



## CE&UKCA EMC Test Report

**Project No.** : 2408C100  
**Equipment** : Industrial Personal Computer  
**Brand Name** : SINSEGYE  
**Test Model** : SX5820  
**Series Model** : SX5820-0001, SX5820-0002 , SX5821-1001, SX5821-1002  
**Applicant** : SINSEGYE(Shenzhen) Computer System Co.,Ltd.  
**Address** : 14th Floor, West Tower of Baidu International Building, 1st Haitian Road, Nanshan District, Shenzhen,China.  
**Manufacturer** : SINSEGYE(Shenzhen) Computer System Co.,Ltd.  
**Address** : 14th Floor, West Tower of Baidu International Building, 1st Haitian Road, Nanshan District, Shenzhen,China.  
**Date of Receipt** : Dec. 10, 2024  
**Date of Test** : Dec. 12, 2024 ~ Dec. 26, 2024  
**Issued Date** : Jan. 10, 2025  
**Report Version** : R00  
**Test Sample** : Engineering Sample No.: DG2024121039  
**Standard(s)** : EN 55032:2015+A11:2020  
EN 55035:2017+A11:2020  
EN 55011:2016+A2:2021  
EN IEC 61000-6-4:2019  
EN IEC 61000-6-2:2019  
  
BS EN 55032:2015+A11:2020  
BS EN 55035:2017+A11:2020  
BS EN 55011:2016+A2:2021  
BS EN IEC 61000-6-4:2019  
BS EN IEC 61000-6-2:2019

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

**Prepared by** : Lea Lu  
Lea Lu

**Approved by** : Kang Zhang  
Kang Zhang

Room 108-116, 309-310, Building 2, No.1, Yile Road, Songshan Lake Zone, Dongguan City,  
Guangdong, People's Republic of China

Tel: +86-769-8318-3000    Web: [www.newbtl.com](http://www.newbtl.com)    Service mail: [btl\\_qa@newbtl.com](mailto:btl_qa@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 assumes no responsibility for the data provided by the customer, any statements, inferences or generalizations drawn by the customer or others from the reports issued by BTL.

The report must not be used by the client to claim product certification, approval, or endorsement by 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: 2017 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.

<b>Table of Contents</b>	<b>Page</b>
<b>REPORT ISSUED HISTORY</b>	<b>6</b>
<b>1 . SUMMARY OF TEST RESULTS</b>	<b>7</b>
1.1 TEST FACILITY	8
1.2 MEASUREMENT UNCERTAINTY	8
1.3 TEST ENVIRONMENT CONDITIONS	9
<b>2 . GENERAL INFORMATION</b>	<b>10</b>
2.1 GENERAL DESCRIPTION OF EUT	10
2.2 DESCRIPTION OF TEST MODES	11
2.3 EUT OPERATING CONDITIONS	12
2.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	12
2.5 DESCRIPTION OF SUPPORT UNITS	12
<b>3 . EMC EMISSION TEST</b>	<b>13</b>
3.1 RADIATED EMISSIONS UP TO 1 GHZ	13
3.1.1 LIMITS	13
3.1.2 MEASUREMENT INSTRUMENTS LIST	13
3.1.3 TEST PROCEDURE	14
3.1.4 DEVIATION FROM TEST STANDARD	14
3.1.5 TEST SETUP	14
3.1.6 MEASUREMENT DISTANCE	15
3.1.7 TEST RESULTS	16
3.2 RADIATED EMISSIONS ABOVE 1 GHZ	18
3.2.1 LIMITS	18
3.2.2 MEASUREMENT INSTRUMENTS LIST	18
3.2.3 TEST PROCEDURE	19
3.2.4 DEVIATION FROM TEST STANDARD	19
3.2.5 TEST SETUP	19
3.2.6 MEASUREMENT DISTANCE	20
3.2.7 TEST RESULTS	21
3.3 CONDUCTED EMISSION MEASUREMENT AT DC POWER PORTS	23
3.3.1 LIMITS	23
3.3.2 MEASUREMENT INSTRUMENTS LIST	23
3.3.3 TEST PROCEDURE	23
3.3.4 DEVIATION FROM TEST STANDARD	23
3.3.5 TEST SETUP	24
3.3.6 TEST RESULTS	25
3.4 ASYMMETRIC MODE CONDUCTED EMISSIONS TEST	27
3.4.1 LIMITS	27
3.4.2 MEASUREMENT INSTRUMENTS LIST	27
3.4.3 TEST PROCEDURE	27

<b>Table of Contents</b>	<b>Page</b>
3.4.4 DEVIATION FROM TEST STANDARD	28
3.4.5 TEST SETUP	28
3.4.6 TEST RESULTS	29
<b>4 . EMC IMMUNITY TEST</b>	<b>30</b>
4.1 STANDARD COMPLIANCE/SEVERITY LEVEL/CRITERIA - EN 55035	30
4.2 STANDARD COMPLIANCE/SEVERITY LEVEL/CRITERIA - EN IEC 61000-6-2	33
4.3 GENERAL PERFORMANCE CRITERIA	34
4.4 ELECTROSTATIC DISCHARGE IMMUNITY TEST (ESD)	35
4.4.1 TEST SPECIFICATION	35
4.4.2 MEASUREMENT INSTRUMENTS	35
4.4.3 TEST PROCEDURE	35
4.4.4 DEVIATION FROM TEST STANDARD	36
4.4.5 TEST SETUP	36
4.4.6 TEST RESULTS	37
4.5 RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD IMMUNITY TEST (RS)	39
4.5.1 TEST SPECIFICATION	39
4.5.2 MEASUREMENT INSTRUMENTS	39
4.5.3 TEST PROCEDURE	39
4.5.4 DEVIATION FROM TEST STANDARD	39
4.5.5 TEST SETUP	40
4.5.6 TEST RESULTS	41
4.6 ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST (EFT)	42
4.6.1 TEST SPECIFICATION	42
4.6.2 MEASUREMENT INSTRUMENTS	42
4.6.3 TEST PROCEDURE	42
4.6.4 DEVIATION FROM TEST STANDARD	42
4.6.5 TEST SETUP	43
4.6.6 TEST RESULTS	44
4.7 SURGE IMMUNITY TEST (SURGE)	46
4.7.1 TEST SPECIFICATION	46
4.7.2 MEASUREMENT INSTRUMENTS	46
4.7.3 TEST PROCEDURE	46
4.7.4 DEVIATION FROM TEST STANDARD	46
4.7.5 TEST SETUP	47
4.7.6 TEST RESULTS	48
4.8 IMMUNITY TO CONDUCTED DISTURBANCES, INDUCED BY RADIO-FREQUENCY	
FIELDS TEST (CS)	49
4.8.1 TEST SPECIFICATION	49
4.8.2 MEASUREMENT INSTRUMENTS	49
4.8.3 TEST PROCEDURE	49
4.8.4 DEVIATION FROM TEST STANDARD	50
4.8.5 TEST SETUP	50

<b>Table of Contents</b>	<b>Page</b>
4.8.6 TEST RESULTS	51
4.9 POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST (PFMF)	52
4.9.1 TEST SPECIFICATION	52
4.9.2 MEASUREMENT INSTRUMENTS	52
4.9.3 TEST PROCEDURE	52
4.9.4 DEVIATION FROM TEST STANDARD	52
4.9.5 TEST SETUP	53
4.9.6 TEST RESULTS	54
5 . EUT TEST PHOTO	56

REPORT ISSUED HISTORY

Report No.	Version	Description	Issued Date	Note
BTL-EMC-1-2408C100	R00	Original Report.	Jan. 10, 2025	Valid

## 1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

Emission		
Standard(s)	Test Item	Result
EN 55032:2015+A11:2020 EN IEC 61000-6-4:2019 BS EN 55032:2015+A11:2020 BS EN IEC 61000-6-4:2019	Radiated emissions up to 1 GHz	PASS
	Radiated emissions above 1 GHz	PASS
	Radiated emissions from FM receivers	N/A
	Conducted emissions DC power port	PASS
	Asymmetric mode conducted emissions	AAN
		Current Probe
		CP+CVP
	Conducted differential voltage emissions	N/A

Emission		
Standard(s)	Test Item	Result
EN 55011:2016+A2:2021 BS EN 55011:2016+A2:2021	Mains terminal disturbance voltage	PASS
	Radiation disturbance	PASS

Immunity			
Standard(s)	Ref Standard(s)	Test Item	Result
EN 55035:2017+A11:2020 EN IEC 61000-6-2:2019 BS EN 55035:2017+A11:2020 BS EN IEC 61000-6-2:2019	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 61000-4-6:2023	CS	PASS
	IEC 61000-4-8:2009	PFMF	PASS
	IEC 61000-4-11:2020	Dips	N/A

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 1-2/F, 4/F, Building A, 1-2/F, Building B, 3/F, Building C, No.3, Jinshagang 1st Road, 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  $U_{\text{CISPR}}$  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-CB01 (3m)	CISPR	30MHz ~ 200MHz	V	4.92
		30MHz ~ 200MHz	H	3.94
		200MHz ~ 1,000MHz	V	4.60
		200MHz ~ 1,000MHz	H	4.32

B. Radiated emissions above 1 GHz measurement:

Test Site	Method	Measurement Frequency Range	$U$ , (dB)
DG-CB01 (3m)	CISPR	1GHz ~ 6GHz	4.56

C. Conducted emissions DC power port measurement:

Test Site	Method	Measurement Frequency Range	$U$ , (dB)
DG-C02	CISPR	150kHz ~ 30MHz	2.88

D. Asymmetric mode conducted emissions measurement:

Test Site	Method	Test Item	$U$ , (dB)
DG-C02	CISPR	Current Probe (CP)	2.16

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	Test Date
Radiated emissions up to 1 GHz	24°C	48%	Parker Mai	Dec. 17, 2024
Radiated emissions above 1 GHz	24°C	48%	Parker Mai	Dec. 17, 2024
Conducted emissions DC power port	25°C	48%	Axel Huang	Dec. 18, 2024
Asymmetric mode conducted emissions	25°C	48%	Axel Huang	Dec. 18, 2024

Test Item	Temperature	Humidity	Pressure	Tested By	Test Date
ESD	21°C	43%	1021hPa	Paul Li	Dec. 24, 2024
RS	19°C	50%	/	Hunter Xu	Dec. 16, 2024
EFT	23°C	52%	/	Ellery Liang	Dec. 16, 2024
CS	19°C	50%	/	Penn Li	Dec. 15, 2024
Surge	23°C	52%	/	Ellery Liang	Dec. 16, 2024
PFMF	23°C	52%	/	Ellery Liang	Dec. 16, 2024

## 2. GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

Equipment	Industrial Personal Computer
Brand Name	SINSEGYE
Test Model	SX5820
Series Model	SX5820-0001, SX5820-0002, SX5821-1001, SX5821-1002
Model Difference(s)	SX5820-0001cpu main frequency locked at 1.4G and 4GB memory through BIOS. SX5820-0002cpu main frequency locked at 2.0G and 4GB memory through BIOS. SX5821-1001cpu clock speed locked at 1.4G through BIOS, 8GB memory. SX5821-1002cpu clock speed locked at 2.0G through BIOS, 8GB memory.
Identification No. of EUT(S/N)	SX58A0124100035
Dimensions and mass	210 x 100 x 90 mm
Component unit of EUT	<input checked="" type="checkbox"/> Single unit <input type="checkbox"/> Multiple unit
Sample Status	<input type="checkbox"/> Engineering sample <input checked="" type="checkbox"/> Final shipment prototype
Power Source	DC power supply.
Power Rating	DC 24V
Connecting I/O Port(s)	Please refer to EUT photos.
Classification of EUT	Class A
Highest Internal Frequency(Fx)	2.0GHz

**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	FULL SYSTEM

Radiated emissions up to 1 GHz Test	
Final Test Mode	Description
Mode 1	FULL SYSTEM

Radiated emissions Above 1 GHz Test	
Final Test Mode	Description
Mode 1	FULL SYSTEM

Conducted emissions DC power port Test	
Final Test Mode	Description
Mode 1	FULL SYSTEM

Asymmetric mode conducted emissions Test	
Final Test Mode	Description
Mode 1	FULL SYSTEM (LAN1 1Gbps)

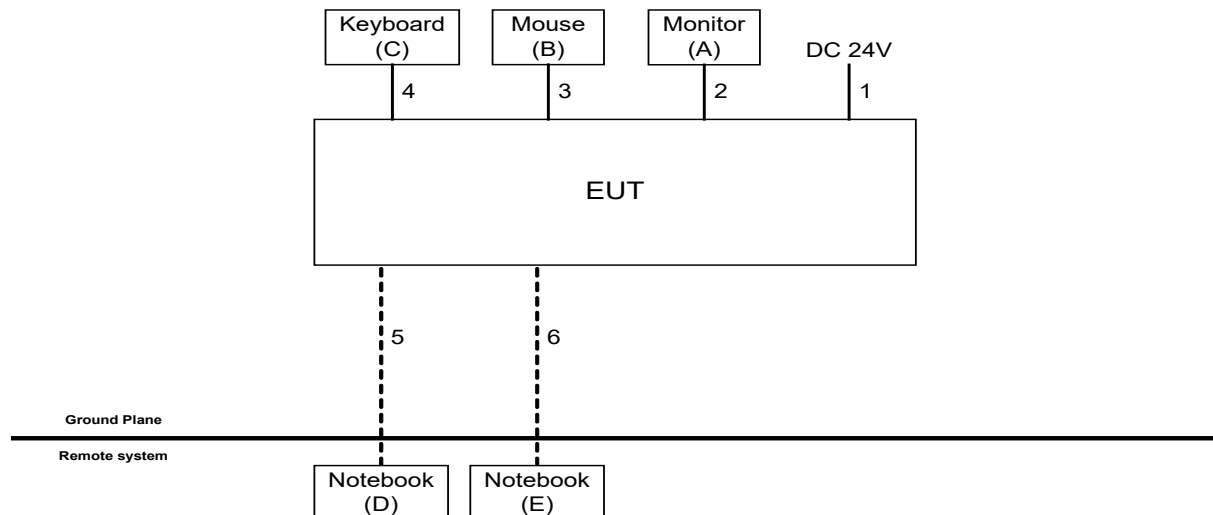
Immunity Test	
Final Test Mode	Description
Mode 1	FULL SYSTEM

## 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. Keyboard and Mouse connected to EUT via USB Cable.
2. EUT connected to Monitor via HDMI Cable.
3. EUT connected to Notebook(D&E) 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.	Remark
A	Monitor	Lenovo	A16270UP0	1S61CBGCR1CSU3336 W6N	For Conducted, ESD, Surge signal port items
	Monitor	DELL	U2718Q	CN-05DWRH-QDC00-7 AU-0G0L-A02	For other items
B	Mouse	DELL	MS111-P	CN011D3V71581279OL OT	/
C	Keyboard	DELL	KB212-B	CN0HTXH97158125004 DXA01	/
D	Notebook	Lenovo	V310-14ISK	LR07GZHC	/
E	Notebook	Lenovo	V310-14ISK	LR07GZML	/

Item	Cable Type	Shielded Type	Ferrite Core	Length
1	DC Cable	NO	NO	1.8m
2	HDMI Cable	YES	NO	1.8m
3	USB Cable	YES	NO	1.8m
4	USB Cable	YES	NO	1.8m
5-6	RJ45 Cable	YES	NO	1.5m

### 3. EMC EMISSION TEST

#### 3.1 RADIATED EMISSIONS UP TO 1 GHz

##### 3.1.1 LIMITS

Class A equipment up to 1 GHz

For EN 55032&EN IEC 61000-6-4

Frequency Range MHz	Measurement			Class A limits dB(μV/m)
	Facility	Distance m	Detector type/ bandwidth	
30 - 230	SAC	3	Quasi peak / 120 kHz	50
230 - 1000				57

For EN 55011

Frequency Range (MHz)	Class A
	3 m measuring distance Rated input power of ≤ 20 kVA
	Quasi-peak (dBuV/m)
30 - 230	50
230 - 1000	57

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	Preamplifier	EMC INSTRUMENT	EMC001330	980987	May 31, 2025
2	MXE EMI Receiver	Keysight	N9038A	MY56400091	Dec. 22, 2024
3	Cable	RW	LMR-400(30MHz-1G Hz)(12m+9.5m+0.8M)	N/A	Nov. 26, 2025
4	Controller	ETS-Lindgren	2090	N/A	N/A
5	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
6	Trilog-Broadband Antenna	Schwarzbeck	VULB9168	01585	May 24, 2025
7	Attenuator	HUBER+SUHNER	6806_N-50-1	N/A	May 24, 2025

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

All calibration period of equipment list is one year.

