

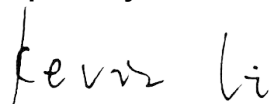
CE&UKCA EMC Test Report

Project No. : 2106C129
Equipment : AV1000 Gigabit Passthrough Powerline Adapter
Brand Name : Tenda
Test Model : P6
Series Model : PH6
Applicant : SHENZHEN TENDA TECHNOLOGY CO.,LTD
Address : 6-8 Floor, Tower E3, No. 1001, Zhongshanyuan Road, Nanshan District, Shenzhen, China. 518052
Manufacturer : SHENZHEN TENDA TECHNOLOGY CO.,LTD
Address : 6-8 Floor, Tower E3, No. 1001, Zhongshanyuan Road, Nanshan District, Shenzhen, China. 518052
Date of Receipt : Jun. 18, 2021
Date of Test : Jun. 21, 2021 ~ Jul. 13, 2021
Issued Date : Jul. 22, 2021
Report Version : R00
Test Sample : Engineering Sample No.: DG20210618157
Standard(s) : EN 55032:2015+A11:2020
 EN IEC 61000-3-2:2019
 EN 61000-3-3:2013+A1:2019
 EN 55035:2017+A11:2020
 BS EN 55032:2015+A11:2020
 BS EN IEC 61000-3-2:2019
 BS EN 61000-3-3:2013+A1:2019
 BS EN 55035:2017+A11:2020

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.



Prepared by : Dave Hong



Approved by : Kevin Li



TESTING CERT #5123.02

Add: No. 3 Jinshagang 1st Rd. Shixia, Dalang Town, Dongguan City, Guangdong, People's Republic of China

Tel: +86-769-8318-3000

Web: www.newbtl.com

Declaration

BTL represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with standards traceable to international standard(s) and/or national standard(s).

BTL's reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **BTL** shall have no liability for any declarations, inferences or generalizations drawn by the client or others from **BTL** issued reports.

The report must not be used by the client to claim product certification, approval, or endorsement by NIST, A2LA, or any agency of the U.S. Government.

This report is the confidential property of the client. As a mutual protection to the clients, the public and ourselves, the test report shall not be reproduced, except in full, without our written approval.

BTL's laboratory quality assurance procedures are in compliance with the **ISO/IEC 17025** requirements, and accredited by the conformity assessment authorities listed in this test report.

BTL is not responsible for the sampling stage, so the results only apply to the sample as received.

The information, data and test plan are provided by manufacturer which may affect the validity of results, so it is manufacturer's responsibility to ensure that the apparatus meets the essential requirements of applied standards and in all the possible configurations as representative of its intended use.

Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

Please note that the measurement uncertainty is provided for informational purpose only and are not use in determining the Pass/Fail results.

Table of Contents	Page
REPORT ISSUED HISTORY	6
1 . SUMMARY OF TEST RESULTS	7
1.1 TEST FACILITY	8
1.2 MEASUREMENT UNCERTAINTY	8
1.3 TEST ENVIRONMENT CONDITIONS	10
2 . GENERAL INFORMATION	11
2.1 GENERAL DESCRIPTION OF EUT	11
2.2 DESCRIPTION OF TEST MODES	12
2.3 EUT OPERATING CONDITIONS	13
2.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	13
2.5 DESCRIPTION OF SUPPORT UNITS	14
3 . EMC EMISSION TEST	15
3.1 RADIATED EMISSIONS UP TO 1 GHZ	15
3.1.1 LIMITS	15
3.1.2 MEASUREMENT INSTRUMENTS LIST	15
3.1.3 TEST PROCEDURE	16
3.1.4 DEVIATION FROM TEST STANDARD	16
3.1.5 TEST SETUP	16
3.1.6 MEASUREMENT DISTANCE	17
3.1.7 TEST RESULTS	18
3.2 RADIATED EMISSIONS ABOVE 1 GHZ	22
3.2.1 LIMITS	22
3.2.2 MEASUREMENT INSTRUMENTS LIST	22
3.2.3 TEST PROCEDURE	23
3.2.4 DEVIATION FROM TEST STANDARD	23
3.2.5 TEST SETUP	23
3.2.6 MEASUREMENT DISTANCE	24
3.2.7 TEST RESULTS	25
3.3 CONDUCTED EMISSION MEASUREMENT AT AC MAINS POWER PORTS	29
3.3.1 LIMITS	29
3.3.2 MEASUREMENT INSTRUMENTS LIST	29
3.3.3 TEST PROCEDURE	29
3.3.4 DEVIATION FROM TEST STANDARD	30
3.3.5 TEST SETUP	30
3.3.6 TEST RESULTS	31
3.4 ASYMMETRIC MODE CONDUCTED EMISSIONS TEST	35
3.4.1 LIMITS	35
3.4.2 MEASUREMENT INSTRUMENTS LIST	35
3.4.3 TEST PROCEDURE	36

Table of Contents	Page
3.4.4 DEVIATION FROM TEST STANDARD	36
3.4.5 TEST SETUP	36
3.4.6 TEST RESULTS	37
3.5 HARMONIC CURRENT EMISSIONS TEST	39
3.5.1 LIMITS	39
3.5.2 MEASUREMENT INSTRUMENTS LIST	39
3.5.3 TEST PROCEDURE	39
3.5.4 DEVIATION FROM TEST STANDARD	40
3.5.5 TEST SETUP	40
3.5.6 TEST RESULTS	41
3.6 VOLTAGE FLUCTUATIONS (FLICKER) TEST	44
3.6.1 LIMITS	44
3.6.2 MEASUREMENT INSTRUMENTS LIST	44
3.6.3 TEST PROCEDURE	44
3.6.4 DEVIATION FROM TEST STANDARD	44
3.6.5 TEST SETUP	45
3.6.6 TEST RESULTS	46
4 . EMC IMMUNITY TEST	47
4.1 STANDARD COMPLIANCE/SEVERITY LEVEL/CRITERIA	47
4.2 GENERAL PERFORMANCE CRITERIA	50
4.3 ELECTROSTATIC DISCHARGE IMMUNITY TEST (ESD)	51
4.3.1 TEST SPECIFICATION	51
4.3.2 MEASUREMENT INSTRUMENTS	51
4.3.3 TEST PROCEDURE	51
4.3.4 DEVIATION FROM TEST STANDARD	52
4.3.5 TEST SETUP	52
4.3.6 TEST RESULTS	53
4.4 RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD IMMUNITY TEST (RS)	55
4.4.1 TEST SPECIFICATION	55
4.4.2 MEASUREMENT INSTRUMENTS	55
4.4.3 TEST PROCEDURE	55
4.4.4 DEVIATION FROM TEST STANDARD	55
4.4.5 TEST SETUP	56
4.4.6 TEST RESULTS	57
4.5 ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST (EFT)	58
4.5.1 TEST SPECIFICATION	58
4.5.2 MEASUREMENT INSTRUMENTS	58
4.5.3 TEST PROCEDURE	58
4.5.4 DEVIATION FROM TEST STANDARD	58
4.5.5 TEST SETUP	59
4.5.6 TEST RESULTS	60
4.6 SURGE IMMUNITY TEST (SURGE)	61
4.6.1 TEST SPECIFICATION	61

Table of Contents	Page
4.6.2 MEASUREMENT INSTRUMENTS	61
4.6.3 TEST PROCEDURE	61
4.6.4 DEVIATION FROM TEST STANDARD	62
4.6.5 TEST SETUP	62
4.6.6 TEST RESULTS	63
4.7 IMMUNITY TO CONDUCTED DISTURBANCES, INDUCED BY RADIO-FREQUENCY	
FIELDS TEST (CS)	64
4.7.1 TEST SPECIFICATION	64
4.7.2 MEASUREMENT INSTRUMENTS	64
4.7.3 TEST PROCEDURE	64
4.7.4 DEVIATION FROM TEST STANDARD	65
4.7.5 TEST SETUP	65
4.7.6 TEST RESULTS	66
4.8 POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST (PFMF)	67
4.8.1 TEST SPECIFICATION	67
4.8.2 MEASUREMENT INSTRUMENTS	67
4.8.3 TEST PROCEDURE	67
4.8.4 DEVIATION FROM TEST STANDARD	67
4.8.5 TEST SETUP	68
4.8.6 TEST RESULTS	69
4.9 VOLTAGE DIPS, SHORT INTERRUPTIONS AND VOLTAGE VARIATIONS IMMUNITY	
TEST (DIPS)	70
4.9.1 TEST SPECIFICATION	70
4.9.2 MEASUREMENT INSTRUMENTS	70
4.9.3 TEST PROCEDURE	70
4.9.4 DEVIATION FROM TEST STANDARD	70
4.9.5 TEST SETUP	70
4.9.6 TEST RESULTS	71
5 . EUT TEST PHOTO	72

REPORT ISSUED HISTORY

Report Version	Description	Issued Date
R00	Original Issue.	Jul. 22, 2021

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

Emission			
Standard(s)	Test Item		Result
EN 55032:2015+A11:2020 BS EN 55032:2015+A11:2020	Radiated emissions up to 1 GHz		PASS
	Radiated emissions above 1 GHz		PASS
	Radiated emissions from FM receivers		N/A
	Conducted emissions AC mains power port		PASS
	Asymmetric mode conducted emissions	AAN	PASS
		Current Probe	N/A
		CP+CVP	N/A
	Conducted differential voltage emissions		N/A

Standard(s)	Test Item	Result
EN IEC 61000-3-2:2019 BS EN IEC 61000-3-2:2019	Harmonic current	PASS
EN 61000-3-3:2013+A1:2019 BS EN 61000-3-3:2013+A1:2019	Voltage fluctuations (Flicker)	PASS

Immunity			
Standard(s)	Ref Standard(s)	Test Item	Result
EN 55035:2017+A11:2020 BS EN 55035:2017+A11:2020	IEC 61000-4-2:2008	ESD	PASS
	IEC 61000-4-3:2020	RS	PASS
	IEC 61000-4-4:2012	EFT	PASS
	IEC 61000-4-5:2014+AMD1:2017	Surge	PASS
	IEC 61000-4-6:2013	CS	PASS
	IEC 61000-4-8:2009	PFMF	PASS
	IEC 61000-4-11:2020	Dips	PASS

Standard(s)	Section	Test Item	Result
EN 55035:2017+A11:2020 BS EN 55035:2017+A11:2020	4.2.7	BIN-R	N/A
	4.2.7	BIN-I	N/A

NOTE:

(1) "N/A" denotes test is not applicable to this device.

1.1 TEST FACILITY

The test facilities used to collect the test data in this report is at the location of No. 3 Jinshagang 1st Rd. Shixia, Dalang Town, Dongguan City, Guangdong, People's Republic of China.

1.2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2, The BTL measurement uncertainty is less than the CISPR 16-4-2 U_{CISPR} requirement.

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%**.

A. Radiated emissions up to 1 GHz measurement:

Test Site	Method	Measurement Frequency Range	Ant. H / V	U,(dB)
DG-CB08 (10m)	CISPR	30MHz ~ 200MHz	V	4.44
		30MHz ~ 200MHz	H	3.44
		200MHz ~ 1,000MHz	V	4.28
		200MHz ~ 1,000MHz	H	3.52

B. Radiated emissions above 1 GHz measurement:

Test Site	Method	Measurement Frequency Range	U,(dB)
DG-CB08 (3m)	CISPR	1GHz ~ 6GHz	4.36

C. Conducted emissions AC mains power port measurement:

Test Site	Method	Measurement Frequency Range	U,(dB)
DG-C01	CISPR	150kHz ~ 30MHz	3.18

D. Asymmetric mode conducted emissions measurement:

Test Site	Method	Test Item	U,(dB)
DG-C01	CISPR	AAN Cat.5 LCL = 65 ... 50 dB	4.26

E. Harmonic current / Voltage fluctuations (Flicker) measurement:

Test Site	Method	Item	U (%)
DG-C01	EN IEC 61000-3-2	Current	0.593
	EN 61000-3-3	Voltage	0.595

F. Immunity Measurement:

Test Site	Method	Item	U
DG-SR02	IEC 61000-4-2	Rise time tr	6.80%
		Peak current Ip	6.30%
		Current at 30 ns	6.50%
		Current at 60 ns	6.90%
DG-CB05	IEC 61000-4-3 (80MHz~6GHz)	Electromagnetic field immunity test	2.38dB
DG-SR05	IEC 61000-4-4	Peak voltage (V _P)	3.7%
		Rise time (tr)	4.4%
		Pulse width(tw)	4.1%
		Pulse Freq.(kHz)	0.8%
		Burst Duration(ms)	1.4%
		Burst Period(ms)	1.4%
		Peak voltage (V _P)-with clamp	3.7%
		Rise time (tr) -with clamp	5.0%
		Pulse width(tw) -with clamp	4.8%
DG-SR05/ DG-SR01	IEC 61000-4-5	Open-Circuit Output Voltage (1.2/50us)	3.8%
		Open circuit front time (1.2/50us)	6.3%
		Open circuit time of half value (1.2/50us)	4.6%
		Open-Circuit Output Voltage (10/700us)	3.8%
		Open circuit front time (10/700us)	5.9%
		Open circuit time of half value (10/700us)	4.7%
DG-CB06	IEC 61000-4-6 (150kHz-80MHz)	CDN	1.32dB
		EM clamp	3.16dB
DG-SR05	IEC 61000-4-8	Magnetic Field Strength	2.38%
DG-SR05	IEC 61000-4-11	DIP Amplitude	0.5%
		DIP Time Event	3%

Note: Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

1.3 TEST ENVIRONMENT CONDITIONS

Test Item	Temperature	Humidity	Tested By
Radiated emissions up to 1 GHz	25°C	60%	Better Yan
Radiated emissions above 1 GHz	25°C	60%	Better Yan
Conducted emissions AC mains power port	25°C	53%	Gerry Zhao
Asymmetric mode conducted emissions	25°C	53%	Gerry Zhao
Harmonic current	25°C	55%	Gerry Zhao
Voltage fluctuations (Flicker)	25°C	55%	Gerry Zhao

Test Item	Temperature	Humidity	Pressure	Tested By
ESD	24°C	46%	1012hPa	Able Zhou
RS	23°C	46%	/	Hunter Xu
EFT	24°C	46%	/	Celina Lai
Surge	24°C	46%	/	Celina Lai
CS	23°C	45%	/	Promise Yin
PFMF	24°C	46%	/	Celina Lai
Dips	24°C	46%	/	Celina Lai

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	AV1000 Gigabit Passthrough Powerline Adapter
Brand Name	Tenda
Test Model	P6
Series Model	PH6
Model Difference(s)	Only differ in model name.
Power Source	AC Mains.
Power Rating	For EU plug: I/P: AC 100-240V~ 50/60Hz 16A(0.1A,product only) O/P: 16A Max.load For UK plug: I/P: AC 100-240V~ 50/60Hz 13A(0.1A,product only) O/P: 13A Max.load
Connecting I/O Port(s)	1* LAN port 1* AC port
Classification of EUT	Class B
Highest Internal Frequency(Fx)	400MHz

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

2.2 DESCRIPTION OF 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	Operating
Mode 2	Standby
Mode 3	LAN 1Gbps
Mode 4	LAN 10Mbps

Radiated emissions up to 1 GHz test	
Final Test Mode	Description
Mode 1	Operating

Radiated emissions Above 1 GHz test	
Final Test Mode	Description
Mode 1	Operating

Conducted emissions AC mains power port test	
Final Test Mode	Description
Mode 2	Standby

Asymmetric mode conducted emissions test	
Final Test Mode	Description
Mode 3	LAN 1Gbps
Mode 4	LAN 10Mbps

Harmonic current & Voltage fluctuations (Flicker) Test	
Final Test Mode	Description
Mode 1	Operating

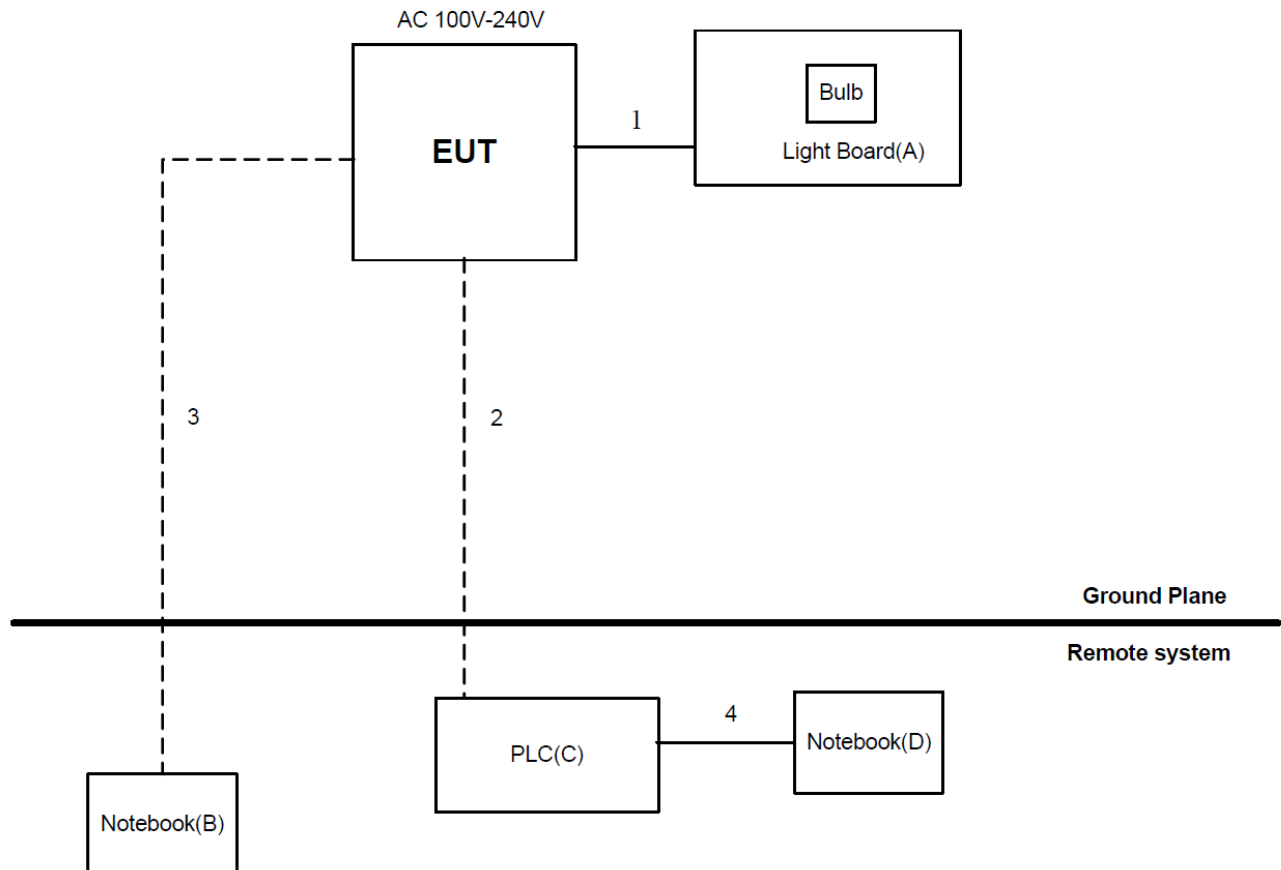
For Immunity Test	
Final Test Mode	Description
Mode 1	Operating

2.3 EUT OPERATING CONDITIONS

The EUT exercise program used during radiated and/or conducted emission measurement was designed to exercise the various system components in a manner similar to a typical use. The standard test signals and output signal as following:

1. EUT connected to Light Board via AC Cable.
2. EUT connected to Notebook(B) via RJ45 Cable.
3. EUT connected to PLC via AC Cable.
4. PLC connected to Notebook (D) via RJ45 Cable.

2.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



2.5 DESCRIPTION OF SUPPORT UNITS

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

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.
A	Light Board	N/A	N/A	N/A
B	Notebook	Lenovo	E46L	EB21809870
C	PLC	Tenda	P6	N/A
D	Notebook	Lenovo	E445	MP-05Y56S

Item	Cable Type	Shielded Type	Ferrite Core	Length
1	AC Cable	NO	NO	1.5m
2	AC Cable	NO	NO	1m
3	RJ45 Cable	NO	NO	10m
4	RJ45 Cable	NO	NO	10m

3. EMC EMISSION TEST

3.1 RADIATED EMISSIONS UP TO 1 GHz

3.1.1 LIMITS

Class B equipment up to 1 GHz

Frequency Range MHz	Measurement			Class B limits dB(μV/m)
	Facility	Distance m	Detector type/ bandwidth	
30 - 230	SAC	10	Quasi peak / 120 kHz	30
230 - 1000				37

Notes:

- (1) The limit for radiated test was performed according to as following: EN 55032
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).
- (4) The test result calculated as following:
 Measurement Value = Reading Level + Correct Factor
 Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain(if use)
 Margin Level = Measurement Value - Limit Value

3.1.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Receiver	Keysight	N9038A	MY56400091	Feb. 27, 2022
2	MXE EMI Receiver	Agilent	N9038A	MY53220133	Feb. 28, 2022
3	Pre-Amplifier	EMC INSTRUMENT	EMC 9135	980284	Dec. 13, 2021
4	Pre-Amplifier	EMC INSTRUMENT	EMC 9135	980283	Dec. 13, 2021
5	Trilog-Broadband Antenna	Schwarzbeck	VULB9168	946	Oct. 16, 2021
6	Trilog-Broadband Antenna	Schwarzbeck	VULB9168	947	Nov. 09, 2021
7	Cable	emci	LMR-400(5m+8m+8m)	N/A	Jan. 06, 2022
8	Cable	emci	LMR-400(5m+8m+8m)	N/A	Jan. 06, 2022
9	Measurement Software	Farad	EZ-EMC Ver.BTL-2ANT-1	N/A	N/A
10	Multi-Device Controller	ETS-Lindgren	2090	N/A	N/A
11	Controller	MF	MF-7802	MF780208159	N/A
12	Attenuator	EMCI	EMCI-N-6-06	N0670	Nov. 09, 2021
13	Attenuator	EMCI	EMCI-N-6-06	N0671	Oct. 16, 2021

Remark: "N/A" denotes no model name, no serial no. or no calibration specified.

