EMC Test Report

Report No.: STS2406011E01

Issued for

Ji lin Test BIO-Electron Co.,Ltd

No. 1165 Ya 'an Road, Beihu Science and Technology Development Zone, Changchun City, Jilin Province

Product Name:	Water Test Equipment
Brand Name:	N/A
Model Name:	TR-2000
Series Model(s):	N/A
Test Standards:	EN IEC 55014-1:2021 EN IEC 55014-2:2021

TEST REPORT

Applicant's Name..... :	Ji lin Test BIO-Electron Co.,Ltd
Address ..... :	No. 1165 Ya 'an Road, Beihu Science and Technology Development Zone, Changchun City, Jilin Province
Manufacturer's Name ..... :	Ji lin Test BIO-Electron Co.,Ltd
Address ..... :	No. 1165 Ya 'an Road, Beihu Science and Technology Development Zone, Changchun City, Jilin Province

Product Description

Product Name..... :	Water Test Equipment
Brand Name ..... :	N/A
Model Name ..... : .	TR-2000
Series Model(s) ..... :	N/A
Test Standards..... :	EN IEC 55014-1:2021 EN IEC 55014-2:2021

The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Shenzhen STS Test Services Co., Ltd.

Date of Test ..... :	
Date of Receipt of Test Item ..... :	05 June 2024
Date (s) of Performance of Tests..... :	05 June 2024 ~ 13 June 2024
Date of Issue..... :	13 June 2024
Test Result..... :	**Pass**

Testing Engineer **:** Star Deng

(Star Deng)

Technical Manager **:** Chris Chen

(Chris Chen)

Authorized Signatory **:** Bovey Yang

(Bovey Yang)

SHENZHEN STS TEST SERVICES CO.,LTD. TESTING APPROVAL

TABLE OF CONTENTS

Revision History

Rev.	Issue Date	Report No.	Effect Page	Contents
00	13 June 2024	STS2406011E01	ALL	Initial Issue

1. TEST SUMMARY

Test procedures according to the technical standards:

EMC Emission				
Standard	Test Item	Limit	Judgement	Remark
EN IEC 55014-1:2021	Conducted Emission on Mains Ports 150kHz to 30MHz	---	PASS	
	Disturbance Power(30-300MHz)	Meets the requirements	N/A	NOTE (1)
	Radiated Emission	---	PASS	
EMC Immunity				
Section EN IEC 55014-2:2021	Test Item	Performance Criteria	Judgement	Remark
EN 61000-4-2:2009	Electrostatic discharges	B	PASS	
EN IEC 61000-4-3:2020	Continuous RF electromagnetic field disturbances	A	PASS	
EN 61000-4-4:2012	Electrical fast transients/burst	B	N/A	
EN 61000-4-5:2014/A1:2017	Surges	B	N/A	
EN 61000-4-6:2014+AC:2015	Continuous induced RF disturbances	A	N/A	
EN 61000-4-8:2010	Power frequency magnetic field	A	N/A	
EN IEC 61000-4-11:2020	Voltage dips and interruptions	C / C / C	N/A	NOTE (2)

Note:

(1) Clock frequency less than 30MHz and absorbing clamp met applicable limits (Table 7) reduced by the margin (Table 8).

(2) Voltage Dip: 100% reduction – Performance Criteria **C**

Voltage Dip: 30% reduction – Performance Criteria **C**

Voltage Dip: 60% reduction – Performance Criteria **C**

(3) N/A=Not Applicable.

1.1 TEST FACTORY

Company Name:	SHENZHEN STS TEST SERVICES CO.,LTD.
Address:	101, Building B, Zhuoke Science Park, No.190 Chongqing Road, ZhanChengShequ, Fuhai Sub-District, Bao'an District, Shenzhen, Guang Dong, China
Telephone:	+86-755 3688 6288
Fax:	+86-755 3688 6277
Registration No.:	FCC test Firm Registration Number: 625569
	IC test Firm Registration Number: 12108A
	A2LA Certificate No.: 4338.01

1.2 MEASUREMENT UNCERTAINTY

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

A. Conducted Measurement:

Test Site	Method	Measurement Frequency Range	U · (dB)	NOTE
STSC01	CISPR 16-4-2	9KHz ~ 150KHz	2.19	
		150KHz ~ 30MHz	2.53	

B. Radiated Measurement:

Test Site	Method	Measurement Frequency Range	U · (dB)	NOTE
STSC02	CISPR 16-4-2	30MHz ~ 1000MHz	4.18	
		1GHz ~ 6 GHz	4.90	

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF THE EUT

Product Name	Water Test Equipment
Brand Name	N/A
Model Name	TR-2000
Series Model(s)	N/A
Product Differences	N/A
Product Description	The EUT is a Water Test Equipment. Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an Home Appliances Device. More details of EUT technical specification, please refer to the User's Manual.
Immunity test category	Category III
Rating	Input : LR6 1.5V*3 “AA”

2.2 DESCRIPTION OF THE TEST MODES

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

Pretest Mode	Description
Mode 1	Working

For Radiated Test	
Final Test Mode	Description
Mode 1	Working

For Radiated Test	
Final Test Mode	Description
Mode 1	Working

For EMS Test	
Final Test Mode	Description
Mode 1	Working

Note:

1. For conducted emission test, test mode 1 was the worst case and only this mode was presented in this report.
2. For radiated emission test, test mode 1 was the worst case and only this mode was presented in this report.

2.3 DESCRIPTION OF THE TEST SETUP

The EUT has been tested with associated equipment below and the test setup please refer to appendix 1 - test setup.

Necessary accessories

Item	Equipment	Mfr/Brand	Model/Type No.	Length	Note
	N/A	N/A	N/A	N/A	N/A

Support units

Item	Equipment	Mfr/Brand	Model/Type No.	Length	Note
	Adapter	SZTY	TPA-46050100VU	N/A	N/A
	USB Cable	N/A	N/A	110cm	NO

Note:

(1) For detachable type I/O cable should be specified the length in cm in『Length』column.

(2) “YES” means “with core”; “NO” means “without core”.

2.4 MEASUREMENT INSTRUMENTS LIST

2.4.1 CONDUCTED TEST SITE

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
EMI Test Receiver	R&S	ESCI	101427	2023.9.25	2024.9.24
LISN	R&S	AiT-F01220	8130179	2023.9.25	2024.9.24
Absorbing Clamp	R&S	MDS-21	100668	2024.2.23	2025.2.22
CE Cable	N/A	C01	N/A	2023.9.25	2024.9.24
EMF Antenna	SCHWARZBECK	VDHH 9502	147	2023.9.25	2024.9.24
Temperature & Humidity	Mieo	HH660	N/A	2023.9.25	2024.9.24
ISN	SCHWARZBECK	CAT 3	CAT3 8158-0053	2023.9.25	2024.9.24
Testing Software	EZ-EMC(Ver.STSLAB-03A1 CE)				

