



CE&UKCA EMC Test Report

Project No. : 2406C022
Equipment : Industrial Personal Computer
Brand Name : SINSEGYE
Test Model : SX5100
Series Model : SX5164, SX5132, SX5016, SX5032, SX5164H, SX5132H, SX5016H, SX5032H
Applicant : SINSEGYE(Shenzhen)Computer System Co.,Ltd.
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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 : Jun. 13, 2024
Date of Test : Jun. 18, 2024 ~ Jul. 03, 2024
Issued Date : Sep. 29, 2024
Report Version : R01
Test Sample : Engineering Sample No.: DG20240613220
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.

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Declaration

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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.

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REPORT ISSUED HISTORY

Report No.	Version	Description	Issued Date	Note
BTL-EMC-1-2406C022	R00	Original Report.	Jul. 24, 2024	Invalid
BTL-EMC-1-2406C022	R01	<ol style="list-style-type: none"> Removed the standards CISPR 32:2015+AMD1:2019 and CISPR 35:2016. Added the standards EN 55011:2016+A2:2021, EN IEC 61000-6-4:2019, EN IEC 61000-6-2:2019, BS EN 55011:2016+A2:2021, BS EN IEC 61000-6-4:2019, BS EN IEC 61000-6-2:2019 and its associated description, and add test data. 	Sep. 29, 2024	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 AC mains power port	N/A
	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	N/A
	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	N/A
	IEC 61000-4-6:2013	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 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_{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. Asymmetric mode conducted emissions measurement:

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

D. Immunity Measurement:

Test Site	Method	Item	<i>U</i>
DG-SR02	IEC 61000-4-2	Rise time t_r	7.00%
		Peak current I_p	6.50%
		Current at 30 ns	6.60%
		Current at 60 ns	6.80%
DG-CB05	IEC 61000-4-3 (80MHz~6GHz)	Electromagnetic field immunity test	2.00dB
DG-SR05	IEC 61000-4-4	Peak voltage (VP)	3.8%
		Rise time (t_r)	4.4%
		Pulse width(t_w)	4.2%
		Pulse Freq.(kHz)	0.7%
		Burst Duration(ms)	1.5%
		Burst Period(ms)	1.4%
		Peak voltage (VP)-with clamp	3.9%
		Rise time (t_r) -with clamp	4.4%
		Pulse width(t_w) -with clamp	4.2%
DG-CB06	IEC 61000-4-6 (150kHz-80MHz)	CDN	1.28dB
		EM clamp	3.74dB
DG-SR05	IEC 61000-4-8	Magnetic Field Strength	1.91%

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	22°C	52%	Amous Shen	Jun. 25, 2024
Radiated emissions above 1 GHz	22°C	52%	Amous Shen	Jun. 25, 2024
Asymmetric mode conducted emissions	20°C	52%	Yang Yan	Jul. 03, 2024

Test Item	Temperature	Humidity	Pressure	Tested By	Test Date
ESD	29°C	48%	1010hPa	Jack Zhang	Jun. 28, 2024
	29°C	44%	1004hPa	Jerry Lu	Sep. 19, 2024
RS	26°C	56%	/	Ternence Li	Jun. 26, 2024
	24°C	56%	/	Ternence Li	Sep. 19, 2024
EFT	27°C	70%	/	Ellery Liang	Jul. 02, 2024
	28°C	52%	/	Sean Wan	Sep. 20, 2024
CS	24°C	52%	/	Penn Li	Jun. 25, 2024
	25°C	56%	/	Penn Li	Sep. 19, 2024
PFMF	27°C	70%	/	Ellery Liang	Jul. 02, 2024
	28°C	52%	/	Sean Wan	Sep. 20, 2024

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Industrial Personal Computer
Brand Name	SINSEGYE
Test Model	SX5100
Series Model	SX5164, SX5132, SX5016, SX5032, SX5164H, SX5132H, SX5016H, SX5032H
Model Difference(s)	Differences in the number of network ports, memory size, and software: The SX5100 is the highest configured version with 4 network ports and 8GB, the SX50xx is the 2-network port version, the SX51xx is the 4-network port version, and the SX5xxH is the corresponding 8GB version.
Identification No. of EUT(S/N)	SX5100H23110011
Dimensions and mass	130mm x 90mm x 100mm
Component unit of EUT	<input checked="" type="checkbox"/> Single unit <input type="checkbox"/> Multiple unit
Sample Status	<input checked="" type="checkbox"/> Engineering sample <input type="checkbox"/> Final shipment prototype
Power Source	Supplied from DC.
Power Rating	DC 24V 2A
Connecting I/O Port(s)	Please refer to EUT photos.
Classification of EUT	Class A
Highest Internal Frequency(Fx)	1.9GHz

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

Asymmetric mode conducted emissions Test	
Final Test Mode	Description
Mode 1	FULL SYSTEM (LAN1 2.5Gbps)

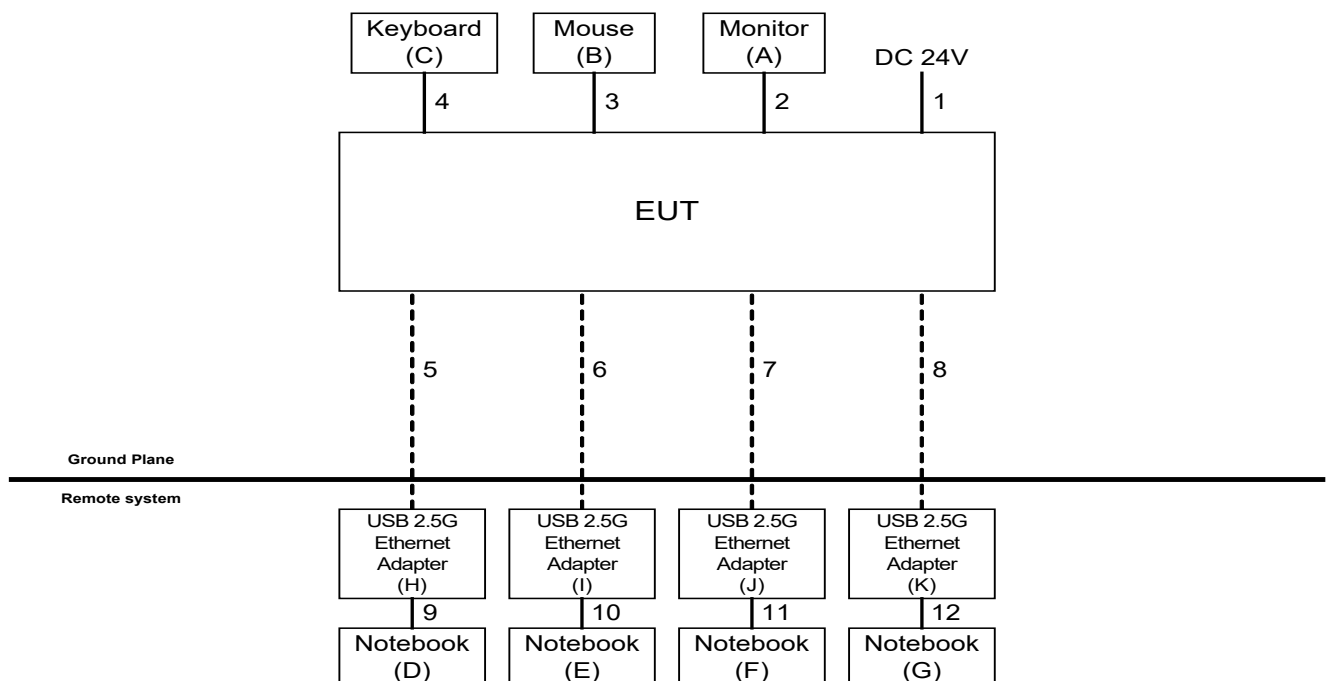
Immunity Test	
Final Test Mode	Description
Mode 1	FULL SYSTEM

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 USB 2.5G Ethernet Adapter via RJ45 Cable.
4. USB 2.5G Ethernet Adapter connected to Notebook via USB 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	Monitor	Lenovo	A16270UP0	1S61CBGCR1CSU3336W6N
B	Mouse	DELL	MS111-P	CN011D3V71581279OLOT
C	Keyboard	DELL	KB212-B	CN0HTXH97158125004DXA01
D	Notebook	Lenovo	V310-14ISK	LR07GZHC
E	Notebook	Lenovo	V310-14ISK	LR07GZML
F	Notebook	Lenovo	V310-14ISK	LR07GZNB
G	Notebook	Lenovo	V310-14IKB	LR07SH58
H-K	USB 2.5G Ethernet Adapter	UGREEN	CM275	N/A

Item	Cable Type	Shielded Type	Ferrite Core	Length
1	DC Cable	NO	NO	1m
2	HDMI Cable	YES	NO	1.8m
3	USB Cable	YES	NO	1.8m
4	USB Cable	YES	NO	1.8m
5-8	RJ45 Cable	YES	NO	10m
9-12	USB Cable	YES	NO	0.1m

3. EMC EMISSION TEST

3.1 RADIATED EMISSIONS UP TO 1 GHz

3.1.1 LIMITS

Class A equipment up to 1 GHz

For EM 55035&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 EM 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	Amplifier	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. 27, 2024
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	1585	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.