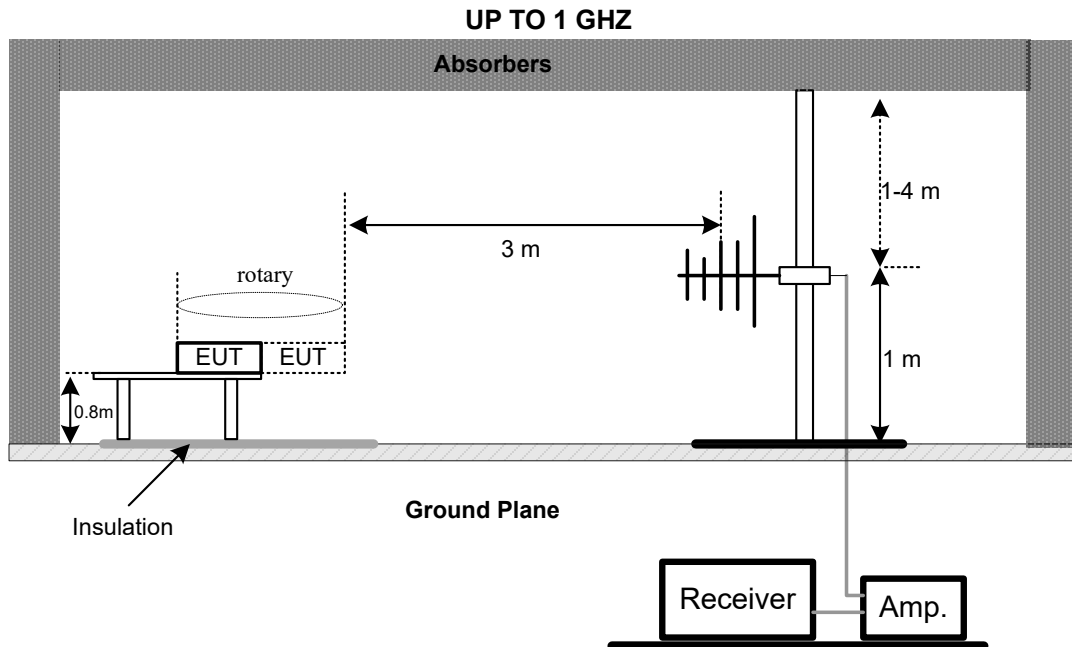
### 3.1.3 TEST PROCEDURE

- The measuring distance of 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 3 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

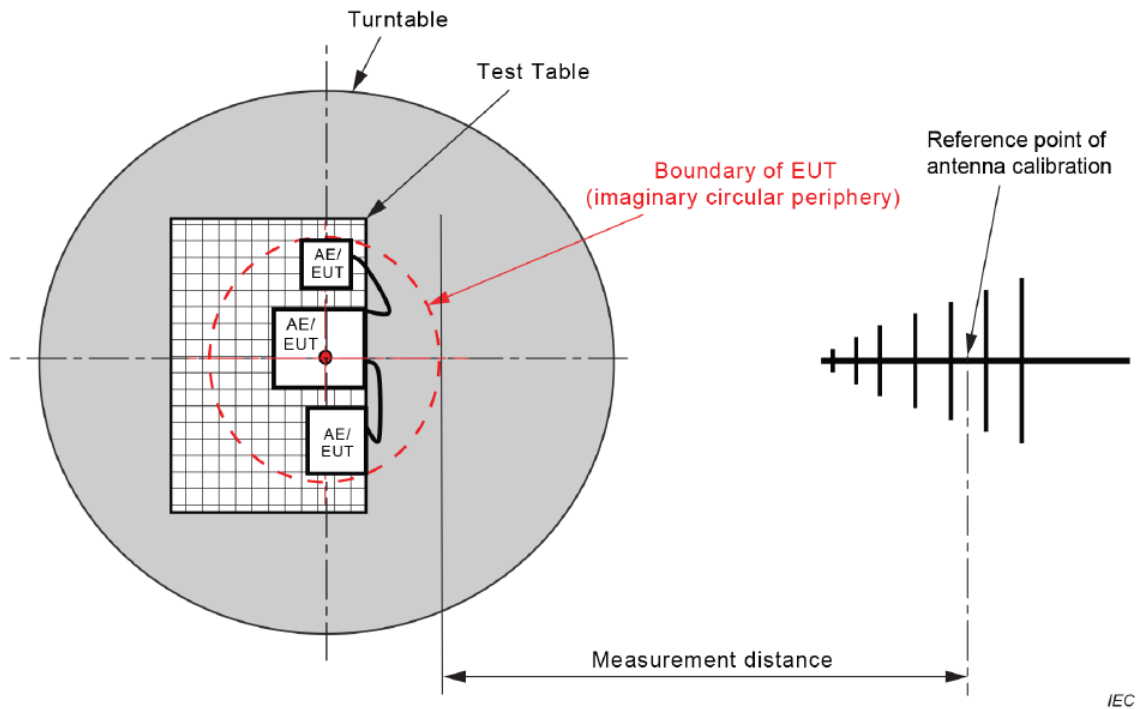


Figure C.1 – Measurement distance

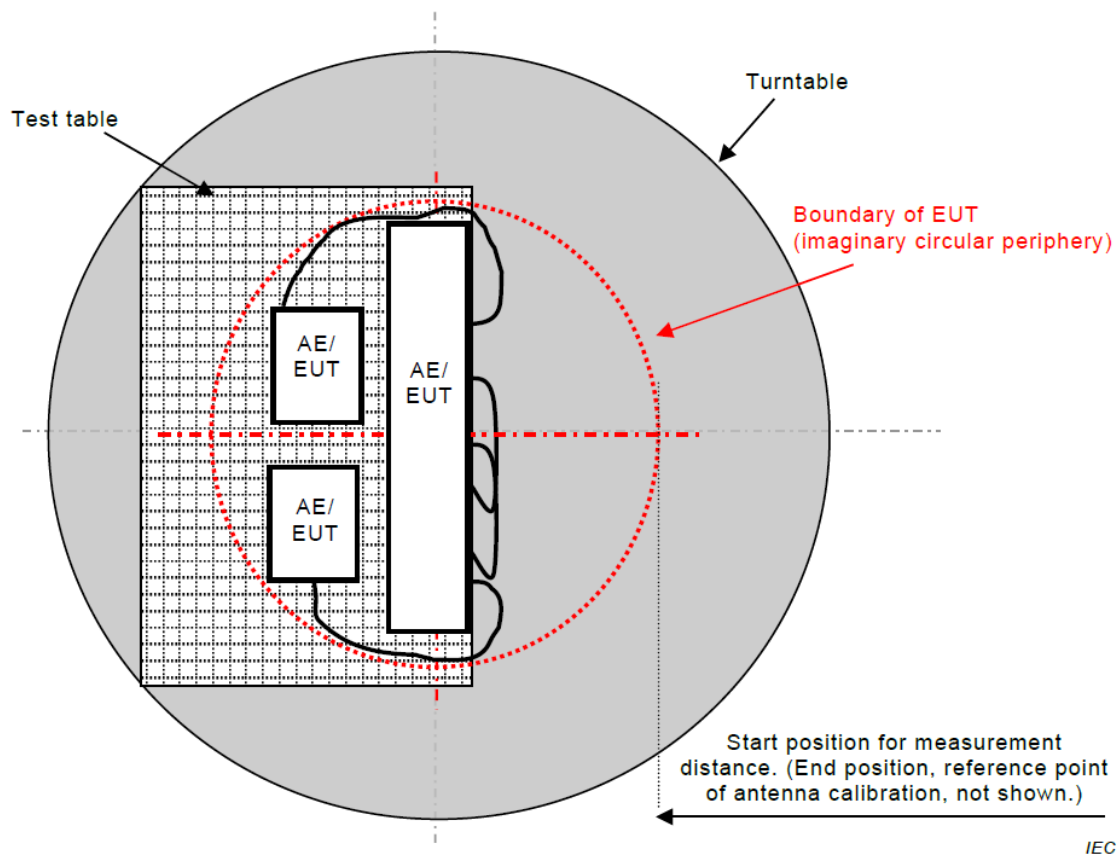
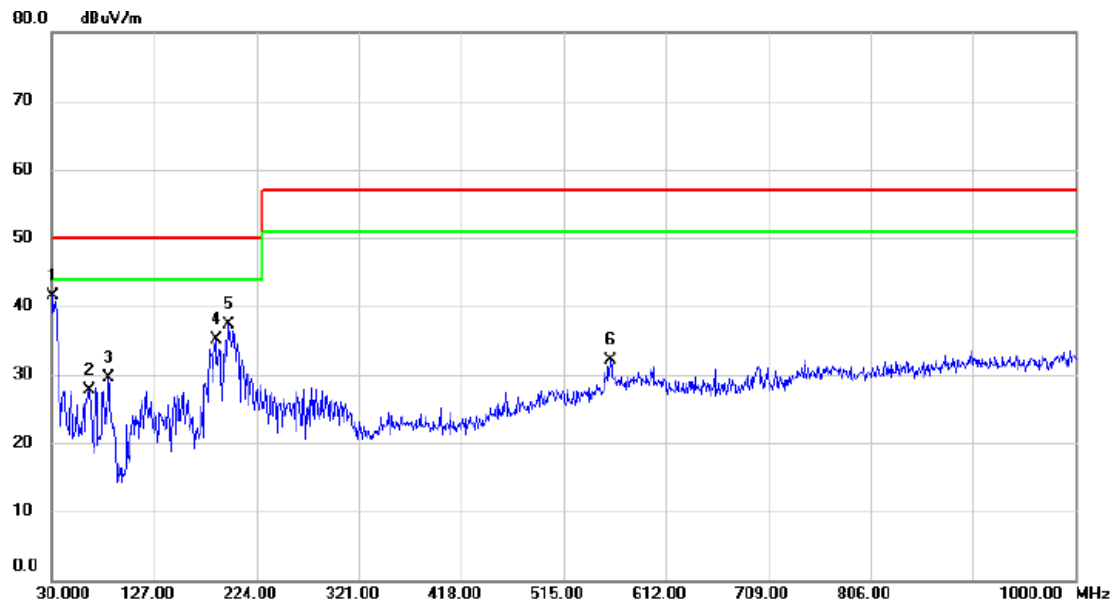


Figure C.2 – Boundary of EUT, Local AE and associated cabling

## 3.1.7 TEST RESULTS

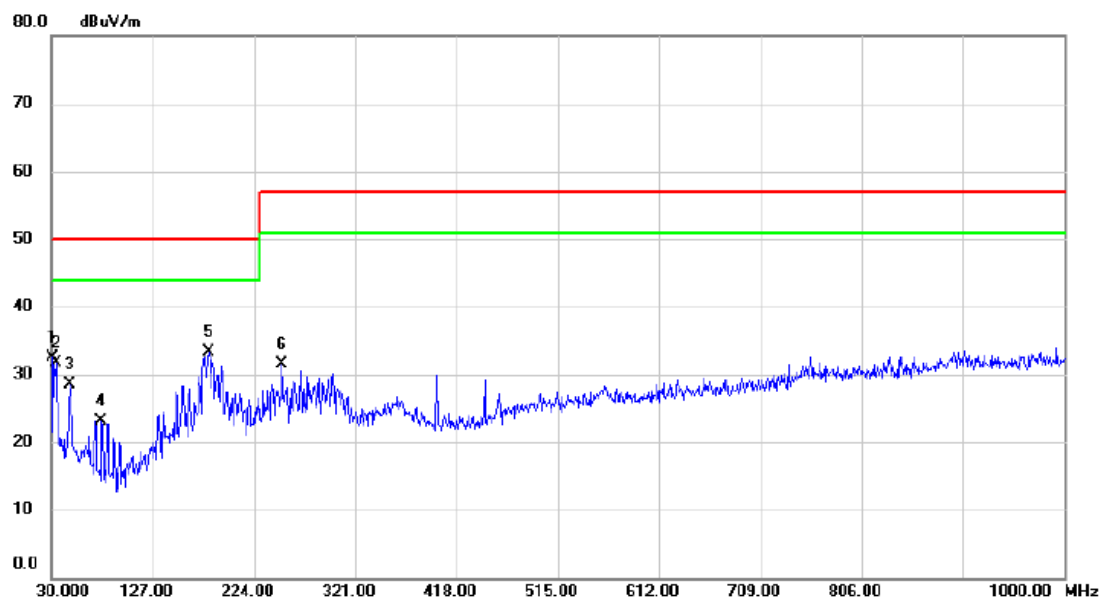
Test Voltage	DC 24V	Polarization	Vertical
Test Mode	Mode 1		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	30.9700	54.17	-12.57	41.60	50.00	-8.40	QP	
2		64.9200	38.88	-11.10	27.78	50.00	-22.22	QP	
3		83.3500	45.44	-16.02	29.42	50.00	-20.58	QP	
4		185.2000	47.65	-12.58	35.07	50.00	-14.93	QP	
5		196.8400	50.71	-13.49	37.22	50.00	-12.78	QP	
6		559.6200	35.96	-3.78	32.18	57.00	-24.82	QP	



Test Voltage	DC 24V	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		30.0000	45.24	-12.74	32.50	50.00	-17.50	QP	
2		33.8800	43.79	-12.06	31.73	50.00	-18.27	QP	
3		47.4600	39.49	-10.95	28.54	50.00	-21.46	QP	
4		77.5300	37.85	-14.76	23.09	50.00	-26.91	QP	
5	*	180.3500	45.22	-12.00	33.22	50.00	-16.78	QP	
6		250.1900	43.14	-11.58	31.56	57.00	-25.44	QP	

### 3.2 RADIATED EMISSIONS ABOVE 1 GHz

#### 3.2.1 LIMITS

Class A equipment above 1 GHz

Frequency Range MHz	Measurement			Class A limits dB(μV/m)
	Facility	Distance m	Detector type/bandwidth	
1000 - 3000	FSOATS	3	Average / 1 MHz	56
3000 - 6000				60
1000 - 3000			Peak / 1 MHz	76
3000 - 6000				80

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 <sub>x</sub> )	Highest measured frequency
F <sub>x</sub> ≤ 108 MHz	1 GHz
108 < F <sub>x</sub> ≤ 500 MHz	2 GHz
500 < F <sub>x</sub> ≤ 1000 MHz	5 GHz
F <sub>x</sub> > 1 GHz	5 x F <sub>x</sub> 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	Cable	RW	LMR-400(1GHz-18G Hz)(9.5m+2.5m+1M)	N/A	Oct. 27, 2025
2	Controller	ETS-Lindgren	2090	N/A	N/A
3	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
4	Double-Ridged Waveguide Horn Antennas	ETS-LINDGREN	3117-PA	00224991	Apr. 24, 2025
5	MXA Signal Analyzer	Keysight	N9020B	MY57100162	Dec. 22, 2024
6	Preamplifier	ETS-LINDGREN	3117-PA	00224991	May 31, 2025

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

All calibration period of equipment list is one year.