All calibration period of equipment list is one year.

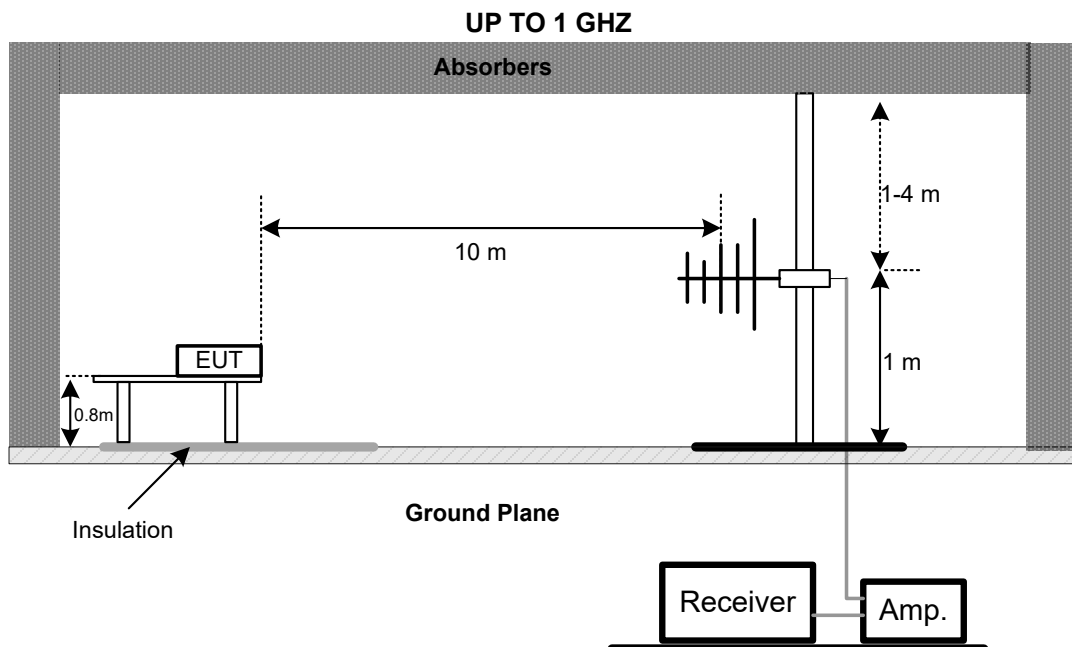
3.1.3 TEST PROCEDURE

- The measuring distance of 10 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The height of the equipment or of the substitution antenna shall be 0.8 m, the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.
- For the actual test configuration, please refer to the related Item - EUT Test Photos.

3.1.4 DEVIATION FROM TEST STANDARD

No deviation

3.1.5 TEST SETUP



3.1.6 MEASUREMENT DISTANCE

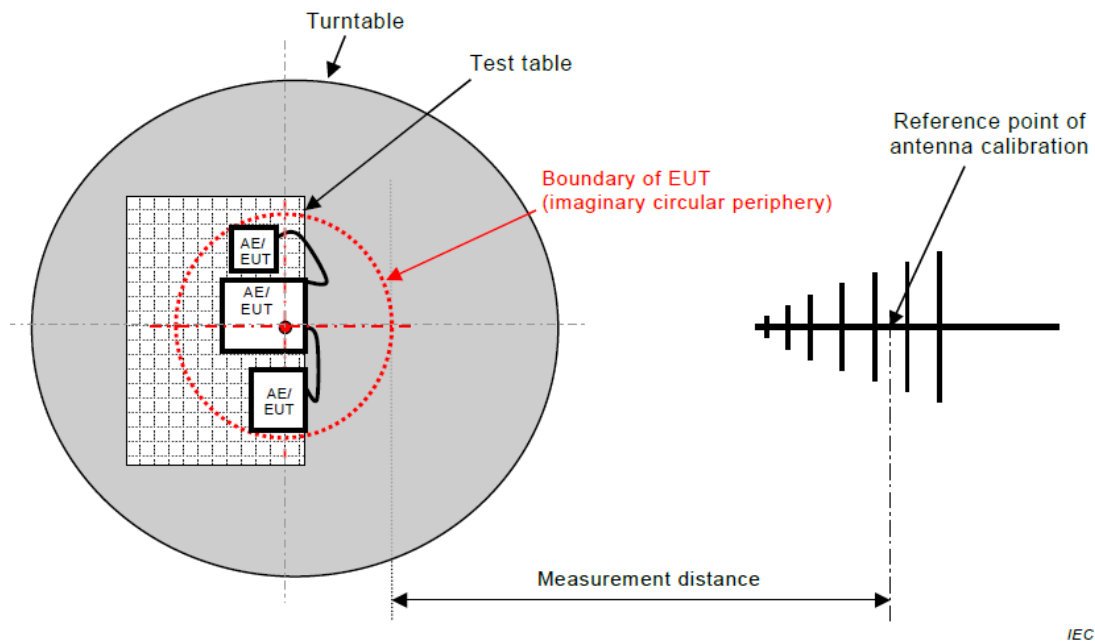


Figure C.1 – Measurement distance

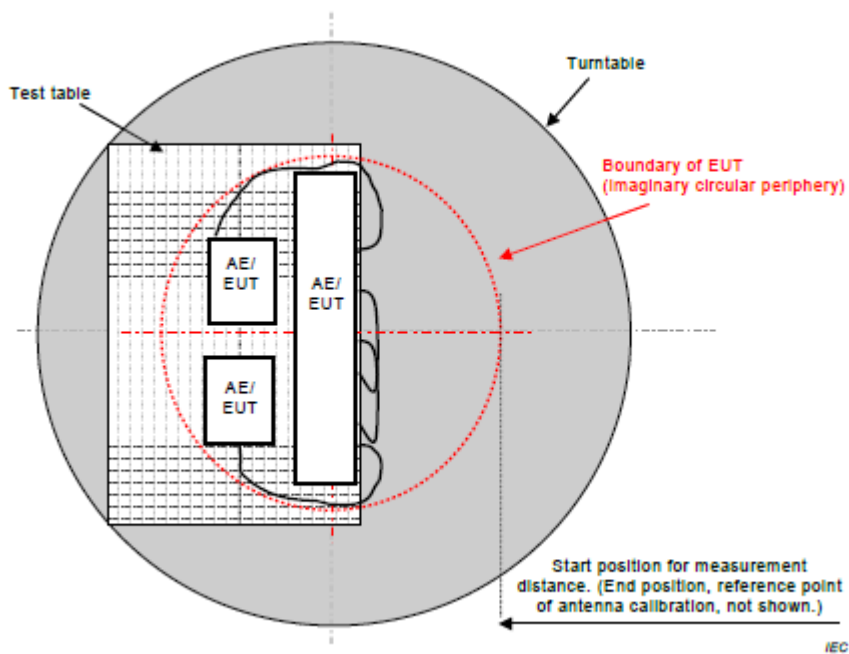
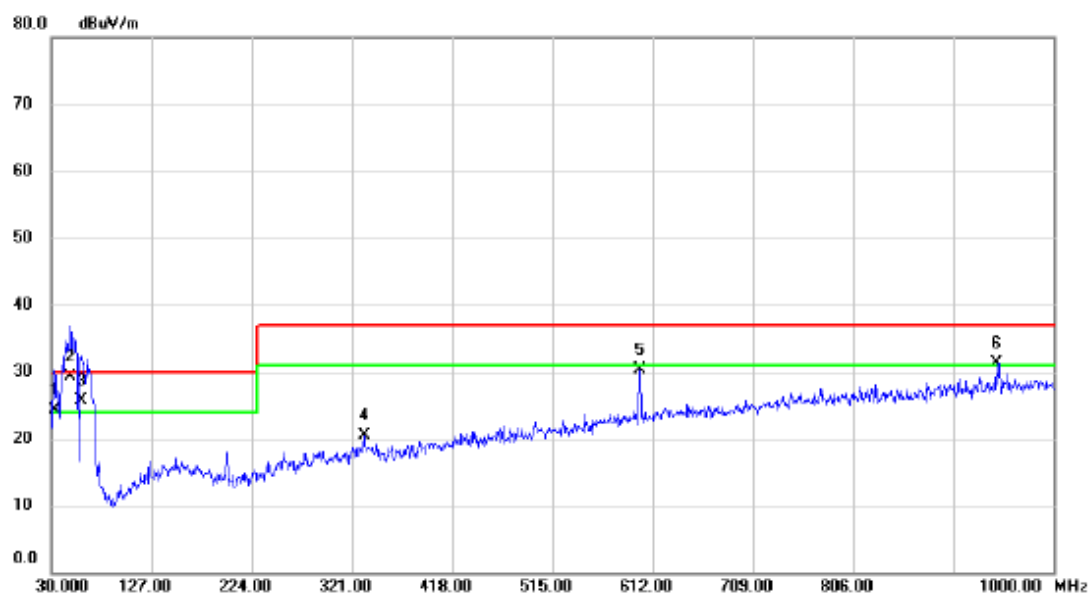


Figure C.2 – Boundary of EUT, Local AE and associated cabling

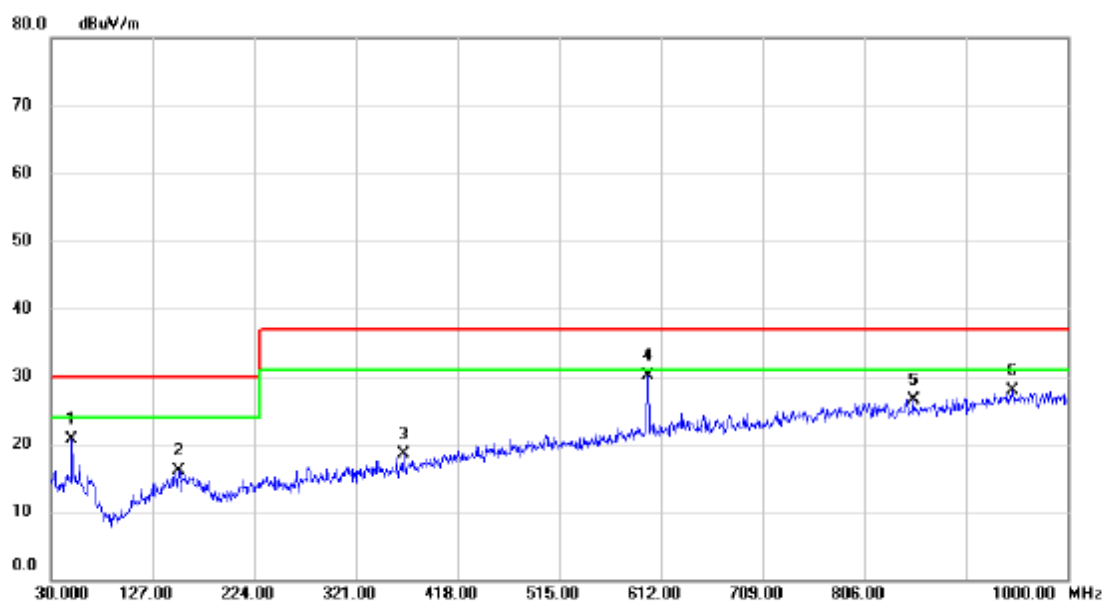
3.1.7 TEST RESULTS

Test Voltage	AC 230V/50Hz	Polarization	Vertical
Test Mode	Mode 1		



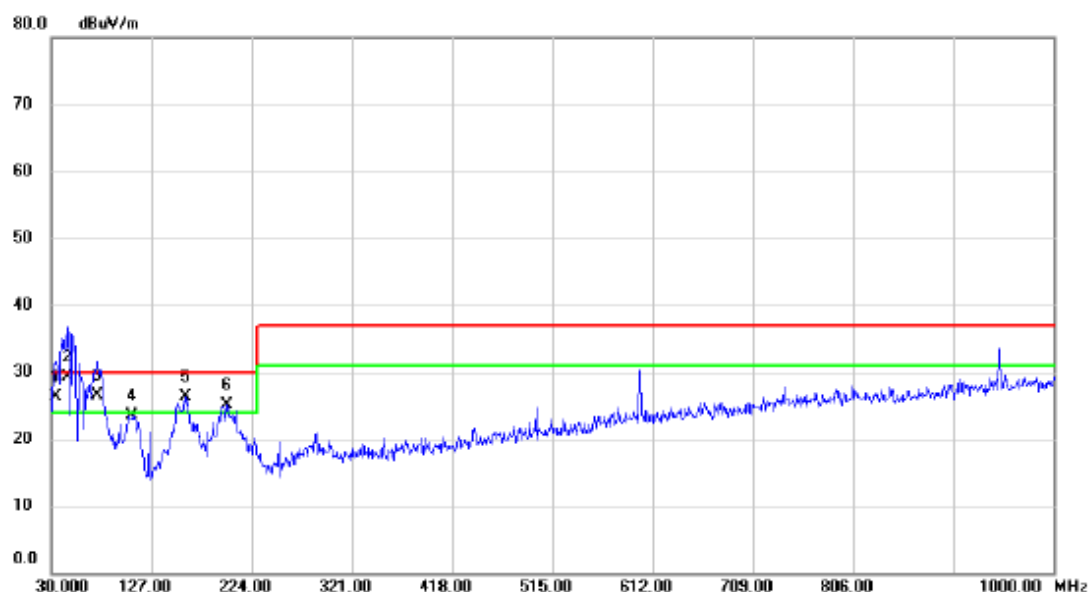
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	!	32.9100	43.22	-18.98	24.24	30.00	-5.76	QP	
2	*	48.4300	47.06	-17.79	29.27	30.00	-0.73	QP	
3	!	59.1000	43.56	-17.86	25.70	30.00	-4.30	QP	
4		332.6400	35.20	-14.61	20.59	37.00	-16.41	QP	
5		599.3900	39.24	-8.94	30.30	37.00	-6.70	QP	
6	!	944.7100	36.96	-5.60	31.36	37.00	-5.64	QP	

Test Voltage	AC 230V/50Hz	Polarization	Horizontal
Test Mode	Mode 1		



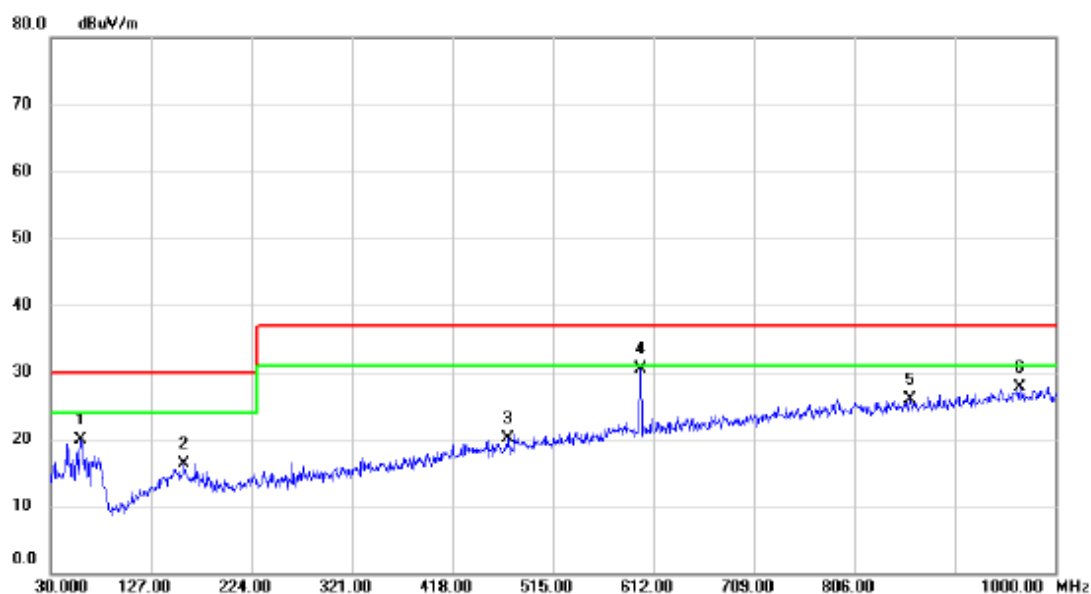
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		50.3700	38.38	-17.68	20.70	30.00	-9.30	QP	
2		152.7050	32.55	-16.42	16.13	30.00	-13.87	QP	
3		366.5900	31.90	-13.49	18.41	37.00	-18.59	QP	
4	*	599.3900	38.83	-8.69	30.14	37.00	-6.86	QP	
5		852.5600	33.05	-6.55	26.50	37.00	-10.50	QP	
6		947.6200	32.72	-4.79	27.93	37.00	-9.07	QP	

Test Voltage	AC 110V/60Hz	Polarization	Vertical
Test Mode	Mode 1		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	!	33.8800	45.27	-18.93	26.34	30.00	-3.66	QP	
2	*	46.4900	47.11	-17.89	29.22	30.00	-0.78	QP	
3	!	74.6200	46.58	-20.07	26.51	30.00	-3.49	QP	
4		108.5700	44.16	-20.69	23.47	30.00	-6.53	QP	
5	!	159.9800	43.30	-16.96	26.34	30.00	-3.66	QP	
6	!	199.7500	44.45	-19.34	25.11	30.00	-4.89	QP	

Test Voltage	AC 110V/60Hz	Polarization	Horizontal
Test Mode	Mode 1		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		59.1000	37.96	-18.11	19.85	30.00	-10.15	QP	
2		159.0100	32.60	-16.26	16.34	30.00	-13.66	QP	
3		471.3500	30.94	-10.90	20.04	37.00	-16.96	QP	
4	*	599.3900	39.17	-8.69	30.48	37.00	-6.52	QP	
5		859.3500	32.44	-6.47	25.97	37.00	-11.03	QP	
6		965.0800	32.38	-4.67	27.71	37.00	-9.29	QP	

3.2 RADIATED EMISSIONS ABOVE 1 GHZ

3.2.1 LIMITS

Class B equipment above 1 GHz

Frequency Range MHz	Measurement			Class B limits dB(μV/m)
	Facility	Distance m	Detector type/bandwidth	
1000 - 3000	FSOATS	3	Average / 1 MHz	50
3000 - 6000				54
1000 - 3000			Peak / 1 MHz	70
3000 - 6000				74

Notes:

- (1) The limit for radiated test was performed according to as following: EN 55032
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).
- (4) The test result calculated as following:
 Measurement Value = Reading Level + Correct Factor
 Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain(if use)
 Margin Level = Measurement Value - Limit Value

Required highest frequency for radiated measurement

Highest internal frequency (F _x)	Highest measured frequency
F _x ≤ 108 MHz	1 GHz
108 < F _x ≤ 500 MHz	2 GHz
500 < F _x ≤ 1000 MHz	5 GHz
F _x > 1 GHz	5 x F _x up to a maximum of 6 GHz

3.2.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Horn Antenna	EMCO	3115	9605-4803	May 26, 2022
2	Amplifier	Agilent	8449B	3008A02333	Feb. 28, 2022
3	MXE EMI Receiver	Agilent	N9038A	MY53220133	Feb. 28, 2022
4	Measurement Software	Farad	EZ-EMC Ver.BTL-2ANT-1	N/A	N/A
5	Multi-Device Controller	ETS-Lindgren	2090	N/A	N/A
6	Controller	MF	MF-7802	MF780208159	N/A
7	Cable	Micable	RWLP50-4.0A-S MSM-12M-KJ	20191107 002	Mar. 31, 2022

Remark: "N/A" denotes no model name, no serial no. or no calibration specified.

All calibration period of equipment list is one year.

3.2.3 TEST PROCEDURE

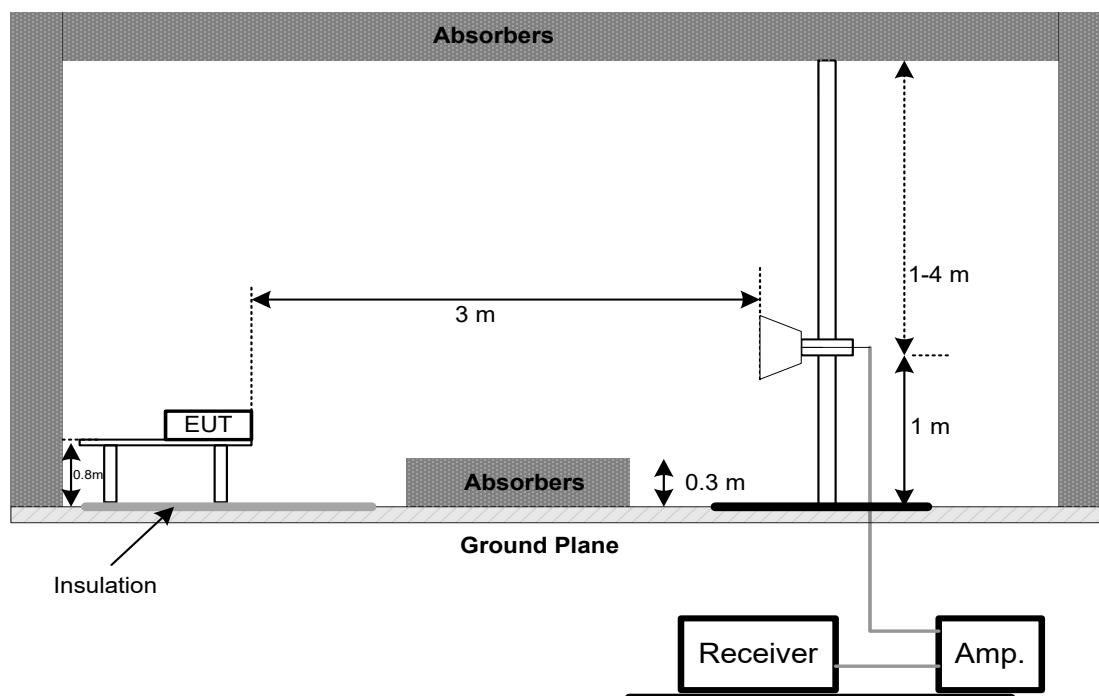
- The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The height of the equipment or of the substitution antenna shall be 0.8 m, the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then AVG detector mode re-measured.
- All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn't perform.
- For the actual test configuration, please refer to the related Item - EUT Test Photos.