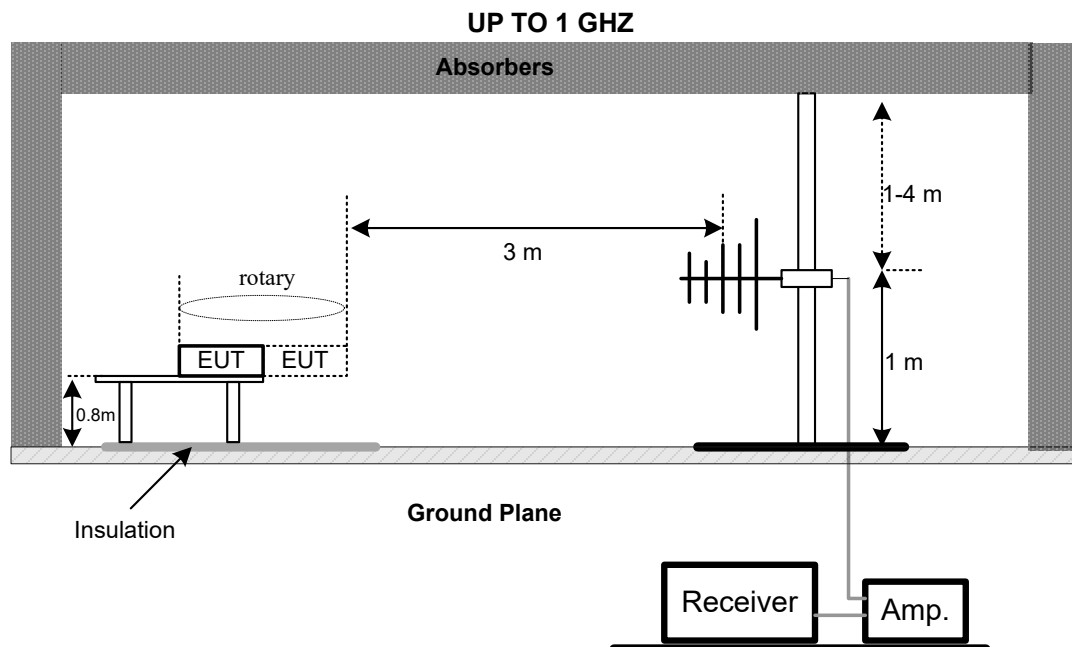
3.1.3 TEST PROCEDURE

- 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

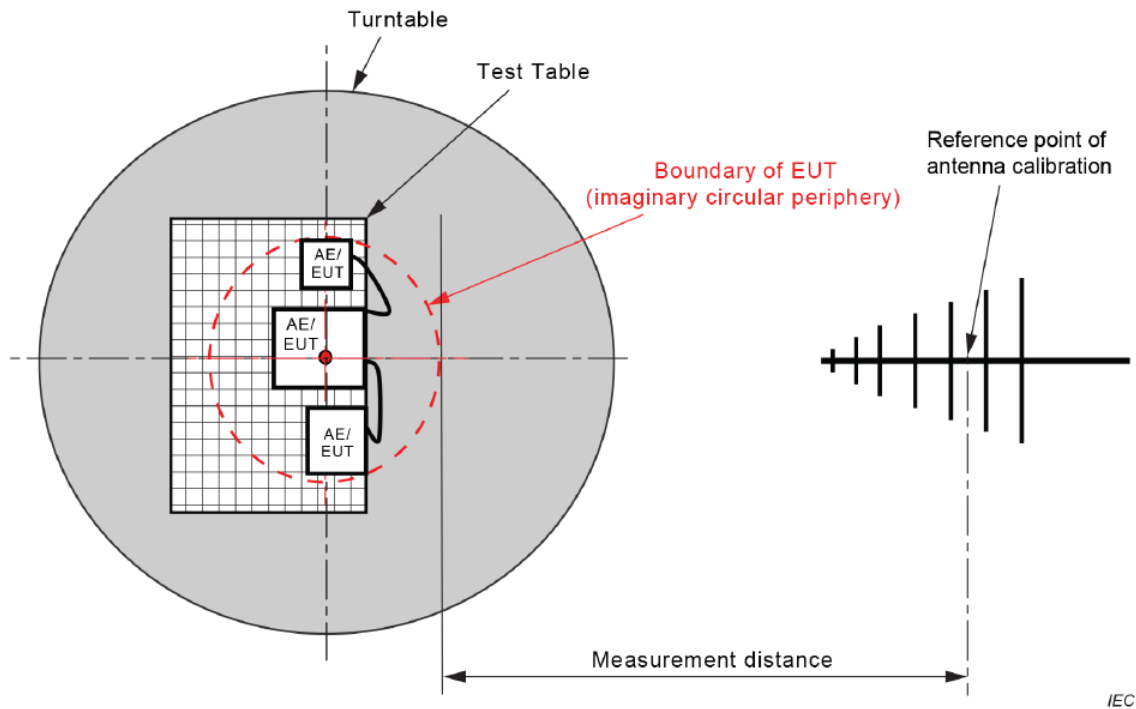


Figure C.1 – Measurement distance

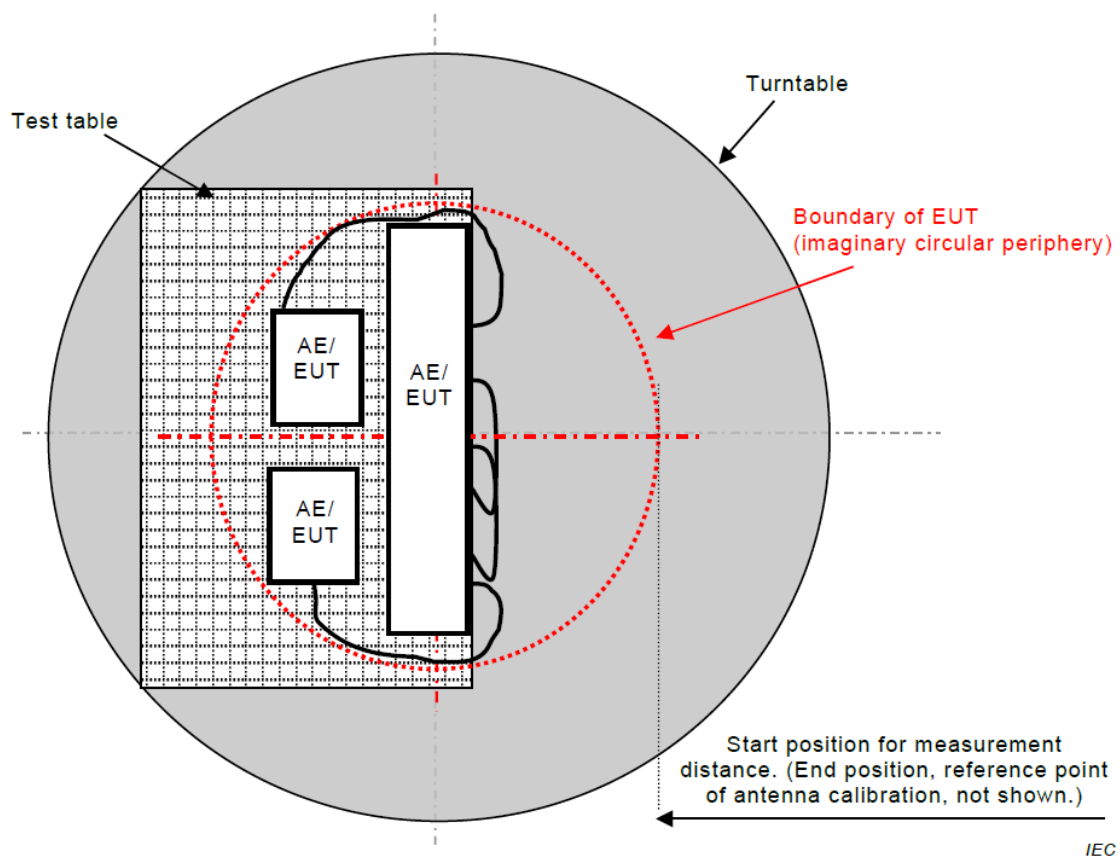
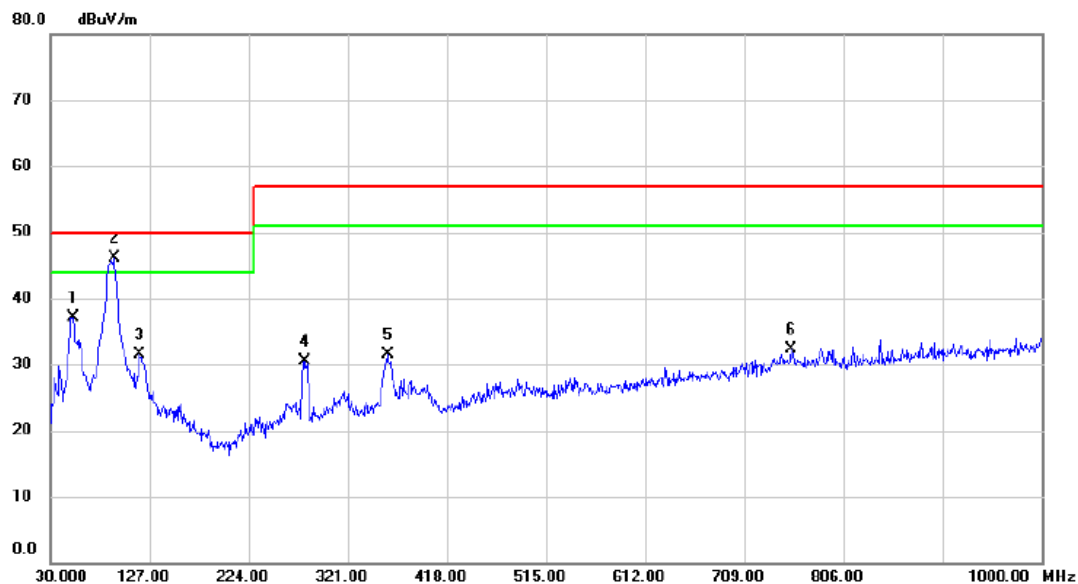