2.4.2 RADIATED TEST SITE

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
EMI Test Receiver	R&S	ESCI	101427	2023.9.25	2024.9.24
Bi-log Antenna	TESEQ	CBL6111D	45873	2023.9.27	2024.9.26
Horn Antenna	SCHWARZBECK	BBHA 9120D	1343	2023.9.27	2024.9.26
Pre-amplifier(1-26.5G)	Agilent	8449B	3008A02383	2024.2.23	2025.2.22
Pre-amplifier(0.1M-3GHz)	EM	EM330	060665	2024.2.23	2025.2.22
Spectrum Analyzer	Agilent	N9020A	MY49100060	2023.9.26	2024.9.25
Universal Radio Communication Tester	R&S	CMW500	117239	2023.9.25	2024.9.24
RE Cable (9K-1G)	N/A	R01	N/A	2023.9.25	2024.9.24
RE Cable (1-26G)	N/A	R02	N/A	2023.9.28	2024.9.27
Temperature & Humidity	Mieo	HH660	N/A	2023.9.25	2024.9.24
Testing Software	EZ-EMC(Ver.STSLAB-03A1 RE)				

2.4.3 ESD

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
ESD TEST GENERATOR	TESEQ	NSG438	1175	2023.9.27	2024.9.26
Temperature & Humidity	N/A	WS1066	N/A	2024.2.23	2025.2.22

2.4.4 RS

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
Power Meter	Agilent	E4419B	QB43312265	2023.9.25	2024.9.24
Power Sensor	hp	E9300A	US39210170	2023.9.25	2024.9.24
Power Sensor	hp	E9300A	US39210476	2023.9.25	2024.9.24

Signal Generator	Agilent	N5181A	MY56144718	2023.9.25	2024.9.24
Power Amplifier	MICOTOP	MPA-80-1000-250	MPA1711489	2023.9.25	2024.9.24
Power Amplifier	MICOTOP	MPA-1000-6000-100	MPA1904132	2023.9.25	2024.9.24
RS Test Antenna (80-1GHz)	SCHWARZBECK	VULP 9118E	000999	N/A	N/A
RS Test Antenna (1G-10GHz)	SCHWARZBECK	STLP 9149	000648	N/A	N/A
Universal Radio Communication Tester	R&S	CMU200	116337	2024.2.23	2025.2.22
Audio Analyzer	R&S	UPL	100689	2024.2.23	2025.2.22
Audio Breakthrough Shielding Box	SKET	SB_ABT/C35	N/A	N/A	N/A
Ear Simulator	SKET	AE_ABT/C35	N/A	N/A	N/A
Mouth Simulator	SKET	AM_ABT/C35	N/A	N/A	N/A
1KHz Standard Source	SKET	MSC_ABT/C35	N/A	2023.9.28	2024.9.27
Field Probe	Narda	EP601	611WX80261	2024.2.23	2025.2.22
Temperature & Humidity	Mieo	HH660	N/A	2023.9.28	2024.9.27
Testing Software	EMC-S V1.4.0.53				

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION

(Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	At load terminals and additional terminals (dBuV)		At mains terminals (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 -0.5	80.00	70.00	66 - 56 *	59 - 46 *
0.50 -5.0	74.00	64.00	56.00	46.00
5.0 -30.0	74.00	64.00	60.00	50.00

Note:

(1) The tighter limit applies at the band edges.

(2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

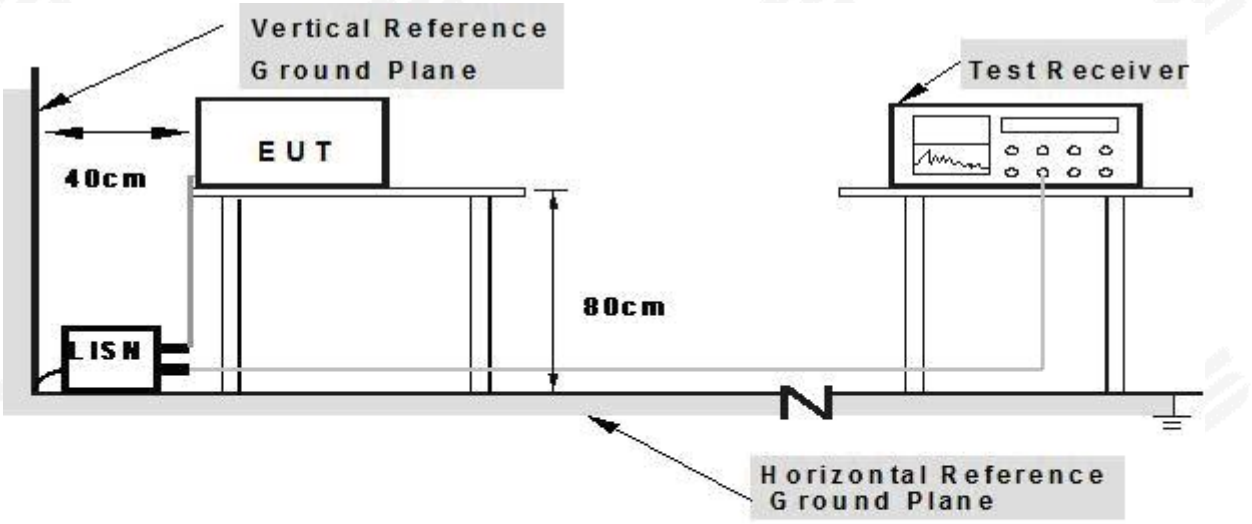
The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

3.1.2 TEST PROCEDURE

a. The EUT was placed 0.4 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
d. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 TEST SETUP



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

3.1.4 EUT OPERATING CONDITIONS

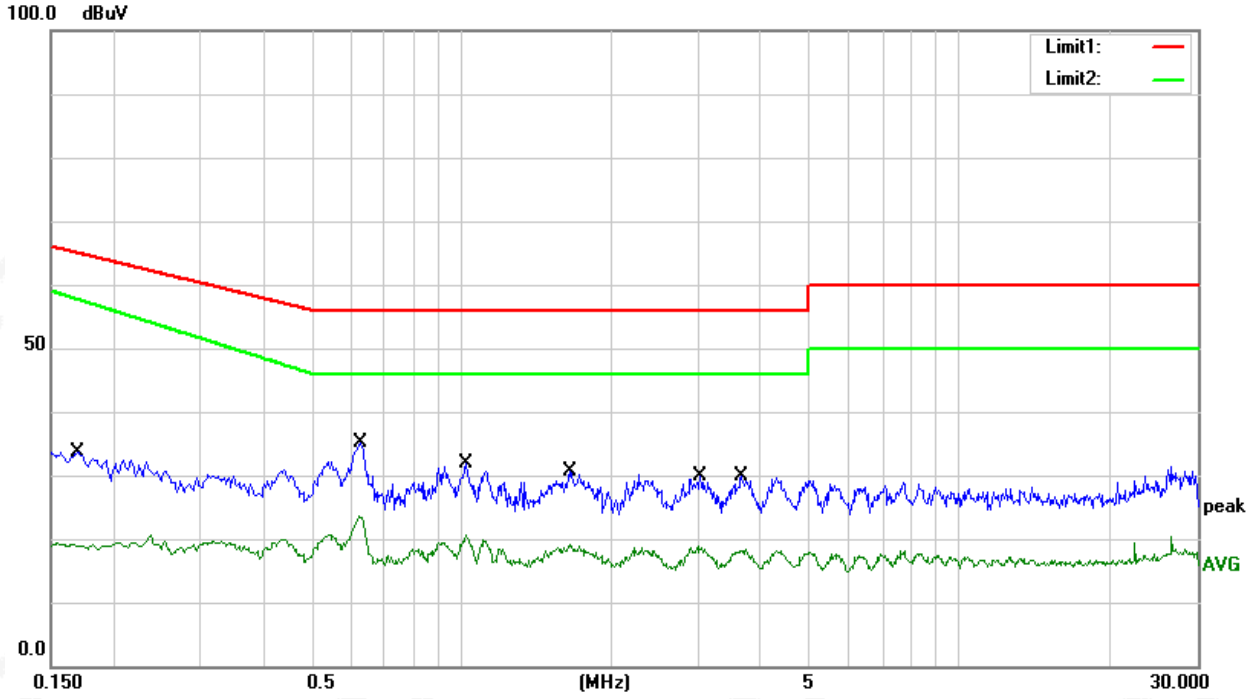
The EUT tested system was configured as the statements of **2.3** Unless otherwise a special operating condition is specified in the following during the testing.