3.2.4 DEVIATION FROM TEST STANDARD

No deviation

3.2.5 TEST SETUP

ABOVE 1 GHZ



3.2.6 MEASUREMENT DISTANCE

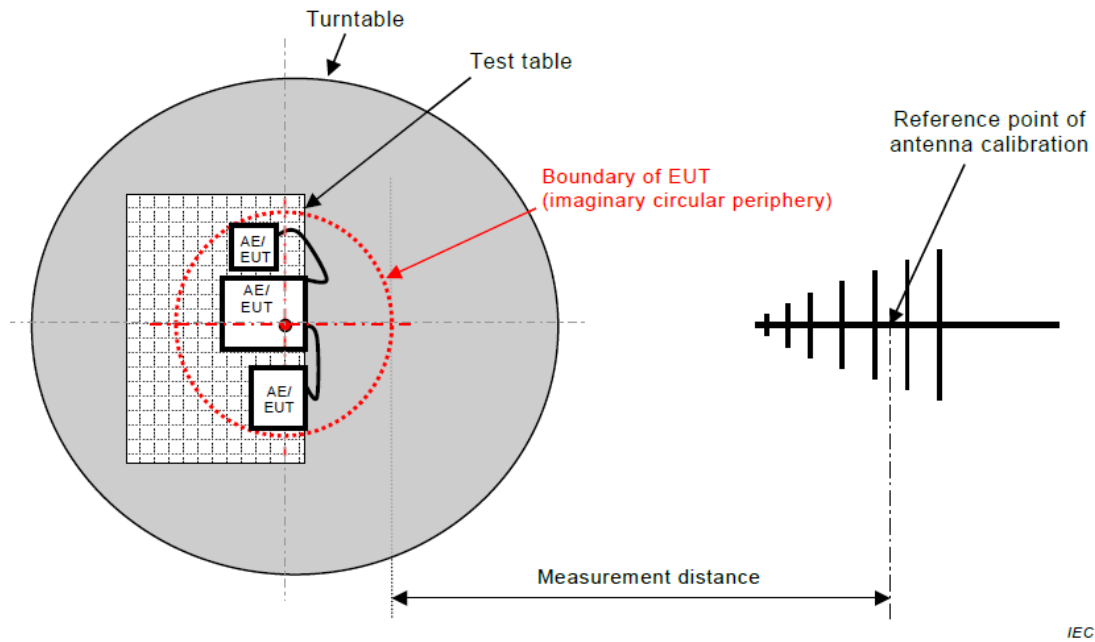


Figure C.1 – Measurement distance

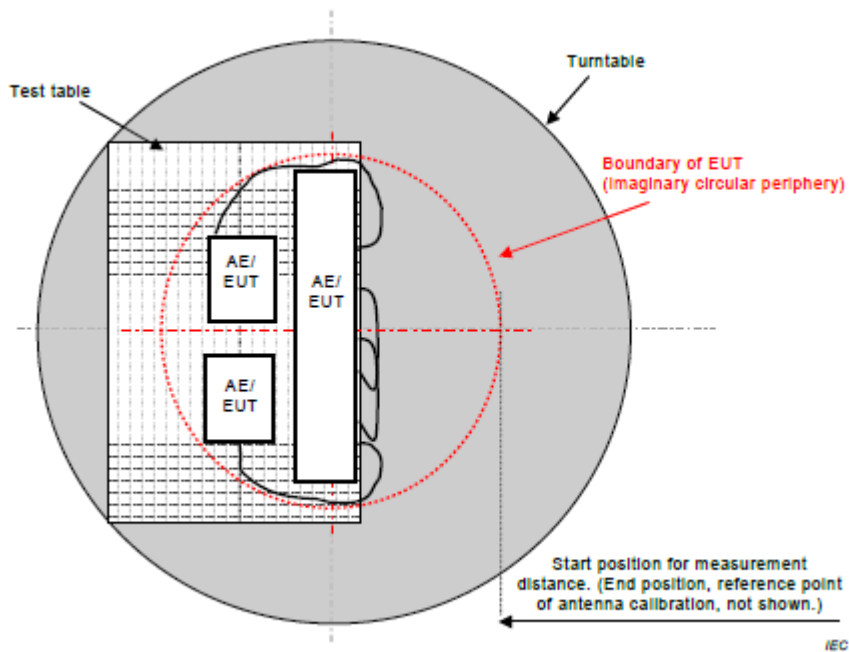
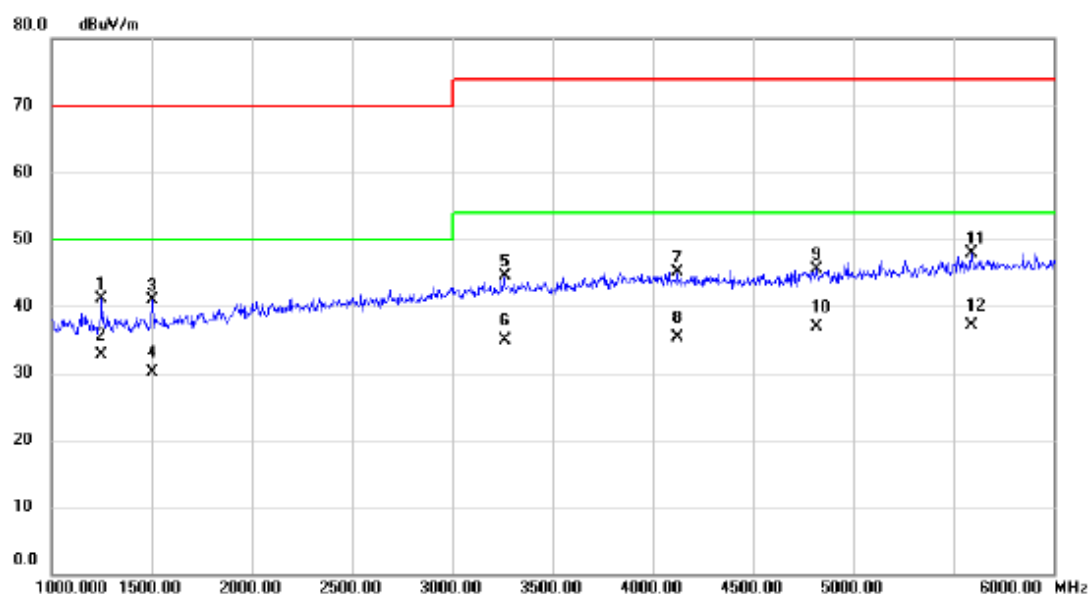


Figure C.2 – Boundary of EUT, Local AE and associated cabling

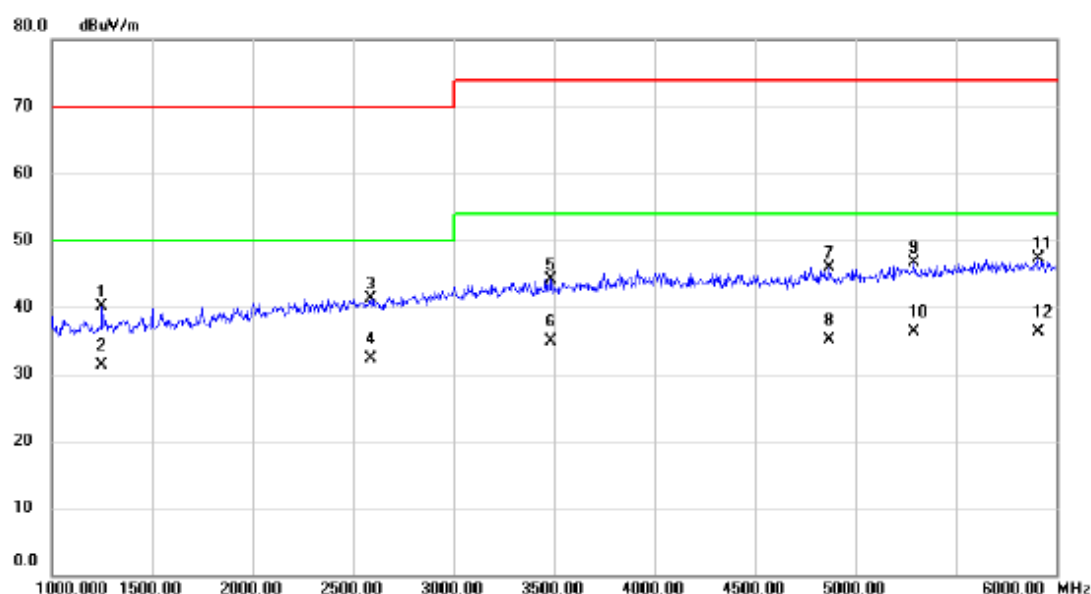
3.2.7 TEST RESULTS

Test Voltage	AC 230V/50Hz	Polarization	Vertical
Test Mode	Mode 1		



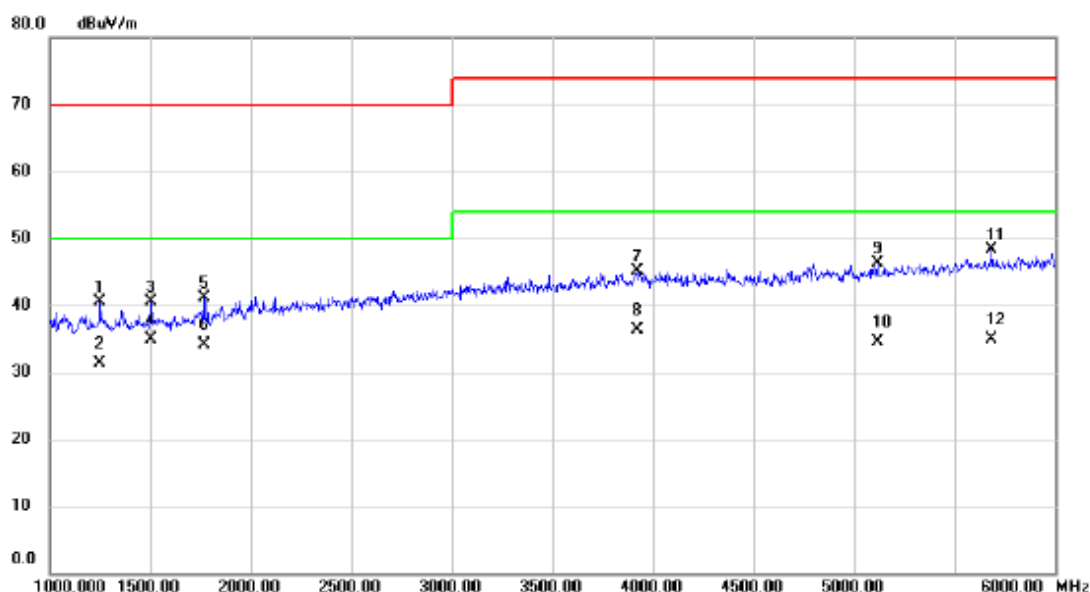
No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	1250.000	45.23	-4.10	41.13	70.00	-28.87	peak	
2	1250.000	36.74	-4.10	32.64	50.00	-17.36	AVG	
3	1500.000	43.95	-3.12	40.83	70.00	-29.17	peak	
4	1500.000	33.27	-3.12	30.15	50.00	-19.85	AVG	
5	3262.500	39.45	5.00	44.45	74.00	-29.55	peak	
6	3262.500	29.87	5.00	34.87	54.00	-19.13	AVG	
7	4122.500	37.13	8.06	45.19	74.00	-28.81	peak	
8	4122.500	27.27	8.06	35.33	54.00	-18.67	AVG	
9	4817.500	36.41	9.16	45.57	74.00	-28.43	peak	
10	4817.500	27.81	9.16	36.97	54.00	-17.03	AVG	
11	5590.000	36.49	11.51	48.00	74.00	-26.00	peak	
12 *	5590.000	25.62	11.51	37.13	54.00	-16.87	AVG	

Test Voltage	AC 230V/50Hz	Polarization	Horizontal
Test Mode	Mode 1		



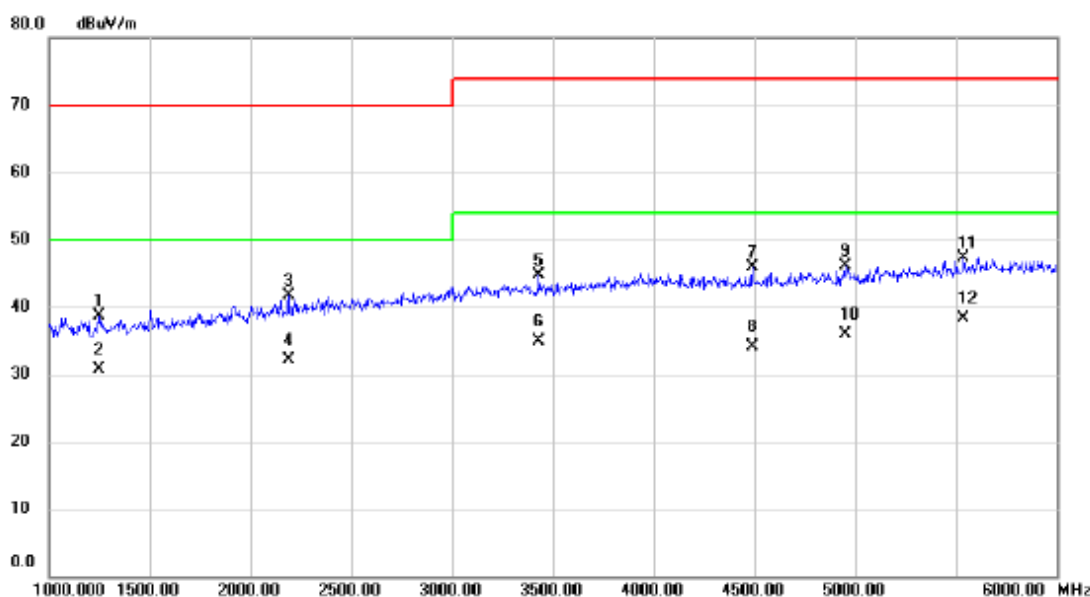
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		1250.000	44.24	-4.10	40.14	70.00	-29.86	peak	
2		1250.000	35.36	-4.10	31.26	50.00	-18.74	AVG	
3		2587.500	39.08	2.31	41.39	70.00	-28.61	peak	
4		2587.500	29.98	2.31	32.29	50.00	-17.71	AVG	
5		3480.000	38.39	5.71	44.10	74.00	-29.90	peak	
6		3480.000	29.16	5.71	34.87	54.00	-19.13	AVG	
7		4870.000	36.67	9.28	45.95	74.00	-28.05	peak	
8		4870.000	25.75	9.28	35.03	54.00	-18.97	AVG	
9		5290.000	36.01	10.61	46.62	74.00	-27.38	peak	
10		5290.000	25.71	10.61	36.32	54.00	-17.68	AVG	
11		5907.500	35.11	12.12	47.23	74.00	-26.77	peak	
12	*	5907.500	24.24	12.12	36.36	54.00	-17.64	AVG	

Test Voltage	AC 110V/60Hz	Polarization	Vertical
Test Mode	Mode 1		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		1250.000	44.66	-4.10	40.56	70.00	-29.44	peak	
2		1250.000	35.36	-4.10	31.26	50.00	-18.74	AVG	
3		1500.000	43.54	-3.12	40.42	70.00	-29.58	peak	
4	*	1500.000	37.99	-3.12	34.87	50.00	-15.13	AVG	
5		1767.500	42.47	-1.41	41.06	70.00	-28.94	peak	
6		1767.500	35.47	-1.41	34.06	50.00	-15.94	AVG	
7		3920.000	37.42	7.60	45.02	74.00	-28.98	peak	
8		3920.000	28.77	7.60	36.37	54.00	-17.63	AVG	
9		5117.500	36.33	10.00	46.33	74.00	-27.67	peak	
10		5117.500	24.59	10.00	34.59	54.00	-19.41	AVG	
11		5685.000	36.52	11.69	48.21	74.00	-25.79	peak	
12		5685.000	23.20	11.69	34.89	54.00	-19.11	AVG	

Test Voltage	AC 110V/60Hz	Polarization	Horizontal
Test Mode	Mode 1		



No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	1250.000	42.79	-4.10	38.69	70.00	-31.31	peak	
2	1250.000	34.74	-4.10	30.64	50.00	-19.36	AVG	
3	2187.500	41.02	0.76	41.78	70.00	-28.22	peak	
4	2187.500	31.27	0.76	32.03	50.00	-17.97	AVG	
5	3430.000	39.22	5.54	44.76	74.00	-29.24	peak	
6	3430.000	29.39	5.54	34.93	54.00	-19.07	AVG	
7	4492.500	37.57	8.39	45.96	74.00	-28.04	peak	
8	4492.500	25.67	8.39	34.06	54.00	-19.94	AVG	
9	4952.500	36.58	9.48	46.06	74.00	-27.94	peak	
10	4952.500	26.39	9.48	35.87	54.00	-18.13	AVG	
11	5537.500	35.96	11.41	47.37	74.00	-26.63	peak	
12 *	5537.500	26.82	11.41	38.23	54.00	-15.77	AVG	

3.3 CONDUCTED EMISSION MEASUREMENT AT AC MAINS POWER PORTS

3.3.1 LIMITS

Requirements for conducted emissions from AC mains power ports of Class B equipment

Frequency Range MHz	Coupling Device	Detector Type / bandwidth	Class B Limits (dB(μV))
0.15 - 0.5	AMN	Quasi Peak / 9 kHz	66-56
0.5 - 5			56
5 - 30			60
0.15 - 0.5	AMN	Average / 9 kHz	56-46
0.5 - 5			46
5 - 30			50

NOTE:

(1) The test result calculated as following:

Measurement Value = Reading Level + Correct Factor

Correct Factor = Insertion Loss + Cable Loss + Attenuator Factor(if use)

Margin Level = Measurement Value – Limit Value

3.3.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	50Ω Terminator	SHX	TF2-3G-A	8122901	Feb. 27, 2022
2	TWO-LINE V-NETWORK	R&S	ENV216	100526	Nov. 04, 2021
3	EMI Test Receiver	R&S	ESR3	101862	Jul. 25, 2021
4	Artificial-Mains Network	SCHWARZBECK	NSLK 8127	8127685	Feb. 28, 2022
5	Cable	N/A	RG400	N/A(12m)	Mar. 09, 2022
6	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A

Remark: "N/A" denotes no model name, no serial no. or no calibration specified.

All calibration period of equipment list is one year.

