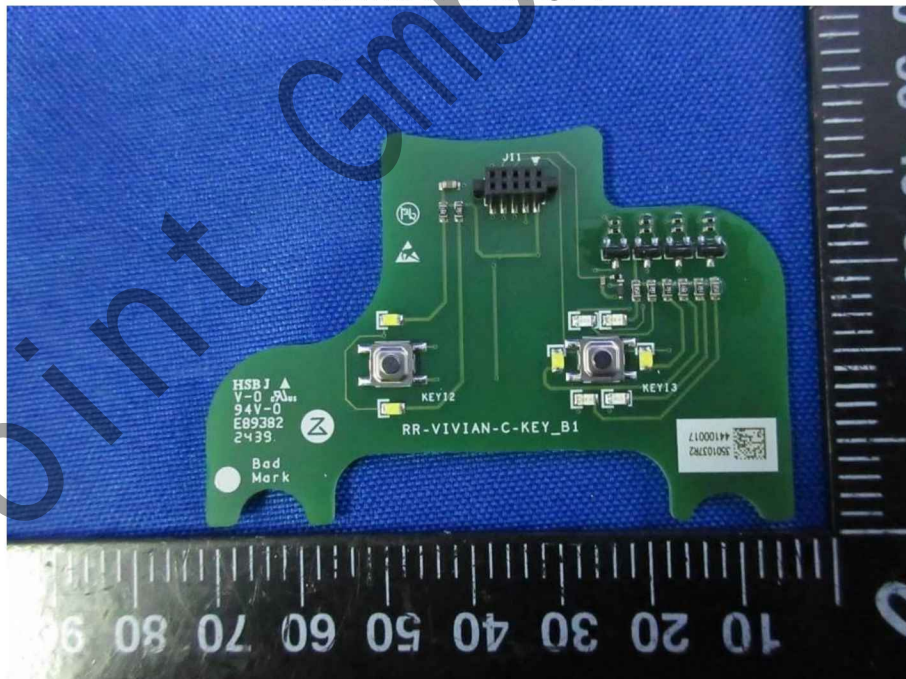
Internal View of EUT-5



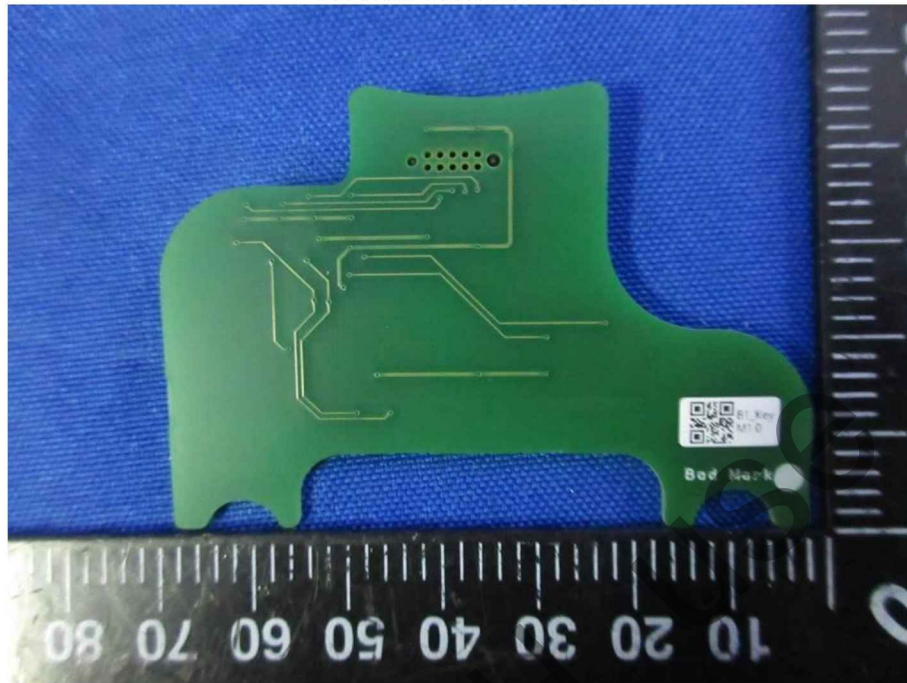
Internal View of EUT-6



Internal View of EUT-7



Internal View of EUT-8



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Sample 2 (EUT with another design scheme)