3.1.5 TEST RESULTS

Temperature:	25.1℃	Relative Humidity:	59%
Phase:	L	Test Mode:	Mode 1
Test Voltage:	AC 230V/50Hz	Test Date:	2024.06.11

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1700	13.61	20.07	33.68	64.96	-31.28	QP
2	0.1700	-0.70	20.07	19.37	57.65	-38.28	AVG
3	0.6300	15.12	19.97	35.09	56.00	-20.91	QP
4	0.6300	3.68	19.97	23.65	46.00	-22.35	AVG
5	1.0260	12.17	19.71	31.88	56.00	-24.12	QP
6	1.0260	1.00	19.71	20.71	46.00	-25.29	AVG
7	1.6500	11.04	19.66	30.70	56.00	-25.30	QP
8	1.6500	-0.63	19.66	19.03	46.00	-26.97	AVG
9	3.0140	10.27	19.65	29.92	56.00	-26.08	QP
10	3.0140	-0.89	19.65	18.76	46.00	-27.24	AVG
11	3.6420	10.24	19.66	29.90	56.00	-26.10	QP
12	3.6420	-1.20	19.66	18.46	46.00	-27.54	AVG

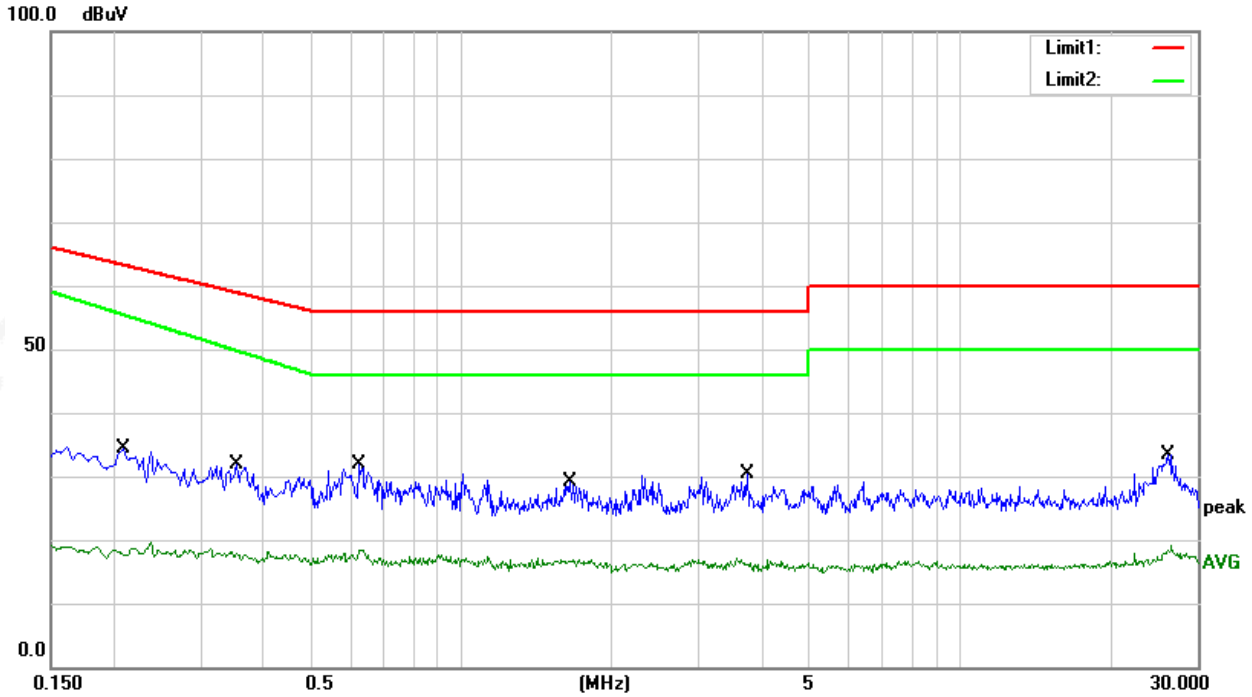
Remark:
1. All readings are Quasi-Peak and Average values
2. Margin = Result (Result =Reading + Factor)–Limit
3. Factor = Insertion loss + Cable loss



Temperature:	25.1℃	Relative Humidity:	59%
Phase:	N	Test Mode:	Mode 1
Test Voltage:	AC 230V/50Hz	Test Date:	2024.06.11

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.2100	14.21	20.10	34.31	63.21	-28.90	QP
2	0.2100	-1.12	20.10	18.98	55.37	-36.39	AVG
3	0.3540	11.87	19.90	31.77	58.87	-27.10	QP
4	0.3540	-1.15	19.90	18.75	49.73	-30.98	AVG
5	0.6260	11.92	19.97	31.89	56.00	-24.11	QP
6	0.6260	-1.53	19.97	18.44	46.00	-27.56	AVG
7	1.6460	9.46	19.66	29.12	56.00	-26.88	QP
8	1.6460	-2.68	19.66	16.98	46.00	-29.02	AVG
9	3.7500	10.60	19.66	30.26	56.00	-25.74	QP
10	3.7500	-2.63	19.66	17.03	46.00	-28.97	AVG
11	26.2460	13.54	19.81	33.35	60.00	-26.65	QP
12	26.2460	-0.68	19.81	19.13	50.00	-30.87	AVG

Remark:
1. All readings are Quasi-Peak and Average values
2. Margin = Result (Result =Reading + Factor)–Limit
3. Factor = Insertion loss + Cable loss



3.2 DISTURBANCE POWER MEASUREMENT

3.2.1 LIMITS OF THE DISTURBANCE POWER MEASUREMENT (30MHz-300MHz)

Table 7 – Disturbance power limits – 30 MHz to 300 MHz

Frequency range	General		Tools					
			P≤700 W		700 W < P≤1000W		P > 1 000 W	
1	2	3	4	5	6	7	8	9
MHz	Quasi-peak	Average dBpW	Quasi-peak dBpW	Average dBpW	Quasi-peak dBpW	Average dBpW	Quasi-peak dBpW	Average dBpW
30 ~ 300	Increasing linearly with the frequency from:							
	44 ~ 55	35 ~ 45	44 ~ 55	35 ~ 45	49 ~ 59	39 ~ 49	55 ~ 65	45 ~ 55
Key P = rated power of the motor only.								

If the quasi-peak measurements meet the average limit, the EUT shall be deemed to meet both limits and the measurements using the average detector need not be carried out.