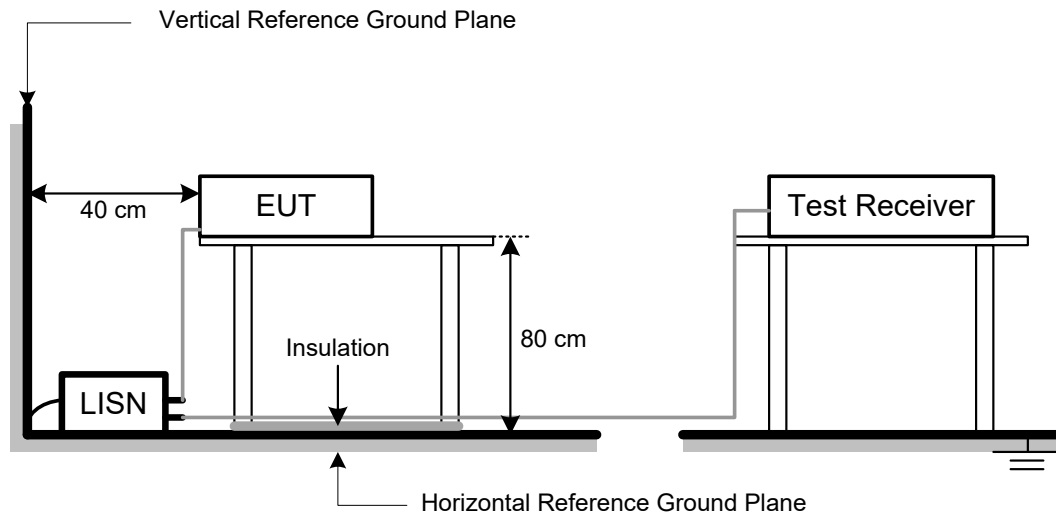
3.3.3 TEST PROCEDURE

- The EUT was placed 0.8 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.
- 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.
- 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.
- LISN at least 80 cm from nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.3.4 DEVIATION FROM TEST STANDARD

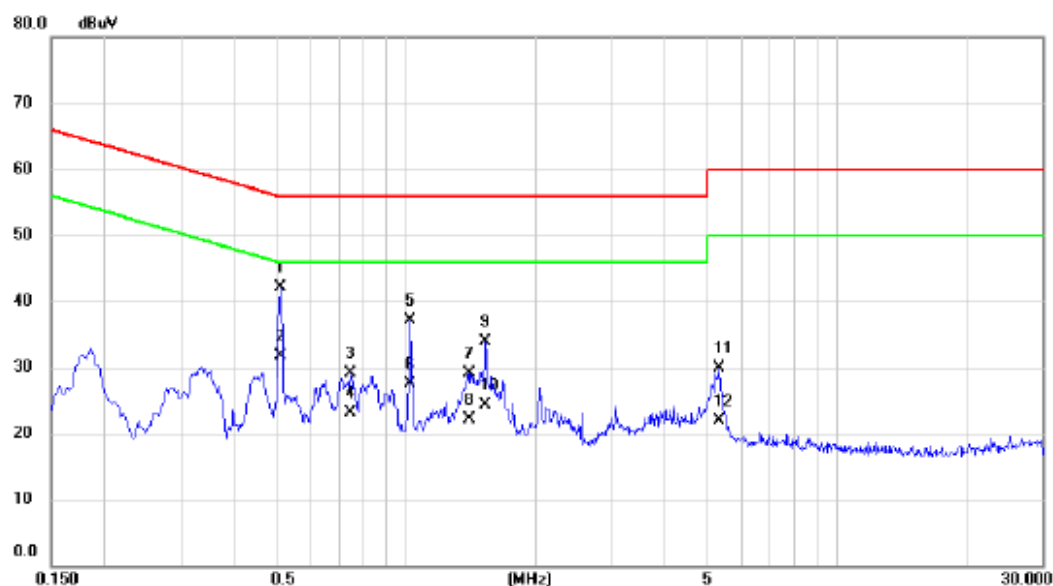
No deviation

3.3.5 TEST SETUP



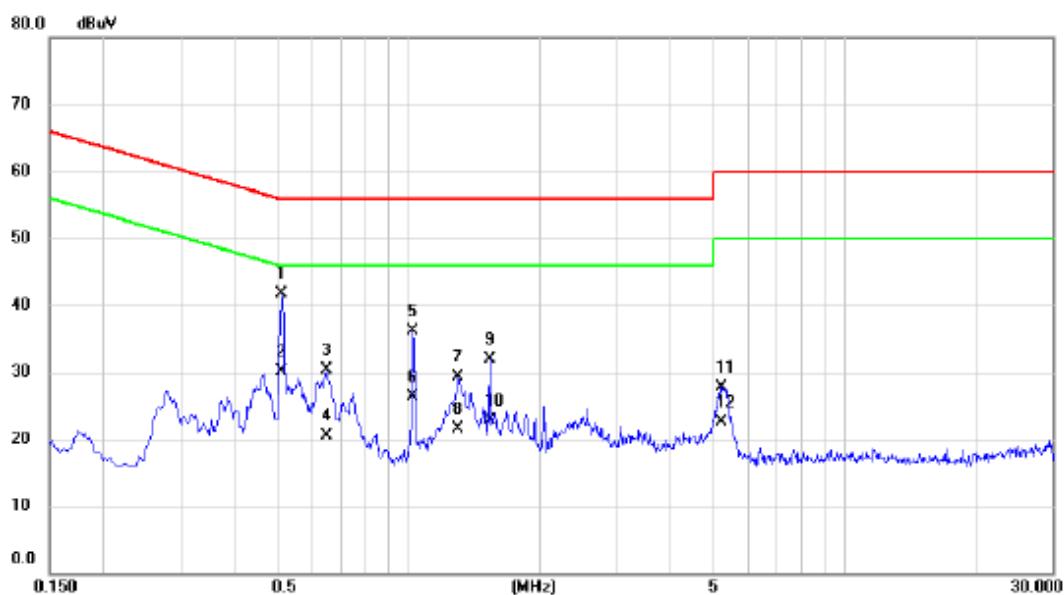
3.3.6 TEST RESULTS

Test Voltage	AC 230V/50Hz	Phase	Line
Test Mode	Mode 2		



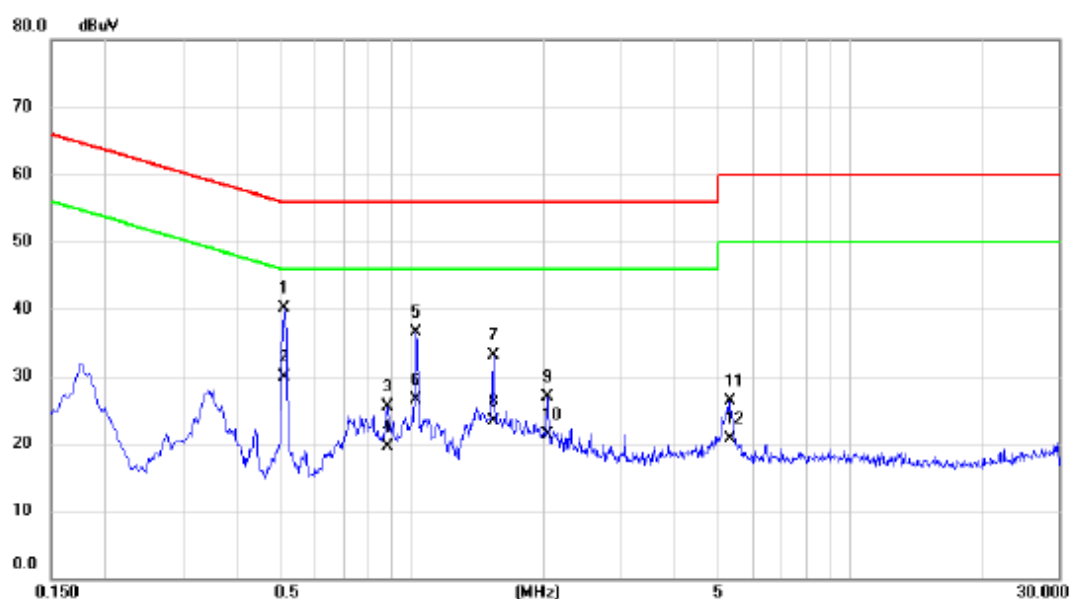
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	0.5100	32.42	9.68	42.10	56.00	-13.90	QP	
2		0.5100	22.10	9.68	31.78	46.00	-14.22	AVG	
3		0.7440	19.46	9.70	29.16	56.00	-26.84	QP	
4		0.7440	13.50	9.70	23.20	46.00	-22.80	AVG	
5		1.0207	27.39	9.73	37.12	56.00	-18.88	QP	
6		1.0207	17.80	9.73	27.53	46.00	-18.47	AVG	
7		1.3988	19.35	9.76	29.11	56.00	-26.89	QP	
8		1.3988	12.40	9.76	22.16	46.00	-23.84	AVG	
9		1.5315	24.04	9.77	33.81	56.00	-22.19	QP	
10		1.5315	14.50	9.77	24.27	46.00	-21.73	AVG	
11		5.3408	19.94	10.01	29.95	60.00	-30.05	QP	
12		5.3408	11.90	10.01	21.91	50.00	-28.09	AVG	

Test Voltage	AC 230V/50Hz	Phase	Neutral
Test Mode	Mode 2		



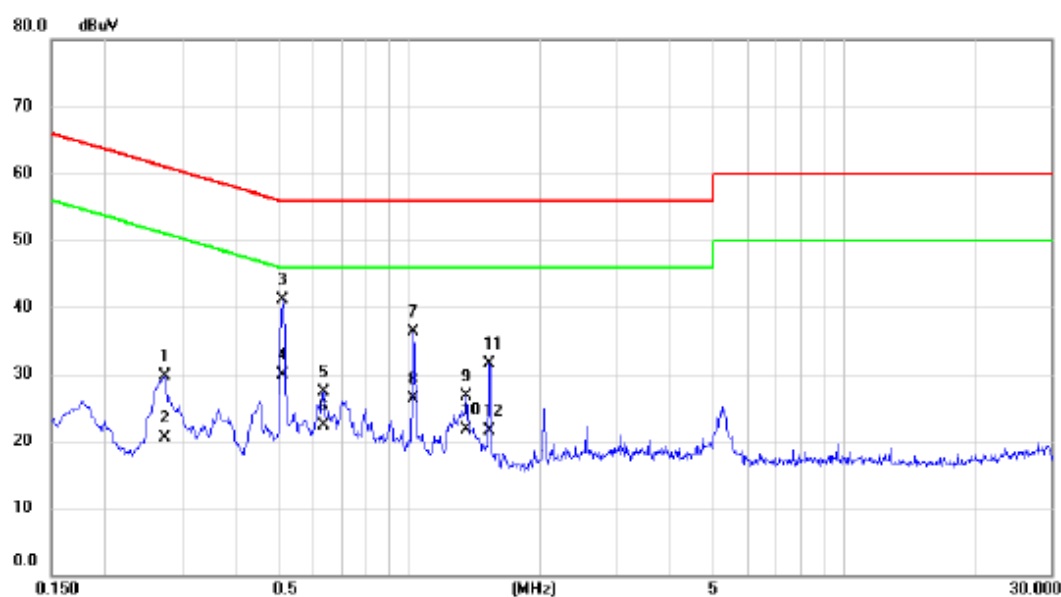
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	0.5122	31.97	9.68	41.65	56.00	-14.35	QP	
2		0.5122	20.50	9.68	30.18	46.00	-15.82	AVG	
3		0.6495	20.66	9.70	30.36	56.00	-25.64	QP	
4		0.6495	10.80	9.70	20.50	46.00	-25.50	AVG	
5		1.0230	26.44	9.73	36.17	56.00	-19.83	QP	
6		1.0230	16.50	9.73	26.23	46.00	-19.77	AVG	
7		1.3020	19.64	9.75	29.39	56.00	-26.61	QP	
8		1.3020	11.70	9.75	21.45	46.00	-24.55	AVG	
9		1.5360	22.23	9.77	32.00	56.00	-24.00	QP	
10		1.5360	12.90	9.77	22.67	46.00	-23.33	AVG	
11		5.2305	17.80	10.00	27.80	60.00	-32.20	QP	
12		5.2305	12.50	10.00	22.50	50.00	-27.50	AVG	

Test Voltage	AC 110V/60Hz	Phase	Line
Test Mode	Mode 2		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	0.5122	30.48	9.68	40.16	56.00	-15.84	QP	
2		0.5122	20.30	9.68	29.98	46.00	-16.02	AVG	
3		0.8790	15.78	9.72	25.50	56.00	-30.50	QP	
4		0.8790	9.80	9.72	19.52	46.00	-26.48	AVG	
5		1.0230	26.76	9.73	36.49	56.00	-19.51	QP	
6		1.0230	16.80	9.73	26.53	46.00	-19.47	AVG	
7		1.5338	23.25	9.77	33.02	56.00	-22.98	QP	
8		1.5338	13.50	9.77	23.27	46.00	-22.73	AVG	
9		2.0423	17.06	9.80	26.86	56.00	-29.14	QP	
10		2.0423	11.50	9.80	21.30	46.00	-24.70	AVG	
11		5.3520	16.27	10.01	26.28	60.00	-33.72	QP	
12		5.3520	10.70	10.01	20.71	50.00	-29.29	AVG	

Test Voltage	AC 110V/60Hz	Phase	Neutral
Test Mode	Mode 2		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		0.2737	20.01	9.66	29.67	61.00	-31.33	QP	
2		0.2737	10.80	9.66	20.46	51.00	-30.54	AVG	
3	*	0.5122	31.50	9.68	41.18	56.00	-14.82	QP	
4		0.5122	20.30	9.68	29.98	46.00	-16.02	AVG	
5		0.6360	17.57	9.70	27.27	56.00	-28.73	QP	
6		0.6360	12.60	9.70	22.30	46.00	-23.70	AVG	
7		1.0230	26.57	9.73	36.30	56.00	-19.70	QP	
8		1.0230	16.50	9.73	26.23	46.00	-19.77	AVG	
9		1.3560	17.04	9.75	26.79	56.00	-29.21	QP	
10		1.3560	11.90	9.75	21.65	46.00	-24.35	AVG	
11		1.5315	21.67	9.77	31.44	56.00	-24.56	QP	
12		1.5315	11.70	9.77	21.47	46.00	-24.53	AVG	

3.4 ASYMMETRIC MODE CONDUCTED EMISSIONS TEST

3.4.1 LIMITS

Requirements for asymmetric mode conducted emissions from Class B equipment

Frequency Range MHz	Coupling device	Detector type / Bandwidth	Class B voltage limits dB(μV)	Class B current limits dB(μA)
0.15 - 0.5	AAN	Quasi Peak / 9 kHz	84 - 74	n/a
0.5 - 30			74	
0.15 - 0.5	AAN	Average / 9 kHz	74 - 64	
0.5 - 30			64	

NOTE:

(1) The test result calculated as following:

Measurement Value = Reading Level + Correct Factor

Correct Factor = Insertion Loss + Cable Loss + Attenuator Factor(if use)

Margin Level = Measurement Value – Limit Value

3.4.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	50Ω Terminator	SHX	TF2-3G-A	8122901	Feb. 27, 2022
2	TWO-LINE V-NETWORK	R&S	ENV216	100526	Nov. 04, 2021
3	EMI Test Receiver	R&S	ESR3	101862	Jul. 25, 2021
4	Artificial-Mains Network	SCHWARZBECK	NSLK 8127	8127685	Feb. 28, 2022
5	Cable	N/A	RG400	N/A(12m)	Mar. 09, 2022
6	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
7	ISN	TESEQ	ISN T800	42838	Jul. 25, 2021

Remark: "N/A" denotes no model name, no serial No. or no calibration specified.

All calibration period of equipment list is one year.

3.4.3 TEST PROCEDURE

- The EUT was placed 0.8 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.
- 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.
- 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.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.
- AAN** at least 80 cm from nearest part of EUT chassis.

NOTE:

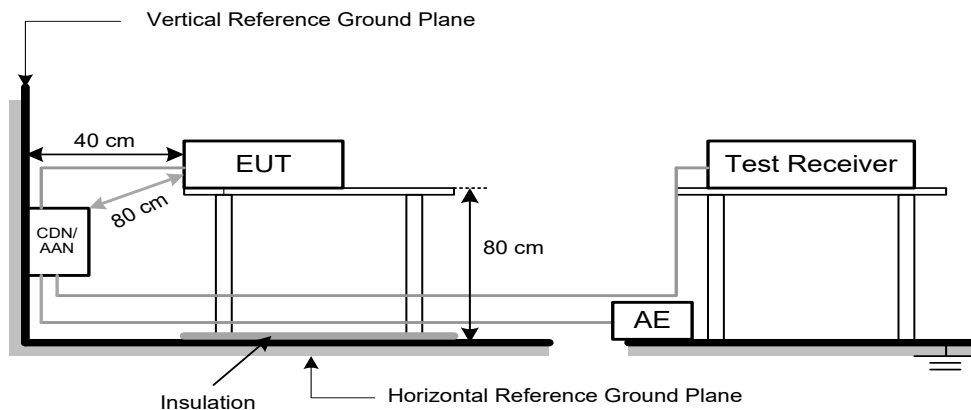
- The communication function of EUT was executed and AAN was connected between EUT and associated equipment and the AAN was connected directly to reference ground plane.
Measure the voltage at the measurement port of the AAN
Correct the measured voltage by adding the AAN voltage division factor
Compare the corrected voltage with the limit.

3.4.4 DEVIATION FROM TEST STANDARD

No deviation

3.4.5 TEST SETUP

- Cable Type: Balanced Unscreened, Screened or Coaxial



3.4.6 TEST RESULTS

Test Voltage	AC 230V/50Hz
Test Mode	Mode 3



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		0.4627	47.60	9.85	57.45	74.64	-17.19	QP	
2		0.4627	36.25	9.85	46.10	64.64	-18.54	AVG	
3		1.3920	44.58	9.79	54.37	74.00	-19.63	QP	
4		1.3920	34.25	9.79	44.04	64.00	-19.96	AVG	
5		4.5488	46.85	9.89	56.74	74.00	-17.26	QP	
6		4.5488	36.35	9.89	46.24	64.00	-17.76	AVG	
7		19.1490	51.14	10.34	61.48	74.00	-12.52	QP	
8	*	19.1490	45.35	10.34	55.69	64.00	-8.31	AVG	
9		24.3960	51.72	10.67	62.39	74.00	-11.61	QP	
10		24.3960	43.15	10.67	53.82	64.00	-10.18	AVG	
11		26.3423	52.16	10.82	62.98	74.00	-11.02	QP	
12		26.3423	43.69	10.82	54.51	64.00	-9.49	AVG	

Test Voltage	AC 230V/50Hz
Test Mode	Mode 4



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		4.4723	47.97	9.89	57.86	74.00	-16.14	QP	
2		4.4723	35.26	9.89	45.15	64.00	-18.85	AVG	
3		10.0004	54.65	10.05	64.70	74.00	-9.30	QP	
4		10.0004	44.15	10.05	54.20	64.00	-9.80	AVG	
5		16.4017	51.09	10.24	61.33	74.00	-12.67	QP	
6		16.4017	43.26	10.24	53.50	64.00	-10.50	AVG	
7		18.9420	53.70	10.34	64.04	74.00	-9.96	QP	
8		18.9420	45.26	10.34	55.60	64.00	-8.40	AVG	
9		23.8290	56.31	10.63	66.94	74.00	-7.06	QP	
10		23.8290	42.16	10.63	52.79	64.00	-11.21	AVG	
11	*	25.9778	56.80	10.78	67.58	74.00	-6.42	QP	
12		25.9778	45.15	10.78	55.93	64.00	-8.07	AVG	

3.5 HARMONIC CURRENT EMISSIONS TEST

3.5.1 LIMITS

EN IEC 61000-3-2		
Equipment Category	Harmonic Order	Max. Permissible Harmonic Current
	n	A
Class 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
	$8 \leq n \leq 40$	$0.23 \times 8/n$

3.5.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Harmonics and Flicker Analyzer	California Instruments	PACS-1	72344	Jul. 25, 2021
2	3KVA AC Power source	California Instruments	3001ix	56309	Jul. 25, 2021
3	Measurement Software	California	CTS4.0 Version 4.23	N/A	N/A

Remark: "N/A" denotes no model name, no serial No. or no calibration specified.

All calibration period of equipment list is one year.

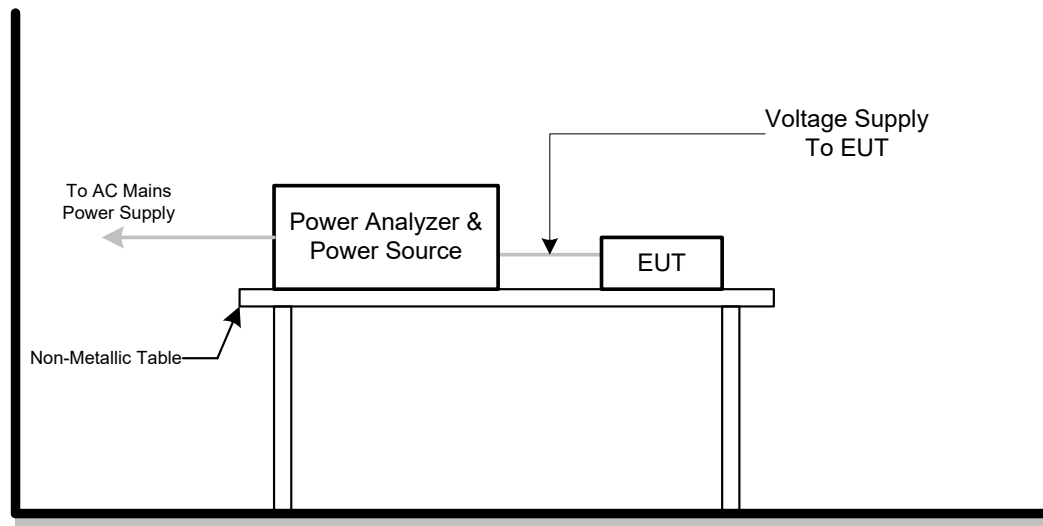
3.5.3 TEST PROCEDURE

- 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.
- The classification of EUT is according to of EN IEC 61000-3-2. The EUT is classified as Class A.
- 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 time necessary for the EUT to be exercised.