Figure C.2 – Boundary of EUT, Local AE and associated cabling

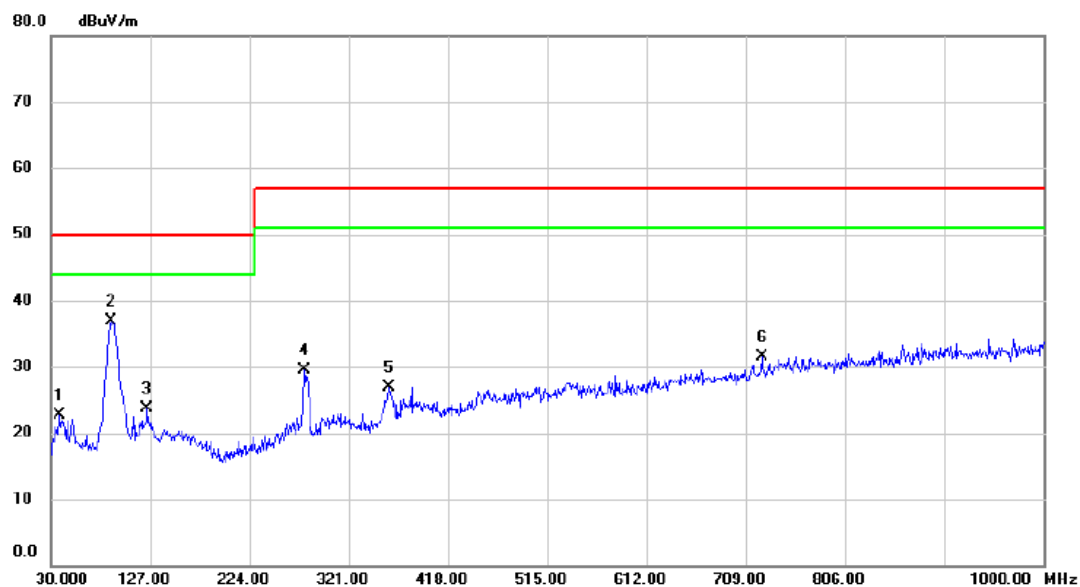
3.1.7 TEST RESULTS

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		52.3100	48.18	-10.99	37.19	50.00	-12.81	QP	
2	*	92.0800	62.54	-16.41	46.13	50.00	-3.87	QP	
3		117.3000	44.72	-13.21	31.51	50.00	-18.49	QP	
4		278.3200	41.10	-10.50	30.60	57.00	-26.40	QP	
5		359.8000	40.22	-8.62	31.60	57.00	-25.40	QP	
6		754.5900	32.77	-0.44	32.33	57.00	-24.67	QP	

Test Voltage	DC 24V	Polarization	Horizontal
Test Mode	Mode 1		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		38.7300	34.26	-11.52	22.74	50.00	-27.26	QP	
2	*	88.2000	53.42	-16.51	36.91	50.00	-13.09	QP	
3		124.0900	36.22	-12.54	23.68	50.00	-26.32	QP	
4		277.3500	40.07	-10.54	29.53	57.00	-27.47	QP	
5		359.8000	35.58	-8.62	26.96	57.00	-30.04	QP	
6		724.5200	32.64	-1.06	31.58	57.00	-25.42	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 _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	Cable	RW	LMR-400(1GHz-18G Hz)(9.5m+2.5m+1M)	N/A	Nov. 27, 2024
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	224991	Apr. 24, 2025
5	MXA Signal Analyzer	Keysight	N9020B	MY57100162	Dec. 22, 2024
6	Preamplifier	ETS-LINDGREN	3117-PA	224991	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.

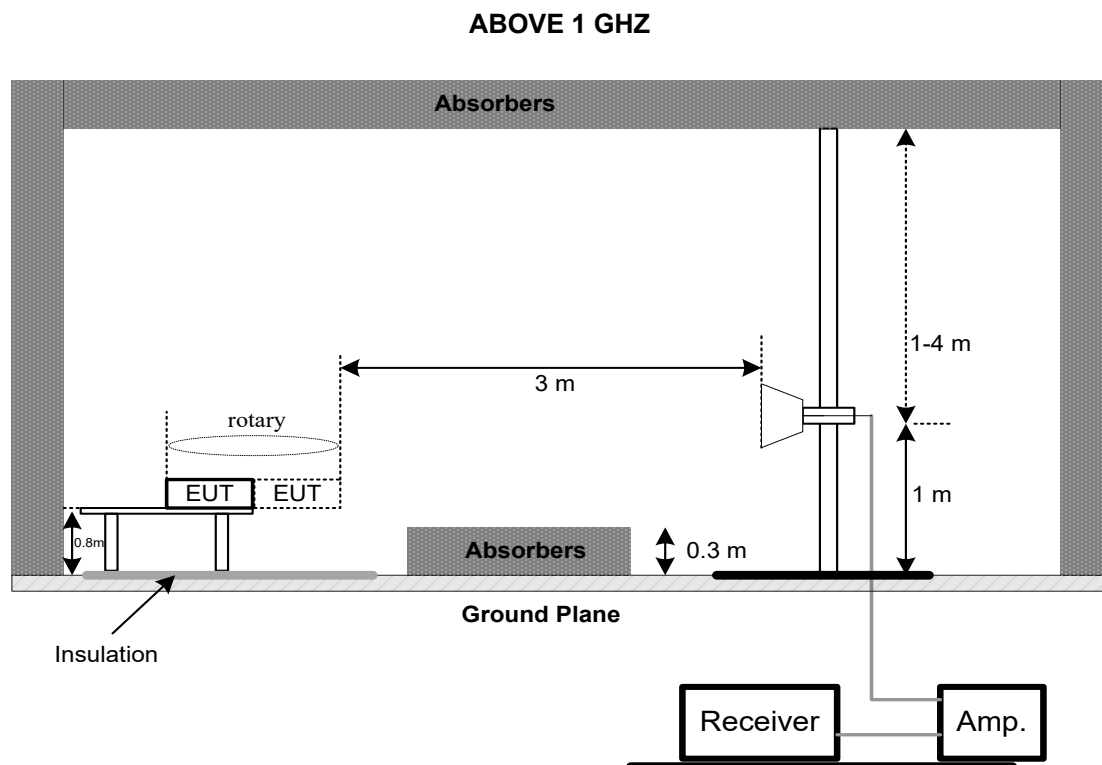
3.2.3 TEST PROCEDURE

- 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

The limit of the EN 55032:2015+A1:2020 and CISPR 32:2015+AMD1:2019 standard deviates from the requirements, but the limit of the EN 55032:2015+A11:2020 standard is more stringent and can be covered, so the test data meets the EN 55032:2015+A1:2020 and CISPR 32:2015+AMD1:2019 standard.