External Photo:

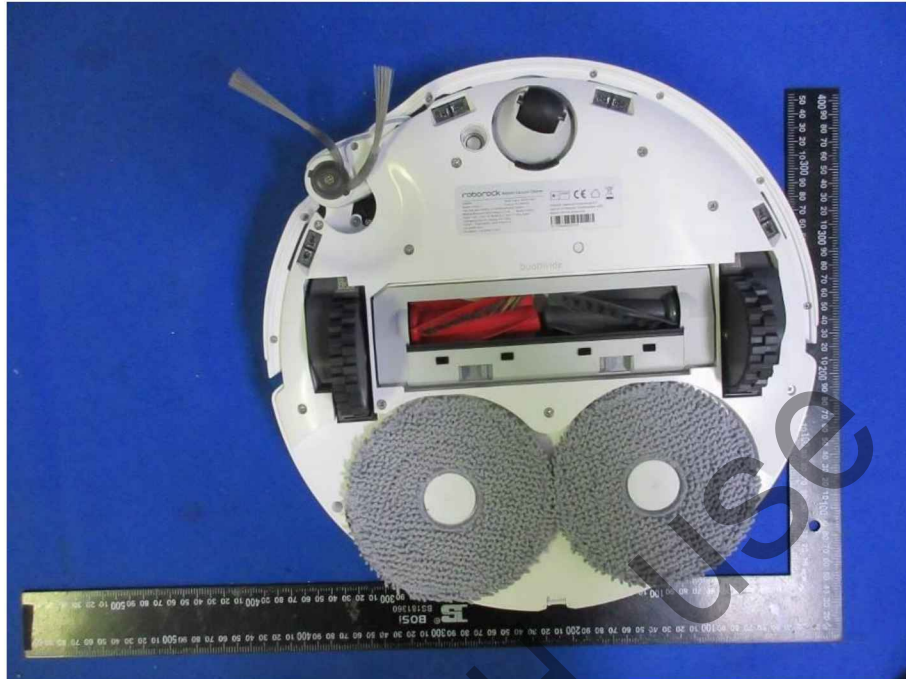
All View of EUT



Top View of EUT



Bottom View of EUT



Front View of EUT



Back View of EUT



Left View of EUT



Right View of EUT



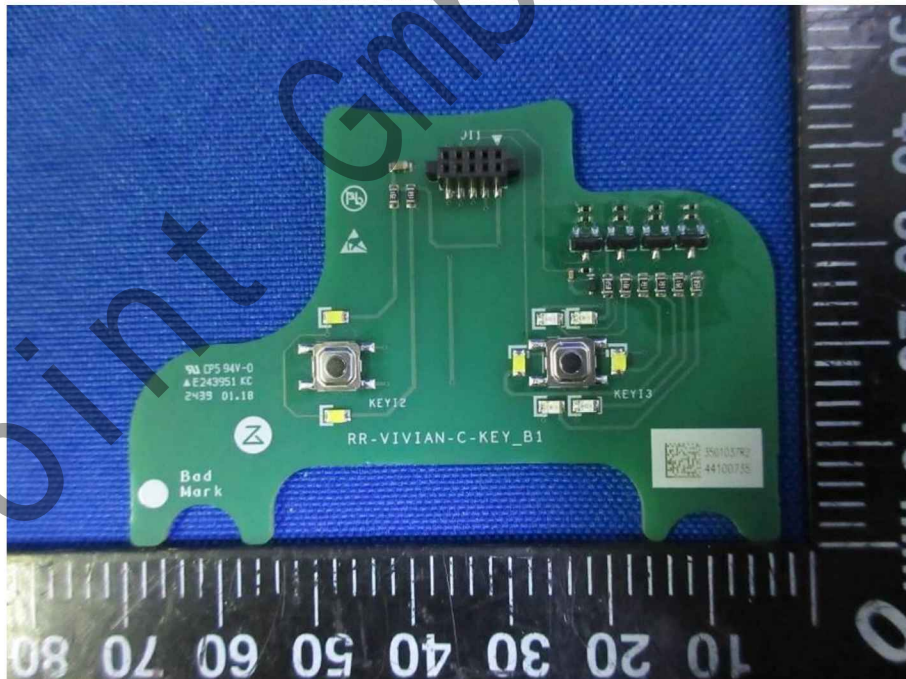
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Internal Photo:

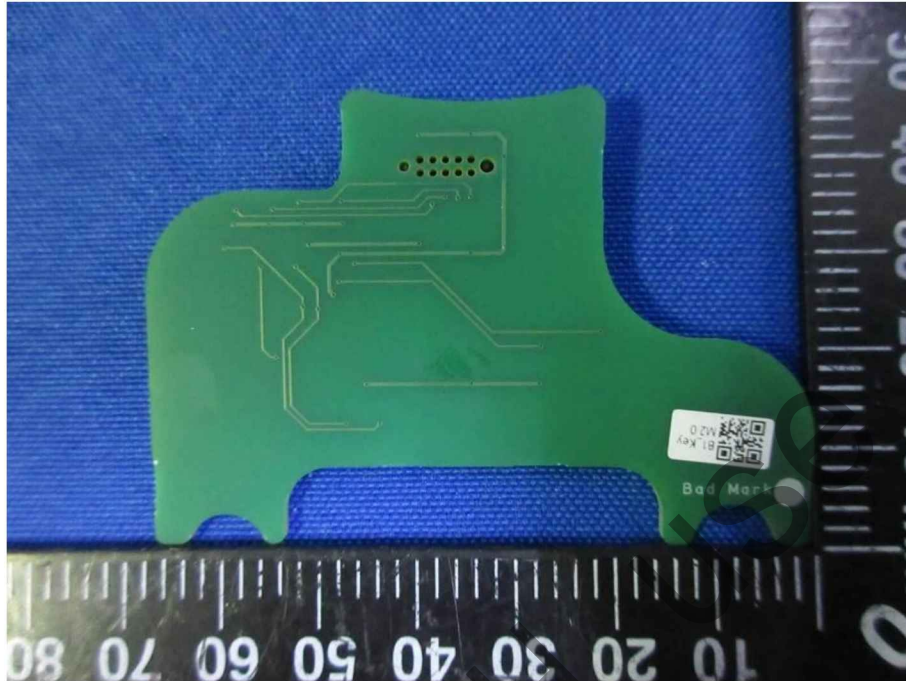
Open View of EUT



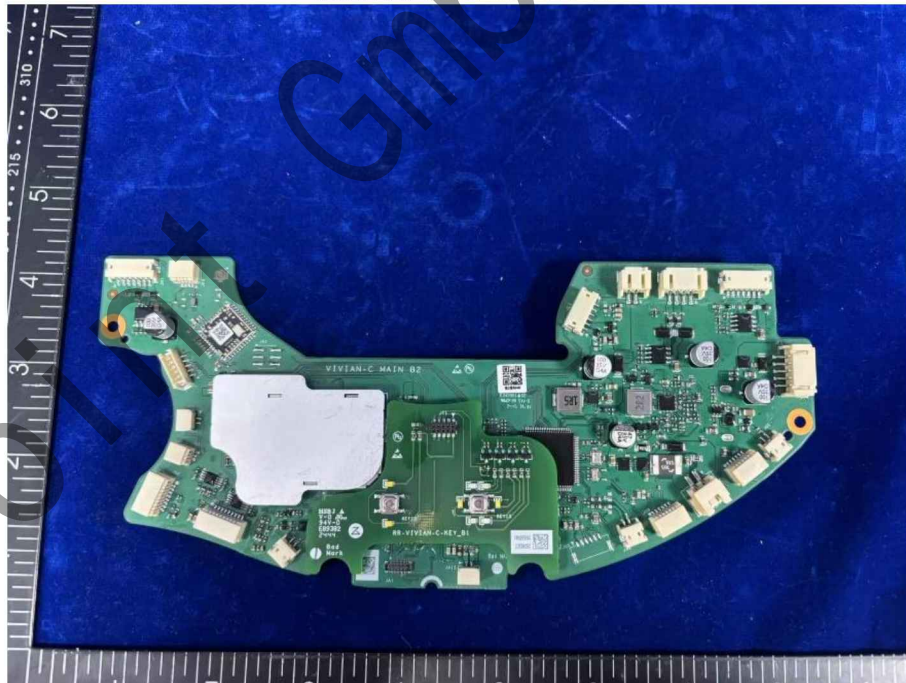
Internal View of EUT-1



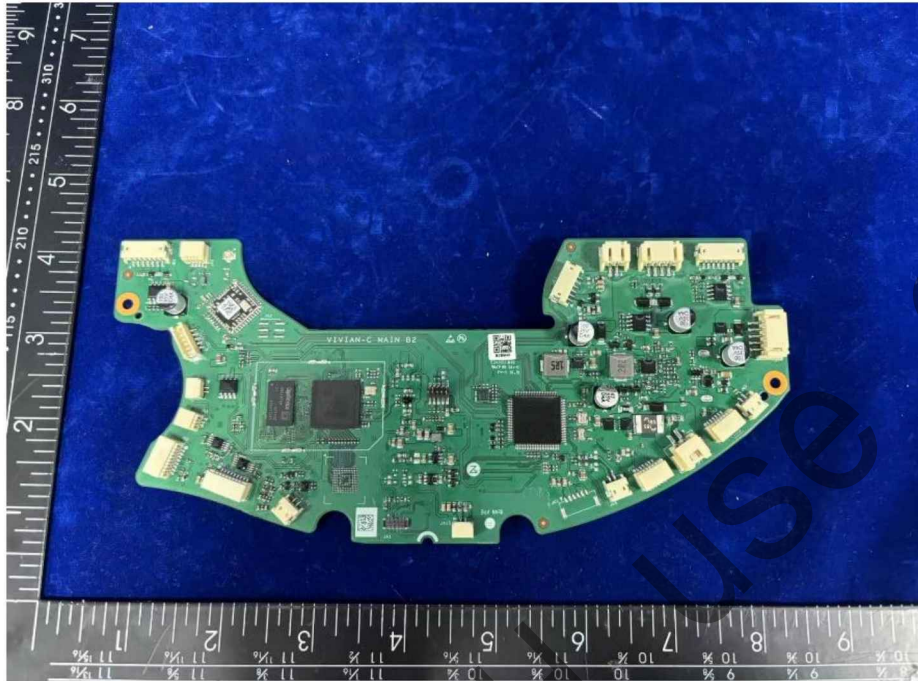
Internal View of EUT-2