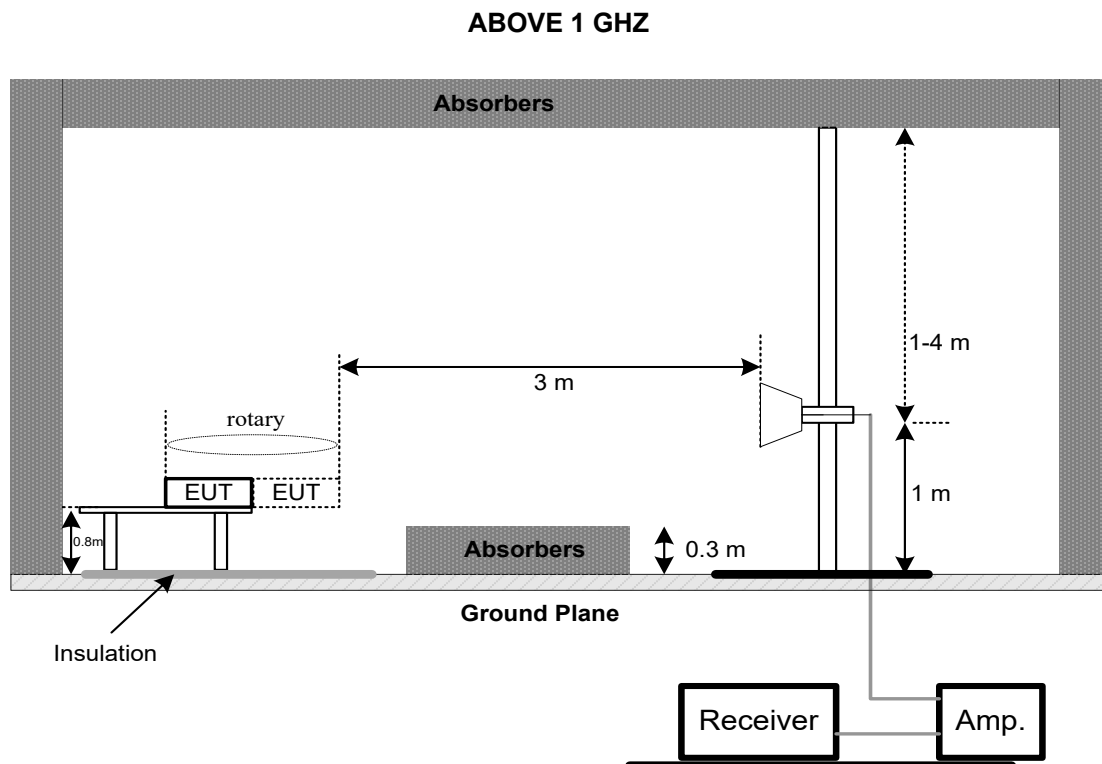
### 3.2.3 TEST PROCEDURE

- 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 3 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



## 3.2.6 MEASUREMENT DISTANCE

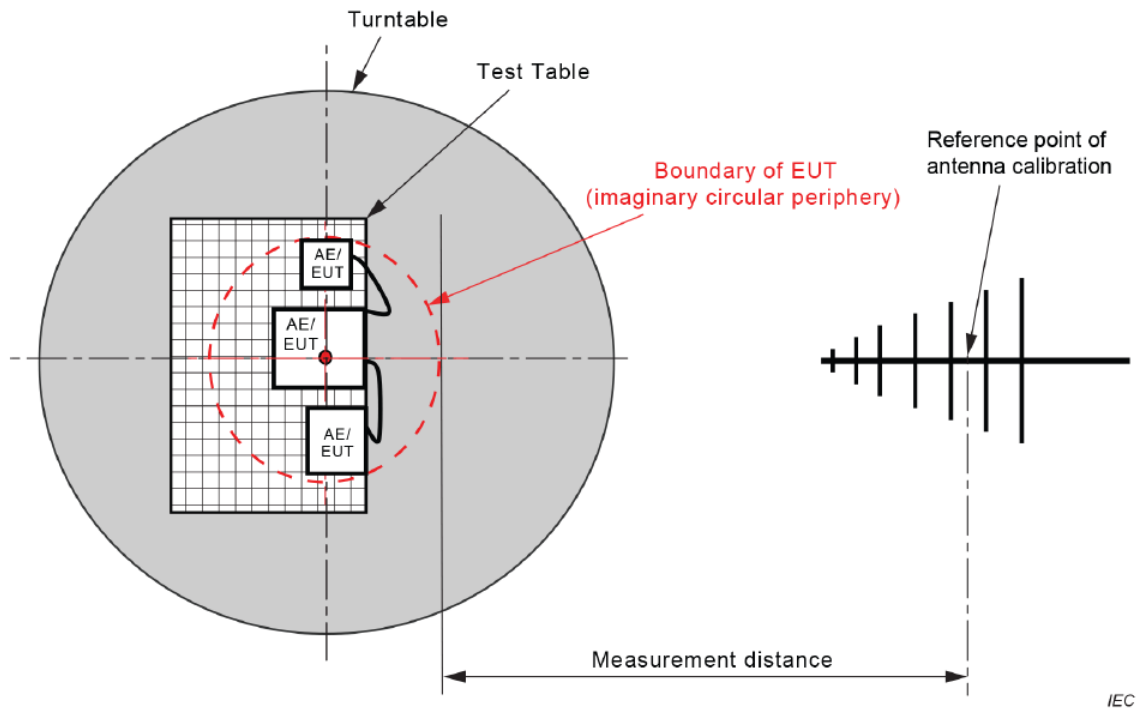


Figure C.1 – Measurement distance

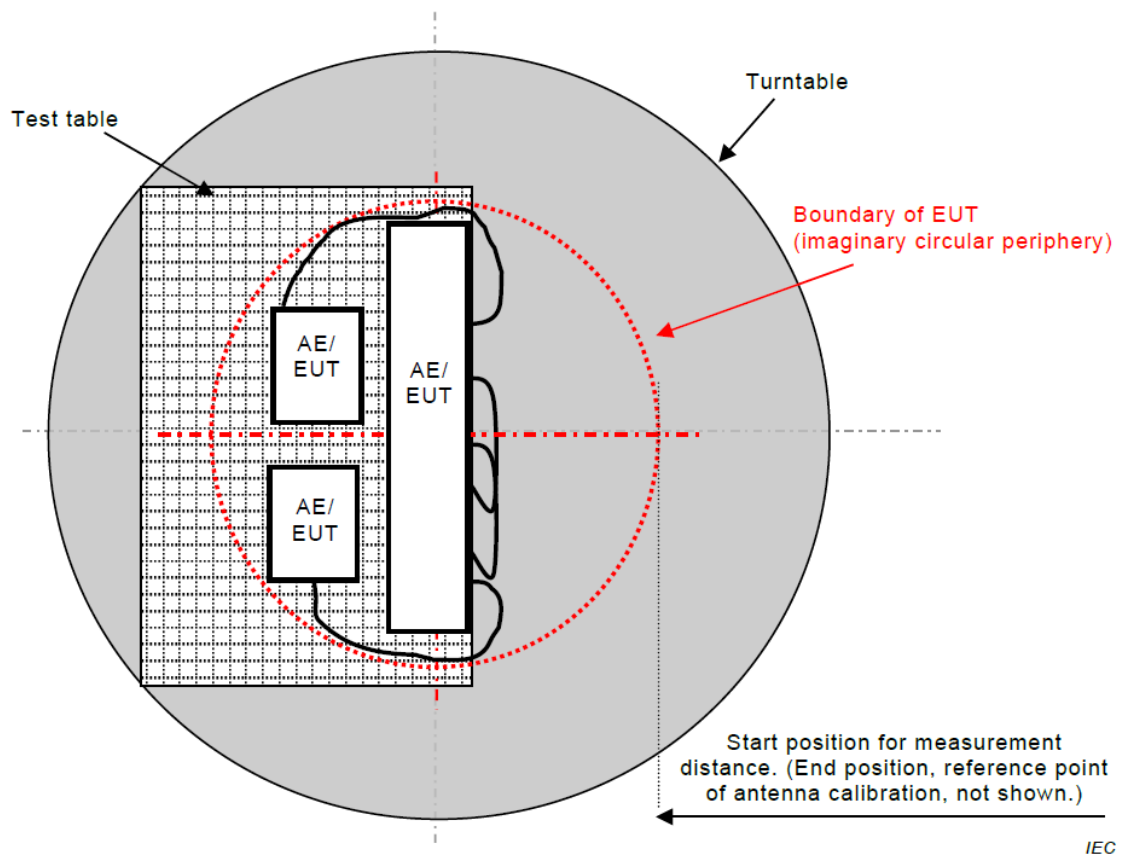
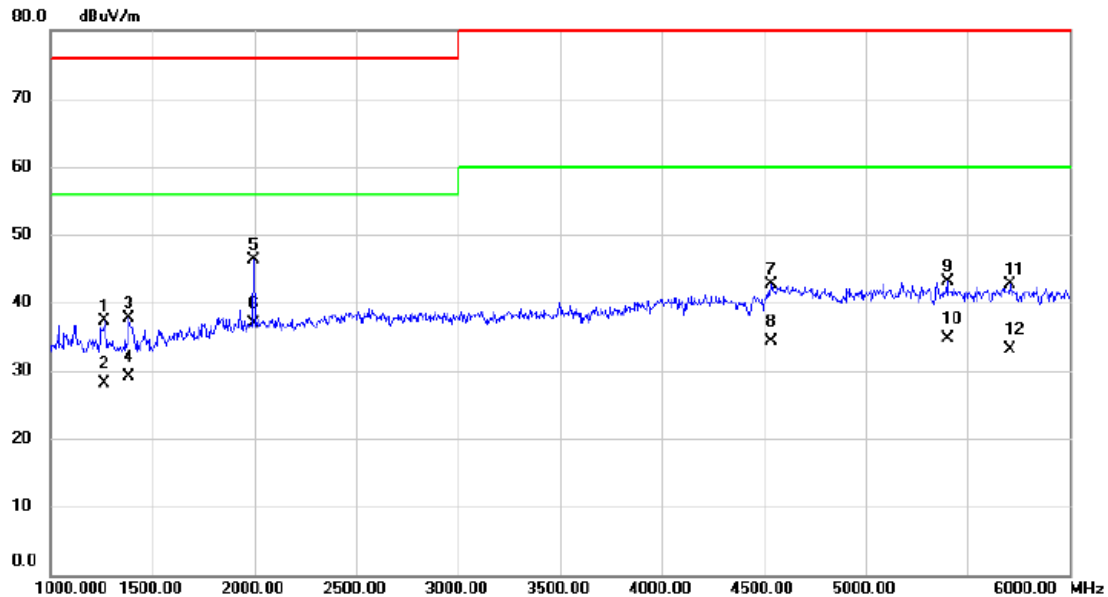


Figure C.2 – Boundary of EUT, Local AE and associated cabling

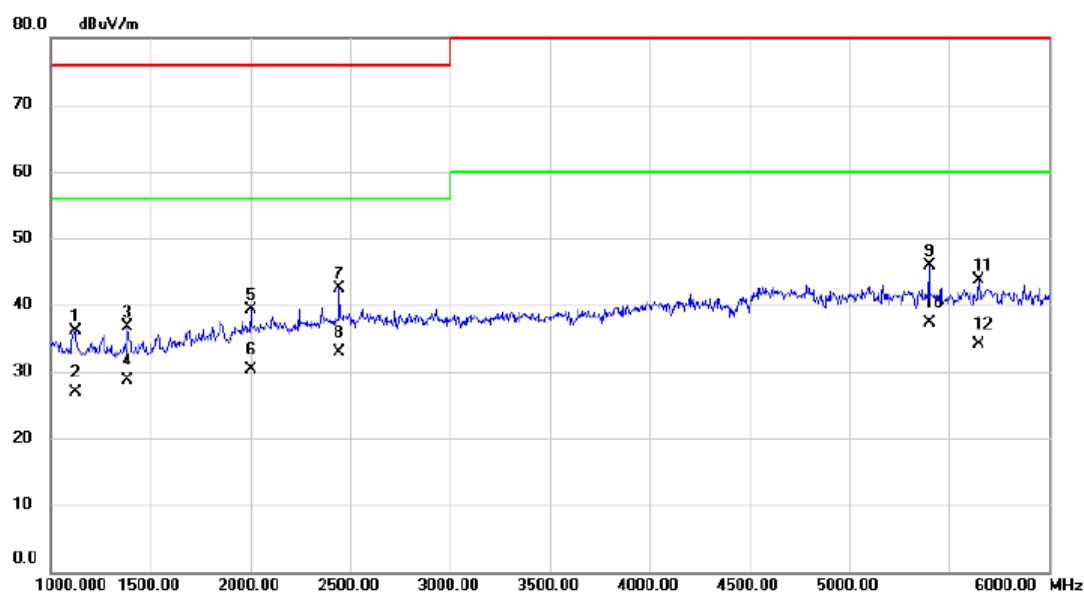
## 3.2.7 TEST RESULTS

Test Voltage	DC 24V	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		1265.000	52.81	-15.48	37.33	76.00	-38.67	peak	
2		1265.000	43.66	-15.48	28.18	56.00	-27.82	AVG	
3		1385.000	53.09	-15.36	37.73	76.00	-38.27	peak	
4		1385.000	44.37	-15.36	29.01	56.00	-26.99	AVG	
5		1995.000	57.72	-11.47	46.25	76.00	-29.75	peak	
6	*	1995.000	48.32	-11.47	36.85	56.00	-19.15	AVG	
7		4535.000	46.04	-3.34	42.70	80.00	-37.30	peak	
8		4535.000	37.61	-3.34	34.27	60.00	-25.73	AVG	
9		5400.000	46.22	-3.13	43.09	80.00	-36.91	peak	
10		5400.000	37.78	-3.13	34.65	60.00	-25.35	AVG	
11		5710.000	45.71	-2.93	42.78	80.00	-37.22	peak	
12		5710.000	36.12	-2.93	33.19	60.00	-26.81	AVG	

Test Voltage	DC 24V	Polarization	Horizontal
Test Mode	Mode 1		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		1120.000	51.73	-15.63	36.10	76.00	-39.90	peak	
2		1120.000	42.62	-15.63	26.99	56.00	-29.01	AVG	
3		1385.000	52.06	-15.36	36.70	76.00	-39.30	peak	
4		1385.000	43.99	-15.36	28.63	56.00	-27.37	AVG	
5		2000.000	50.81	-11.43	39.38	76.00	-36.62	peak	
6		2000.000	41.67	-11.43	30.24	56.00	-25.76	AVG	
7		2445.000	51.88	-9.46	42.42	76.00	-33.58	peak	
8		2445.000	42.36	-9.46	32.90	56.00	-23.10	AVG	
9		5400.000	49.02	-3.13	45.89	80.00	-34.11	peak	
10	*	5400.000	40.38	-3.13	37.25	60.00	-22.75	AVG	
11		5650.000	46.77	-3.02	43.75	80.00	-36.25	peak	
12		5650.000	37.16	-3.02	34.14	60.00	-25.86	AVG	

### 3.3 CONDUCTED EMISSION MEASUREMENT AT DC POWER PORTS

#### 3.3.1 LIMITS

Requirements for conducted emissions from DC power ports of Class A equipment

Frequency Range MHz	Coupling Device	Detector Type / bandwidth	Class A Limits (dB(μV))
0.15 - 0.5	AMN	Quasi Peak / 9 kHz	79
0.5 - 30			73
0.15 - 0.5	AMN	Average / 9 kHz	66
0.5 - 30			60

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	EMI TEST RECEIVER	R&S	ESCI	100382	Dec. 06, 2025
2	TWO-LINE V-NETWORK	R&S	ENV216	102974	Dec. 06, 2025
3	TWO-LINE V-NETWORK	R&S	ENV216	101447	Dec. 06, 2025
4	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
5	Cable	N/A	SFT205-NMNM-9M -001	9M	Nov. 11, 2025

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

All calibration period of equipment list is one year.