Table 8 – Reduction applicable to Table 7 limits

Frequency range	General		Tools					
			P≤700 W		700 W < P≤1000W		P > 1 000 W	
1	2	3	4	5	6	7	8	9
MHz	Quasi-peak	Average dBpW	Quasi-peak dBpW	Average dBpW	Quasi-peak dBpW	Average dBpW	Quasi-peak dBpW	Average dBpW
200 ~ 300	Increasing linearly with the frequency from:							
	0 ~ 10	0	0 ~ 10	0	0 ~ 10	0	0 ~ 10	0
NOTE This table only applies if method a) specified in 4.3.4.2 is followed.								

Notes:

(1) The limit for radiated test was performed in the following: CISPR14.1.

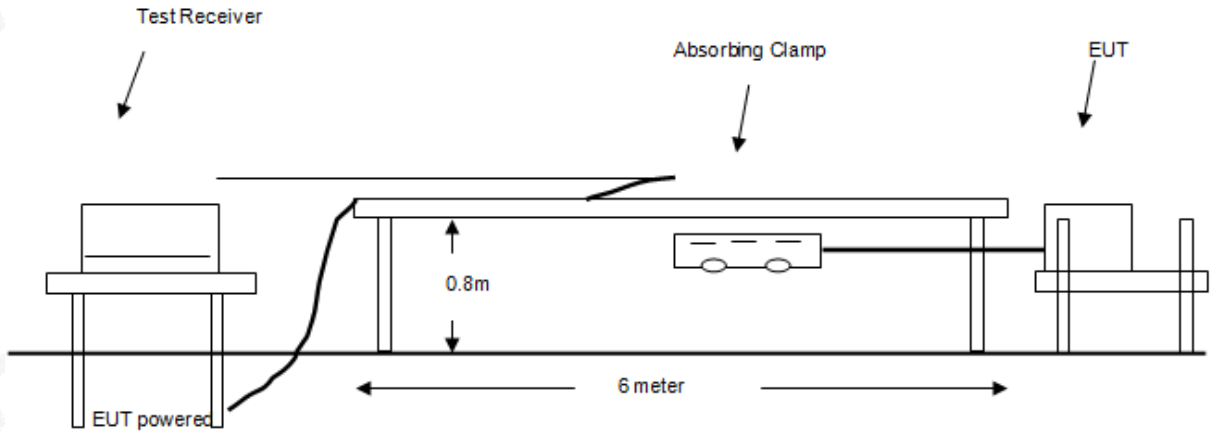
(2) The tighter limit applies at the band edges.

3.2.2 TEST PROCEDURE

a. The EUT is place on a 0.8 meter height wooden table above the ground plane, and kept at least 0.8 m from other metallic object. The straight portion of main lead would put on 6 m long testing bench (if main lead is shorter than 6 m it should be extended).
b. Any lead connecting the main appliance to an auxiliary apparatus is disconnected if this does not affect the operation of the appliance, or is isolated by means of ferrite rings (or an absorbing clamp) close to the appliance.
c. The EUT received AC power source from the outlet socket under the turntable. All support equipment power received from another socket under the turntable.
d. The EUT test program was started. Emissions were scanned and measured using a receiver connected to the absorbing clamp.
e. The absorbing clamp is positioned for maximum indication at each test frequency (30MHz to 300MHz), that means is clamp moved along the main lead until the maximum emission value is found.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.2.3 TEST SETUP

Disturbance Power Test Set-Up



3.2.4 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of **2.3** Unless otherwise a special operating condition is specified in the following during the testing.

3.2.5 TEST RESULTS

DISTURBANCE POWER RESUL (30-300MHz)

Temperature:	25.4℃	Relative Humidity:	61%
Test Voltage:	N/A	Note:	N/A
Test Mode:	N/A		

Note: N/A

3.3 RADIATED EMISSION MEASUREMENT

3.3.1 LIMITS OF THE RADIATED EMISSION MEASUREMENT

FREQUENCY (MHz)	At 10m	At 3m
	Quasi-peak (dBuV/m)	Quasi-peak (dBuV/m)
30 ~ 230	30	40
230 ~ 300	37	47
230 ~ 1000	37	47

FREQUENCY (MHz)	At 3m	
	Peak (dBuV/m)	Avg (dBuV/m)
1000 ~ 3000	70	50
3000 ~ 6000	74	54

Notes:

(1) The limit for radiated test was performed in the following: CISPR 14-1.

(2) The tighter limit applies at the band edges.

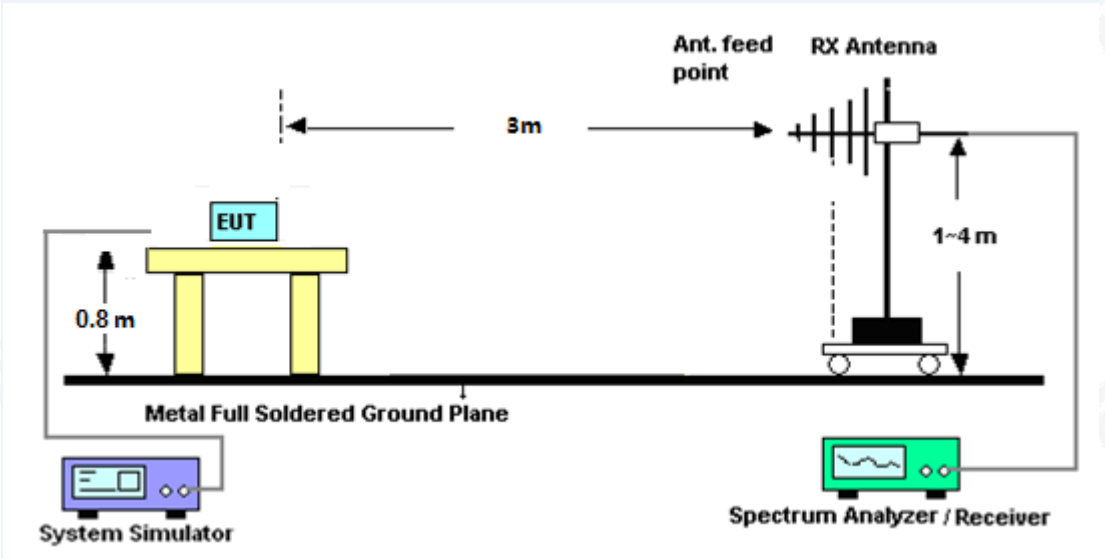
(3) Emission level (dBuV/m) = 20log Emission level (uV/m).