3.2.5 TEST SETUP



3.2.6 MEASUREMENT DISTANCE

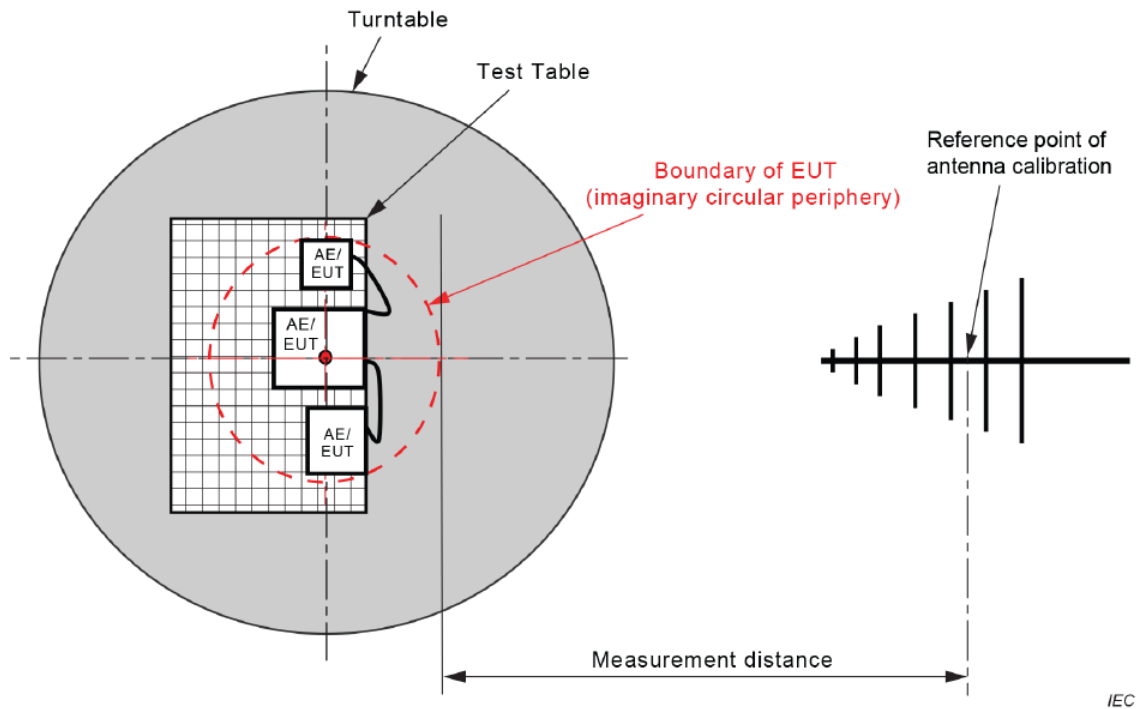


Figure C.1 – Measurement distance

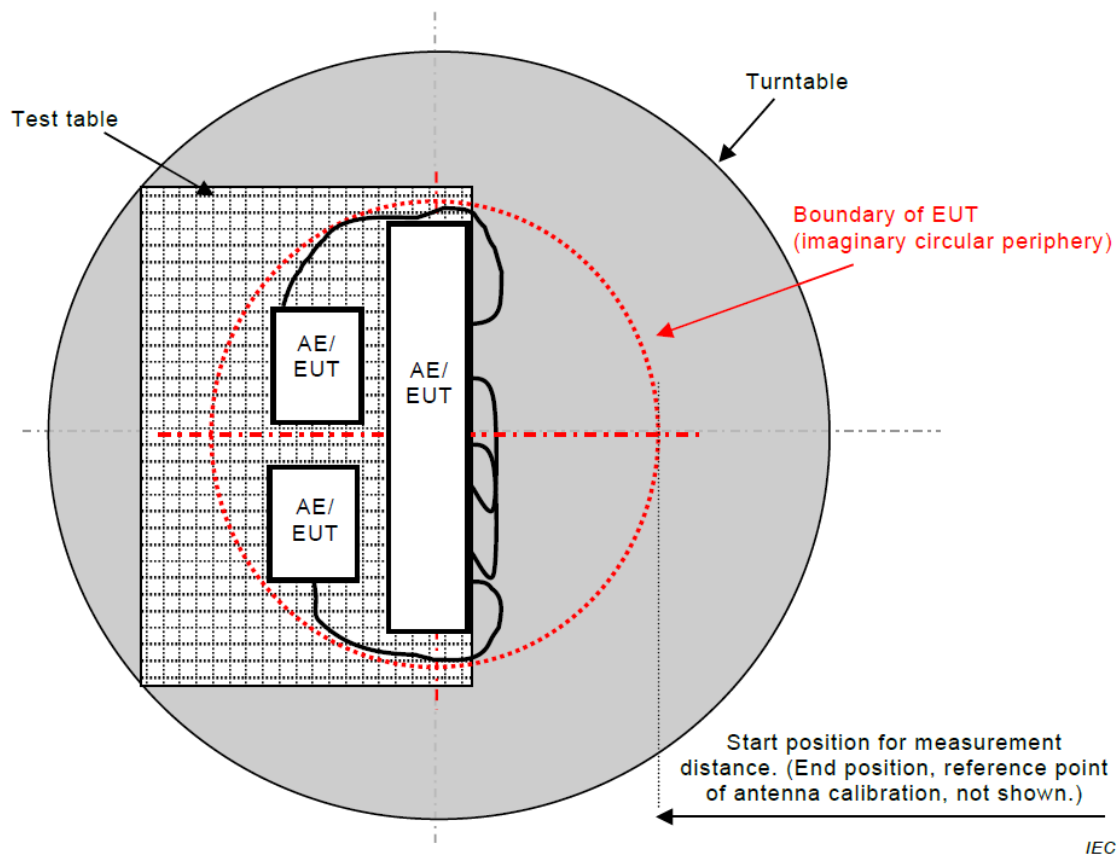
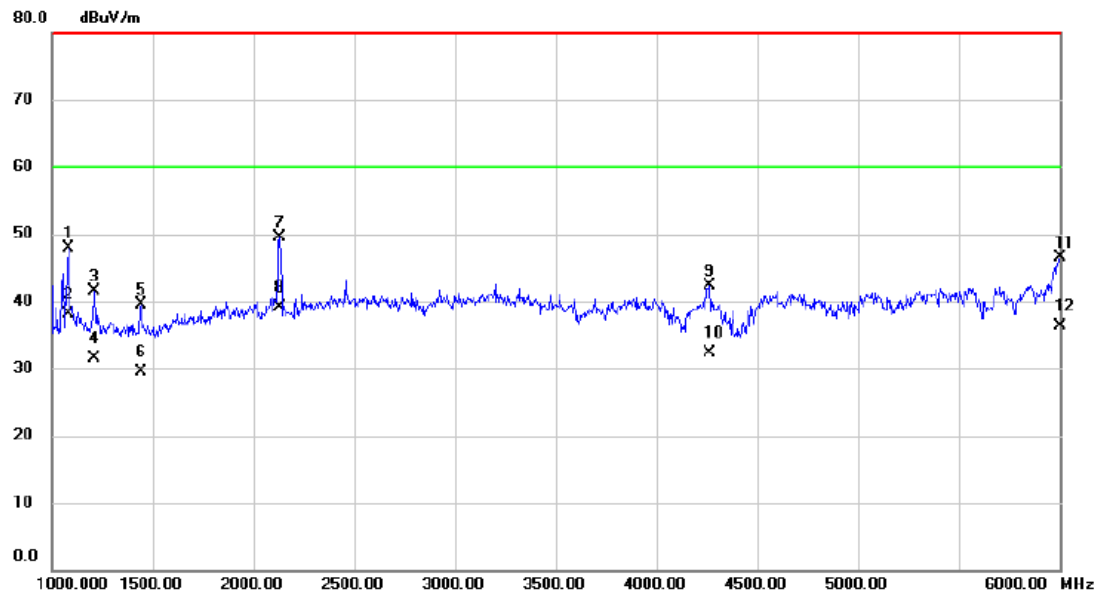


Figure C.2 – Boundary of EUT, Local AE and associated cabling

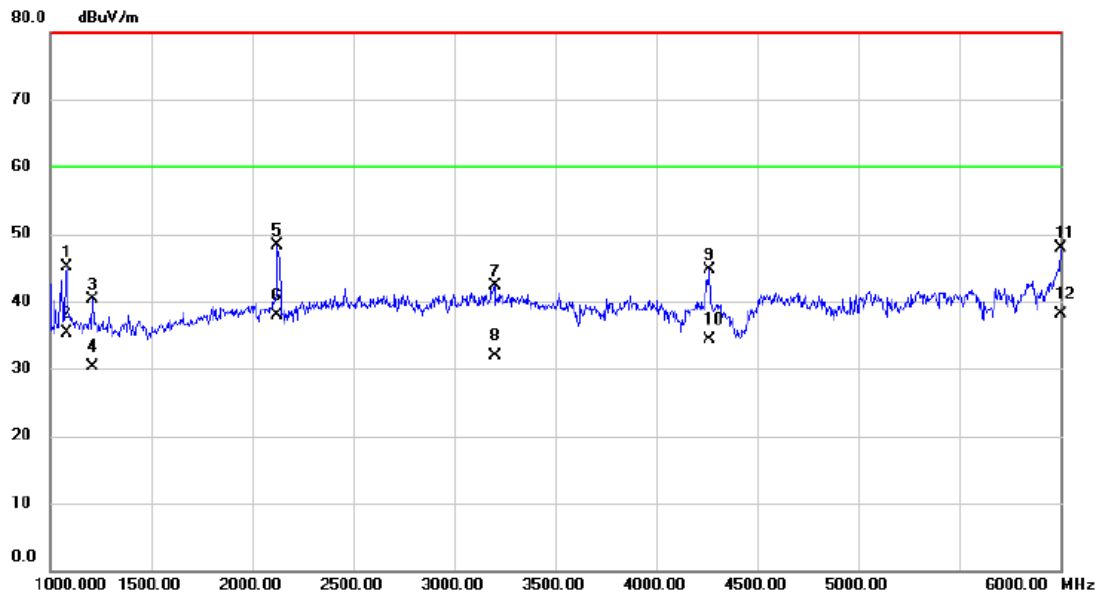
3.2.7 TEST RESULTS

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		1080.000	64.02	-16.16	47.86	80.00	-32.14	peak	
2		1080.000	54.34	-16.16	38.18	60.00	-21.82	AVG	
3		1210.000	57.63	-16.05	41.58	80.00	-38.42	peak	
4		1210.000	47.54	-16.05	31.49	60.00	-28.51	AVG	
5		1440.000	55.33	-15.88	39.45	80.00	-40.55	peak	
6		1440.000	45.36	-15.88	29.48	60.00	-30.52	AVG	
7		2130.000	60.93	-11.44	49.49	80.00	-30.51	peak	
8	*	2130.000	50.46	-11.44	39.02	60.00	-20.98	AVG	
9		4265.000	48.35	-6.08	42.27	80.00	-37.73	peak	
10		4265.000	38.47	-6.08	32.39	60.00	-27.61	AVG	
11		6000.000	50.75	-4.23	46.52	80.00	-33.48	peak	
12		6000.000	40.54	-4.23	36.31	60.00	-23.69	AVG	

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		1080.000	61.29	-16.16	45.13	80.00	-34.87	peak	
2		1080.000	51.40	-16.16	35.24	60.00	-24.76	AVG	
3		1210.000	56.31	-16.05	40.26	80.00	-39.74	peak	
4		1210.000	46.34	-16.05	30.29	60.00	-29.71	AVG	
5		2125.000	59.74	-11.46	48.28	80.00	-31.72	peak	
6		2125.000	49.36	-11.46	37.90	60.00	-22.10	AVG	
7		3200.000	50.93	-8.66	42.27	80.00	-37.73	peak	
8		3200.000	40.52	-8.66	31.86	60.00	-28.14	AVG	
9		4265.000	50.78	-6.08	44.70	80.00	-35.30	peak	
10		4265.000	40.47	-6.08	34.39	60.00	-25.61	AVG	
11		6000.000	52.19	-4.23	47.96	80.00	-32.04	peak	
12	*	6000.000	42.36	-4.23	38.13	60.00	-21.87	AVG	

3.3 ASYMMETRIC MODE CONDUCTED EMISSIONS TEST

3.3.1 LIMITS

Requirements for asymmetric mode conducted emissions from Class A equipment

Frequency Range MHz	Coupling device	Detector type / Bandwidth	Class A voltage limits dB(μV)	Class A 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

3.3.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	EMI TEST RECEIVER	R&S	ESCI	100382	Dec. 22, 2024
2	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
3	TWO-LINE V-NETWORK	R&S	ENV216	101447	Dec. 22, 2024
4	Cable	N/A	SFT205-NMNM-9M-001	9M	Nov. 27, 2024
5	RF Current Probe	FCC	F-33-4	78	Dec. 22, 2024
6	TWO-LINE V-NETWORK	R&S	ENV216	10274	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.