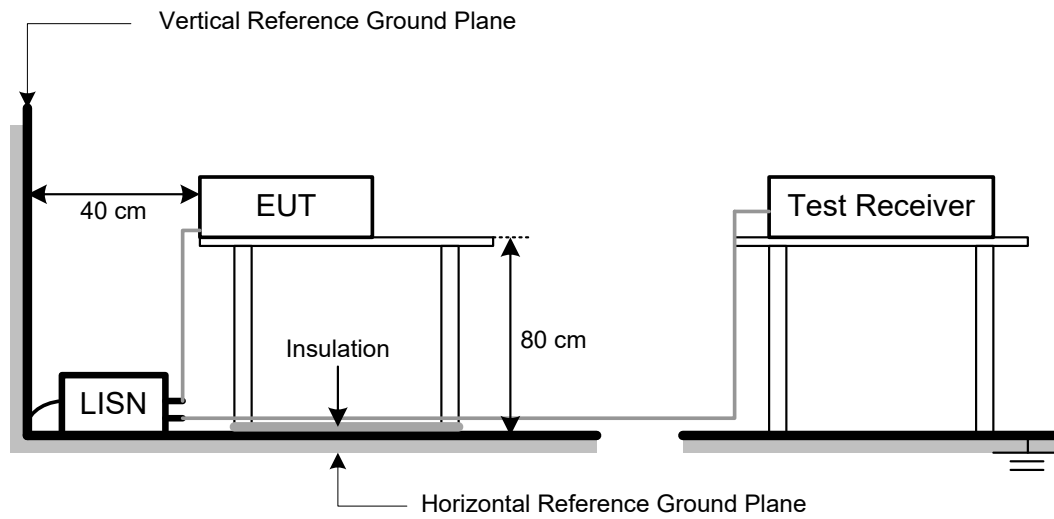
#### 3.3.3 TEST PROCEDURE

- 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

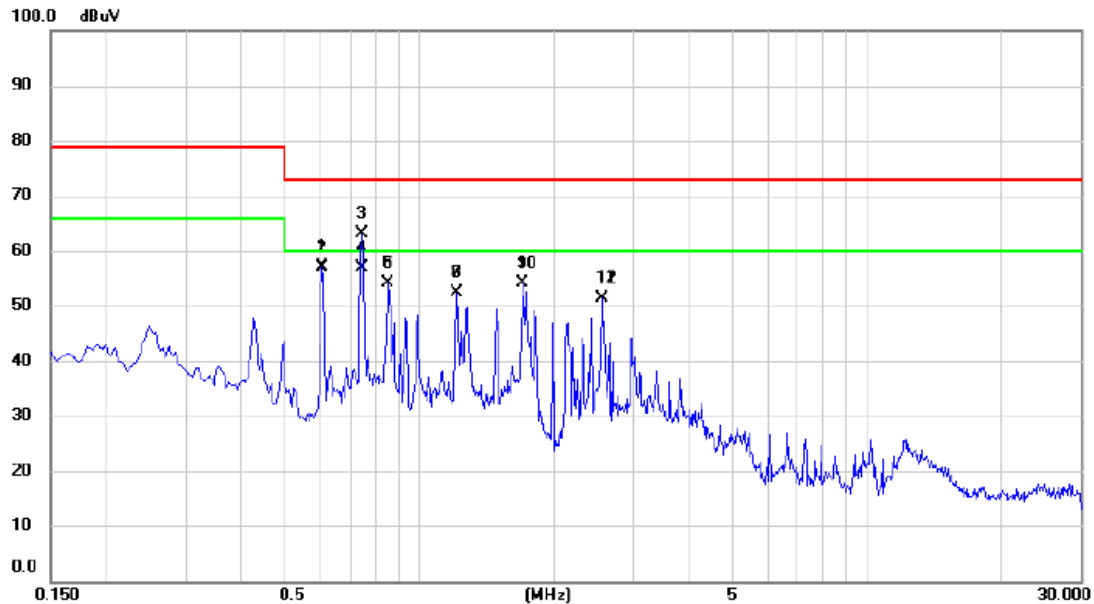
### 3.3.5 TEST SETUP





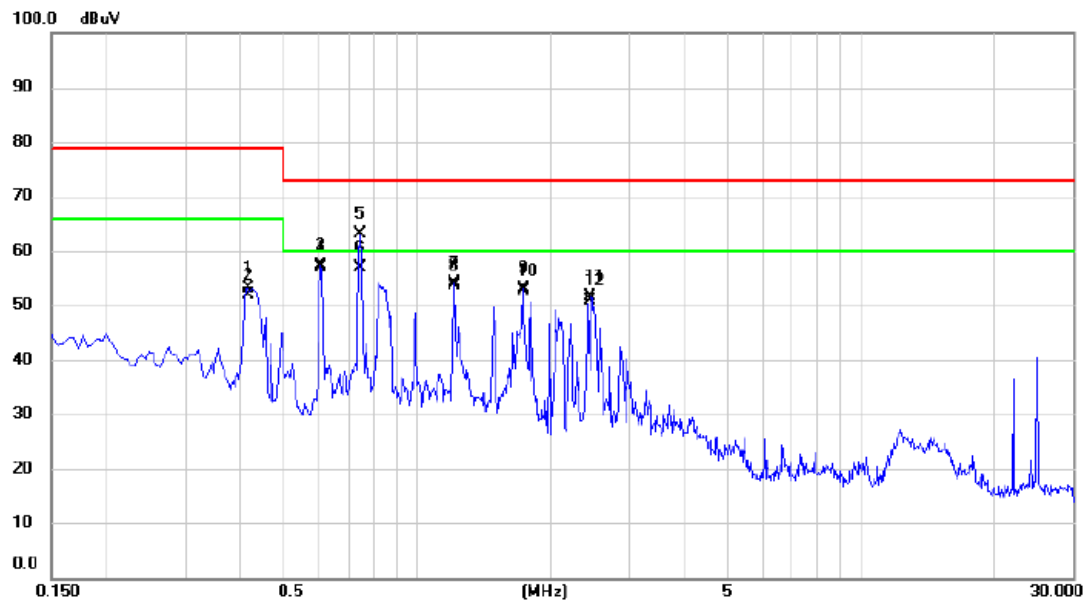
### 3.3.6 TEST RESULTS

Test Voltage	DC 24V	Phase	Positive
Test Mode	Mode 1		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		0.6045	47.44	9.64	57.08	73.00	-15.92	QP	
2		0.6045	47.20	9.64	56.84	60.00	-3.16	AVG	
3		0.7440	53.53	9.67	63.20	73.00	-9.80	QP	
4	*	0.7440	47.30	9.67	56.97	60.00	-3.03	AVG	
5		0.8520	44.40	9.68	54.08	73.00	-18.92	QP	
6		0.8520	44.40	9.68	54.08	60.00	-5.92	AVG	
7		1.2120	42.71	9.70	52.41	73.00	-20.59	QP	
8		1.2120	42.71	9.70	52.41	60.00	-7.59	AVG	
9		1.7025	44.46	9.73	54.19	73.00	-18.81	QP	
10		1.7025	44.46	9.73	54.19	60.00	-5.81	AVG	
11		2.5530	41.59	9.77	51.36	73.00	-21.64	QP	
12		2.5530	41.59	9.77	51.36	60.00	-8.64	AVG	

Test Voltage	DC 24V	Phase	Negative
Test Mode	Mode 1		



No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	0.4155	43.59	9.64	53.23	79.00	-25.77	QP	
2	0.4155	42.30	9.64	51.94	66.00	-14.06	AVG	
3	0.6045	47.69	9.67	57.36	73.00	-15.64	QP	
4	0.6045	47.20	9.67	56.87	60.00	-3.13	AVG	
5	0.7440	53.46	9.72	63.18	73.00	-9.82	QP	
6 *	0.7440	47.20	9.72	56.92	60.00	-3.08	AVG	
7	1.2120	44.48	9.73	54.21	73.00	-18.79	QP	
8	1.2120	44.00	9.73	53.73	60.00	-6.27	AVG	
9	1.7340	43.30	9.75	53.05	73.00	-19.95	QP	
10	1.7340	43.00	9.75	52.75	60.00	-7.25	AVG	
11	2.4585	41.78	9.78	51.56	73.00	-21.44	QP	
12	2.4585	41.00	9.78	50.78	60.00	-9.22	AVG	

### 3.4 ASYMMETRIC MODE CONDUCTED EMISSIONS TEST

#### 3.4.1 LIMITS

Requirements for asymmetric mode conducted emissions from Class A equipment

Frequency Range MHz	Coupling device	Detector type / Bandwidth	voltage limits dB(μV)	current limits dB(μA)
0.15 - 0.5	Current probe	Quasi Peak / 9 kHz	n/a	53 - 43
0.5 - 30				43
0.15 - 0.5	Current probe	Average / 9 kHz		40 - 30
0.5 - 30				30

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	RF Current Probe	FCC	F-33-4	78	Dec. 22, 2024
2	EMI TEST RECEIVER	R&S	ESCI	100382	Dec. 06, 2025
3	TWO-LINE V-NETWORK	R&S	ENV216	102974	Dec. 06, 2025
4	TWO-LINE V-NETWORK	R&S	ENV216	101447	Dec. 06, 2025
5	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
6	Cable	N/A	SFT205-NMNM-9M-001	9M	Nov. 11, 2025

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.

NOTE:

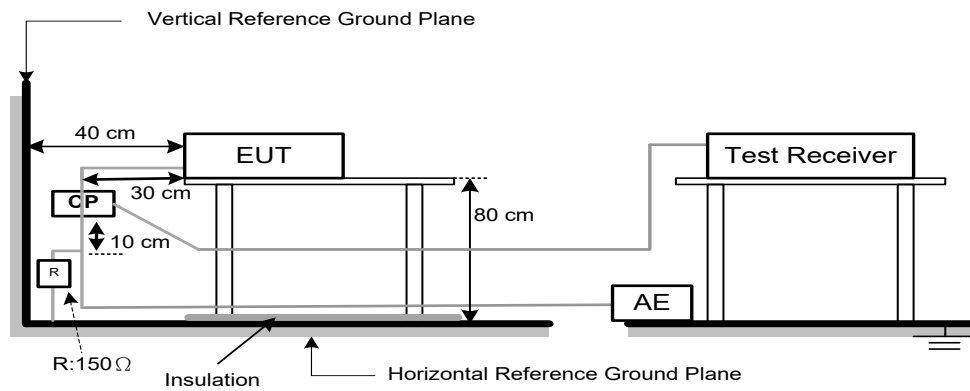
- Break the external protective insulation (exposing the shield) and connect a 150 Ω resistor with a physical connection between the cable screen and the RGP. The 150 Ω resistor shall be ≤0,3 m from the outside surface of the screen to ground.  
Insert a ferrite tube or clamp between the 150 Ω connection and the AE.  
Measure the current with a current probe and compare to the current limit.

### 3.4.4 DEVIATION FROM TEST STANDARD

No deviation

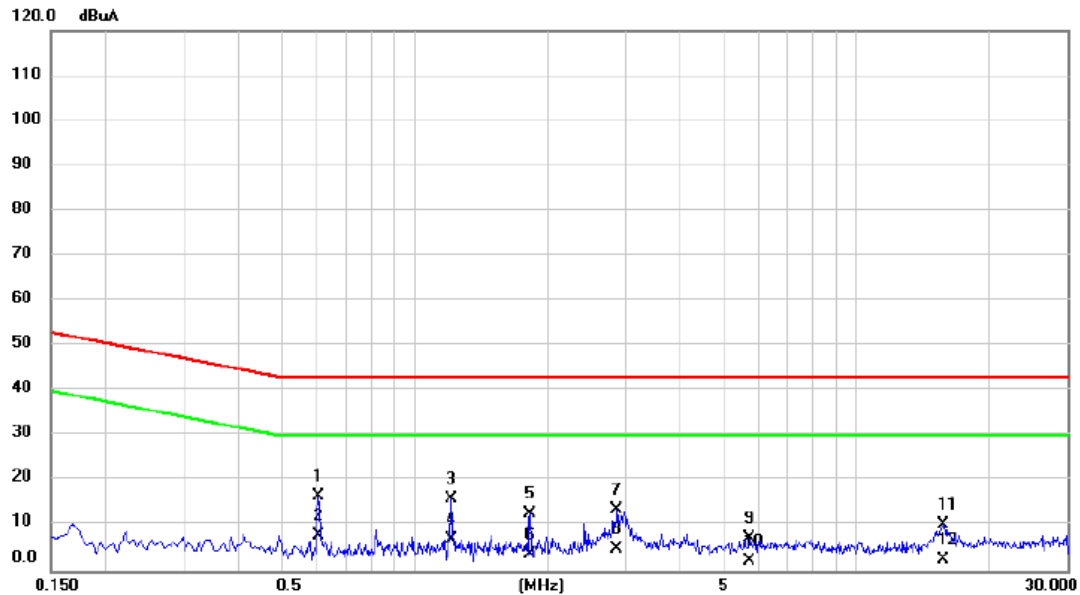
### 3.4.5 TEST SETUP

a) Cable Type: Screened or Coaxial



### 3.4.6 TEST RESULTS

Test Voltage	DC 24V
Test Mode	Mode 1(LAN1 1Gbps)



No. Mk.	Freq. MHz	Reading Level dBuA	Correct Factor dB	Measure- ment dBuA	Limit dBuA	Margin dB	Detector	Comment
1	0.6045	16.59	0.08	16.67	43.00	-26.33	QP	
2 *	0.6045	7.80	0.08	7.88	30.00	-22.12	AVG	
3	1.2120	15.97	0.13	16.10	43.00	-26.90	QP	
4	1.2120	6.90	0.13	7.03	30.00	-22.97	AVG	
5	1.8195	12.47	0.16	12.63	43.00	-30.37	QP	
6	1.8195	3.50	0.16	3.66	30.00	-26.34	AVG	
7	2.8725	13.37	0.20	13.57	43.00	-29.43	QP	
8	2.8725	4.90	0.20	5.10	30.00	-24.90	AVG	
9	5.7165	7.03	0.28	7.31	43.00	-35.69	QP	
10	5.7165	1.90	0.28	2.18	30.00	-27.82	AVG	
11	15.6750	9.98	0.37	10.35	43.00	-32.65	QP	
12	15.6750	2.30	0.37	2.67	30.00	-27.33	AVG	

#### 4. EMC IMMUNITY TEST

##### 4.1 STANDARD COMPLIANCE/SEVERITY LEVEL/CRITERIA - EN 55035

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)	<b>Port Type: unshielded symmetrical</b>		
	<b>Apply: lines to ground</b>		
	<b>Primary protection is Intended</b> ±1 kV and ±4 kV 10/700(5/320)Tr/Th μs	Analogue/digital data ports <b>(NOTE 1) &amp; (NOTE 2)</b>	C
	<b>Primary protection is not Intended</b> ±1 kV 10/700(5/320) Tr/Th μs		C
	<b>Port type: coaxial or shielded</b>		
	<b>Apply: shield to ground</b>		
±0.5 kV 1.2/50(8/20) Tr/Th μs	Analogue/digital data ports <b>(NOTE 1) &amp; (NOTE 2)</b>	B	
<b>line to reference ground for each individual line:</b> ±0.5 kV(peak) 1.2/50(8/20) Tr/Th μs	DC network power ports <b>(NOTE 2)</b>	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 <b>(NOTE 2)</b>	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 <b>(NOTE 2)</b>	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 <b>(Applicable only to CPE xDSL ports)</b>	A
	0.70 ms 8.3 ms(for 60Hz) 10 ms(for 50Hz)	Analogue/digital data ports <b>(Apply period based on the AC mains frequency)</b>	A
Broadband impulse noise disturbances, isolated (BIN-I)	0.15MHz to 30 MHz 110dBuV	Analogue/digital data ports <b>(Applicable only to CPE xDSL ports)</b>	B
	0.24 ms 10 ms 300 ms	Analogue/digital data ports <b>(Apply all burst durations)</b>	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 STANDARD COMPLIANCE/SEVERITY LEVEL/CRITERIA - EN IEC 61000-6-2

Tests Standard No.	TEST SPECIFICATION Level	Test Mode Test Ports	Criterion
Electrostatic discharge immunity EN 61000-4-2	±8 kV air discharge ±4 kV contact discharge	Direct Mode	B
	±4 kV HCP discharge ±4 kV VCP discharge	Indirect Mode	B
Radio-frequency, electromagnetic field immunity EN 61000-4-3	80 MHz to 1000 MHz 10 V/m (unmodulated, r.m.s.), 1 kHz, 80%, AM modulated	Enclosure	A
	1400 MHz to 6000 MHz 3 V/m (unmodulated, r.m.s.), 1 kHz, 80%, AM modulated		A
Fast transient immunity EN 61000-4-4	±2 kV (peak) 5/50ns Tr/Th 5 kHz or 100 kHz Repetition Freq.	AC Power Port	B
	±1 kV (peak) 5/50ns Tr/Th 5 kHz or 100 kHz Repetition Freq.	DC Power Port	B
	±1 kV(peak) 5/50ns Tr/Th 5 kHz or 100 kHz Repetition Freq.	CTL/Signal Data Line Port	B
Surge immunity EN 61000-4-5	±1 kV(5P/5N) 1.2/50(8/20) Tr/Th µs	AC Power Port L-N	B
	±2 kV(5P/5N) 1.2/50(8/20) Tr/Th µs	AC Power Port L-PE/N-PE	B
	±2 kV(5P/5N) 1.2/50(8/20) Tr/Th µs	DC Power Port	B
	±1 kV(5P/5N) 10/700 or 1.2/50 Tr/Th µs	Signal/Telecommuni- cation Ports	B
Radio-frequency common mode immunity EN 61000-4-6	0.15 MHz to 80 MHz 10 V (unmodulated, r.m.s.), 1 kHz 80%, AM Modulated 150Ω source impedance	CTL/Signal Port	A
	0.15 MHz to 80 MHz 10 V (unmodulated, r.m.s.), 1 kHz 80%, AM Modulated 150Ω source impedance	AC Power Port	A
	0.15 MHz to 80 MHz 10 V (unmodulated, r.m.s.), 1 kHz 80%, AM Modulated 150Ω source impedance	DC Power Port	A
Power frequency magnetic field immunity EN 61000-4-8	50/60 Hz, 30 A/m	Enclosure	A
Voltage dips, voltage interruptions immunity EN 61000-4-11	Voltage Dips 0% Voltage Dips 40% Voltage Dips 70% Voltage Interruptions 0%	AC Power Port	B C C C

Note:

- Where the coupling network for the 10/700 µs waveform affects the functioning of high speed data ports, the test shall be carried out using a 1,2/50 (8/20) µs waveform and appropriate coupling network.