3.3.2 TEST PROCEDURE

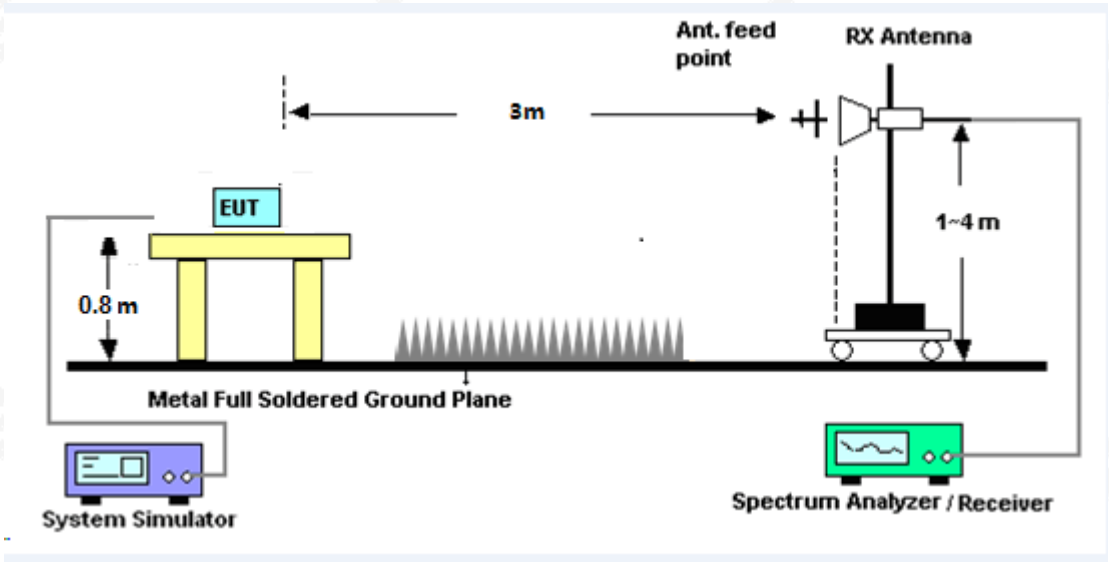
a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The height of antenna is varied from 1 meter to 4 meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1GHz.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.3.3 TEST SETUP

(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



(B) Radiated Emission Test Set-Up Frequency Above 1GHz



3.3.4 EUT OPERATING CONDITIONS

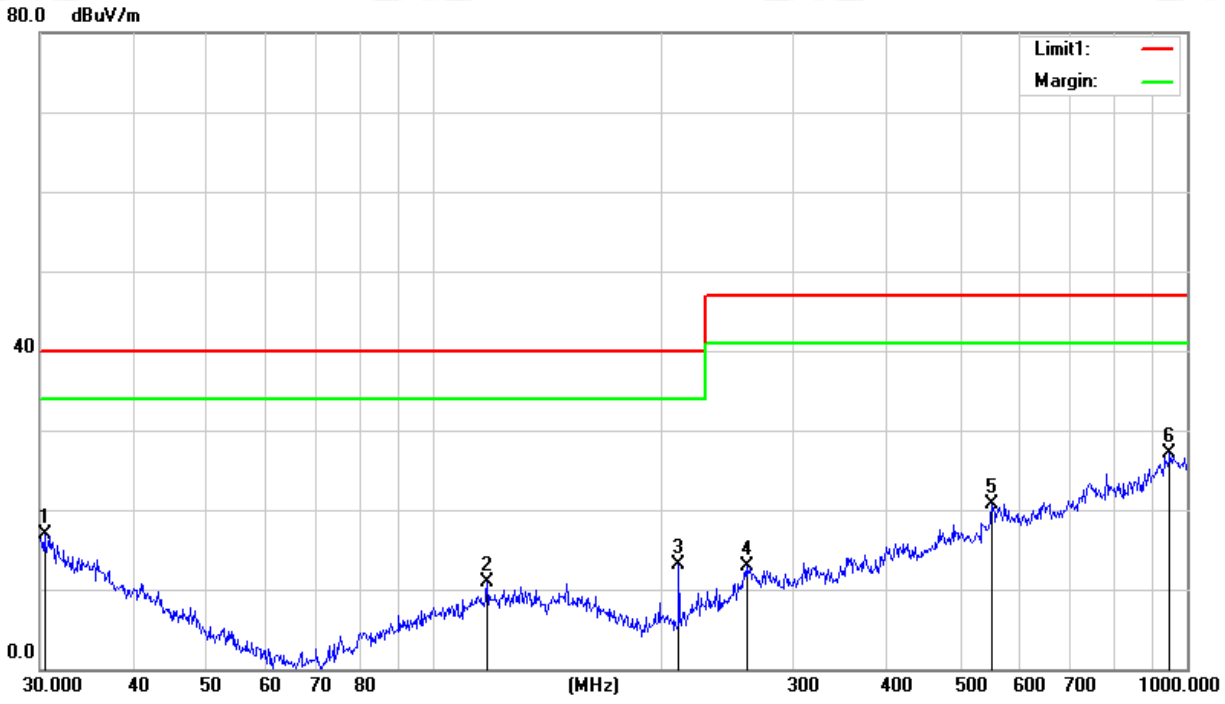
The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the following during the testing.

3.3.5 TEST RESULTS

Temperature:	26.1℃	Relative Humidity:	53%
Phase:	Horizontal	Test Mode:	Mode 1
Test Voltage:	AC 230V/50Hz	Test Date:	2024.06.06

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	30.4238	28.24	-11.26	16.98	40.00	-23.02	QP
2	117.7725	29.49	-18.54	10.95	40.00	-29.05	QP
3	211.5265	34.24	-21.21	13.03	40.00	-26.97	QP
4	260.1444	27.51	-14.69	12.82	47.00	-34.18	QP
5	550.9480	29.05	-8.43	20.62	47.00	-26.38	QP
6	948.7610	29.21	-2.18	27.03	47.00	-19.97	QP

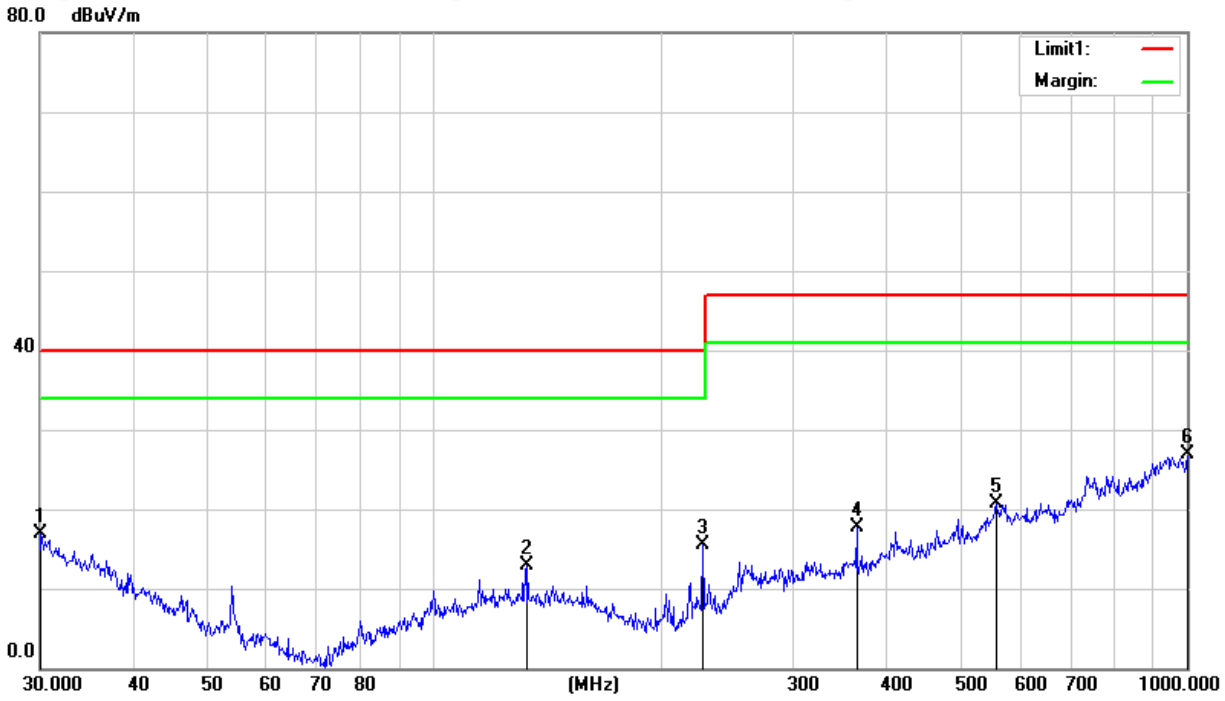
Remark:
1. All readings are Quasi-Peak.
2. Margin = Result (Result =Reading + Factor)–Limit
3. Factor= Cable Loss +Antenna Factor-Amplifier Gain