3.5.4 DEVIATION FROM TEST STANDARD

No deviation

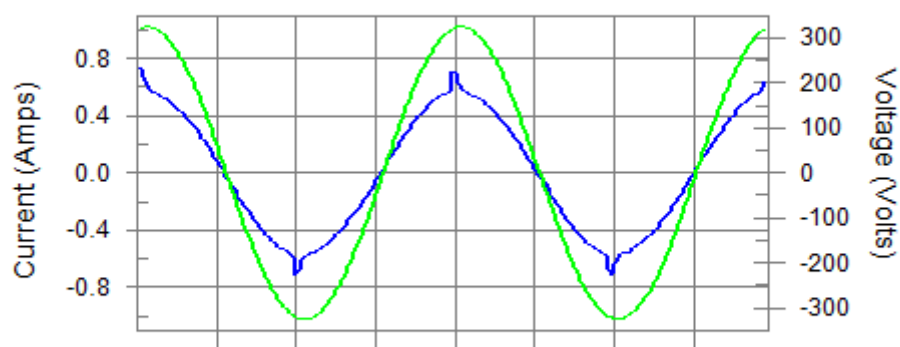
3.5.5 TEST SETUP



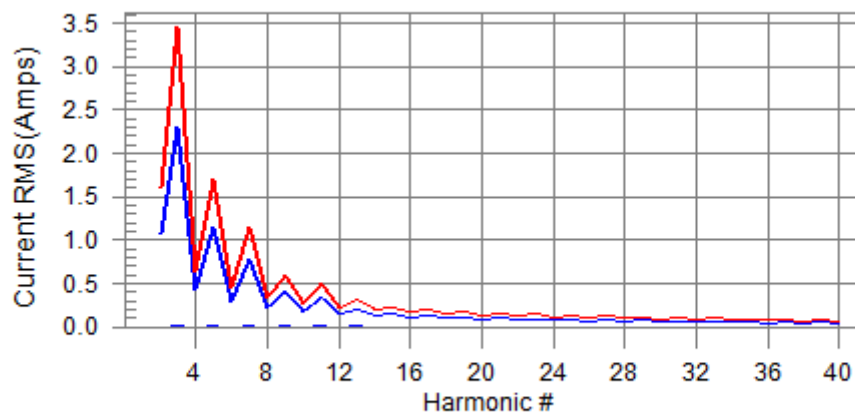
3.5.6 TEST RESULTS

Harmonics - Class A	
Test Voltage	AC 230V/50Hz
Test Mode	Mode 1

Current & voltage waveforms



Harmonics and Class A limit line European Limits



Test result: Pass Worst harmonics H17-2.8% of 150% limit, H17-4.1% of 100% limit

Current Test Result Summary (Run time)

Test Voltage	AC 230V/50Hz
Test Mode	Mode 1

Highest parameter values during test:

V_RMS (Volts):	229.98	Frequency(Hz):	50.00
I_Peak (Amps):	0.731	I_RMS (Amps):	0.414
I_Fund (Amps):	0.413	Crest Factor:	1.771
Power (Watts):	94.8	Power Factor:	0.998

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.001	1.080	N/A	0.002	1.620	N/A	Pass
3	0.009	2.300	0.4	0.010	3.450	0.3	Pass
4	0.001	0.430	N/A	0.001	0.645	N/A	Pass
5	0.008	1.140	0.7	0.008	1.710	0.5	Pass
6	0.000	0.300	N/A	0.000	0.450	N/A	Pass
7	0.008	0.770	1.0	0.008	1.155	0.7	Pass
8	0.000	0.230	N/A	0.000	0.345	N/A	Pass
9	0.007	0.400	1.8	0.007	0.600	1.2	Pass
10	0.000	0.184	N/A	0.000	0.276	N/A	Pass
11	0.007	0.330	2.1	0.007	0.495	1.4	Pass
12	0.000	0.153	N/A	0.000	0.230	N/A	Pass
13	0.006	0.210	3.0	0.006	0.315	2.0	Pass
14	0.000	0.131	N/A	0.000	0.197	N/A	Pass
15	0.006	0.150	3.9	0.006	0.225	2.7	Pass
16	0.000	0.115	N/A	0.000	0.173	N/A	Pass
17	0.005	0.132	4.1	0.005	0.198	2.8	Pass
18	0.000	0.102	N/A	0.000	0.153	N/A	Pass
19	0.005	0.118	N/A	0.005	0.178	N/A	Pass
20	0.000	0.092	N/A	0.000	0.138	N/A	Pass
21	0.004	0.107	N/A	0.004	0.161	N/A	Pass
22	0.000	0.084	N/A	0.000	0.125	N/A	Pass
23	0.004	0.098	N/A	0.004	0.147	N/A	Pass
24	0.000	0.077	N/A	0.000	0.115	N/A	Pass
25	0.004	0.090	N/A	0.004	0.135	N/A	Pass
26	0.000	0.071	N/A	0.000	0.107	N/A	Pass
27	0.003	0.083	N/A	0.003	0.125	N/A	Pass
28	0.000	0.066	N/A	0.000	0.099	N/A	Pass
29	0.003	0.078	N/A	0.003	0.116	N/A	Pass
30	0.000	0.061	N/A	0.000	0.092	N/A	Pass
31	0.002	0.073	N/A	0.002	0.109	N/A	Pass
32	0.000	0.058	N/A	0.000	0.086	N/A	Pass
33	0.002	0.068	N/A	0.002	0.102	N/A	Pass
34	0.000	0.054	N/A	0.000	0.081	N/A	Pass
35	0.002	0.064	N/A	0.002	0.096	N/A	Pass
36	0.000	0.051	N/A	0.000	0.077	N/A	Pass
37	0.002	0.061	N/A	0.002	0.091	N/A	Pass
38	0.000	0.048	N/A	0.000	0.073	N/A	Pass
39	0.002	0.058	N/A	0.002	0.087	N/A	Pass
40	0.000	0.046	N/A	0.000	0.069	N/A	Pass

Voltage Source Verification Data (Run time)	
Test Voltage	AC 230V/50Hz
Test Mode	Mode 1

Highest parameter values during test:

Voltage (Vrms):	229.98	Frequency(Hz):	50.00
I_Peak (Amps):	0.731	I_RMS (Amps):	0.414
I_Fund (Amps):	0.413	Crest Factor:	1.771
Power (Watts):	94.8	Power Factor:	0.998

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.125	0.460	27.20	OK
3	0.535	2.069	25.84	OK
4	0.073	0.460	15.84	OK
5	0.056	0.920	6.09	OK
6	0.033	0.460	7.13	OK
7	0.030	0.690	4.30	OK
8	0.022	0.460	4.86	OK
9	0.046	0.460	9.96	OK
10	0.021	0.460	4.52	OK
11	0.022	0.230	9.75	OK
12	0.019	0.230	8.23	OK
13	0.015	0.230	6.46	OK
14	0.017	0.230	7.55	OK
15	0.024	0.230	10.55	OK
16	0.015	0.230	6.32	OK
17	0.015	0.230	6.45	OK
18	0.011	0.230	5.00	OK
19	0.016	0.230	6.78	OK
20	0.017	0.230	7.25	OK
21	0.012	0.230	5.15	OK
22	0.014	0.230	5.94	OK
23	0.008	0.230	3.68	OK
24	0.008	0.230	3.31	OK
25	0.009	0.230	3.85	OK
26	0.010	0.230	4.31	OK
27	0.014	0.230	6.28	OK
28	0.009	0.230	4.10	OK
29	0.011	0.230	4.92	OK
30	0.006	0.230	2.69	OK
31	0.007	0.230	2.87	OK
32	0.008	0.230	3.46	OK
33	0.007	0.230	3.07	OK
34	0.003	0.230	1.52	OK
35	0.007	0.230	2.95	OK
36	0.005	0.230	1.96	OK
37	0.009	0.230	3.88	OK
38	0.004	0.230	1.59	OK
39	0.006	0.230	2.68	OK
40	0.007	0.230	2.85	OK

3.6 VOLTAGE FLUCTUATIONS (FLICKER) TEST

3.6.1 LIMITS

Tests	Limits	Descriptions
	BS EN 61000-3-3	
Pst	≤ 1.0 , $T_p = 10$ min.	Short Term Flicker Indicator
Plt	≤ 0.65 , $T_p = 2$ hr.	Long Term Flicker Indicator
dc	$\leq 3.3\%$	Relative Steady-State V-Chang
dmax	$\leq 4\%$	Maximum Relative V-change
d (t)	≤ 500 ms	Relative V-change characteristic

3.6.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Harmonics and Flicker Analyzer	California Instruments	PACS-1	72344	Jul. 25, 2021
2	3KVA AC Power source	California Instruments	3001ix	56309	Jul. 25, 2021
3	Measurement Software	California	CTS4.0 Version 4.23	N/A	N/A

Remark: "N/A" denotes no model name, no serial No. or no calibration specified.

All calibration period of equipment list is one year.

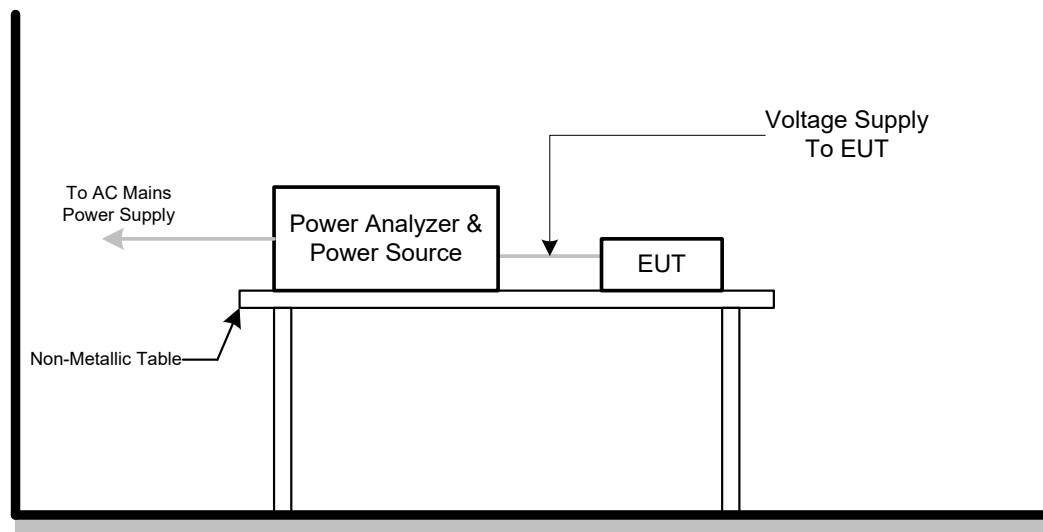
3.6.3 TEST PROCEDURE

- Tests was performed according to the Test Conditions/Assessment of Voltage Fluctuations specified in EN 61000-3-3 depend on which standard adopted for compliance measurement.
- All types of harmonic current and/or voltage fluctuation in this report are assessed by direct measurement using flicker-meter.

3.6.4 DEVIATION FROM TEST STANDARD

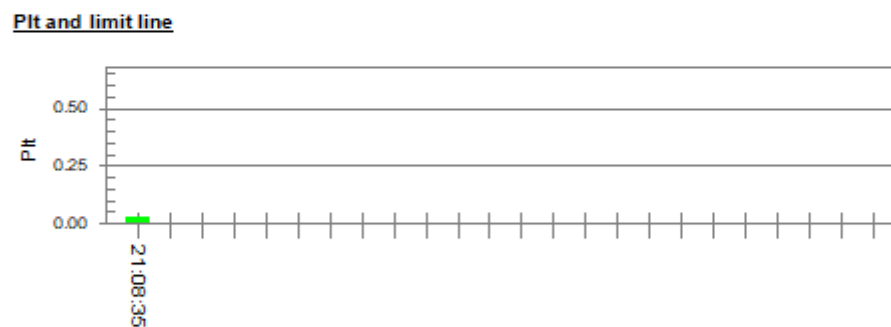
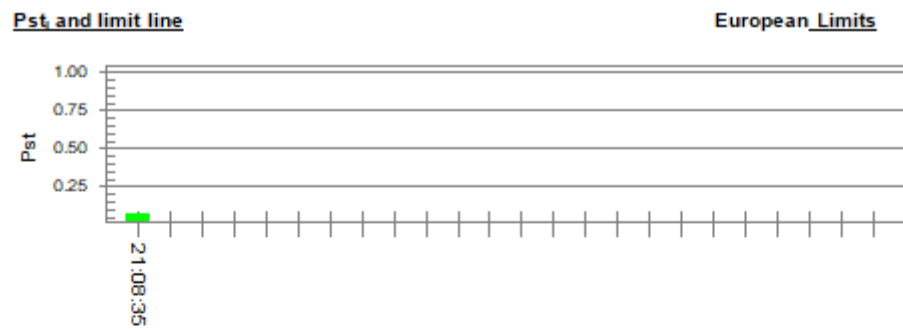
No deviation

3.6.5 TEST SETUP



3.6.6 TEST RESULTS

Test Voltage	AC 230V/50Hz
Test Mode	Mode 1



Parameter values recorded during the test:

Vrms at the end of test (Volt):	229.82	Test limit (mS):	500.0	Pass
T-max (mS):	0	Test limit (%):	3.30	Pass
Highest dc (%):	0.00	Test limit (%):	4.00	Pass
Highest dmax (%):	0.00	Test limit:	1.000	Pass
Highest Pst (10 min. period):	0.064	Test limit:	0.650	Pass
Highest Plt (2 hr. period):	0.028			

4. EMC IMMUNITY TEST

4.1 STANDARD COMPLIANCE/SEVERITY LEVEL/CRITERIA

Tests Standard No.	Test Specification Level / Test Mode	Test Ports	Criteria
Electrostatic discharge IEC 61000-4-2 (ESD)	±8kV air discharge ±4kV contact discharge (Direct Mode)	Enclosure	B
	±4kV HCP discharge ±4kV VCP discharge (Indirect Mode)	Enclosure	B
Continuous RF electromagnetic field disturbances,swept test IEC 61000-4-3 (RS)	80 MHz to 1000 MHz 3V/m(unmodulated, r.m.s), 1 kHz, 80%, AM modulated	Enclosure	A
Continuous RF electromagnetic field disturbances,spot test IEC 61000-4-3 (RS)	1800 MHz, 2600MHz, 3500 MHz, 5000MHz(±1 %) 3V/m(unmodulated, r.m.s), 1 kHz, 80%, AM modulated	Enclosure	A
Electrical fast transient/burst immunity IEC 61000-4-4 (EFT)	±0.5kV(peak) 5/50ns Tr/Th 5kHz Repetition Frequency (100kHz Repetition Frequency for xDSL port)	Analogue/digital data ports (NOTE 2)	B
	±0.5kV(peak) 5/50ns Tr/Th 5kHz Repetition Frequency	DC network power ports (NOTE 2)	B
	±1 kV(peak) 5/50ns Tr/Th 5kHz Repetition Frequency	AC mains power ports	B

Surge immunity IEC 61000-4-5 (Surge)	Port Type: unshielded symmetrical		
	Apply: lines to ground		
	Primary protection is Intended ±1 kV and ±4 kV 10/700(5/320)Tr/Th μs	Analogue/digital data ports (NOTE 1) & (NOTE 2)	C
	Primary protection is not Intended ±1 kV 10/700(5/320) Tr/Th μs		C
	Port type: coaxial or shielded		
	Apply: shield to ground		
±0.5 kV 1.2/50(8/20) Tr/Th μs	Analogue/digital data ports (NOTE 1) & (NOTE 2)	B	
line to reference ground for each individual line: ±0.5 kV(peak) 1.2/50(8/20) Tr/Th μs	DC network power ports (NOTE 2)	B	
±1 kV(peak) 1.2/50(8/20) Tr/Th μs (line to line) ±2 kV(peak) 1.2/50(8/20) Tr/Th μs (line to earth or ground)	AC mains power ports	B	
Continuous induced RF disturbances IEC 61000-4-6 (CS)	0.15 MHz to 10 MHz 3V(unmodulated, r.m.s), 10 MHz to 30 MHz 3V to 1V(unmodulated, r.m.s), 30 MHz to 80 MHz 1V(unmodulated, r.m.s), 1kHz 80%, AM 150Ω source impedance	Analogue/digital data ports (NOTE 2)	A
	0.15 MHz to 10 MHz 3V(unmodulated, r.m.s), 10 MHz to 30 MHz 3V to 1V(unmodulated, r.m.s), 30 MHz to 80 MHz 1V(unmodulated, r.m.s), 1kHz 80%, AM 150Ω source impedance	DC network power ports (NOTE 2)	A
	0.15 MHz to 10 MHz 3V(unmodulated, r.m.s), 10 MHz to 30 MHz 3V to 1V(unmodulated, r.m.s), 30 MHz to 80 MHz 1V(unmodulated, r.m.s), 1kHz 80%, AM 150Ω source impedance	AC mains power ports	A

Power frequency magnetic field immunity IEC 61000-4-8 (PFMF)	50 Hz or 60Hz, 1A/m(r.m.s)	Enclosure	A
Voltage dips, short interruptions and voltage variations immunity IEC 61000-4-11 (Dips)	Voltage dips: Residual voltage < 5% 0.5 cycle Residual voltage < 70% 25 cycle (50Hz), 30 cycle (60Hz) Voltage interruptions: Residual voltage < 5% 250 cycle (50Hz), 300 cycle (60Hz)	AC Power Ports	B C C
Broadband impulse noise disturbances, repetitive (BIN-R)	0.15MHz to 0.5 MHz 107dBuV 0.5 MHz to 10 MHz 107dBuV to 36dBuV 10 MHz to 30 MHz 36dBuV to 30 dBuV	Analogue/digital data ports (Applicable only to CPE xDSL ports)	A
	0.70 ms 8.3 ms(for 60Hz) 10 ms(for 50Hz)	Analogue/digital data ports (Apply period based on the AC mains frequency)	A
Broadband impulse noise disturbances, isolated (BIN-I)	0.15MHz to 30 MHz 110dBuV	Analogue/digital data ports (Applicable only to CPE xDSL ports)	B
	0.24 ms 10 ms 300 ms	Analogue/digital data ports (Apply all burst durations)	B

Note.

- 1) Applicable only to ports which, according to the manufacturer's specification, may connect directly to outdoor cables.
- 2) Applicable only to ports which, according to the manufacturer's specification, support cable lengths greater than 3 m.

4.2 GENERAL PERFORMANCE CRITERIA

According to **EN 55035** standards, the general performance criteria as following:

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.
Criterion B	During the application of the disturbance, degradation of performance is allowed. However, unintentional 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.
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. Areboot or re-start operation is allowed. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

4.3 ELECTROSTATIC DISCHARGE IMMUNITY TEST (ESD)

4.3.1 TEST SPECIFICATION

Basic Standard	IEC 61000-4-2
Discharge Impedance	330 ohm / 150 pF
Required Performance	B
Discharge Voltage	Air Discharge: $\pm 2\text{kV}$, $\pm 4\text{kV}$, $\pm 8\text{kV}$ Contact Discharge: $\pm 4\text{kV}$
Polarity	Positive & Negative
Number of Discharge	20 times at each test point
Discharge Mode	Single Discharge
Discharge Period	1 second

4.3.2 MEASUREMENT INSTRUMENTS

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	ESD Generator	TESEQ AG	NSG 437	450	Dec. 03, 2021

Remark: "N/A" denotes no model name, no serial No. or no calibration specified.

All calibration period of equipment list is one year.

4.3.3 TEST PROCEDURE

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

- a. The test shall be performed with single discharges. On each pre-selected point at least 10 single discharges (in the most sensitive polarity) shall be applied.

NOTE 1 The minimum number of discharges applied is depending on the EUT; for products with synchronized circuits the number of discharges should be larger.

For the time interval between successive single discharges an initial value of 1 s is recommended. Longer intervals may be necessary to determine whether a system failure has occurred.

NOTE 2 The points to which the discharges should be applied may be selected by means of an exploration carried out at a repetition rate of 20 discharges per second, or more.

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.

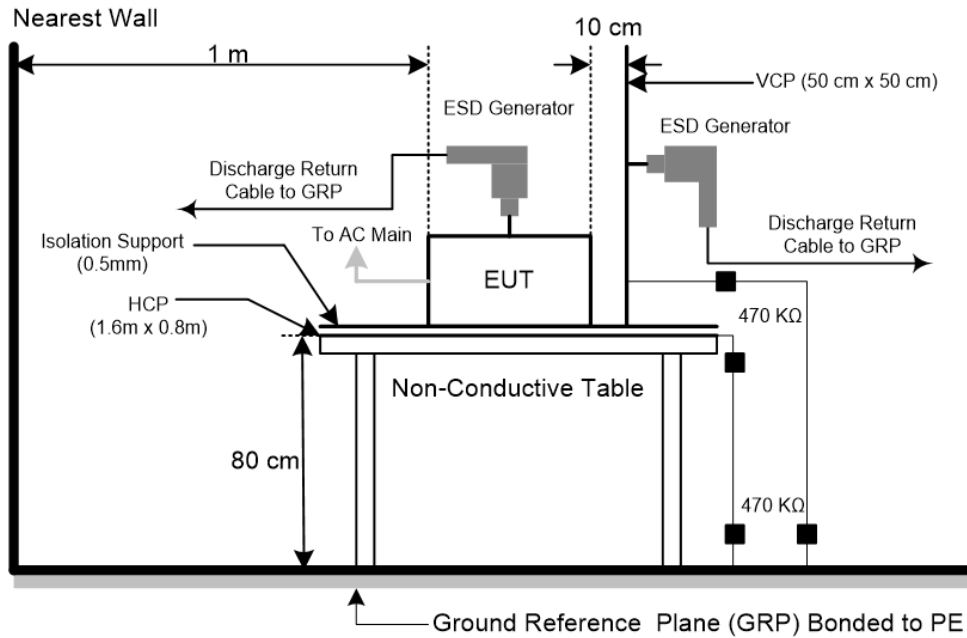
- b. For TABLE-TOP equipment:

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, and 2.5 meters square connected to the protective grounding system. 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 940k total impedance. The equipment under test was installed in a representative system as described in IEC 61000-4-2, and its cables were placed on the HCP and isolated by an insulating support of 0.5mm thickness. A distance of 1-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 TEST SETUP