### 4.3 GENERAL PERFORMANCE CRITERIA

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

<b>Criterion A</b>	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.
<b>Criterion B</b>	During the application of the disturbance, degradation of performance is allowed. However, no unintended change of actual operating state or stored data is allowed to persist after the test. After the test, the equipment shall continue to operate as intended without operator intervention; no degradation of performance or loss of function is allowed, below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level (or the permissible performance loss), or recovery time, is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.
<b>Criterion C</b>	Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. A reboot or re-start operation is allowed. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

According to **EN 61000-6-2** standard, the general performance criterion as following:

<b>Criterion A</b>	The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. 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, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.
<b>Criterion B</b>	The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level 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. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.
<b>Criterion C</b>	Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

## 4.4 ELECTROSTATIC DISCHARGE IMMUNITY TEST (ESD)

### 4.4.1 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

### 4.4.2 MEASUREMENT INSTRUMENTS

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	ESD Generator	TESEQ AG	NSG 437	1133	Mar. 04, 2025

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 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.

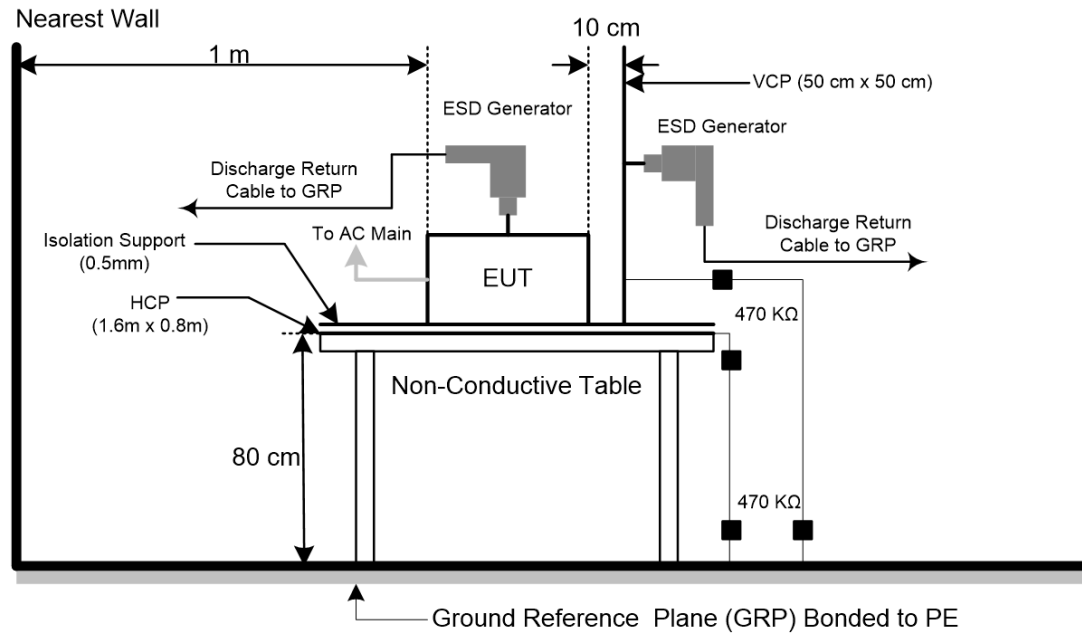
- b. For TABLE-TOP equipment:

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.

#### 4.4.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.4.5 TEST SETUP



#### 4.4.6 TEST RESULTS

Test Voltage	DC 24V
Test Mode	Mode 1

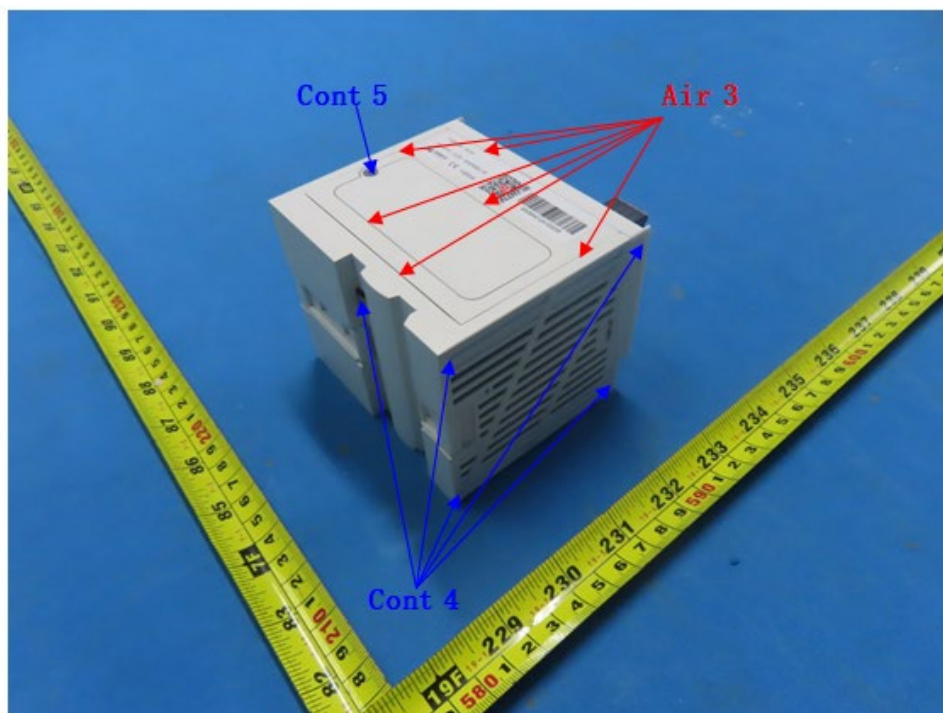
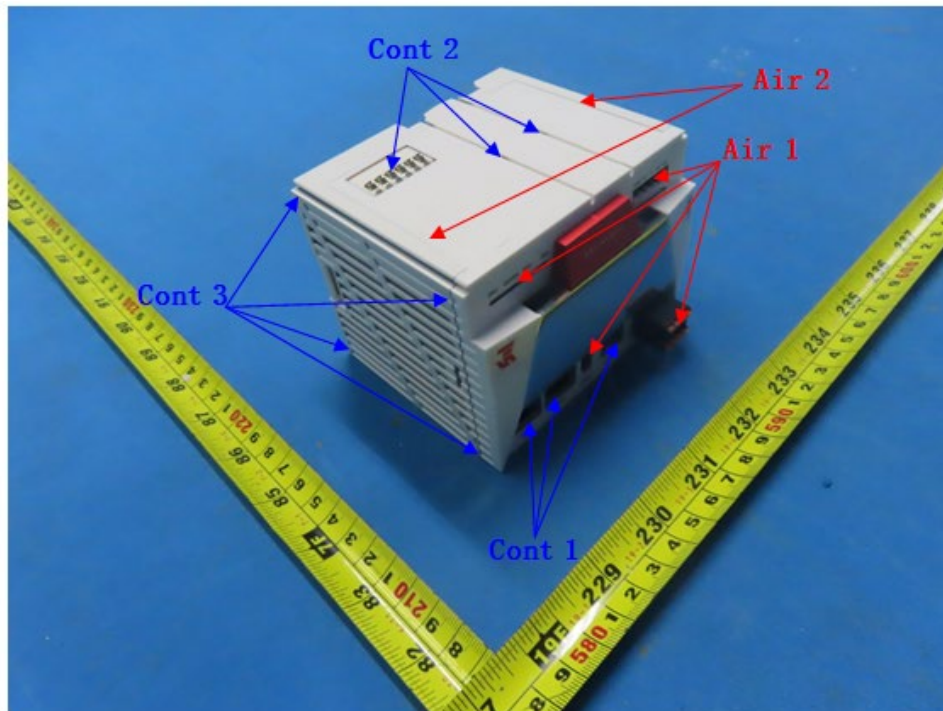
Mode	Air Discharge								Contact Discharge					
	2kV		4kV		8kV		- kV		4kV		- kV		- kV	
Location	P	N	P	N	P	N	P	N	P	N	P	N	P	N
1	A	A	A	A	A	A	-	-	A	A	-	-	-	-
2	A	A	A	A	A	A	-	-	A	A	-	-	-	-
3	A	A	A	A	A	A	-	-	A	A	-	-	-	-
4	-	-	-	-	-	-	-	-	A	A	-	-	-	-
5	-	-	-	-	-	-	-	-	A	A	-	-	-	-
Criteria	B								B					
Result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

Mode	HCP Contact Discharge						VCP Contact Discharge					
	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



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

### 4.5.1 TEST SPECIFICATION

Basic Standard	IEC 61000-4-3
Required Performance	A
Frequency Range For EN 55035	80 MHz - 1000 MHz, 1800 MHz, 2600 MHz, 3500 MHz, 5000MHz ( $\pm 1\%$ )
Frequency Range For EN IEC 61000-6-2	80 MHz - 1000 MHz & 1400 MHz - 6000 MHz
Field Strength	3 V/m, 10 V/m (unmodulated, r.m.s)
Modulation	1 kHz Sine Wave, 80%, AM Modulation
Frequency Step	1% of the preceding frequency.
Polarity of Antenna	Horizontal and Vertical
Test Distance	3 m
Antenna Height	1.55 m
Dwell Time	3 seconds

### 4.5.2 MEASUREMENT INSTRUMENTS

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Antenna	ETS	3142B	00026419	N/A
2	Amplifier	AR	50S1G4A	326720	Dec. 22, 2024
3	MXG Analog Signal Generator	Agilent	N5181A	MY49060710	May 31, 2025
4	Power amplifier	MILMEGA	AS1860-50	1064834	Dec. 22, 2024
5	Microwave Log.-Per. Antenna	Schwarzbeck	STLP 9149	9149-277	N/A
6	Power amplifier	MILMEGA	80RF1000-250	1064833	Dec. 22, 2024
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.

### 4.5.3 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.

a. The field strength level was 3 V/m, 10 V/m (unmodulated, r.m.s).

b. For EN 55035:

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 the preceding frequency.

For EN IEC 61000-6-2:

The frequency range is swept from 80 MHz to 6000 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 the preceding frequency.

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

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

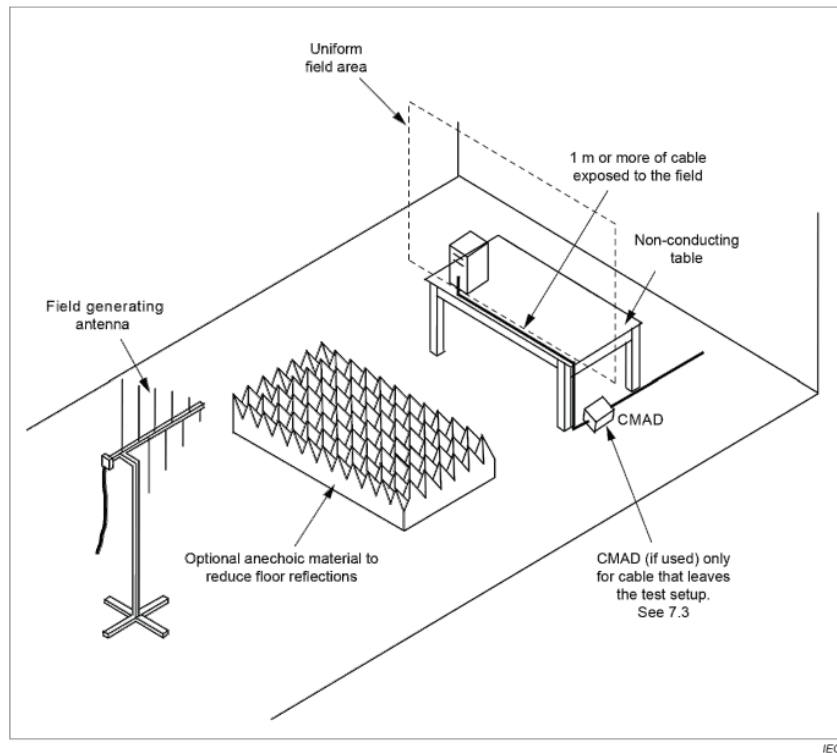
### 4.5.4 DEVIATION FROM TEST STANDARD

No deviation



#### 4.5.5 TEST SETUP

a) For Continuous induced RF disturbances





#### 4.5.6 TEST RESULTS

Test Voltage	DC 24V
Test Mode	Mode 1

For EN 55035:

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		

For EN IEC 61000-6-2:

Frequency Range (MHz)	RF Field Position	R.F. Field Strength	Modulation	Azimuth	Criterion	Result
80 - 1000	H / V	10V/m	AM Modulated 1000Hz, 80%	0	A	A
				90		
				180		
				270		
1400 - 6000	H / V	3V/m	AM Modulated 1000Hz, 80%	0	A	A
				90		
				180		
				270		

## 4.6 ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST (EFT)

### 4.6.1 TEST SPECIFICATION

Basic Standard	IEC 61000-4-4
Required Performance	B
Test Voltage For EN 55035	DC Power Line: $\pm 0.5$ kV Analogue/digital data ports: $\pm 0.5$ kV
Test Voltage For EN IEC 61000-6-2	DC Power Line: $\pm 2$ kV Analogue/digital data ports: $\pm 1$ 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.

### 4.6.2 MEASUREMENT INSTRUMENTS

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Fast Transient Burst Simulator	Prima	EFT61004TA	PR190741004	May 31, 2025
2	Measurement Software	Prima	EFT_Series V1.0. 0.0.20180710	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.

### 4.6.3 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.

### 4.6.4 DEVIATION FROM TEST STANDARD

No deviation

[illegible]

#### 4.6.6 TEST RESULTS

Test Voltage	DC 24V
Test Mode	Mode 1

For EN 55035:

EUT Ports Tested		Polarity	Repetition Frequency	Test Level 0.5 kV	Criterion	Result
DC Power Port	Positive (P)	+	5 kHz	B	B	B
		-	5 kHz	B		
	Negative (N)	+	5 kHz	B	B	B
		-	5 kHz	B		
	Ground (PE)	+	5 kHz	B	B	B
		-	5 kHz	B		
	P+N	+	5 kHz	B	B	B
		-	5 kHz	B		
	P+PE	+	5 kHz	B	B	B
		-	5 kHz	B		
	N+PE	+	5 kHz	B	B	B
		-	5 kHz	B		
	P+N+PE	+	5 kHz	B	B	B
		-	5 kHz	B		

EUT Ports Tested		Polarity	Repetition Frequency	Test Level 0.5 kV	Criterion	Result
Analogue/digital data ports	LAN1	+	5 kHz	B	B	B
		-	5 kHz	B		

For EN IEC 61000-6-2:

EUT Ports Tested		Polarity	Repetition Frequency	Test Level 2 kV	Criterion	Result
DC Power Port	Positive (P)	+	5 kHz	B	B	B
		-	5 kHz	B		
	Negative (N)	+	5 kHz	B	B	B
		-	5 kHz	B		
	Ground (PE)	+	5 kHz	B	B	B
		-	5 kHz	B		
	P+N	+	5 kHz	B	B	B
		-	5 kHz	B		
	P+PE	+	5 kHz	B	B	B
		-	5 kHz	B		
	N+PE	+	5 kHz	B	B	B
		-	5 kHz	B		
	P+N+PE	+	5 kHz	B	B	B
		-	5 kHz	B		

EUT Ports Tested		Polarity	Repetition Frequency	Test Level 1 kV	Criterion	Result
Analogue/digital data ports	LAN1	+	5 kHz	B	B	B
		-	5 kHz	B		

## 4.7 SURGE IMMUNITY TEST (SURGE)

### 4.7.1 TEST SPECIFICATION

Basic Standard	IEC 61000-4-5
Required Performance	B
Wave-Shape	1.2/50(8/20) Tr/Th $\mu$ s combination wave
Test Voltage For EN 55035	AC mains power ports: $\pm 0.5$ kV
Test Voltage For EN IEC 61000-6-2	AC mains power ports: $\pm 0.5$ kV, $\pm 1$ kV Analogue/digital data ports: $\pm 1$ kV
Generator Source Impedance	2 $\Omega$ of the low-voltage power supply network. 42 $\Omega$ (40 $\Omega$ +2 $\Omega$ ) between all other signal lines and ground when use 1.2/50(8/20) wave
Phase Angle, Polarity and Number of Tests	N/A
Pulse Repetition Rate	1 time / min

### 4.7.2 MEASUREMENT INSTRUMENTS

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Lightning Surge Generator	Prima	SUG61005TB	PR190854067	May 31, 2025
2	Measurement Software	Prima	SUG_Series V1. 0.0.7.20190827	N/A	N/A
3	CDN	EMC PARTNER	CDN-UTP8	040	Dec. 06, 2025
4	Lightning Surge Generator	3ctest	CWS 1000N	ES058003022 011	Dec. 06, 2025

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

#### 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 2 meters 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).