Temperature:	26.1 ℃	Relative Humidity:	53%
Phase:	Vertical	Test Mode:	Mode 1
Test Voltage:	AC 230V/50Hz	Test Date:	2024.06.06

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	30.1054	28.05	-11.09	16.96	40.00	-23.04	QP
2	133.1511	31.32	-18.36	12.96	40.00	-27.04	QP
3	227.6906	34.35	-18.89	15.46	40.00	-24.54	QP
4	364.2595	32.02	-14.29	17.73	47.00	-29.27	QP
5	558.7302	28.58	-7.85	20.73	47.00	-26.27	QP
6	1000.0000	29.05	-2.19	26.86	47.00	-20.14	QP

Remark:
1. All readings are Quasi-Peak.
2. Margin = Result (Result =Reading + Factor)–Limit
3. Factor= Cable Loss +Antenna Factor-Amplifier Gain



4. EMC IMMUNITY TEST

4.1 STANDARD COMPLIANCE/SERVRITY LEVEL/CRITERIA

Tests Standard No.	TEST SPECIFICATION	Test Mode Test Ports	Perform. Criteria
1. ESD IEC/EN 61000-4-2	8KV air discharge 4KV contact discharge	Direct Mode	B
	4KV HCP discharge 4KV VCP discharge	Indirect Mode	B
2. RS IEC/EN 61000-4-3	80 MHz to 1000 MHz, 1000Hz, 80%, AM modulated	Enclosure	A

4.2 GENERAL PERFORMANCE CRITERIA

According to **EN 55014-2** standard, the general performance criteria as following:

Criterion A	The apparatus shell continues 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 apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. If the manufacturer does not specify the minimum performance level or the permissible performance loss, 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.
Criterion B	After test, the apparatus shell continues to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomenon below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. However, no change of operating state if stored data is allowed to persist after the test. If the manufacturer does not specify the minimum performance level or the permissible performance loss, 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.
Criterion C	Temporary loss of function is allowed, provided the functions is self-recoverable or can be restored by the operation of controls by the user in accordance with the manufacturer instructions. Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

4.2.1 GENERAL PERFORMANCE CRITERIA TEST SETUP

The EUT tested system was configured as the statements of **2.3** Unless otherwise a special operating condition is specified in the following during the testing.

4.3 ELECTROSTATIC DISCHARGE IMMUNITY TEST (ESD)

4.3.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-2
Discharge Impedance:	330 ohm / 150 pF
Required Performance:	B
Discharge Voltage:	Air Discharge：2KV/4KV/8KV (Direct) Contact Discharge：2KV/4KV (Direct/Indirect)
Polarity:	Positive & Negative
Number of Discharge:	Air Discharge: min. 20 times at each test point Contact Discharge: 10 with positive and 10 with negative polarity
Discharge Mode:	Single Discharge
Discharge Period:	1 second minimum

4.3.2 TEST PROCEDURE

The test generator necessary to perform direct and indirect application of discharges to the EUT in the following manners:

a. 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.

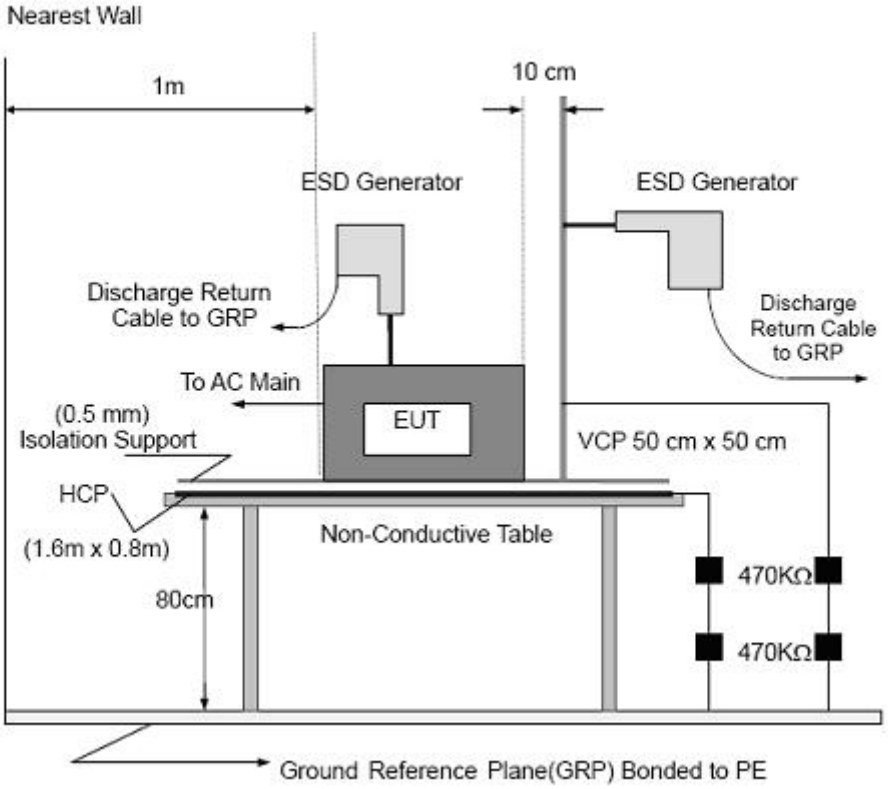
Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.

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 complete.

Vertical Coupling Plane (VCP):
The coupling plane, of dimensions 0.5m x 0.5m, is placed parallel to, and positioned at a distance 0.1m from, the EUT, with the Discharge Electrode touching the coupling plane. The four faces of the EUT will be performed with electrostatic discharge.
Horizontal Coupling Plane (HCP):
The coupling plane is placed under to the EUT. The generator shall be positioned vertically at a distance of 0.1m from the EUT, with the Discharge Electrode touching the coupling plane. The four faces of the EUT will be performed with electrostatic discharge.

b. Air discharges at insulation surfaces of the EUT.
It was at least ten single discharges with positive and negative at the same selected point.

4.3.3 TEST SETUP



Note:

TABLE-TOP EQUIPMENT

The configuration consisted of a wooden table 0.8 meters high standing on the Ground Reference Plane. The GRP consisted of a sheet of aluminum at least 0.25mm thick. A Horizontal Coupling Plane (1.6m x 0.8m) was placed on the table and attached to the GRP by means of a cable with 940kΩ total impedance. The equipment under test, was installed in a representative system as described in section 7 of IEC /EN 61000-4-2, and its cables were placed on the HCP and isolated by an insulating support of 0.5mm thickness. A distance of0.8-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

FLOOR-STANDING EQUIPMENT

The equipment under test was installed in a representative system as described in section 7 of IEC/EN 61000-4-2, and its cables were isolated from the Ground Reference Plane by an insulating support of 0.1 meter thickness. The GRP was consisted of a sheet of aluminum that is at least 0.25mm thick, and extended at least 0.5 meters from the EUT on all sides.