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.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

NOTE:

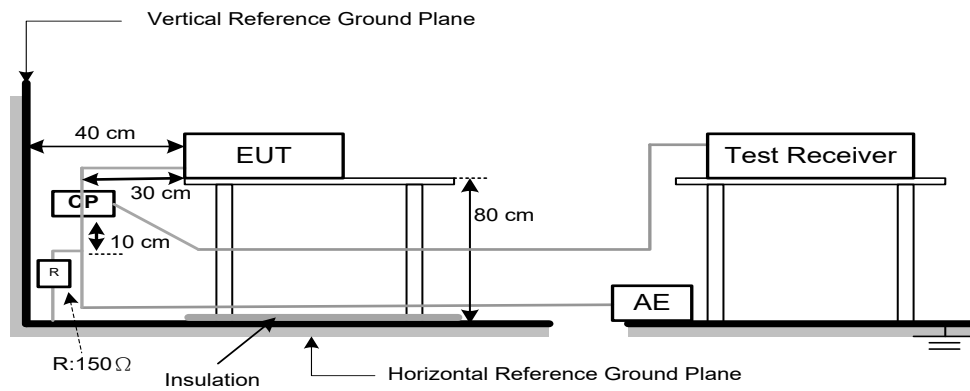
- Break the external protective insulation (exposing the shield) and connect a 150 Ω resistor with a physical connection between the cable screen and the RGP. The 150 Ω resistor shall be $\leq 0,3$ m from the outside surface of the screen to ground.
Insert a ferrite tube or clamp between the 150 Ω connection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

3.3.4 DEVIATION FROM TEST STANDARD

No deviation

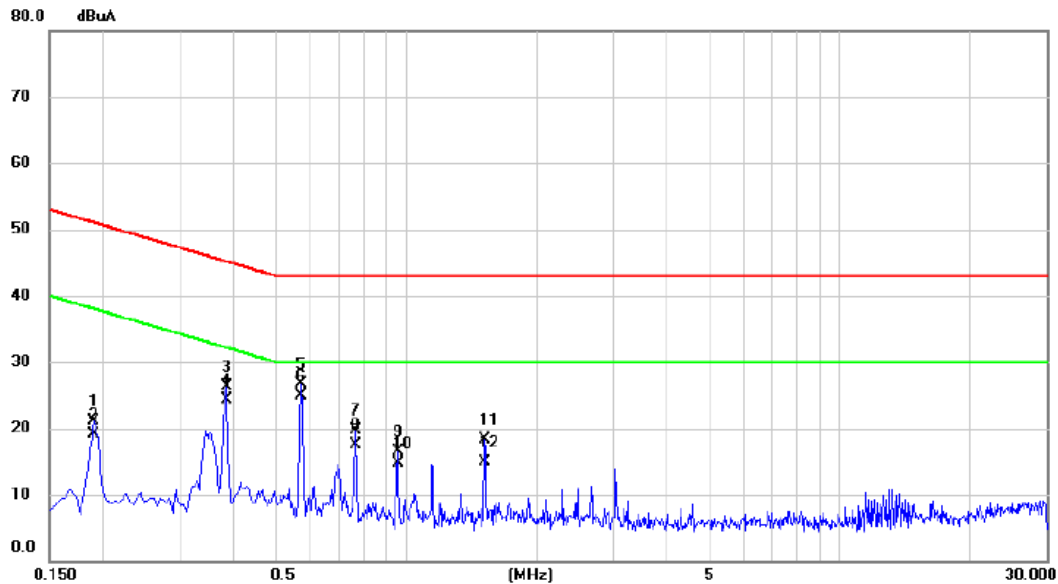
3.3.5 TEST SETUP

a) Cable Type: Screened or Coaxial



3.3.6 TEST RESULTS

Test Voltage	DC 24V
Test Mode	Mode 1(LAN1 2.5Gbps)



No. Mk.	Freq. MHz	Reading Level dBuA	Correct Factor dB	Measure- ment dBuA	Limit dBuA	Margin dB	Detector	Comment
1	0.1905	21.11	0.04	21.15	51.01	-29.86	QP	
2	0.1905	19.10	0.04	19.14	38.01	-18.87	AVG	
3	0.3840	26.25	0.05	26.30	45.19	-18.89	QP	
4	0.3840	24.30	0.05	24.35	32.19	-7.84	AVG	
5	0.5730	26.56	0.06	26.62	43.00	-16.38	QP	
6 *	0.5730	24.80	0.06	24.86	30.00	-5.14	AVG	
7	0.7665	19.70	0.07	19.77	43.00	-23.23	QP	
8	0.7665	17.50	0.07	17.57	30.00	-12.43	AVG	
9	0.9555	16.36	0.08	16.44	43.00	-26.56	QP	
10	0.9555	14.60	0.08	14.68	30.00	-15.32	AVG	
11	1.5180	18.27	0.10	18.37	43.00	-24.63	QP	
12	1.5180	14.90	0.10	15.00	30.00	-15.00	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)	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 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
	±1 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:

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, 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.
Criterion C	Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. A reboot or re-start operation is allowed. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

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

Criterion A	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.
Criterion 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.
Criterion C	Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

4.4 ANNEX F (NORMATIVE) - NETWORKING FUNCTION

4.4.1 GENERAL PERFORMANCE CRITERIA FOR NETWORK FUNCTIONS

Performance criterion A:

Where relevant, during the application of the test the network function shall, as a minimum, operate ensuring that:

- established connections shall be maintained throughout the application of the test;
- no change of operational state or corruption of stored data occurs;
- no increase in error rate above the figure defined by the manufacturer occurs. The manufacturer should select the most appropriate performance measurement criteria for the product or system, for example bit error rate, block error rate;
- no request for retry above the figure defined by the manufacturer;
- the data transmission rate does not reduce below the figure defined by the manufacturer;
- no protocol failure occurs;
- the audio noise level at a two-wire analogue interface (supporting telephony) shall satisfy the requirements of Table G.3. The audio level measurements shall be performed at the demodulated frequency of the disturbance using a narrowband filter with a 3 dB bandwidth of 100 Hz using the method defined in table clause G.1.4. See G.6.1.

As described in the example given in J.3.5 the networking function is monitored during testing using direct functions specified elsewhere in this document.

If needed to verify the operation of the protocol, the following functions shall be verified as described in Table H.1 when performing the additional spot frequency tests:

- ability to establish a connection,
- ability to clear a connection.

Where an EUT has supervisory functions they shall not be affected. Elements that should be monitored include, but are not limited to:

- alarms,
- signalling lamps,
- printer output errors,
- network traffic rates,
- network monitor errors,
- measured network parameters.

Performance criterion B:

Established connections shall be maintained throughout the test, or shall self-recover in a way and timescale that is imperceptible to the user.

The error rate, request for retry and data transmission rates may be degraded during the application of the test. Degradation of the performance as described in criterion A is permitted, provided that the normal operation of the EUT is self-recoverable to the condition established prior to the application of the test.

Where required, the acceptable operation of the function shall be verified at the completion of the test as described in Table H.1, by confirming the following:

- the EUT's ability to establish a connection,
- the EUT's ability to clear a connection.

During surge testing disconnection is allowed on the analogue/digital data port being tested.

If the EUT is a supervisory equipment, it shall not impact the normal operation of the network being monitored. In addition, any supervisory functions impacted during the period of the test shall return to the state prior to the test. Elements to consider include:

- alarms,
- signalling lamps,
- printer output,
- network traffic rates,
- network monitoring.

Performance criterion C:

Degradation of performance as described in criteria A and B is permitted provided that the normal operation of the EUT is self-recoverable to the condition immediately before the application of the test, or can be restored after the test by the operator.

4.5 ELECTROSTATIC DISCHARGE IMMUNITY TEST (ESD)

4.5.1 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: $\pm 2\text{kV}$, $\pm 4\text{kV}$
Polarity	Positive & Negative
Number of Discharge	20 times at each test point
Discharge Mode	Single Discharge
Discharge Period	1 second

4.5.2 MEASUREMENT INSTRUMENTS

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	ESD Generator	TESEQ AG	NSG 437	450	Nov. 12, 2024

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

All calibration period of equipment list is one year.

4.5.3 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.