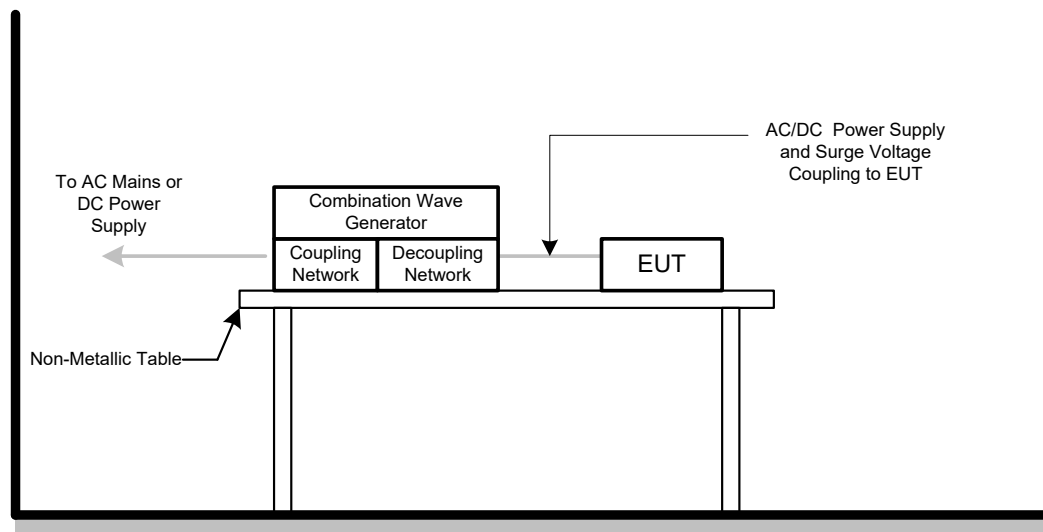
#### c. For test applied to unshielded symmetrically operated interconnection /telecommunication lines of EUT :

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).

### 4.7.4 DEVIATION FROM TEST STANDARD

No deviation

## 4.7.5 TEST SETUP



#### 4.7.6 TEST RESULTS

Test Voltage	DC 24V
Test Mode	Mode 1

For EN 55035:

Wave Form EUT Ports Tested		1.2/50(8/20)Tr/Thµs					Criterion	Result
		Polarity	Voltage					
			0.5kV	-- kV	-- kV	-- kV		
DC	Positive - PE	+ / -	A	-	-	-	B	A
	Negative - PE	+ / -	A	-	-	-		

For EN IEC 61000-6-2:

Wave Form EUT Ports Tested		1.2/50(8/20)Tr/Thµs					Criterion	Result
		Polarity	Voltage					
			0.5kV	1kV	-- kV	-- kV		
DC	Positive - Negative	+ / -	B	-	-	-	B	B
	Positive - PE	+ / -	A	B	-	-		B
	Negative - PE	+ / -	A	B	-	-		B

Wave Form EUT Ports Tested	1.2/50(8/20)Tr/Thµs						Criterion	Result
	Polarity	Phase	Voltage					
			1kV	-- kV	-- kV	-- kV		
Analogue/digital data ports(LAN1)	+/-	N/A	B	-	-	-	B	B



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

### 4.8.1 TEST SPECIFICATION

Basic Standard	IEC 61000-4-6
Required Performance	A
Frequency Range&Field Strength For EN 55035	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.)
Frequency Range&Field Strength For EN IEC 61000-6-2	0.15 MHz - 80 MHz: 10 V (unmodulated, r.m.s.)
Modulation	1 kHz Sine Wave, 80%, AM Modulation
Frequency Step	1 % of the preceding frequency value
Dwell Time	3 seconds

### 4.8.2 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	Jun. 01, 2025
2	Attenuator	Teseq	100-SA-FFN-06	163357	May 31, 2025
3	Measurement Software	Farad	EZ-CS (V2.0.1.4)	N/A	N/A
4	Power CDN	FCC	FCC-801-M2/M3-1 6A	100270	Dec. 22, 2024
5	Coupling Decoupling Network	Teseq GmbH	CDN M016	35834	May 31, 2025
6	EM Clamp	MEB	KEMZ801	14291	May 31, 2025

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

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.

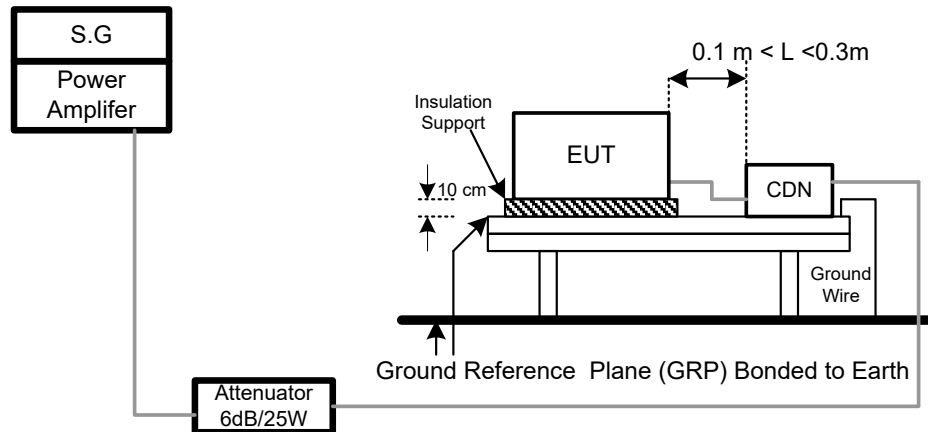
The other condition as following manner:

- The field strength level was 3 V, 10 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 shall not exceed 1 % of the preceding frequency value.
- The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.

## 4.8.4 DEVIATION FROM TEST STANDARD

No deviation

## 4.8.5 TEST SETUP



#### 4.8.6 TEST RESULTS

Test Voltage	DC 24V
Test Mode	Mode 1

For EN 55035:

Test Ports (Mode)	Freq.Range (MHz)	Field Strength	Modulation	Criteria	Results
DC network power ports	0.15 - 10	3V	AM Modulated 1000Hz, 80%	A	A
	10 - 30	3V to 1V			
	30 - 80	1V			
Analogue/digital data ports (LAN1)	0.15 - 10	3V	AM Modulated 1000Hz, 80%	A	A
	10 - 30	3V to 1V			
	30 - 80	1V			

For EN IEC 61000-6-2:

Test Ports (Mode)	Freq. Range (MHz)	Field Strength	Modulation	Criteria	Results
Input/ Output DC. Power Port	0.15 --- 80	10 V	AM Modulated 1000 Hz, 80%	A	A
Analogue/digital data ports (LAN1)	0.15 --- 80	10 V	AM Modulated 1000 Hz, 80%	A	A

## 4.9 POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST (PFMF)

### 4.9.1 TEST SPECIFICATION

Basic Standard	IEC 61000-4-8
Required Performance	A
Frequency Range	50/60Hz
Field Strength	1 A/m, 30 A/m
Observation Time	1 minute
Inductance Coil	Rectangular type, 1mx1m

### 4.9.2 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	Dec. 22, 2024
2	Magnetic Field immunity loop	Thermo KeyTek	F-1000-4-8/9/10-L-1M	4024	Dec. 22, 2024

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

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.

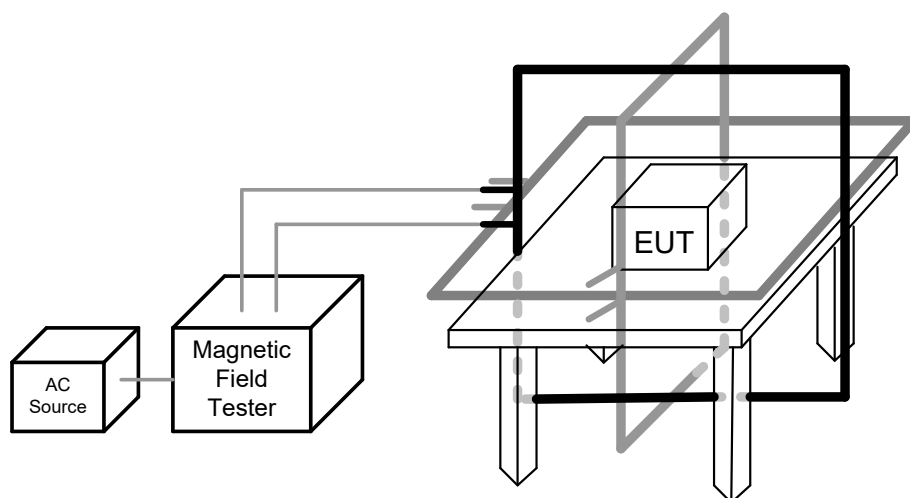
The other condition as following manner:

- 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.

### 4.9.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.9.5 TEST SETUP



#### 4.9.6 TEST RESULTS

Test Voltage	DC 24V
Test Mode	Mode 1

For EN 55035:  
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

For EN IEC 61000-6-2:  
50Hz

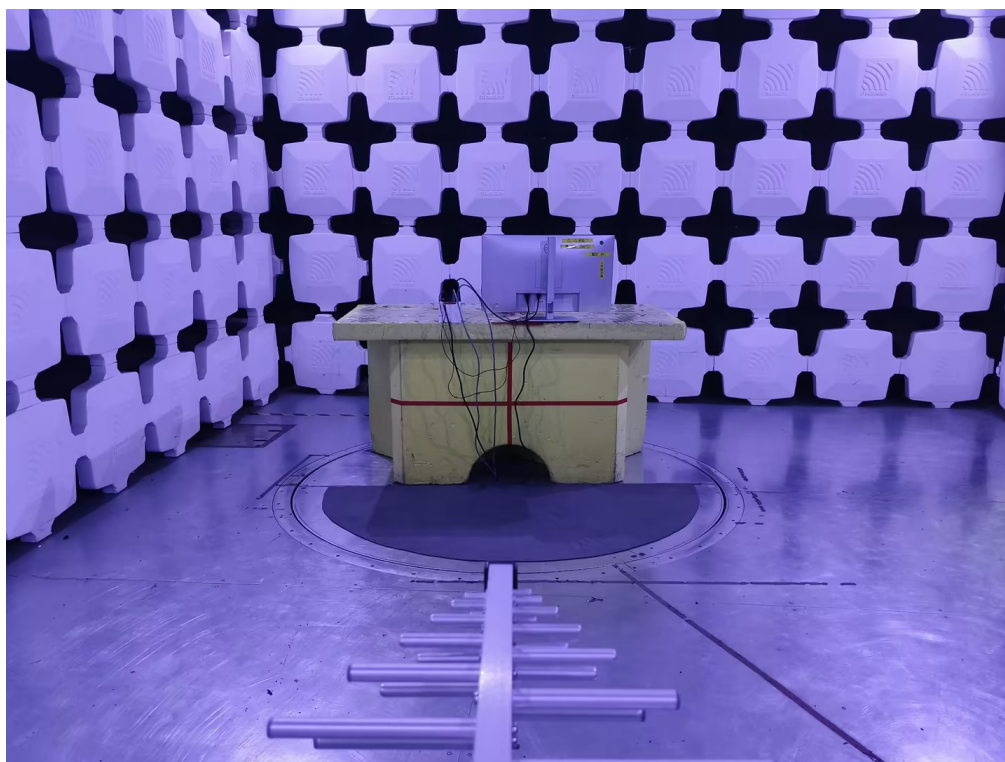
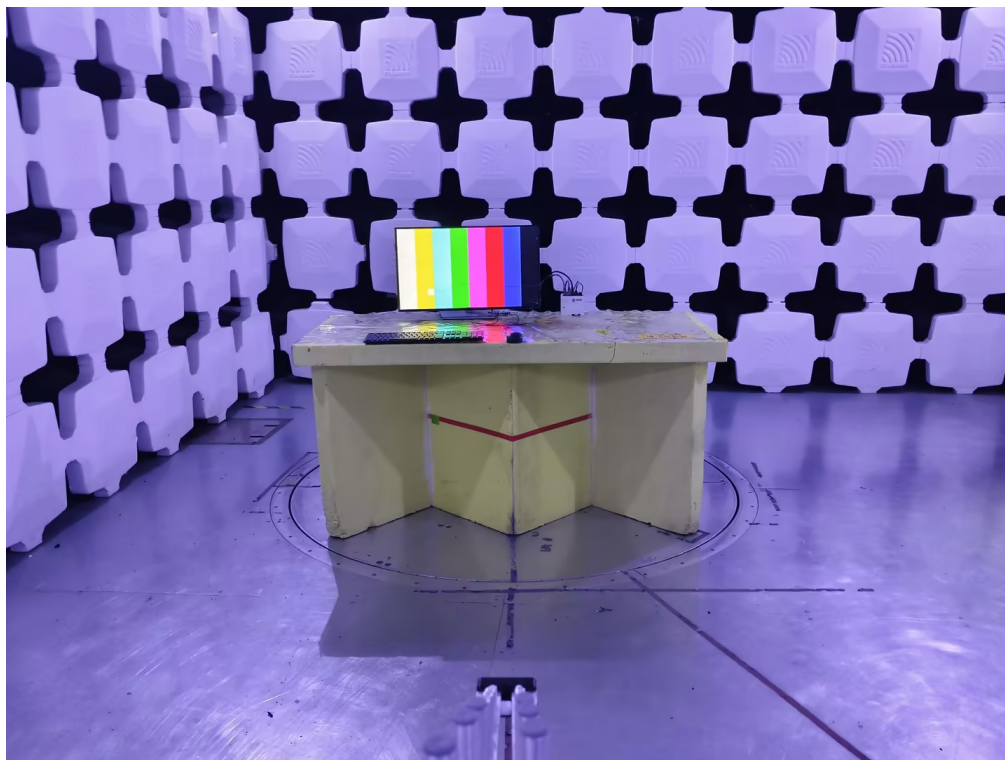
Test Mode	Test Level	Antenna aspect	Duration	Criteria	Results
Enclosure	30 A/m	X	60s	A	A
Enclosure	30 A/m	Y	60s	A	A
Enclosure	30 A/m	Z	60s	A	A

60Hz

Test Mode	Test Level	Antenna aspect	Duration	Criteria	Results
Enclosure	30 A/m	X	60s	A	A
Enclosure	30 A/m	Y	60s	A	A
Enclosure	30 A/m	Z	60s	A	A