4.3.4 TEST RESULTS

Temperature:	27.1 ℃	Relative Humidity:	56%
Pressure:	1017.8hPa	Test Voltage:	AC 230V/50Hz DC 4.5V
Test Mode:	Mode 1	Test Date:	2024.06.12

Discharge Level	Polarity	Test Points	Contact Discharge	Air Discharge	Criterion	Test Result
2,4	+/-	VCP/HCP	NOTE	N/A	B	A
2,4,8	+/-	Red Dot	N/A	NOTE	B	A

Note: The EUT function was correct during the test.
Red Dot —Air Discharged
Green Dot —Contact Discharged

The Photo for Discharge Points of EUT

4.4 RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD IMMUNITY TEST (RS)

4.4.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-3
Required Performance:	A
Frequency Range:	80 MHz - 6000 MHz
Field Strength:	3 V/m
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of fundamental
Polarity of Antenna:	Horizontal and Vertical
Test Distance:	3 m
Antenna Height:	1.5 m
Dwell Time:	3s

4.4.2 TEST PROCEDURE

a. The testing was performed in a fully anechoic chamber. The transmit antenna was located at a distance of 3 meters from the EUT.

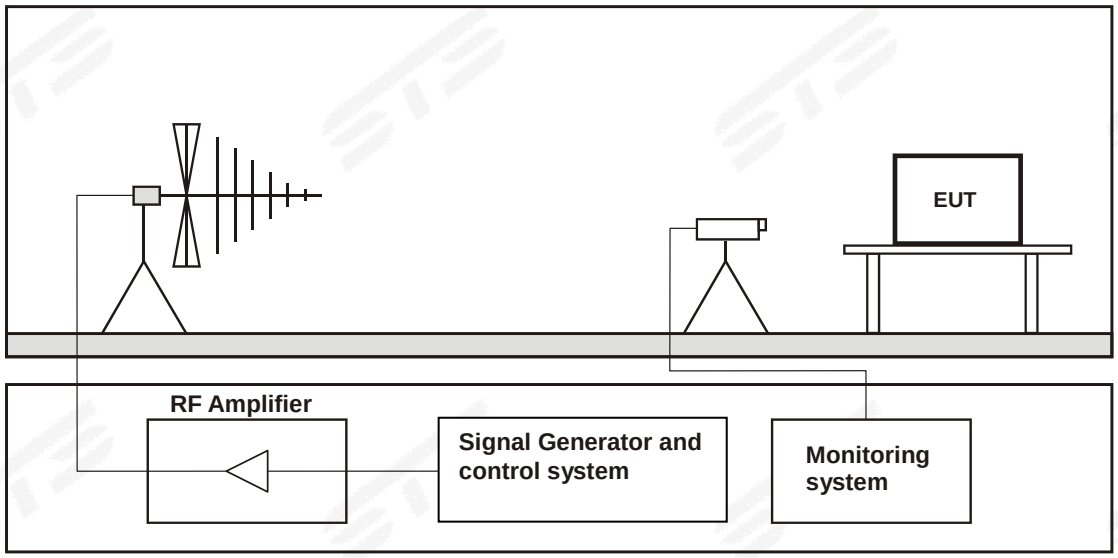
b. The frequency range is swept from 80 MHz to 6000 MHz, with the signal 80% amplitude modulated with a 1kHz sine-wave. The rate of sweep did not exceed 3s, where the frequency range is swept incrementally, the step size was 1% of preceding frequency value.

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

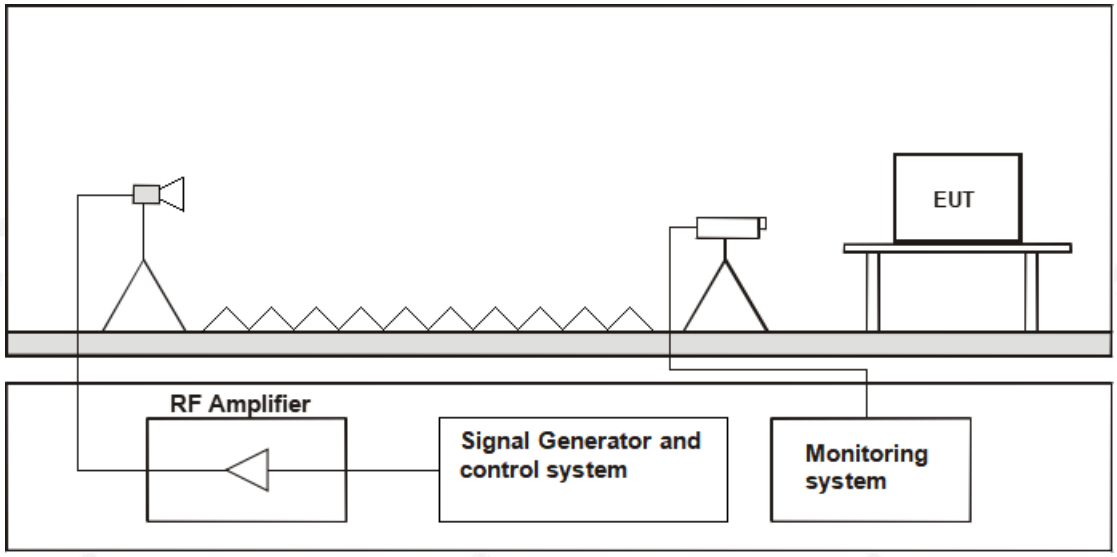
e. The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

4.4.3 TEST SETUP

(A) RS Test Set-Up Frequency Below 1GHz



(B) RS Test Set-Up Frequency Above 1GHz



Note:

TABLE-TOP EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC/EN 61000-4-3 was placed on a non-conductive table 0.8 meter in height. The system under test was connected to the power and signal wire according to the relevant installation instructions.

FLOOR-STANDING EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC/EN 61000-4-3 was placed on a non-conductive wood support 0.1 meter in height. The system under test was connected to the power and signal wire according to the relevant installation instructions.