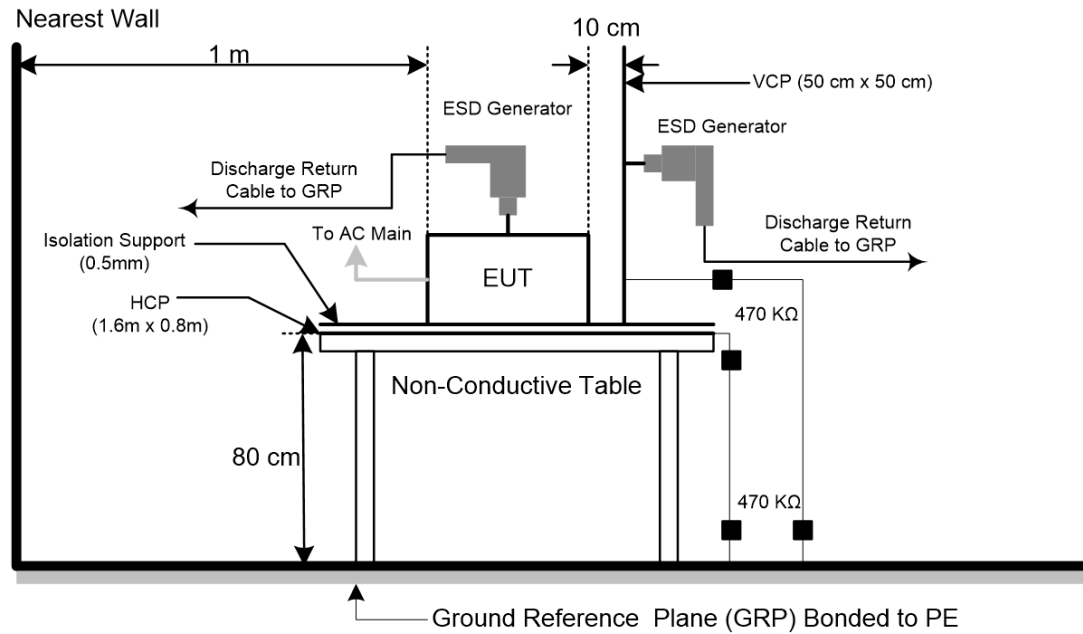
- b. For TABLE-TOP equipment:

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.

4.5.4 DEVIATION FROM TEST STANDARD

No deviation

4.5.5 TEST SETUP



4.5.6 TEST RESULTS

Test Voltage	DC 24V
Test Mode	Mode 1

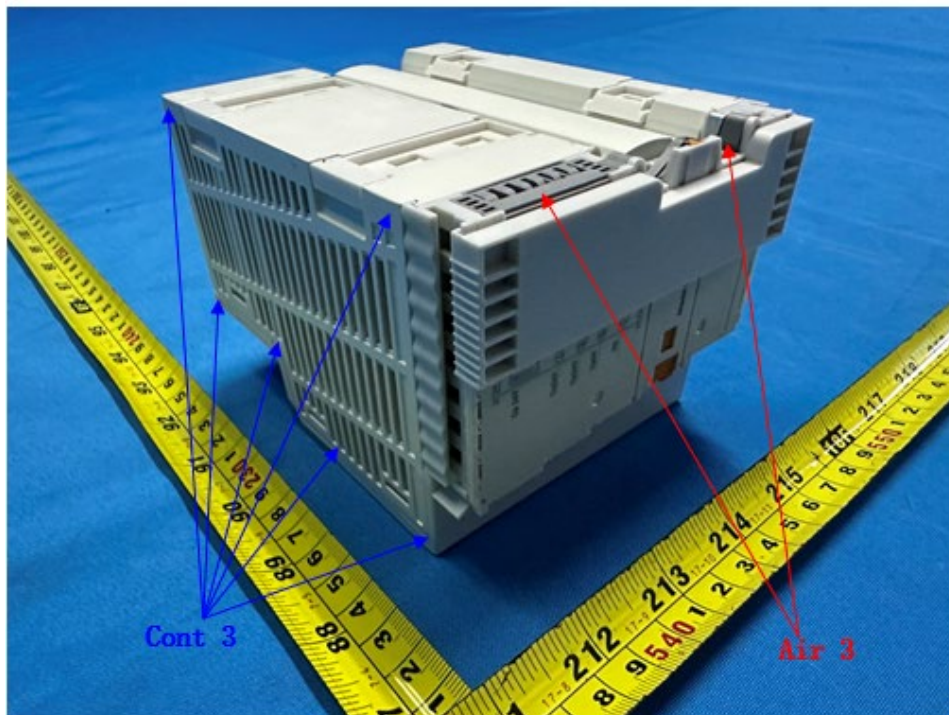
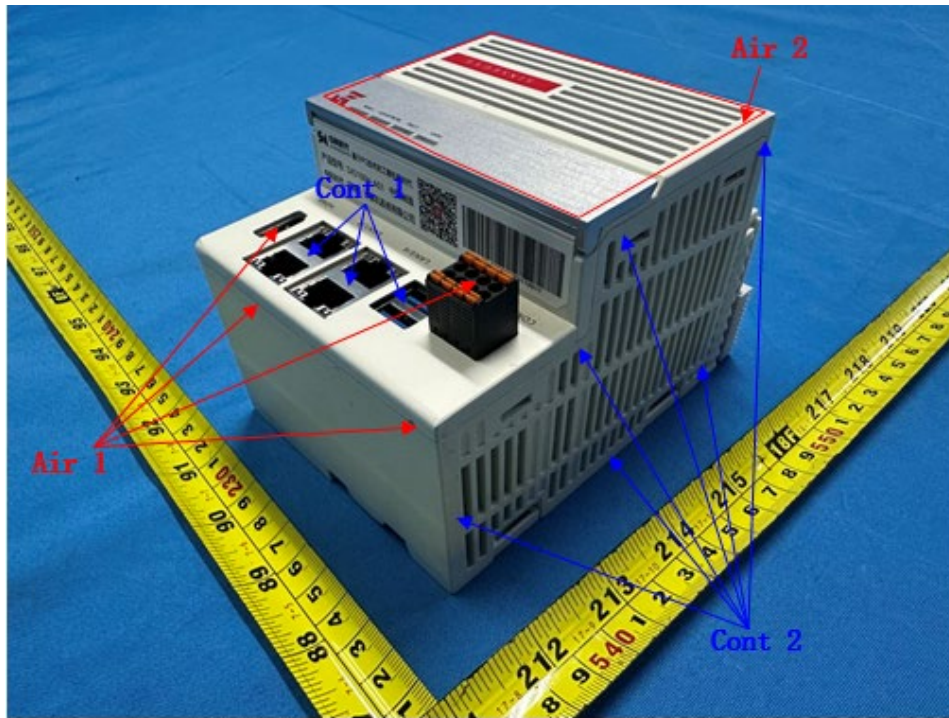
Mode	Air Discharge								Contact Discharge					
	2kV		4kV		8kV		- kV		2kV		4kV		- kV	
Location	P	N	P	N	P	N	P	N	P	N	P	N	P	N
1	A	A	A	A	B	B	-	-	A	A	B	B	-	-
2	A	A	A	A	B	B	-	-	A	A	B	B	-	-
3	A	A	A	A	B	B	-	-	A	A	B	B	-	-
4	A	A	A	A	B	B	-	-	-	-	-	-	-	-
Criteria	B						-		B				-	
Result	B						-		B				-	

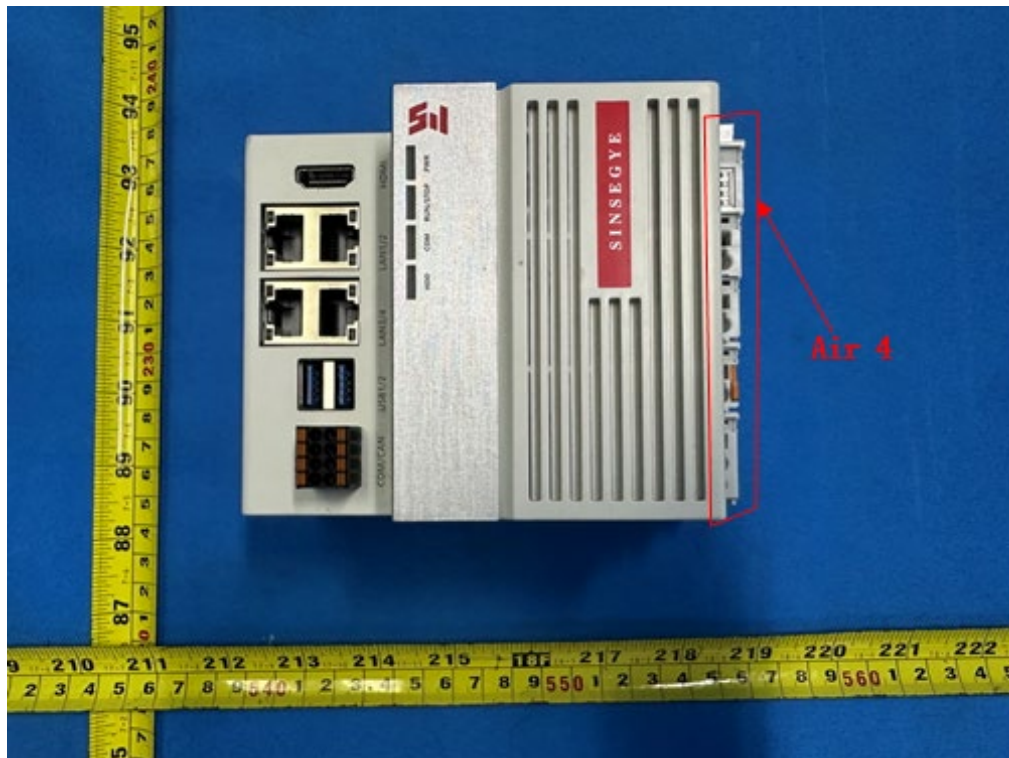
Mode	HCP Contact Discharge						VCP Contact Discharge					
	2kV		4kV		- kV		2kV		4kV		- kV	
Location	P	N	P	N	P	N	P	N	P	N	P	N
Left side	A	A	B	B	-	-	A	A	B	B	-	-
Right side	A	A	B	B	-	-	A	A	B	B	-	-
Front side	A	A	B	B	-	-	A	A	B	B	-	-
Rear side	A	A	B	B	-	-	A	A	B	B	-	-
Criteria	B				-		B				-	
Result	B				-		B				-	

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





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

4.6.1 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 the preceding frequency.
Polarity of Antenna	Horizontal and Vertical
Test Distance	3 m
Antenna Height	1.55 m
Dwell Time	3 seconds

4.6.2 MEASUREMENT INSTRUMENTS

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Antenna	ETS	3142B	26419	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.