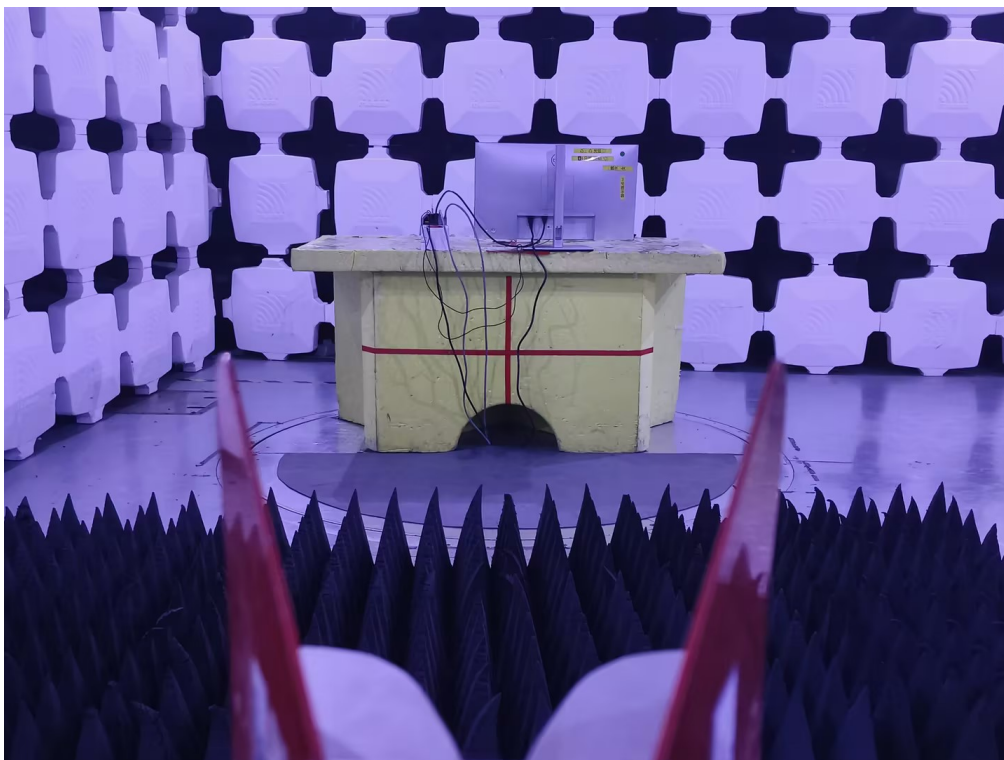
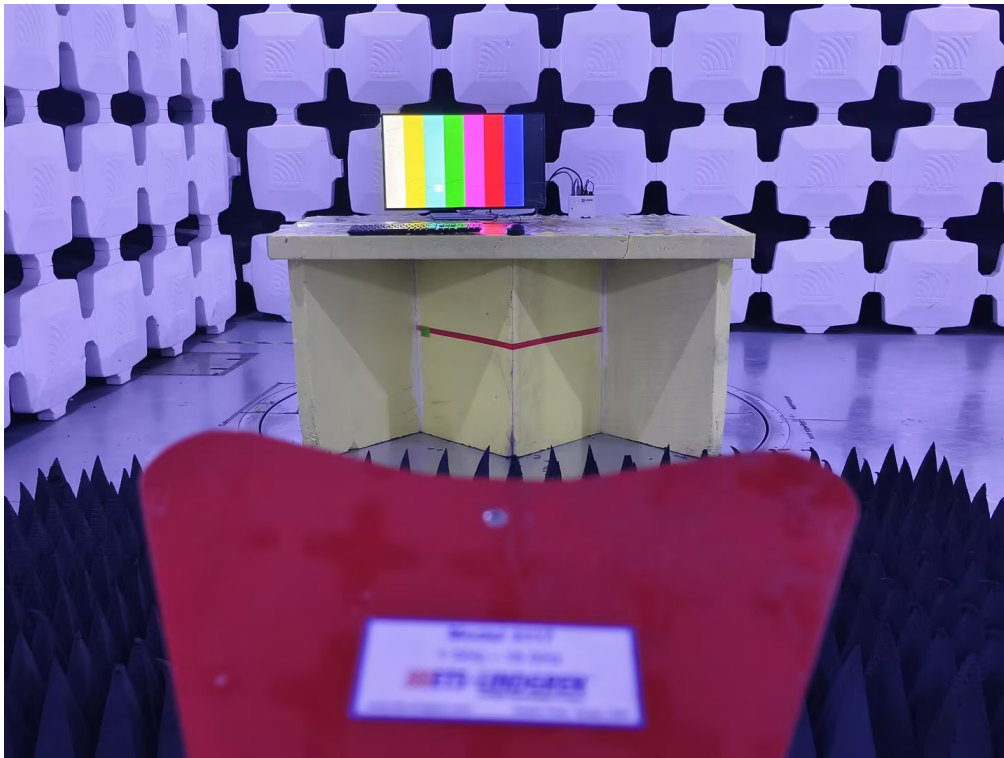
## 5. EUT TEST PHOTO

Radiated emissions up to 1 GHz

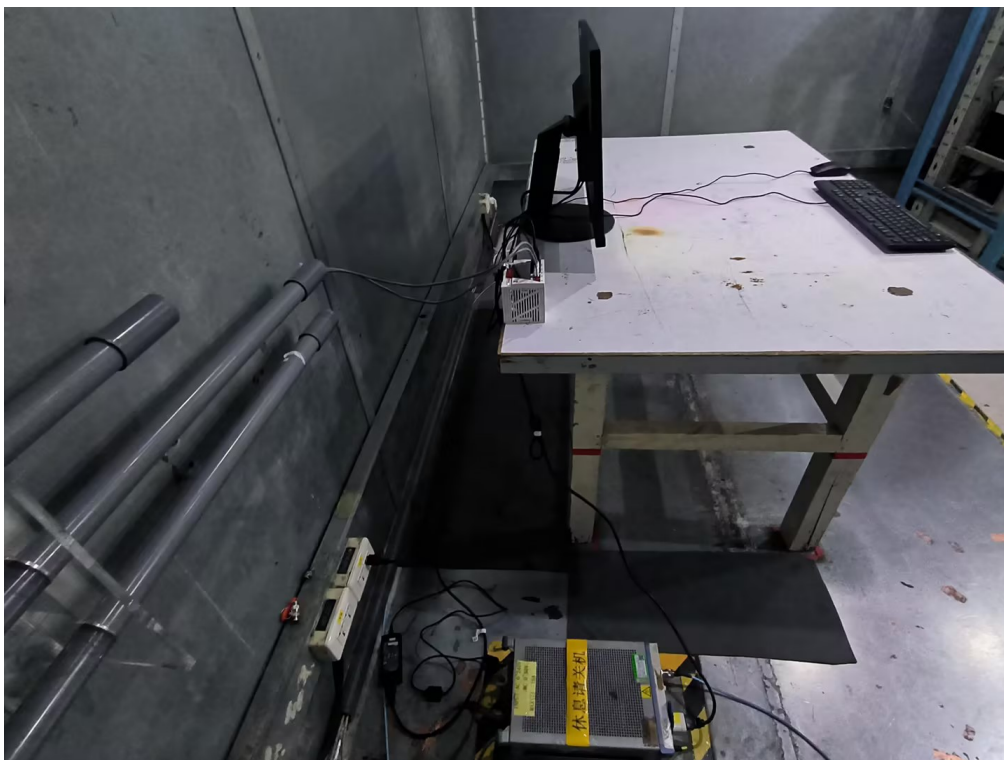
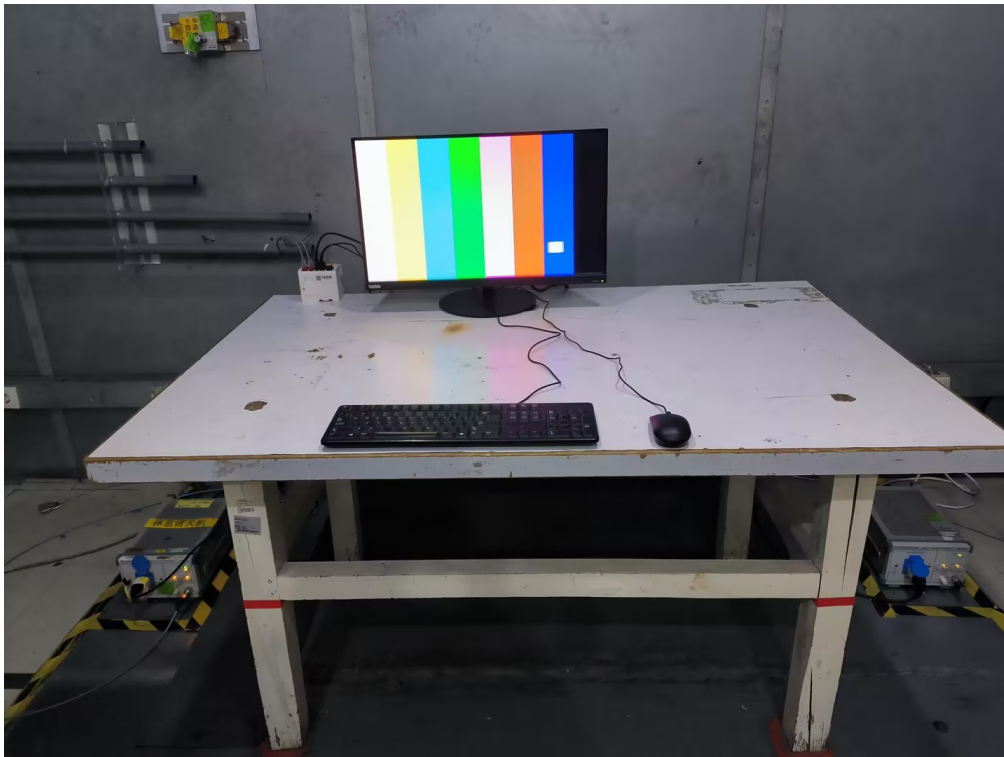




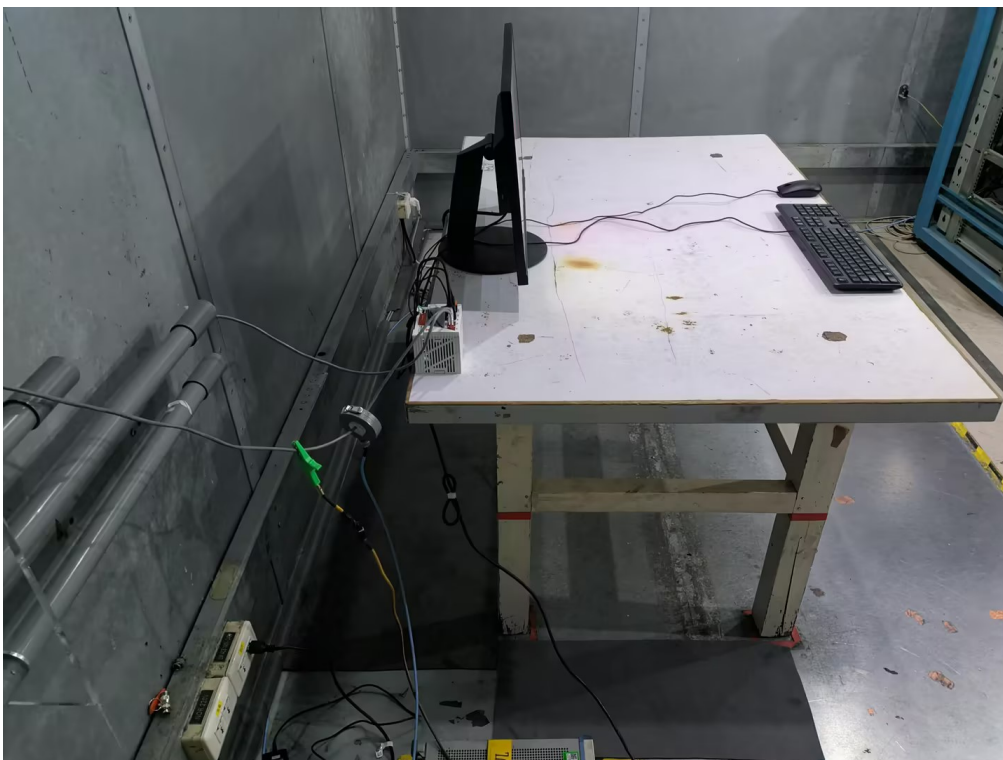
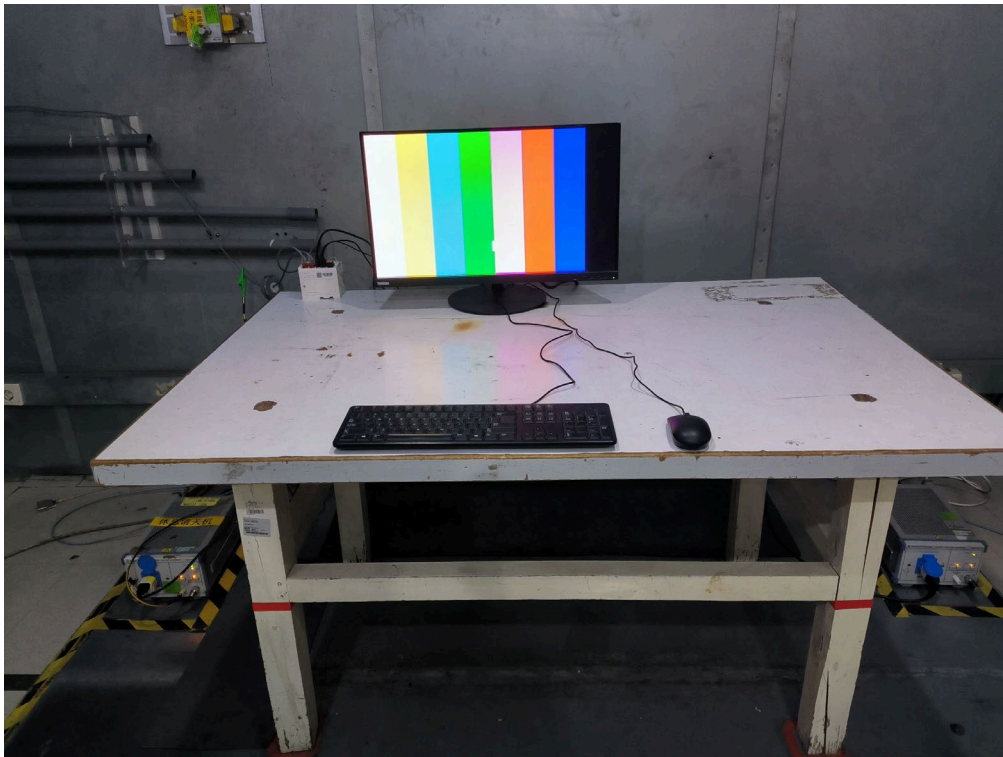
Radiated emissions above 1 GHz



Conducted emissions DC power port

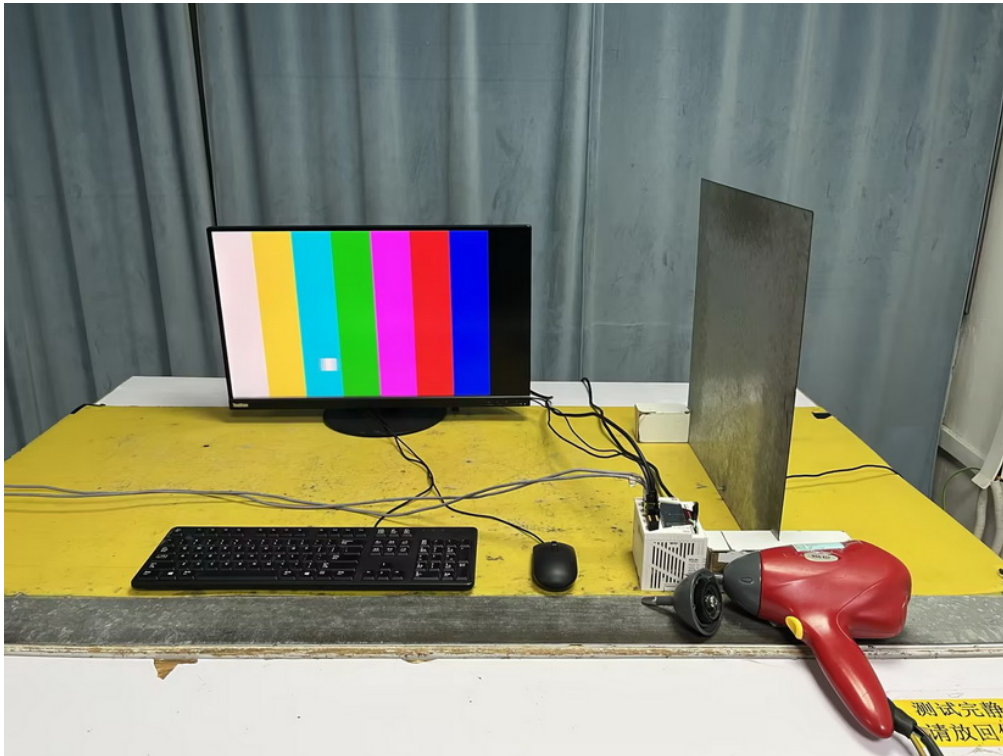


Asymmetric mode conducted emissions(LAN1)