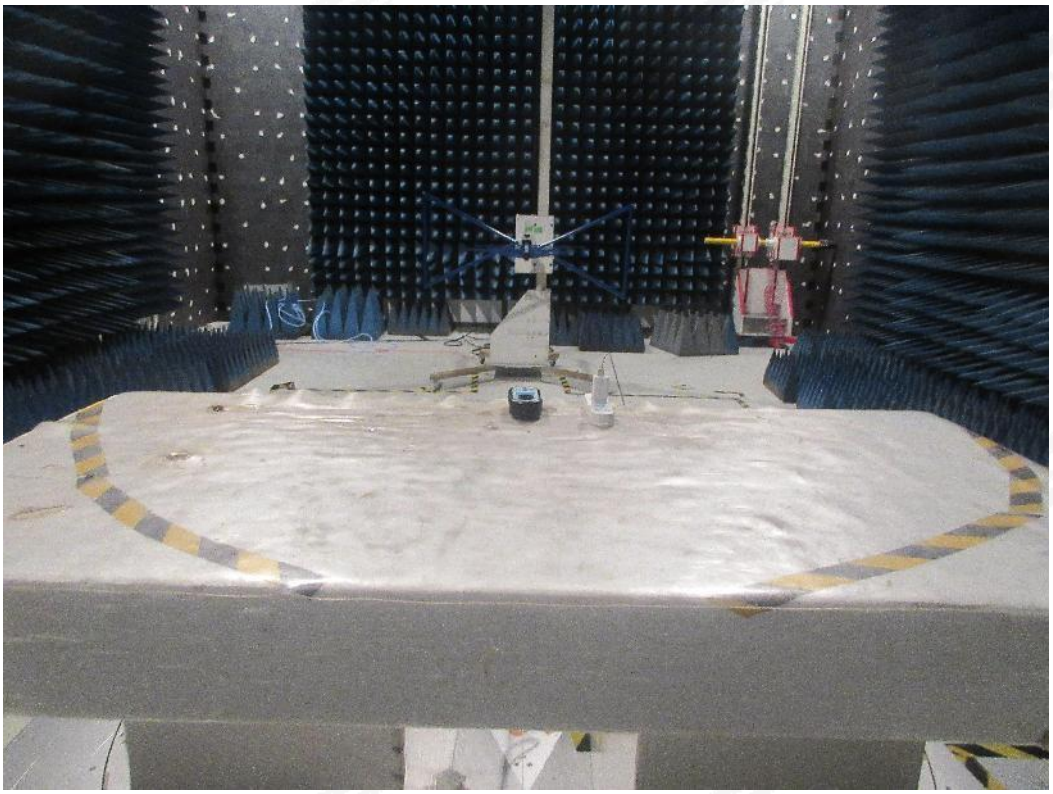
4.4.4 TEST RESULTS

Temperature:	27.1℃	Relative Humidity:	56%
Test Voltage:	AC 230V/50Hz DC 4.5V	Test Date:	2024.06.12
Test Mode:	Mode 1		

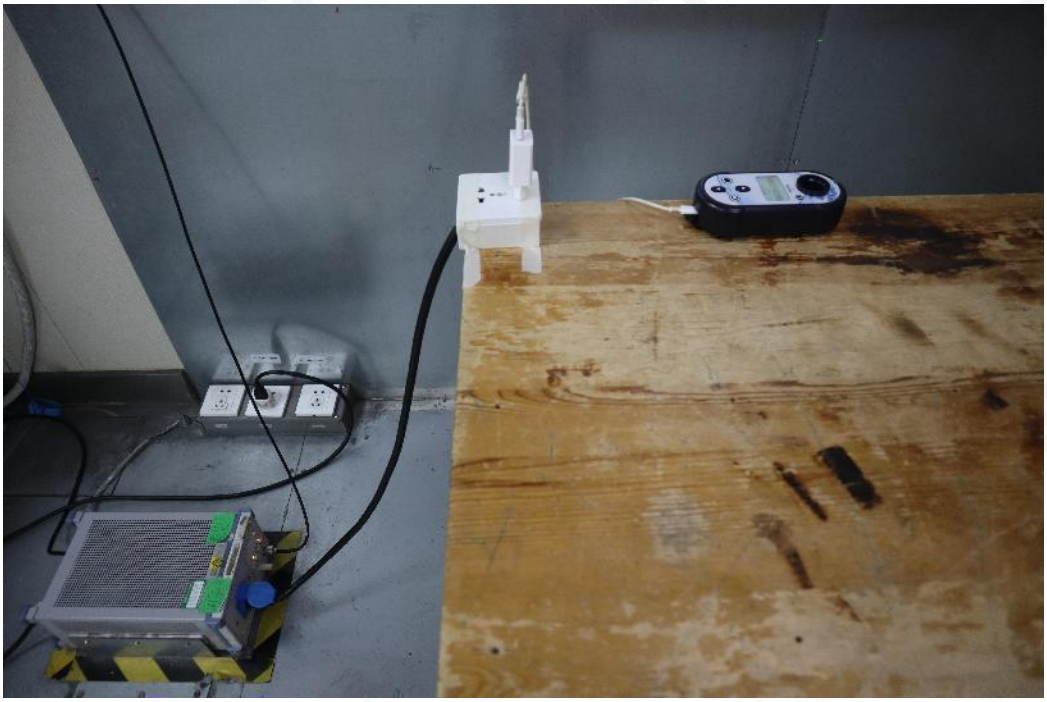
Frequency Range (MHz)	RF Field Position	R.F. Field Strength	Azimuth	Perform. Criteria	Results	Judgment
80MHz - 1000MHz	H / V	3 V/m (rms) AM Modulated 1000Hz, 80%	Front	A	A	PASS
			Rear			
			Left			
			Right			

APPENDIX 1- TEST SETUP

RE (30 - 1000 MHz)

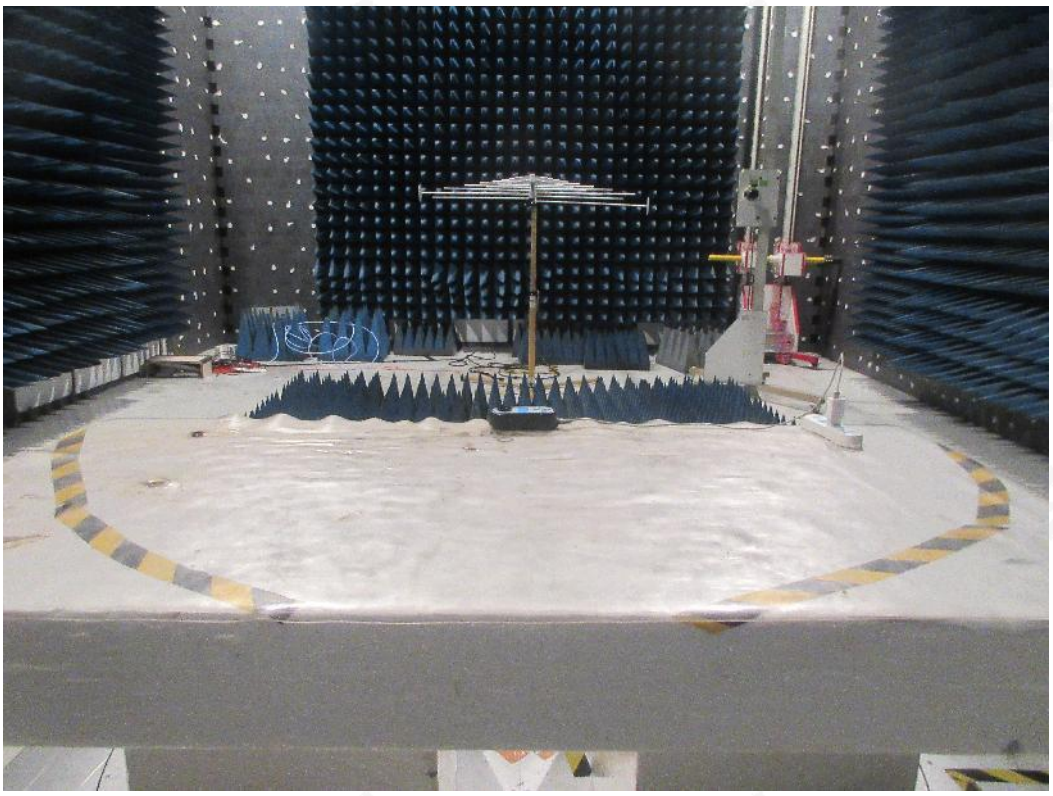


CE



ESD

RS (80 - 1000 MHz)



※※※※※END OF THE REPORT※※※※※