4.3.6 TEST RESULTS

Test Voltage	AC 230V/50Hz
Test Mode	Mode 1

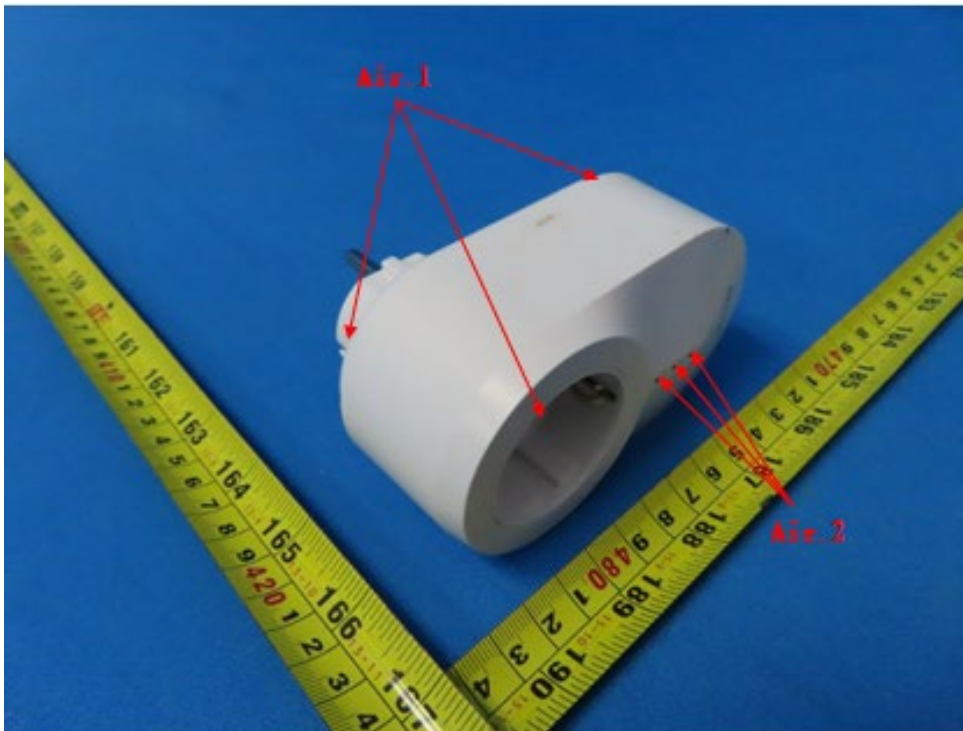
Mode	Air Discharge								Contact Discharge					
Test Level	2kV		4kV		8kV		- kV		4kV		- kV		- kV	
Location	P	N	P	N	P	N	P	N	P	N	P	N	P	N
1	A	A	A	A	A	A	-	-	-	-	-	-	-	-
2	A	A	A	A	A	A	-	-	-	-	-	-	-	-
3	A	A	A	A	A	A	-	-	-	-	-	-	-	-
4	A	A	A	A	B	B	-	-	-	-	-	-	-	-
Criteria	B								B					
Result	B								N/A					

Mode	HCP Contact Discharge						VCP Contact Discharge					
Test Level	4kV		- kV		- kV		4kV		- kV		- kV	
Location	P	N	P	N	P	N	P	N	P	N	P	N
Left side	A	A	-	-	-	-	A	A	-	-	-	-
Right side	A	A	-	-	-	-	A	A	-	-	-	-
Front side	A	A	-	-	-	-	A	A	-	-	-	-
Rear side	A	A	-	-	-	-	A	A	-	-	-	-
Criteria	B						B					
Result	A						A					

Note:

- 1) P/N denotes the Positive/Negative polarity of the output voltage.
- 2) N/A - denotes test is not applicable in this test report

PHOTO(S) SHOWN THE LOCATION(S) OF ESD EVALUATED



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

4.4.1 TEST SPECIFICATION

Basic Standard	IEC 61000-4-3
Required Performance	A
Frequency Range	80 MHz - 1000 MHz, 1800 MHz, 2600 MHz, 3500 MHz, 5000MHz($\pm 1\%$)
Field Strength	3 V/m(unmodulated, r.m.s)
Modulation	1 kHz Sine Wave, 80%, AM Modulation
Frequency Step	1% of fundamental
Polarity of Antenna	Horizontal and Vertical
Test Distance	3 m
Antenna Height	1.55 m
Dwell Time	3 seconds

4.4.2 MEASUREMENT INSTRUMENTS

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Antenna	EMCO	3142C	66462	Mar. 26, 2022
2	Microwave Log.-Per. Antenna	Schwarzbeck	STLP 9149	9149-277	Apr. 14, 2022
3	Power amplifier	MILMEGA	80RF1000-250	1064833	Feb. 28, 2022
4	Amplifier	AR	50S1G4A	326720	Feb. 28, 2022
5	Power amplifier	MILMEGA	AS1860-50	1064834	Feb. 28, 2022
6	MXG Analog Signal Generator	Agilent	N5181A	MY49060710	Jul. 25, 2021
7	Measurement Software	Farad	EZ-RS (V2.0.1.3)	N/A	N/A

Remark: "N/A" denotes no model name, no serial No. or no calibration specified.

All calibration period of equipment list is one year.

4.4.3 TEST PROCEDURE

The EUT and support equipment are in a fully-anechoic chamber.

The testing distance from antenna to the EUT was 3 meters.

For TABLE-TOP equipment:

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

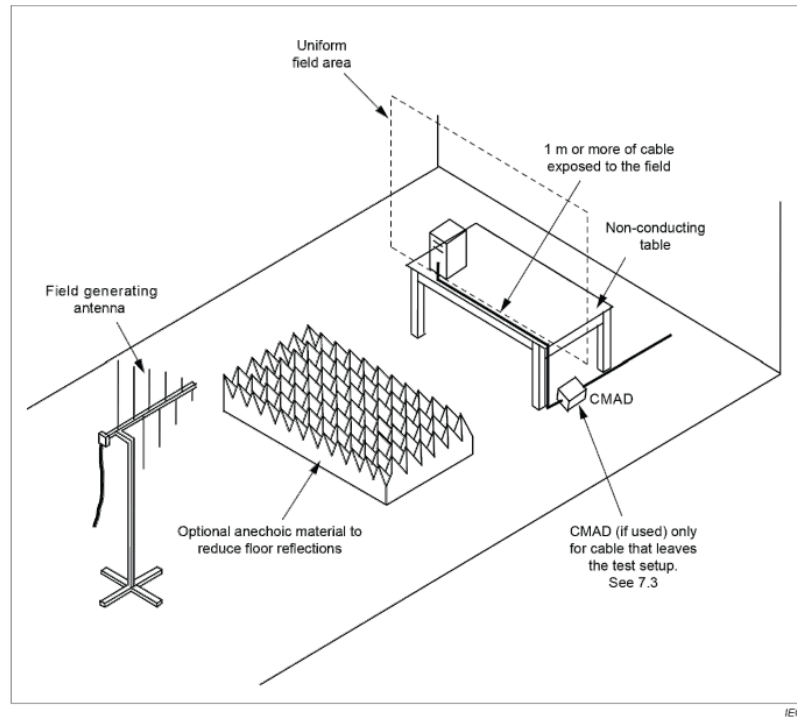
- The field strength level was 3 V/m(unmodulated, r.m.s).
- The frequency range is swept from 80 MHz to 1000 MHz, with the signal 80%amplitude modulated with a 1 kHz sine wave. Where the frequency range is swept incrementally, the step size was 1% of fundamental.
- The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.
- The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

4.4.4 DEVIATION FROM TEST STANDARD

No deviation

4.4.5 TEST SETUP

a) For Continuous induced RF disturbances



4.4.6 TEST RESULTS

Test Voltage	AC 230V/50Hz
Test Mode	Mode 1

Frequency Range (MHz)	RF Field Position	R.F. Field Strength	Modulation	Azimuth	Criterion	Result
80 - 1000	H / V	3V/m	AM Modulated 1000Hz, 80%	0	A	A
				90		
				180		
				270		
1800, 2600, 3500, 5000 (±1%)	H / V	3V/m	AM Modulated 1000Hz, 80%	0	A	A
				90		
				180		
				270		

4.5 ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST (EFT)

4.5.1 TEST SPECIFICATION

Basic Standard	IEC 61000-4-4
Required Performance	B
Test Voltage	AC mains power ports: ± 1 kV Analogue/digital data ports: ± 0.5 kV
Polarity	Positive & Negative
Impulse Frequency	5 kHz
Impulse Wave shape	5/50 ns
Burst Duration	15 ms
Burst Period	300 ms
Test Duration	1 min.

4.5.2 MEASUREMENT INSTRUMENTS

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Fast Transient Burst Simulator	Prima	EFT61004TA	PR190741004	Jul. 25, 2021

Remark: "N/A" denotes no model name, no serial No. or no calibration specified.

All calibration period of equipment list is one year.

4.5.3 TEST PROCEDURE

For TABLE-TOP equipment:

The configuration consisted of a wooden table (0.8m high) standing on the Ground Reference Plane and should be located 0.1 m \pm 0.01m above the Ground Reference Plane. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system. A minimum distance of 0.5m was provided between the EUT and the walls of the laboratory or any other metallic structure.

- Both positive and negative polarity discharges were applied.
- The duration time of each test sequential was 1 minute

4.5.4 DEVIATION FROM TEST STANDARD

No deviation

The diagram illustrates the test setup for the immunity test of a power supply unit (PSU) according to EN 61000-4-6. It shows two configurations, (A) and (B), within a test chamber.

Configuration (A): The PSU (EUT) and an auxiliary equipment (AE) are placed on a table. An EFT/B generator (A) is connected to the PSU via a coupling/decoupling network (A). The AC mains supply is connected to the PSU. Dimensions include 0.5 m for the distance between the AC mains supply and the PSU, and 0.1 m for the distance between the EUT and the AE. The AE is positioned at a distance of >0.5 m from the EUT. The EUT is supported by an insulating support.

Configuration (B): The PSU (EUT) is placed on a table. An EFT/B generator (B) is connected to the PSU via a capacitive coupling clamp. The AC mains supply is connected to the PSU. Dimensions include 1.0 m for the distance between the EFT/B generator (B) and the PSU, and 0.1 m for the distance between the EUT and the capacitive coupling clamp. The EUT is supported by an insulating support. The AC mains supply is connected to the PSU via a grounding connection according to the manufacturer's specification. The length of the grounding connection is to be specified in the test plan.

Common Components and Dimensions:

- AC mains supply
- EUT (Equipment Under Test)
- AE (Auxiliary Equipment)
- EFT/B generator (A) and (B)
- Coupling/decoupling network (A)
- Capacitive coupling clamp
- Contact to the ground reference plane
- Insulating support
- Grounding cable
- Ground reference plane
- Dimensions: >0.5 m, ≥ 0.5 m, 0.5 m, 1.0 m, 0.1 m

4.5.6 TEST RESULTS

Test Voltage	AC 230V/50Hz
Test Mode	Mode 1

EUT Ports Tested		Polarity	Repetition Frequency	Test Level 1kV	Criterion	Result
AC Power Port	Line (L)	+	5 kHz	A	B	A
		-	5 kHz	A		
	Neutral (N)	+	5 kHz	A	B	A
		-	5 kHz	A		
	L+N	+	5 kHz	A	B	A
		-	5 kHz	A		

EUT Ports Tested		Polarity	Repetition Frequency	Test Level 0.5kV	Criterion	Result
Analogue/digital data ports	LAN	+	5 kHz	B	B	B
		-	5 kHz	B		

4.6 SURGE IMMUNITY TEST (SURGE)

4.6.1 TEST SPECIFICATION

Basic Standard	IEC 61000-4-5
Required Performance	B(AC mains power ports) C(Analogue/digital data ports)
Wave-Shape	1.2/50(8/20) Tr/Th μ s combination wave 10/700(5/320) Tr/Th μ s combination wave
Test Voltage	AC mains power ports: ± 0.5 kV, ± 1 kV Analogue/digital data ports: ± 0.5 kV, ± 1 kV
Generator Source Impedance	2 Ω of the low-voltage power supply network. 40 Ω (15 Ω +25 Ω) between outdoor unshielded symmetrical interconnection line and ground when use 10/700(5/320) waveform
Phase Angle, Polarity and Number of Tests	Five positive pulses line-to-neutral at 90° phase Five negative pulses line-to-neutral at 270° phase
Pulse Repetition Rate	1 time / min

4.6.2 MEASUREMENT INSTRUMENTS

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	System mainframe	Schaffner	NSG 2050	200729-619LU	Aug. 14, 2021
2	CDN	EMC PARTNER	CDN-UTP8	40	Feb. 27, 2022
3	Measurement Software	Schaffner	Win 2000 Version V7.10	N/A	N/A
4	Lightning Surge Generator	Prima	SUG61005TB	PR190854067	Jul. 25, 2021

Remark: "N/A" denotes no model name, no serial No. or no calibration specified.

All calibration period of equipment list is one year.

4.6.3 TEST PROCEDURE

a. For EUT power supply:

The surge is to be applied to the EUT power supply terminals via the capacitive coupling network. Decoupling networks are 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. The power cord between the EUT and the coupling/decoupling networks shall be 2meters in length (or shorter).

b. For test applied to unshielded unsymmetrically operated interconnection lines of EUT :

The surge is applied to the lines via the capacitive coupling. The coupling /decoupling networks shall not influence the specified functional conditions of the EUT. The interconnection line between the EUT and the coupling/decoupling networks shall be 2 meters in length (or shorter).

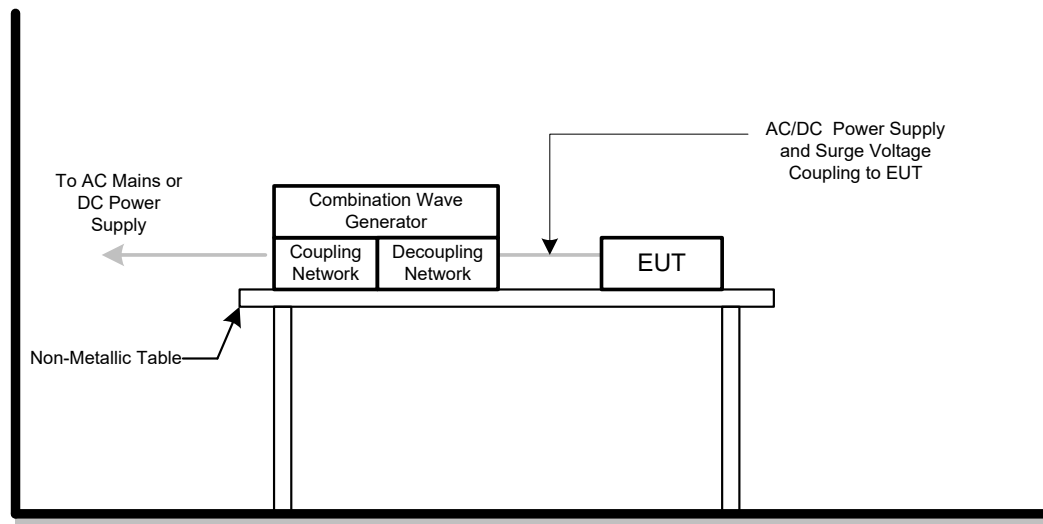
c. For test applied to unshielded symmetrically operated interconnection /telecommunication lines of EUT :

The surge is applied to the lines via gas arrestors coupling. Test levels below the ignition point of the coupling arrestor cannot be specified. The interconnection line between the EUT and the coupling/decoupling networks shall be 2 meters in length (or shorter).

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 TEST SETUP



4.6.6 TEST RESULTS

Test Voltage	AC 230V/50Hz
Test Mode	Mode 1

Wave Form EUT Ports Tested		1.2/50(8/20)Tr/Thµs						Criterion	Result
		Polarity	Phase	Voltage					
				0.5kV	1kV	-- kV	-- kV		
AC	L – N	+	90°	A	A	-	-	B	A
		-	270°	A	A	-	-		

Wave Form EUT Ports Tested	10/700(5/320)Tr/Thµs						Criterion	Result
	Polarity	Phase	Voltage					
			0.5kV	1kV	-- kV	-- kV		
Analogue/digital data ports(LAN)	+/-	N/A	B	B	-	-	C	B

4.7 IMMUNITY TO CONDUCTED DISTURBANCES, INDUCED BY RADIO-FREQUENCY FIELDS TEST (CS)

4.7.1 TEST SPECIFICATION

Basic Standard	IEC 61000-4-6
Required Performance	A
Frequency Range&Field Strength	0.15 MHz - 10 MHz: 3V (unmodulated, r.m.s.) 10 MHz - 30 MHz: 3V to 1V (unmodulated, r.m.s.) 30 MHz - 80 MHz: 1V (unmodulated, r.m.s.)
Modulation	1 kHz Sine Wave, 80%, AM Modulation
Frequency Step	1% of fundamental
Dwell Time	3 seconds

4.7.2 MEASUREMENT INSTRUMENTS

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	TEST SYSTEM FOR CONDUCTED AND RADIATED IMMUNITY	TESEQ	NSG 4070B	37513	Jul. 25, 2021
2	Power CDN	FCC	FCC-801-M2 /M3-16A	100270	Feb. 27, 2022
3	Coupling Decoupling Network	Teseq GmbH	CDN T8-10	40373	Jul. 25, 2021
4	Measurement Software	Farad	EZ-CS (V2.0.1.4)	N/A	N/A

Remark: "N/A" denotes no model name, no serial No. or no calibration specified.

All calibration period of equipment list is one year.

4.7.3 TEST PROCEDURE

The EUT and support equipment, are placed on a table that is 0.8 meter above a metal ground plane measured 1m*1m min. and 0.65mm thick min.

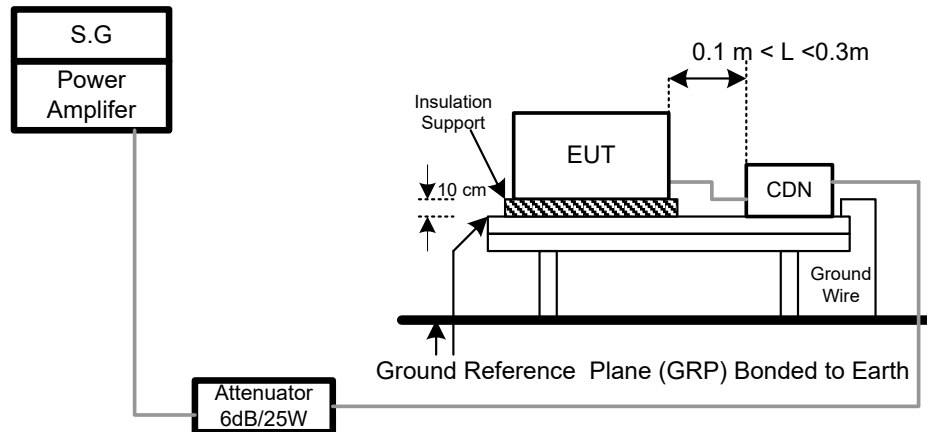
The other condition as following manner:

- The field strength level was 3 V (unmodulated, r.m.s.)
- The frequency range is swept from 150 kHz to 80 MHz, with the signal 80%amplitude modulated with a 1 kHz sinewave. 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.

4.7.4 DEVIATION FROM TEST STANDARD

No deviation

4.7.5 TEST SETUP



4.7.6 TEST RESULTS

Test Voltage	AC 230V/50Hz
Test Mode	Mode 1

Test Ports (Mode)	Freq.Range (MHz)	Field Strength	Modulation	Criteria	Results
AC mains power ports	0.15 - 10	3V	AM Modulated 1000Hz, 80%	A	A
	10 - 30	3V to 1V			
	30 - 80	1V			
Analogue/digital data ports (LAN)	0.15 - 10	3V	AM Modulated 1000Hz, 80%	A	A
	10 - 30	3V to 1V			
	30 - 80	1V			

4.8 POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST (PFMF)

4.8.1 TEST SPECIFICATION

Basic Standard	IEC 61000-4-8
Required Performance	A
Frequency Range	50/60Hz
Field Strength	1 A/m
Observation Time	1 minute
Inductance Coil	Rectangular type, 1mx1m

4.8.2 MEASUREMENT INSTRUMENTS

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Magnetic Field test Generator	FCC	F-1000-4-8-G-125A	4032	Feb. 28, 2022
2	Magnetic Field immunity loop	Thermo KeyTek	F-1000-4-8/9/10-L-1M	4024	Feb. 28, 2022

Remark: "N/A" denotes no model name, no serial No. or no calibration specified.

All calibration period of equipment list is one year.

4.8.3 TEST PROCEDURE

For TABLE-TOP equipment:

The equipment shall be subjected to the test magnetic field by using the induction coil of standard dimension (1 m x 1 m). The induction coil shall then be rotated by 90 degrees in order to expose the EUT to the test field with different orientations.

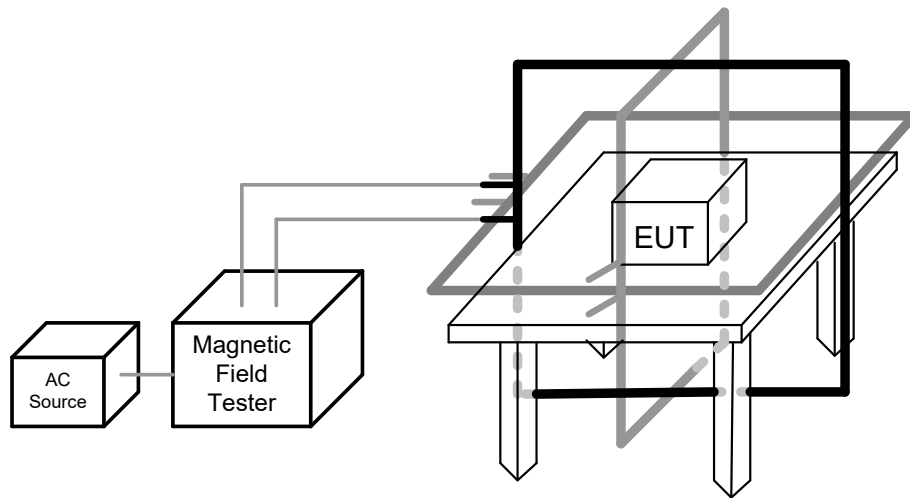
The other condition as following manner:

- The equipment cabinets shall be connected to the safety earth directly on the GRP via the earth terminal of the EUT.
- The cables supplied or recommended by the equipment manufacturer shall be used. 1 meter of all cables used shall be exposed to the magnetic field.