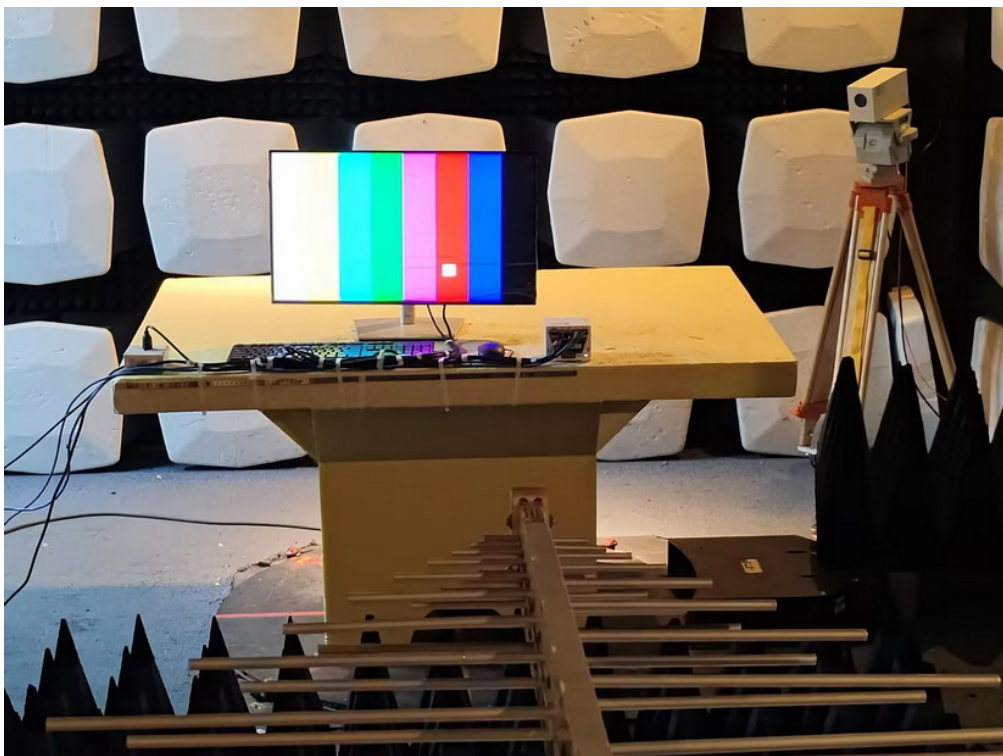




### Electrostatic discharge immunity



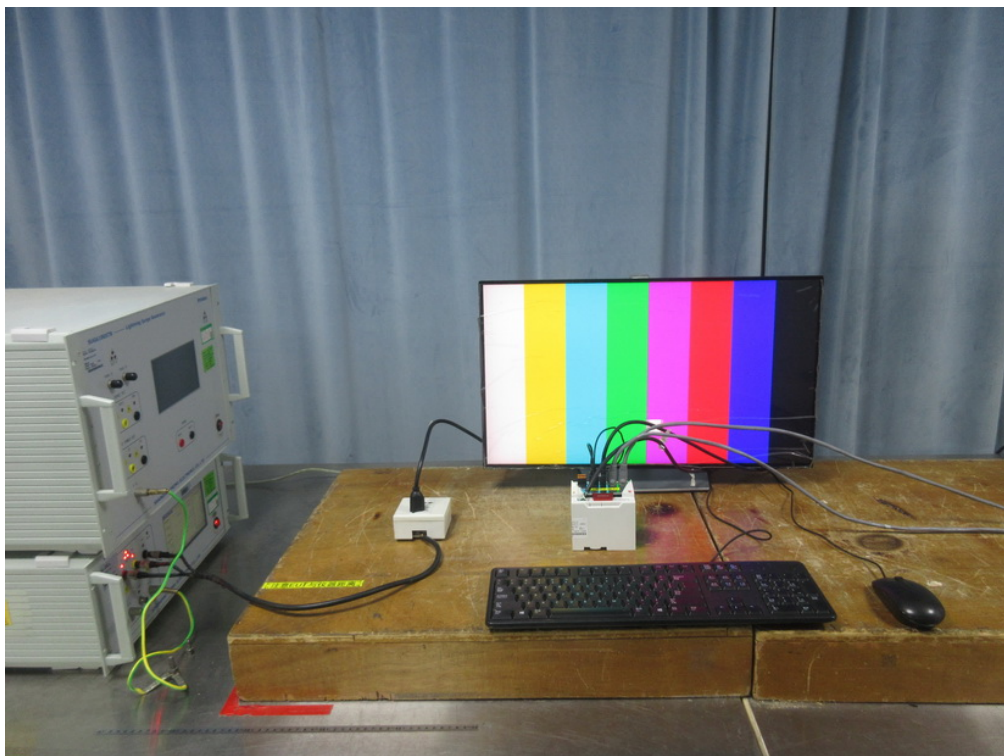
### Radiated, radio-frequency, electromagnetic field immunity – Up to 1GHz



## Radiated, radio-frequency, electromagnetic field immunity – Above 1GHz

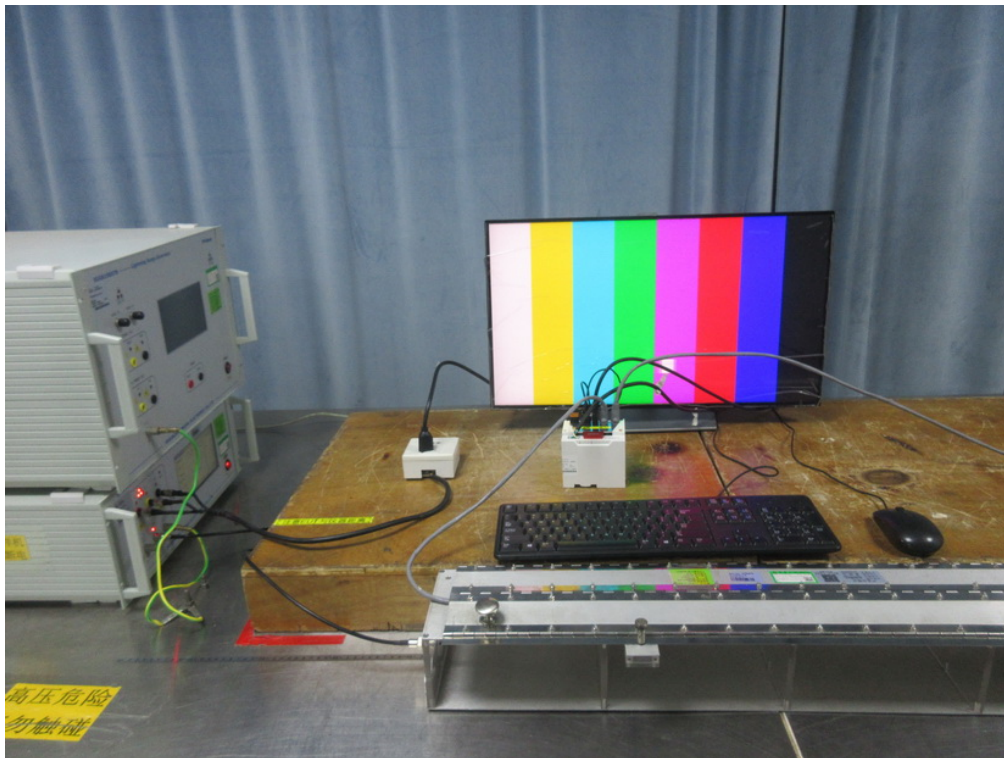


## Electrical fast transient/burst immunity - DC

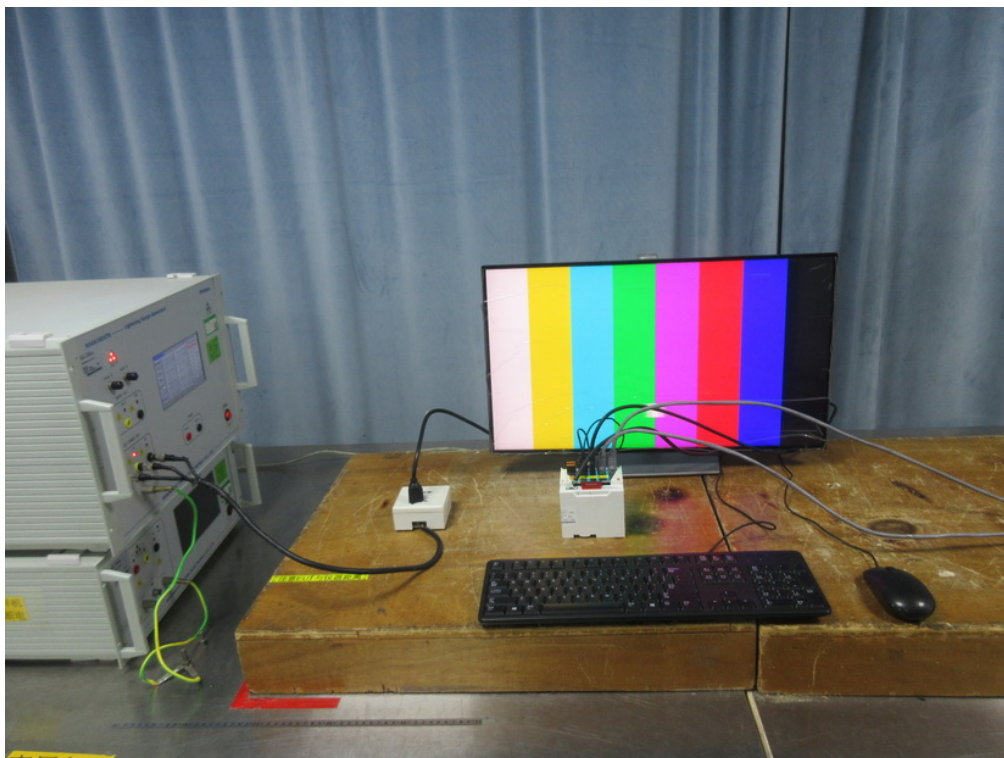




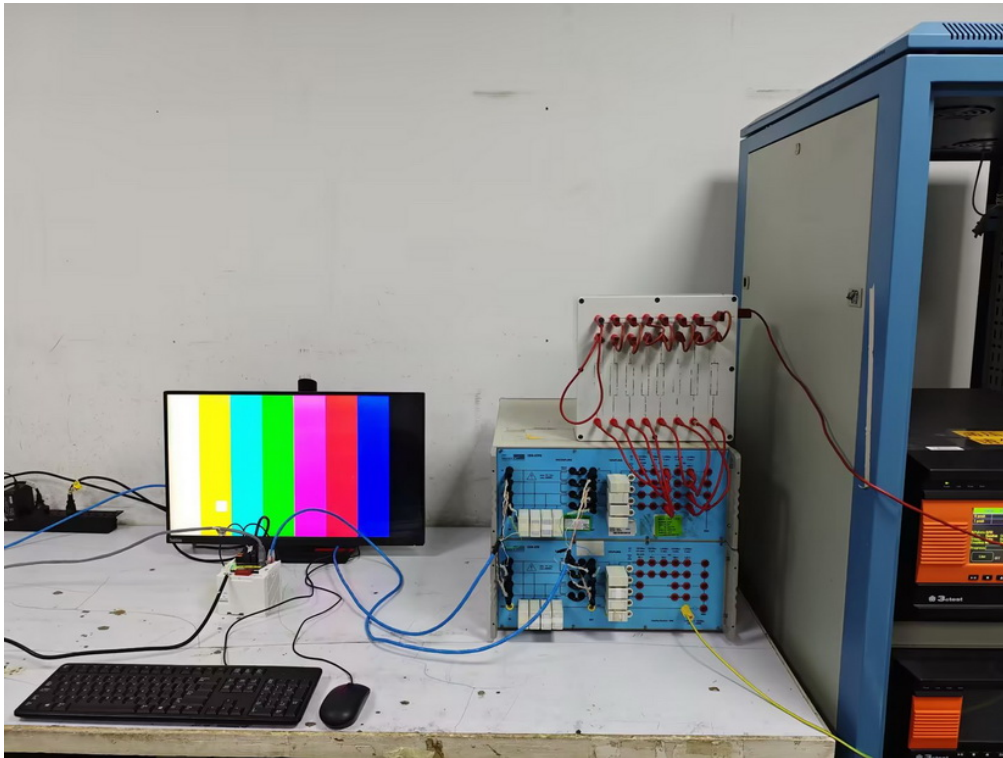
## Electrical fast transient/burst immunity(LAN1)



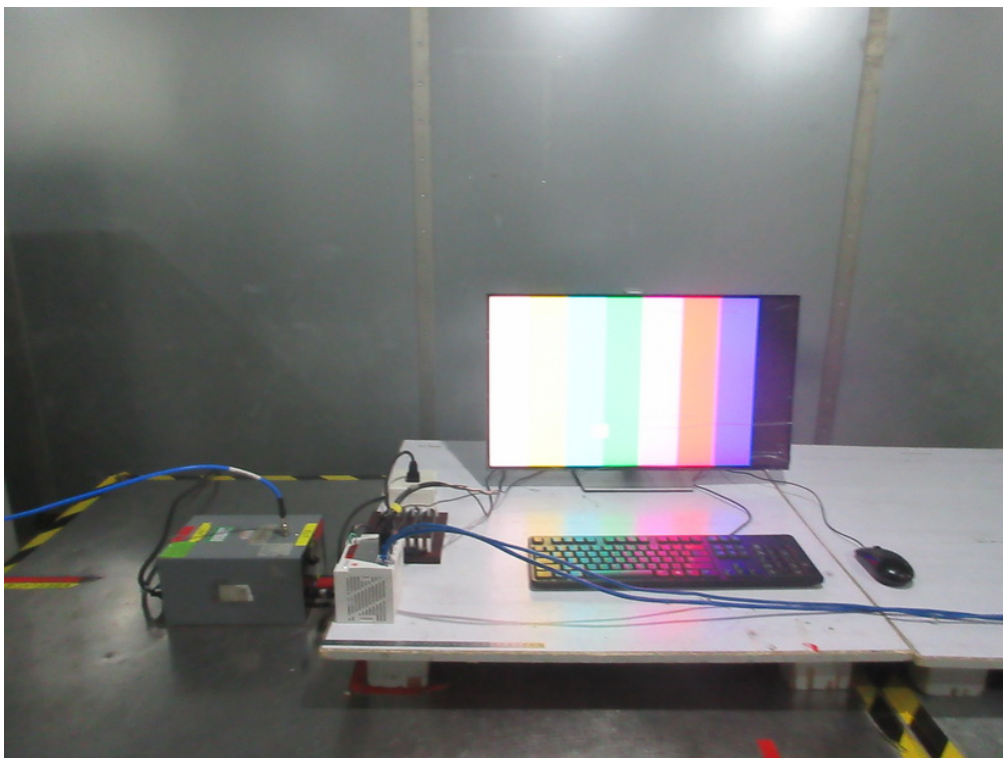
## Surge immunity - DC



## Surge immunity(LAN1)



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

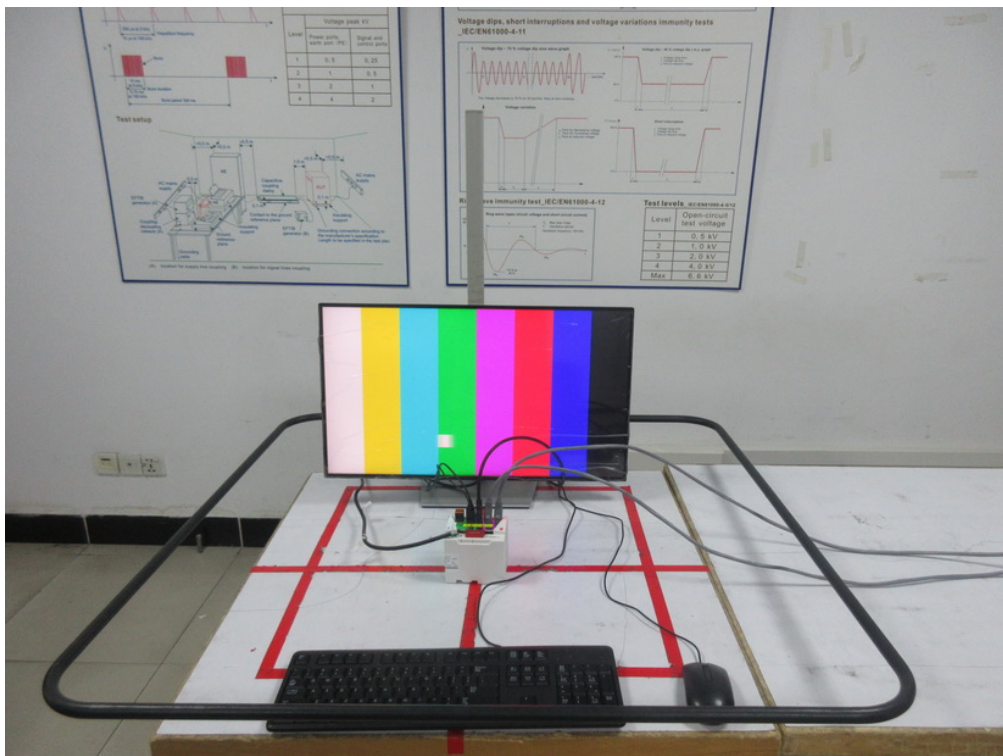




## Immunity to conducted disturbances, induced by radio-frequency fields(LAN)



## Power frequency magnetic field immunity



**End of Test Report**