Internal View of EUT-3



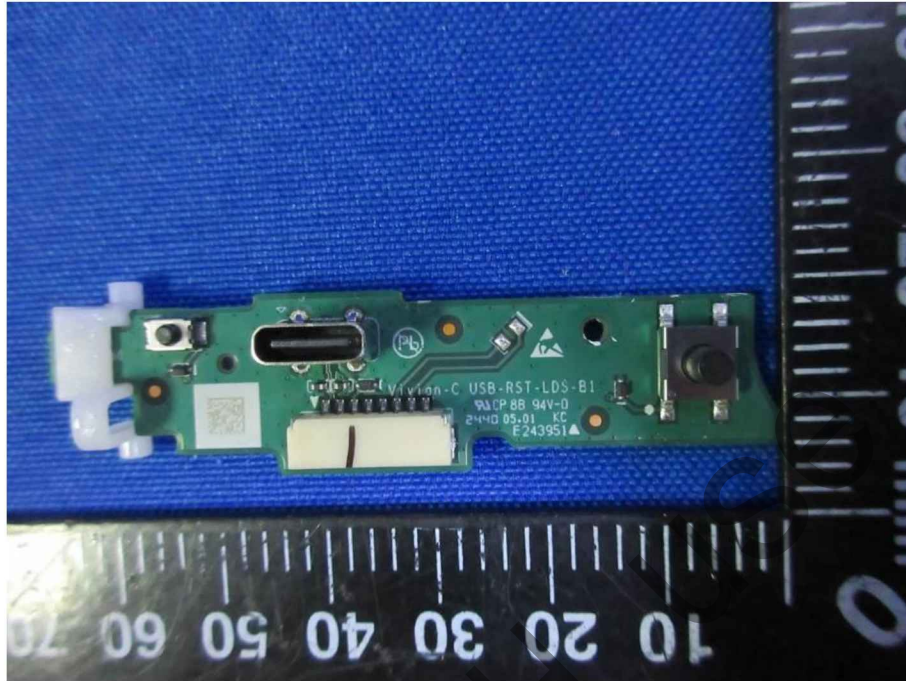
Internal View of EUT-4



Internal View of EUT-5



Internal View of EUT-6



Internal View of EUT-7



END OF REPORT