4.8.4 DEVIATION FROM TEST STANDARD

No deviation

4.8.5 TEST SETUP



4.8.6 TEST RESULTS

Test Voltage	AC 230V/50Hz
Test Mode	Mode 1

50Hz

Test Mode	Test Level	Antenna aspect	Duration	Criteria	Results
Enclosure	1 A/m	X	60s	A	A
Enclosure	1 A/m	Y	60s	A	A
Enclosure	1 A/m	Z	60s	A	A

60Hz

Test Mode	Test Level	Antenna aspect	Duration	Criteria	Results
Enclosure	1 A/m	X	60s	A	A
Enclosure	1 A/m	Y	60s	A	A
Enclosure	1 A/m	Z	60s	A	A

4.9 VOLTAGE DIPS, SHORT INTERRUPTIONS AND VOLTAGE VARIATIONS IMMUNITY TEST (DIPS)

4.9.1 TEST SPECIFICATION

Basic Standard	IEC 61000-4-11
Required Performance	Voltage dips: B (For <5% residual voltage, dips) C (For 70% residual voltage, dips) C (For <5% residual voltage, Interruptions)
Interval between Event	Ten seconds
Phase Angle	0°/180°
Test Cycle	3 times

4.9.2 MEASUREMENT INSTRUMENTS

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Cycle Sag Simulator	Prima	DRP61011TA	PR19076452	Dec. 03, 2021

Remark: "N/A" denotes no model name, no serial No. or no calibration specified.

All calibration period of equipment list is one year.

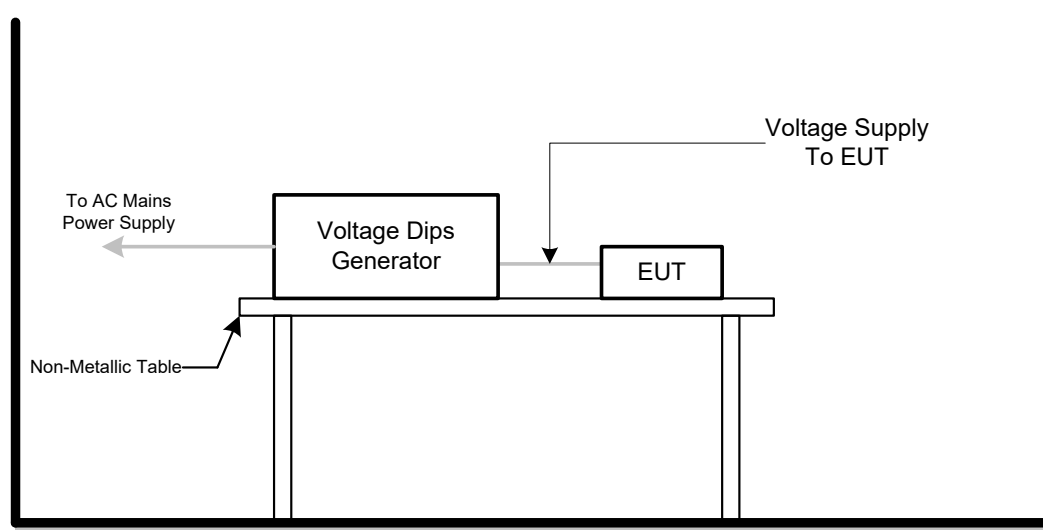
4.9.3 TEST PROCEDURE

The EUT shall be tested for each selected combination of test levels and duration with a sequence of three dips/interruptions with intervals of 10 s minimum (between each test event). Each representative mode of operation shall be tested. Abrupt changes in supply voltage shall occur at zero crossings of the voltage waveform.

4.9.4 DEVIATION FROM TEST STANDARD

No deviation

4.9.5 TEST SETUP



4.9.6 TEST RESULTS

Test Voltage	AC 100V/50Hz, AC 230V/50Hz, AC 240V/50Hz
Test Mode	Mode 1

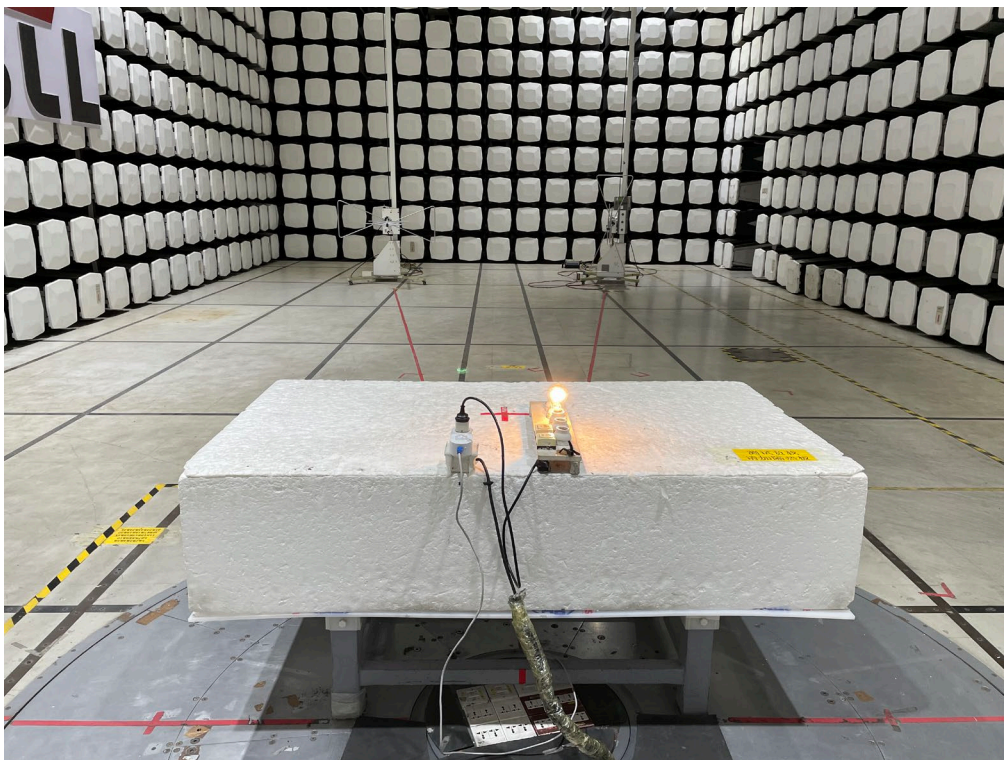
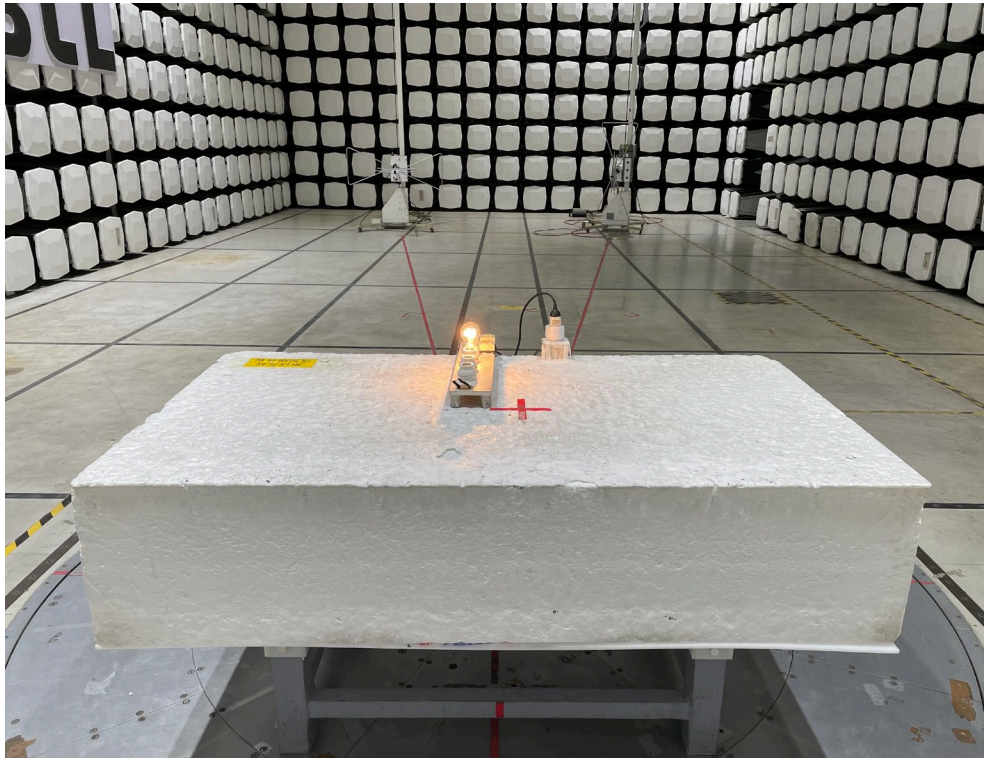
AC 100V/50Hz				
Item	Residual Voltage	Cycle	Criteria	Results
Voltage dips	<5%	0.5	B	A
Voltage dips	70%	25	C	A
Voltage Interruption	<5%	250	C	C

AC 230V/50Hz				
Item	Residual Voltage	Cycle	Criteria	Results
Voltage dips	<5%	0.5	B	A
Voltage dips	70%	25	C	A
Voltage Interruption	<5%	250	C	C

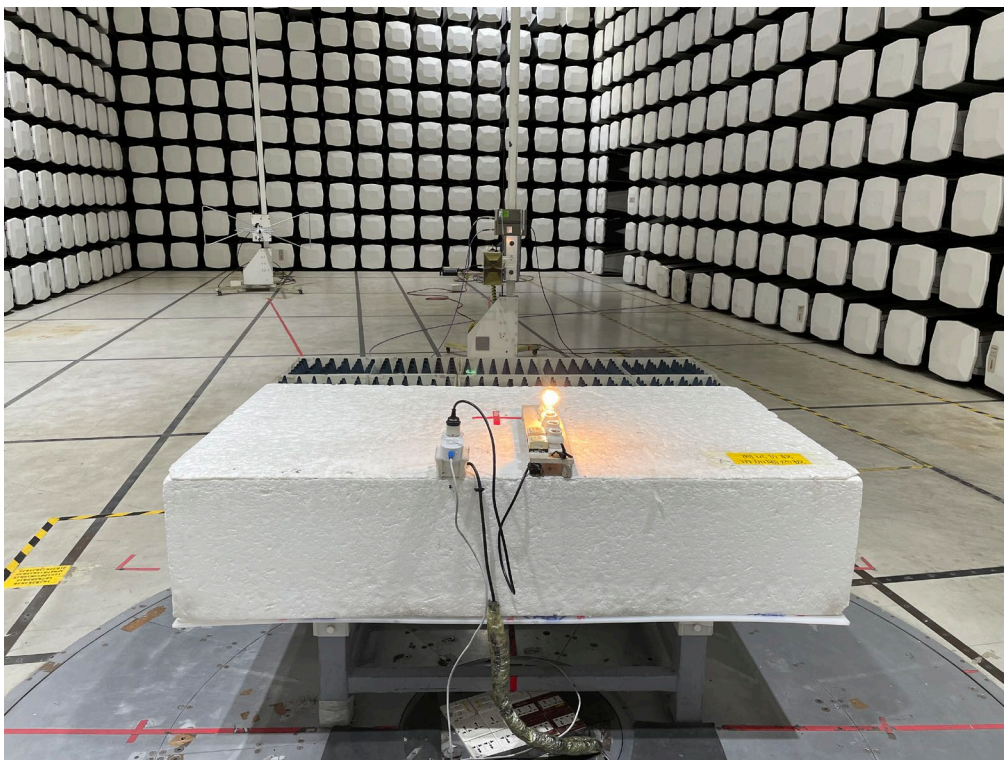
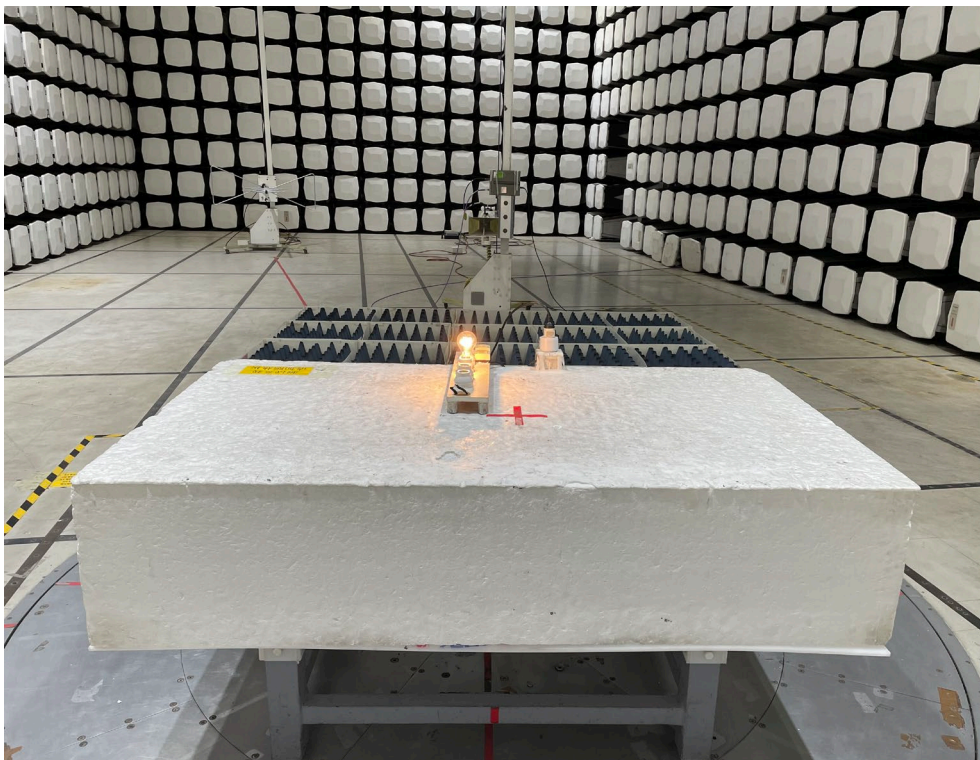
AC 240V/50Hz				
Item	Residual Voltage	Cycle	Criteria	Results
Voltage dips	<5%	0.5	B	A
Voltage dips	70%	25	C	A
Voltage Interruption	<5%	250	C	C

5. EUT TEST PHOTO

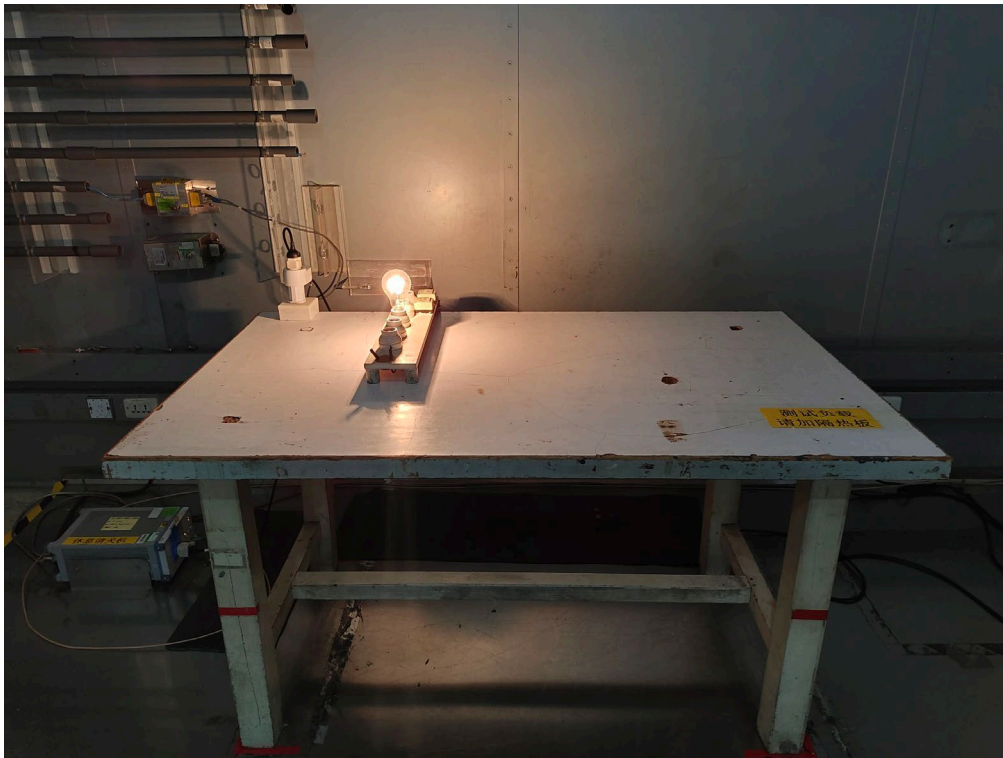
Radiated emissions up to 1 GHz



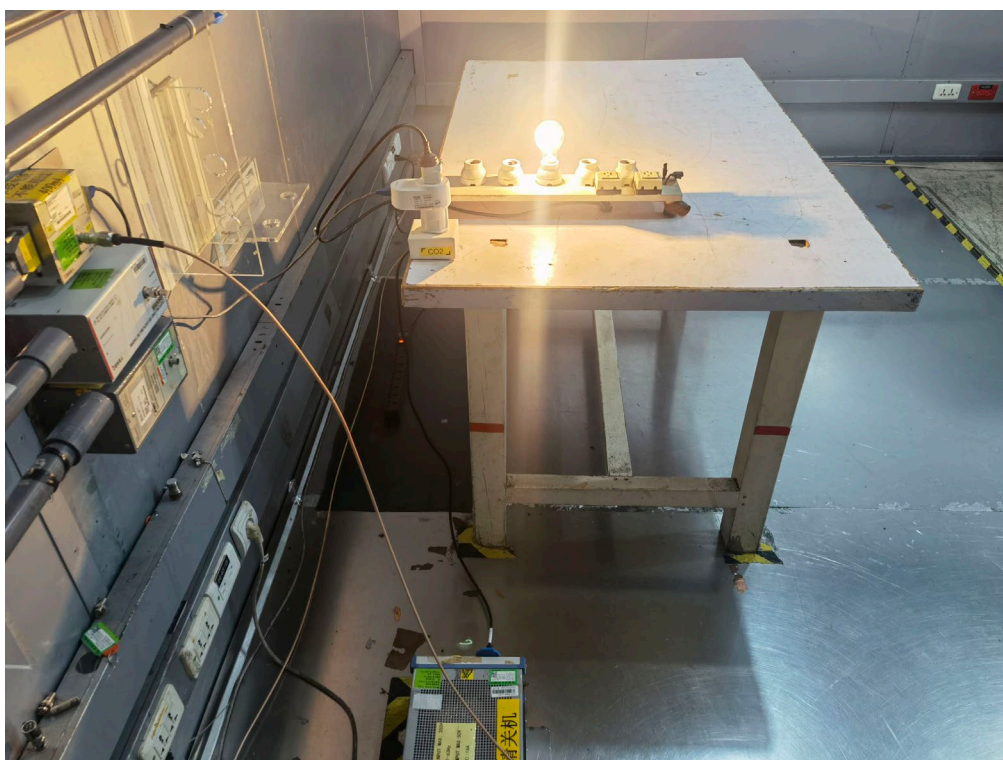
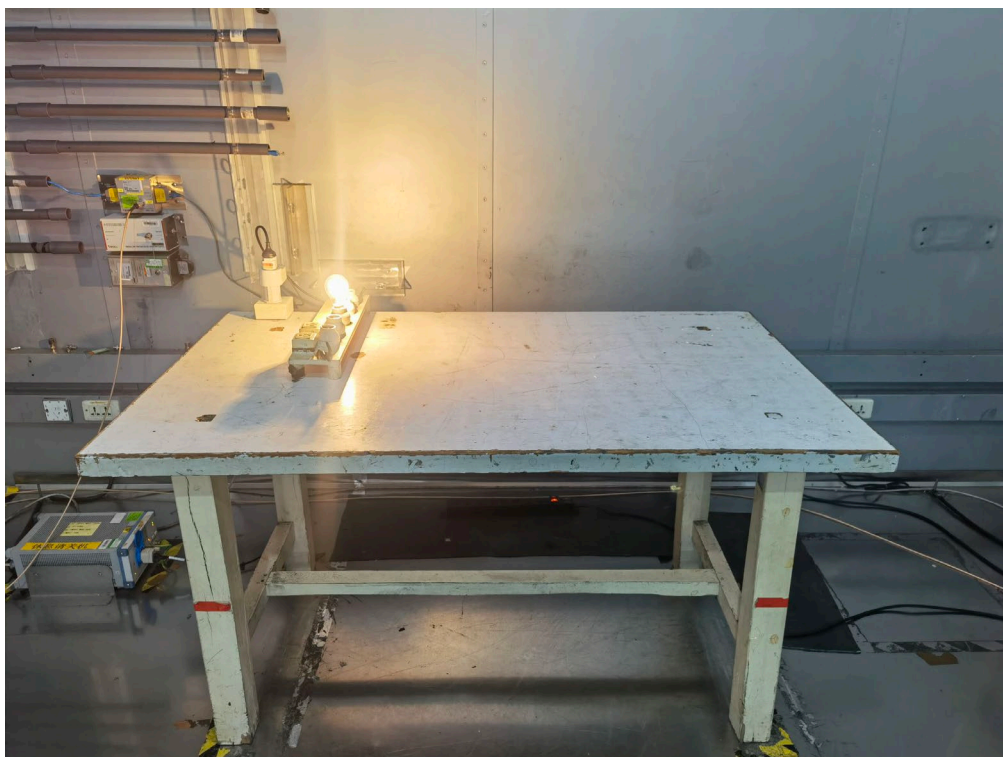
Radiated emissions above 1 GHz



Conducted emissions AC mains power port



Asymmetric mode conducted emissions



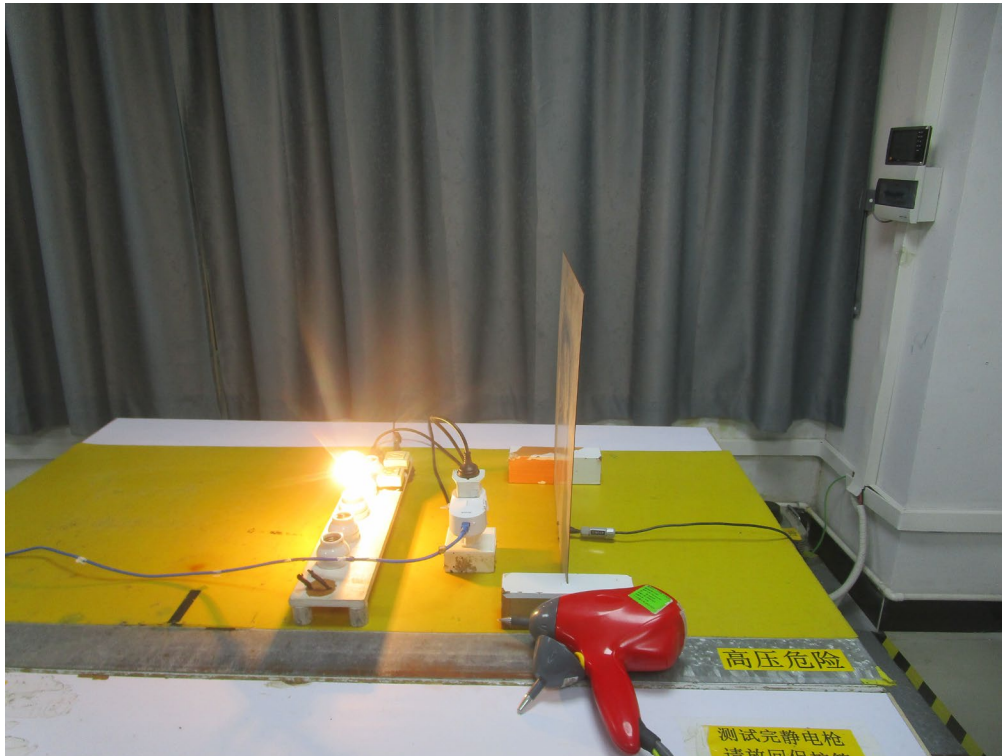
Harmonic current



Voltage fluctuations (Flicker)



Electrostatic discharge immunity



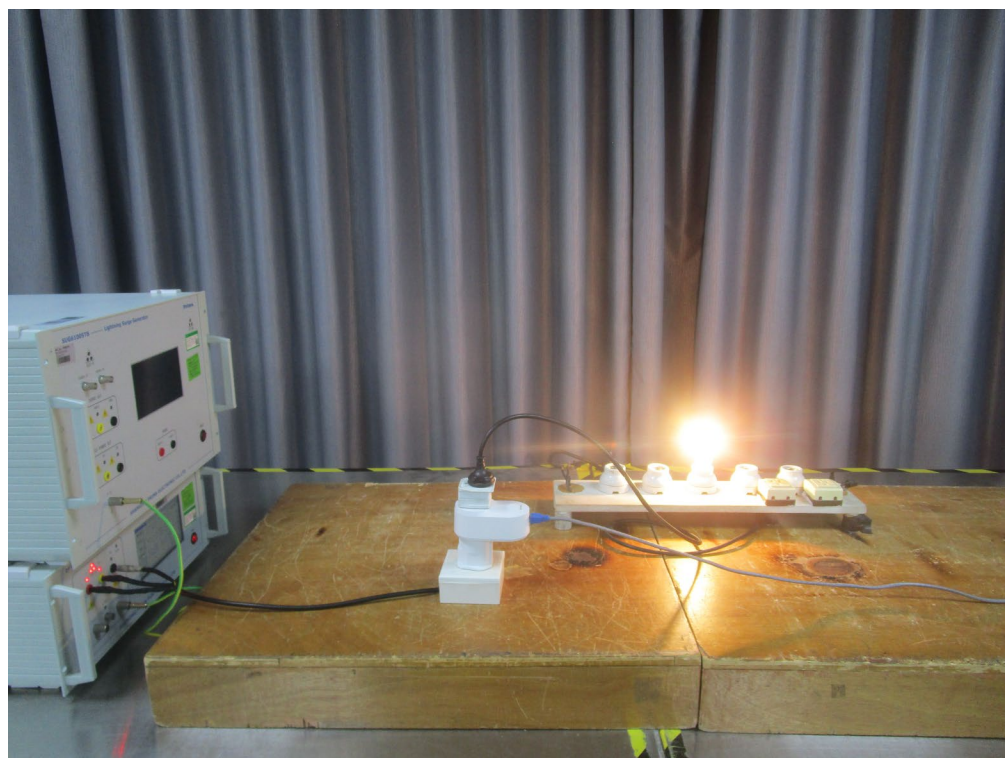
Immunity to radiated electromagnetic fields – Up to 1GHz



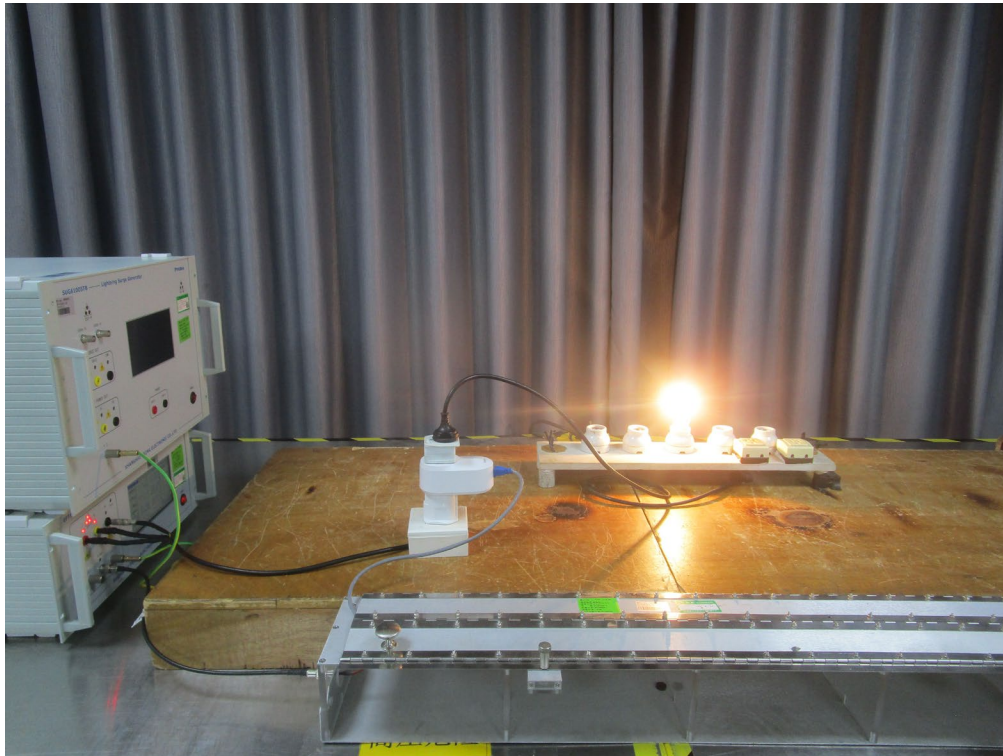
Immunity to radiated electromagnetic fields – Above 1GHz



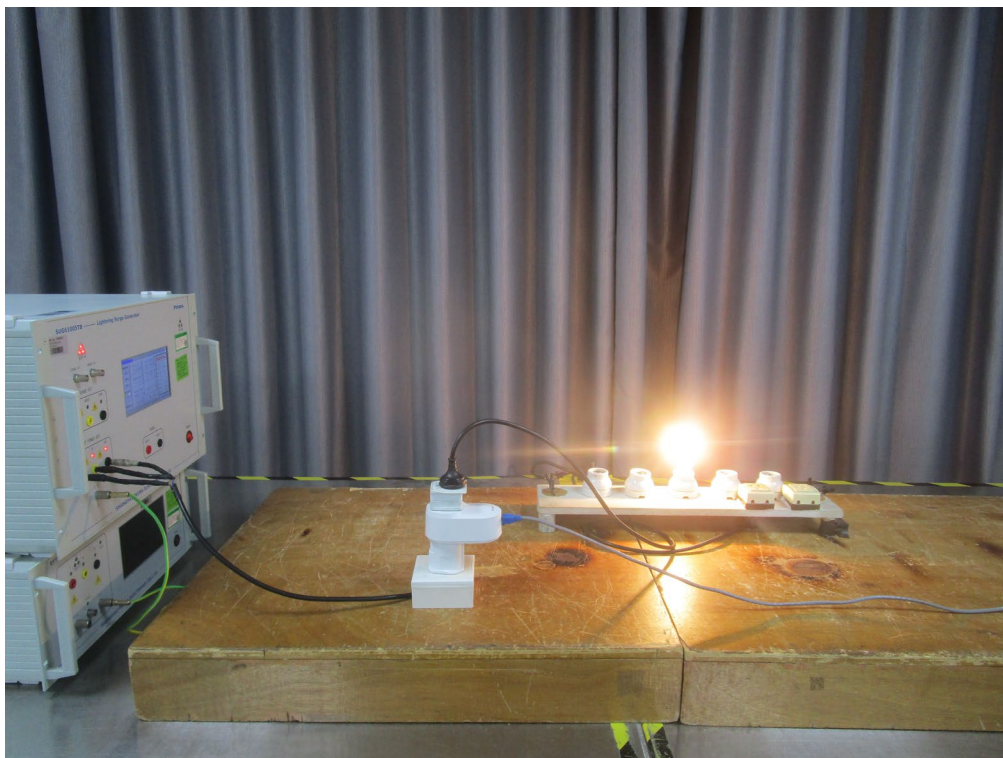
Electrical fast transient/burst - AC



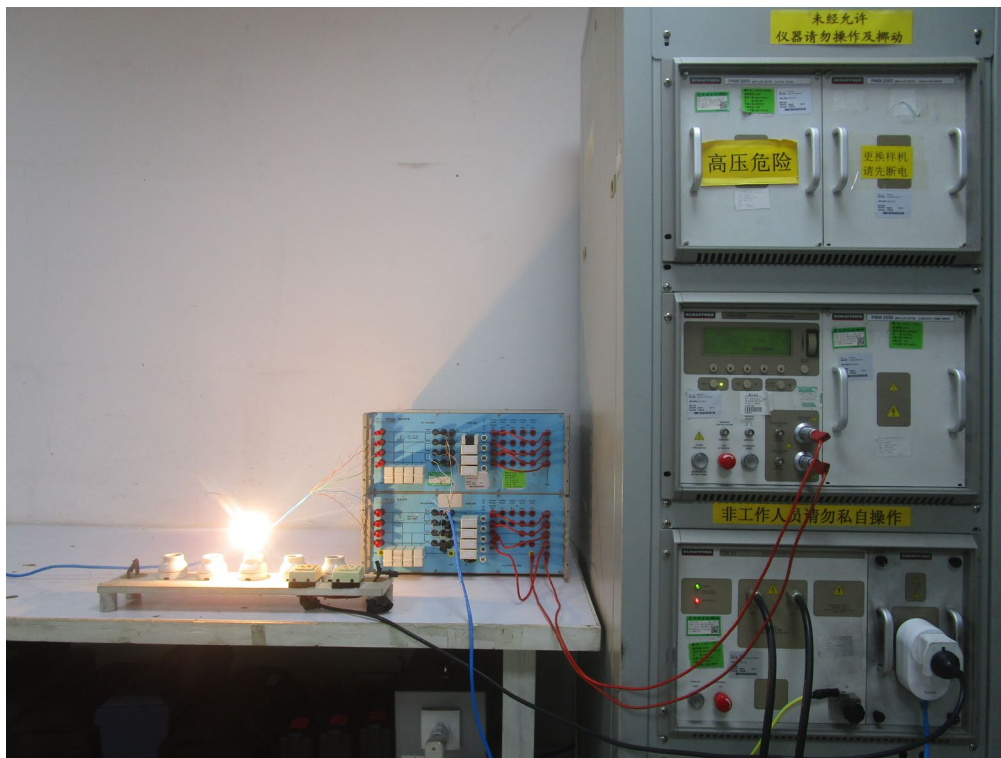
Electrical fast transient/burst(LAN)



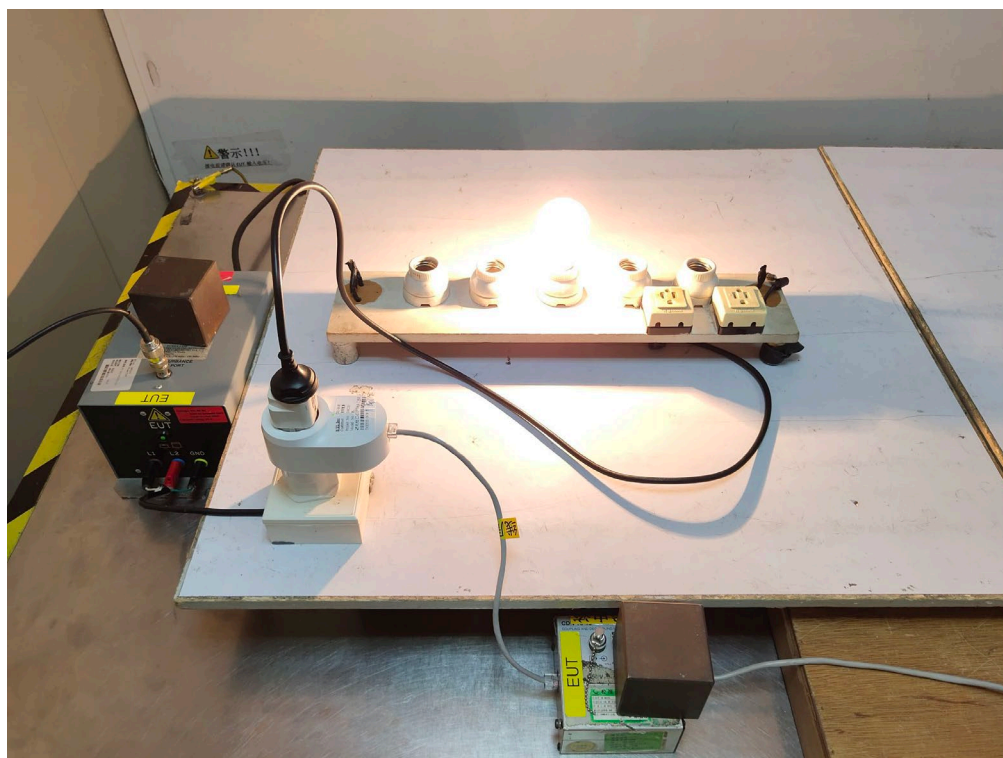
Surge immunity - AC



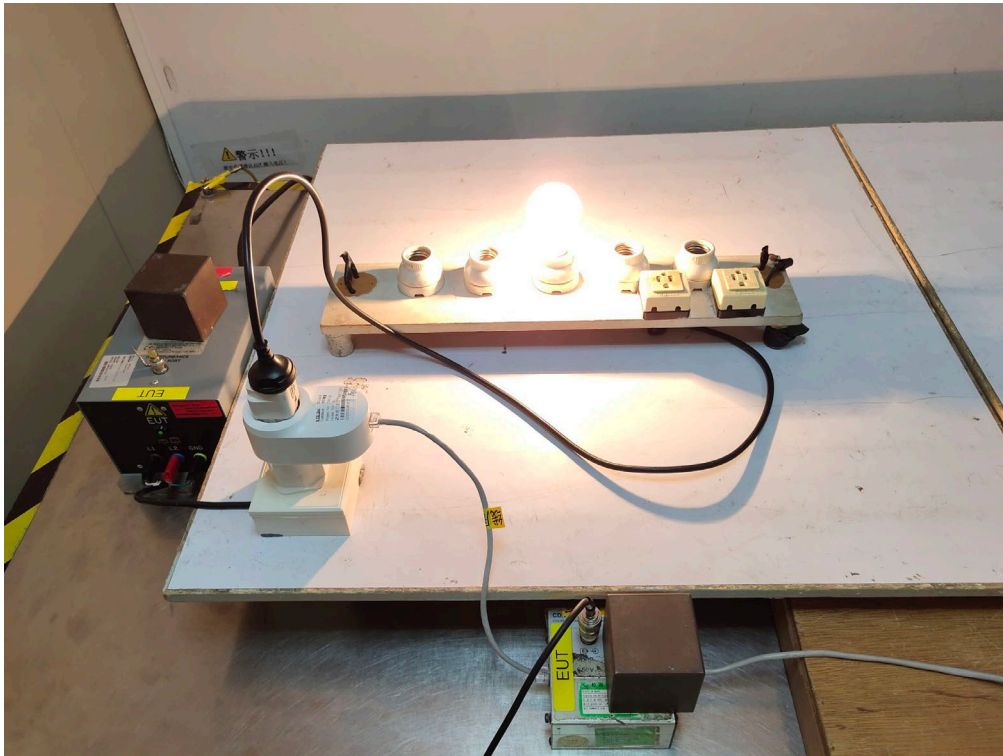
Surge immunity(LAN)



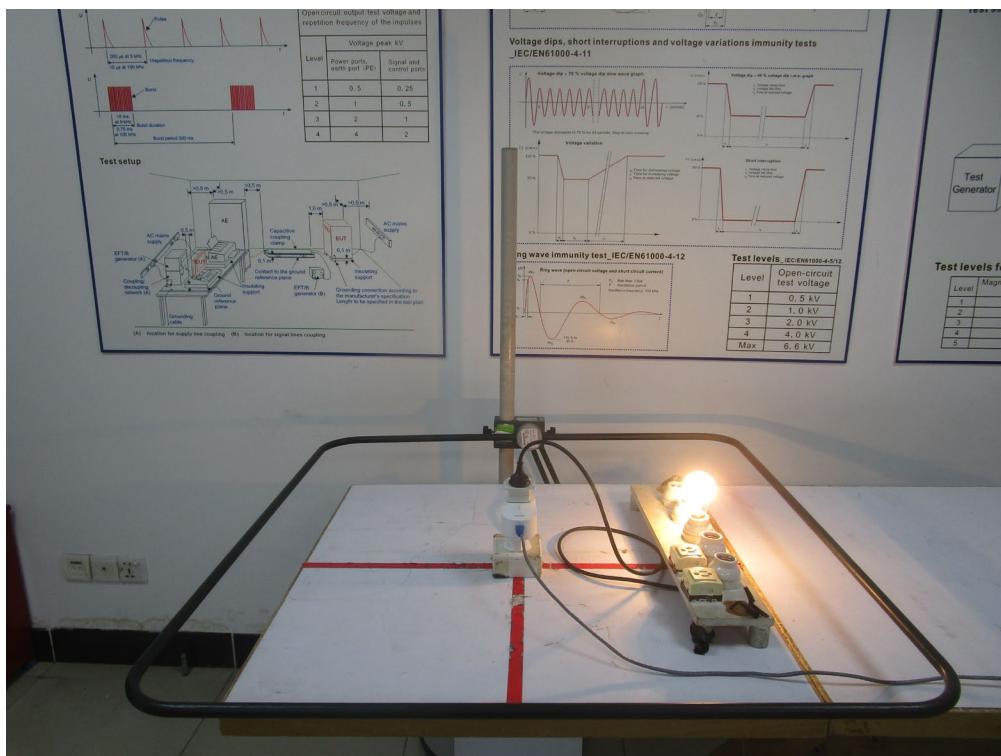
Immunity to conducted disturbances, induced by radio-frequency fields - AC



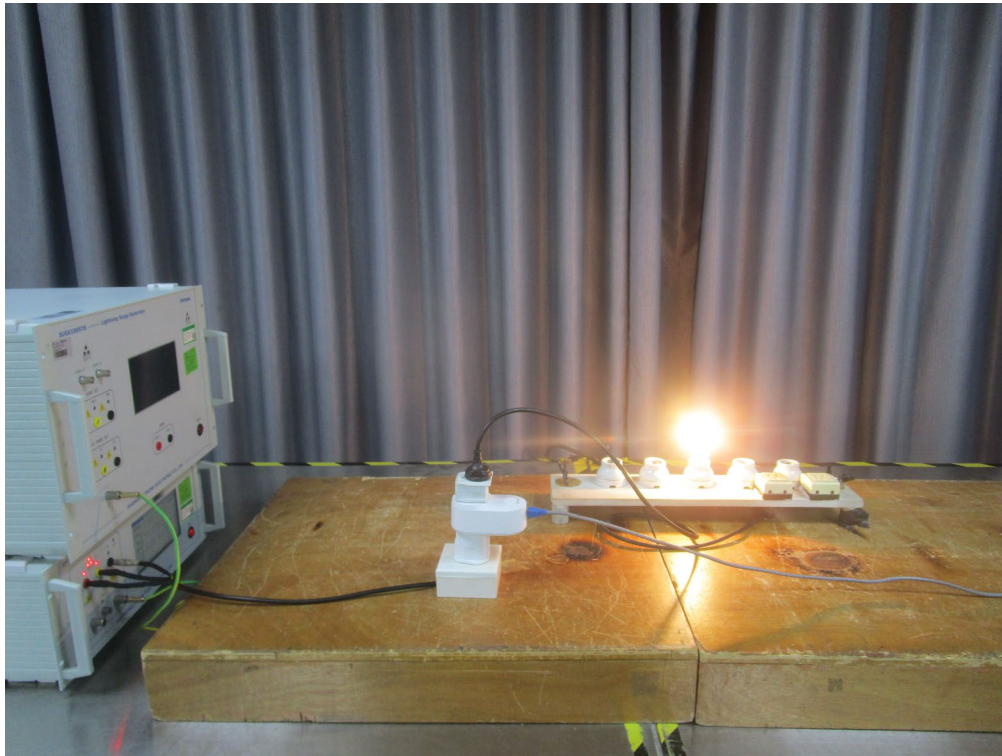
Immunity to conducted disturbances, induced by radio-frequency fields(LAN)



Power Frequency Magnetic Field Immunity



Voltage dips, short interruptions and voltage variations immunity



End of Test Report