4.6.3 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.

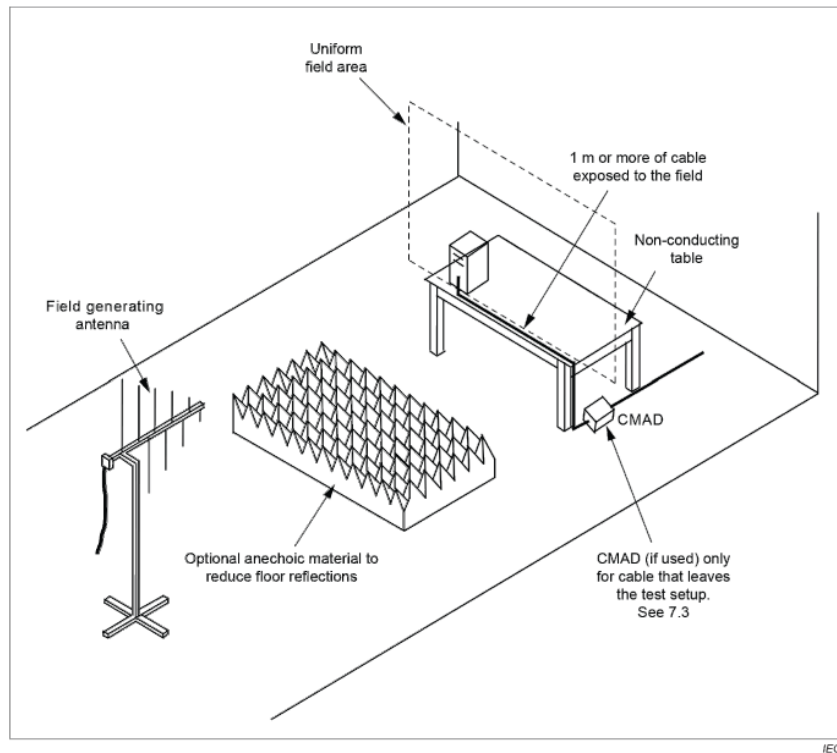
d. The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 TEST SETUP

a) For Continuous induced RF disturbances



4.6.6 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		

4.7 ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST (EFT)

4.7.1 TEST SPECIFICATION

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

4.7.2 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.

4.7.3 TEST PROCEDURE

For TABLE-TOP equipment:

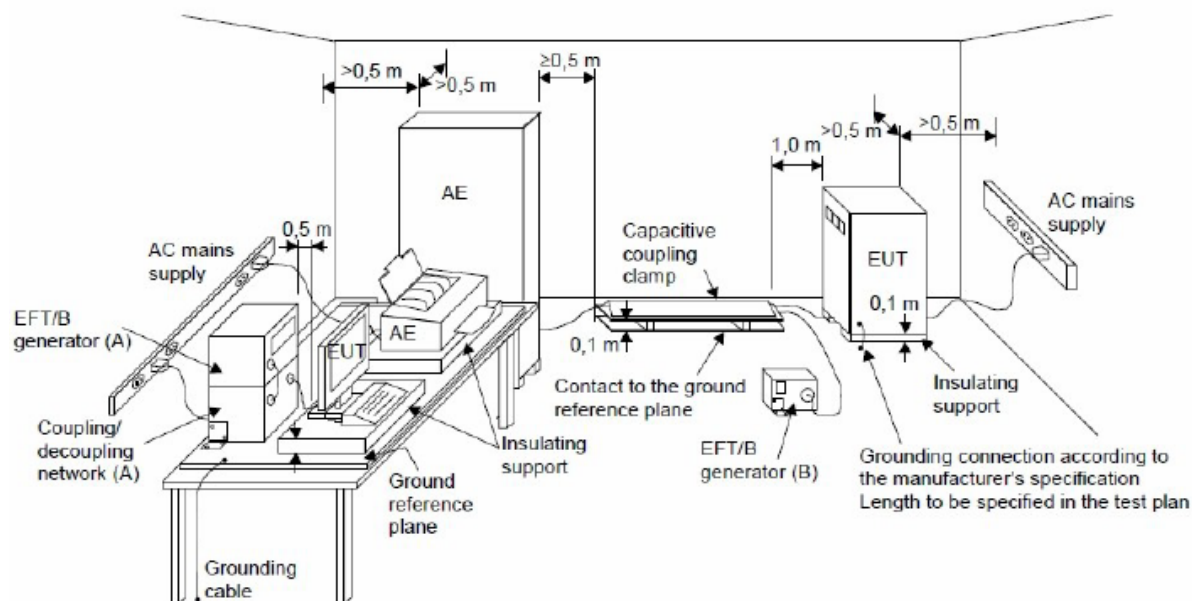
The configuration consisted of a wooden table (0.8m high) standing on the Ground Reference Plane and should be located 0.1 m+/- 0.01m above the Ground Reference Plane. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system. A minimum 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.

4.7.4 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:

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

For EN IEC 61000-6-2:

EUT Ports Tested		Polarity	Repetition Frequency	Test Level 1kV	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		
	Positive (P)- Negative (N)	+	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		

4.8 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.

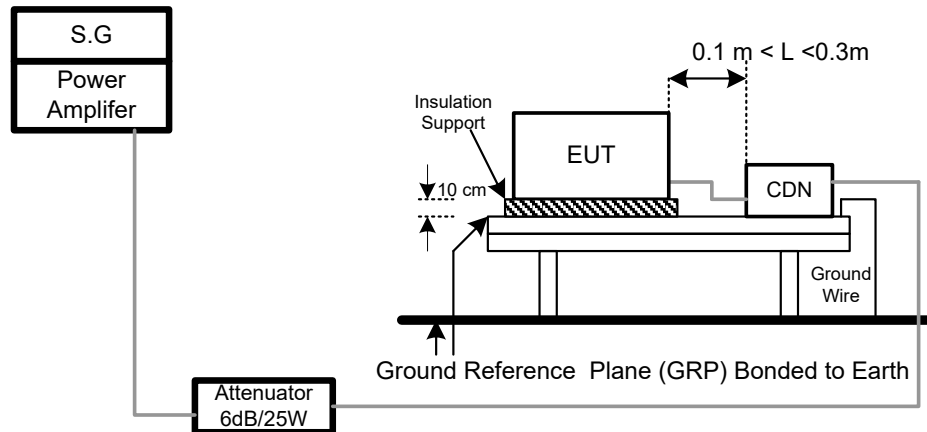
The other condition as following manner:

- The field strength level was 3 V (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
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
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
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.

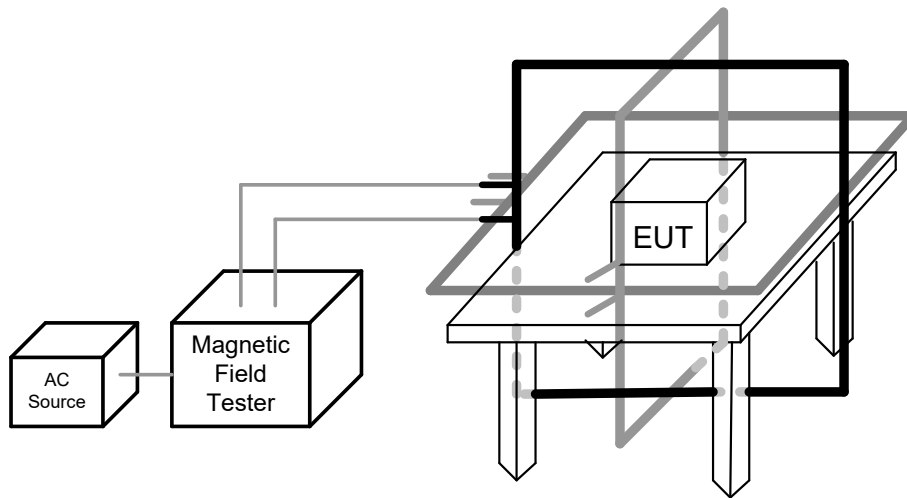
The other condition as following manner:

- 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

50Hz

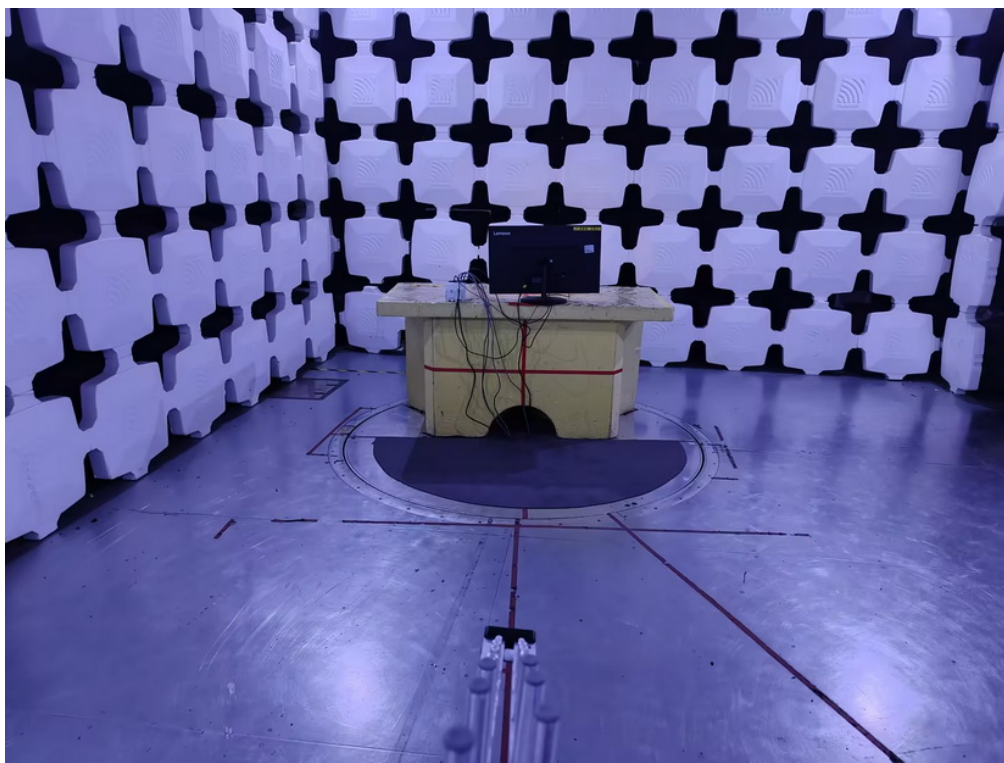
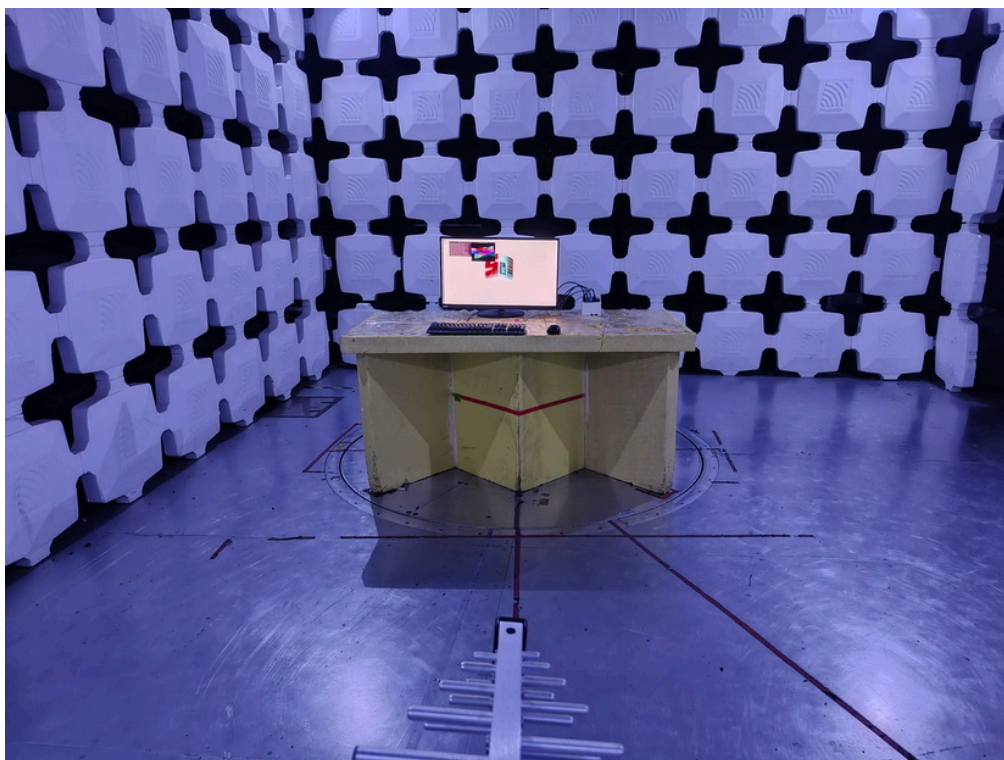
Test Mode	Test Level	Antenna aspect	Duration	Criteria	Results
Enclosure	1 A/m	X	60s	A	A
Enclosure	1 A/m	Y	60s	A	A
Enclosure	1 A/m	Z	60s	A	A

60Hz

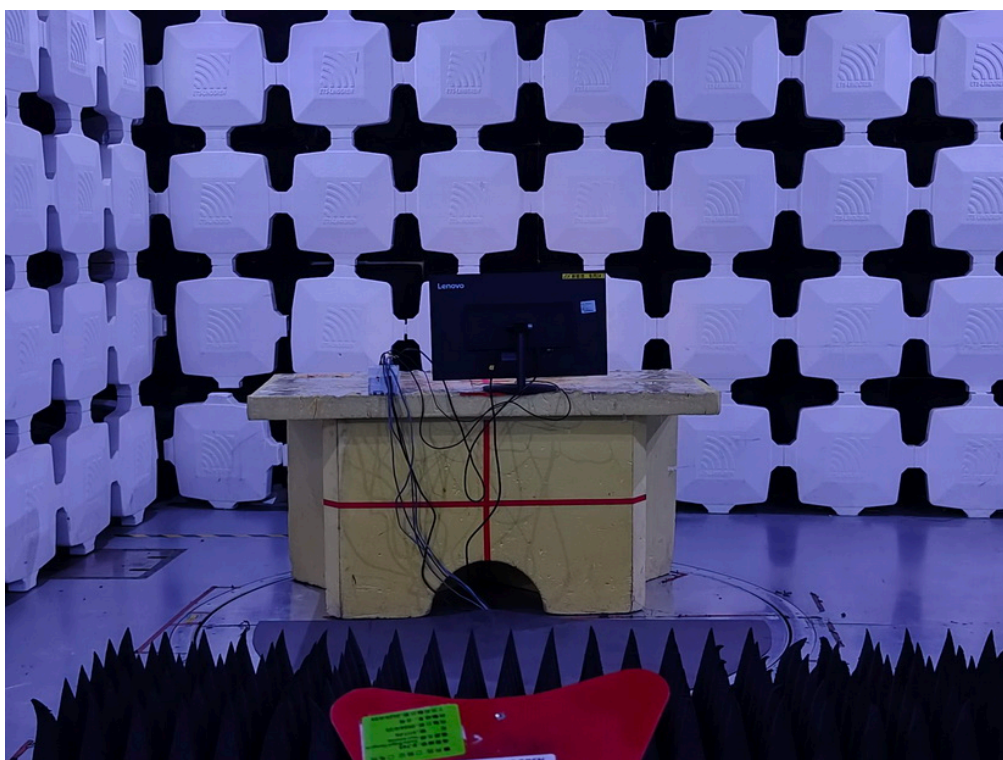
Test Mode	Test Level	Antenna aspect	Duration	Criteria	Results
Enclosure	1 A/m	X	60s	A	A
Enclosure	1 A/m	Y	60s	A	A
Enclosure	1 A/m	Z	60s	A	A

5. EUT TEST PHOTO

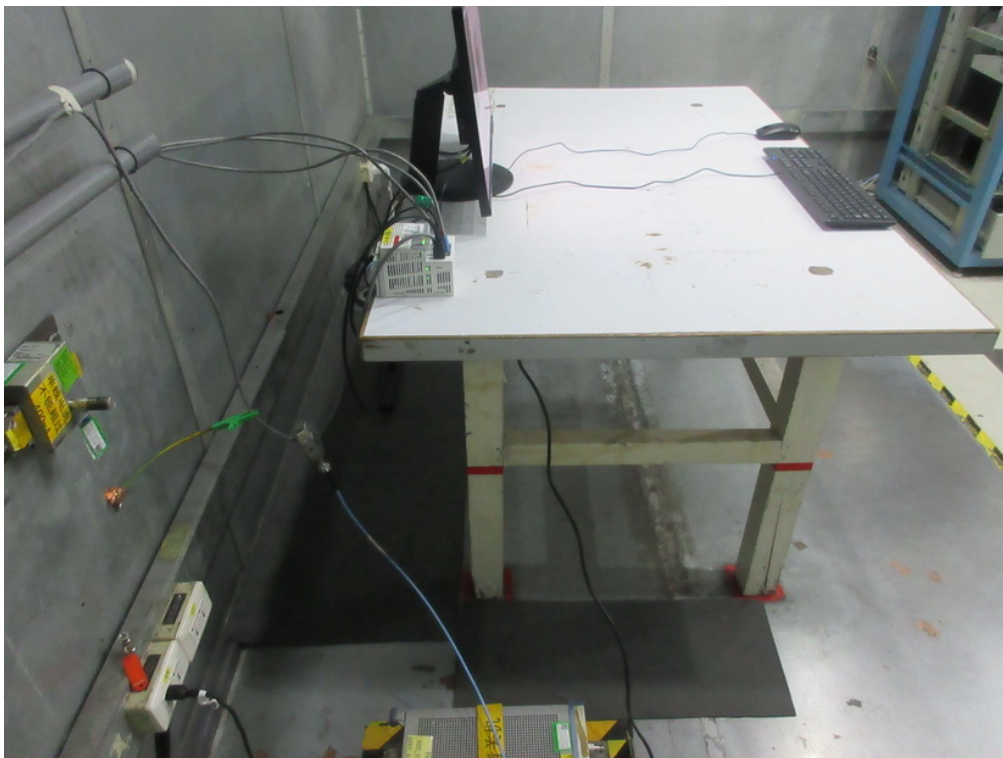
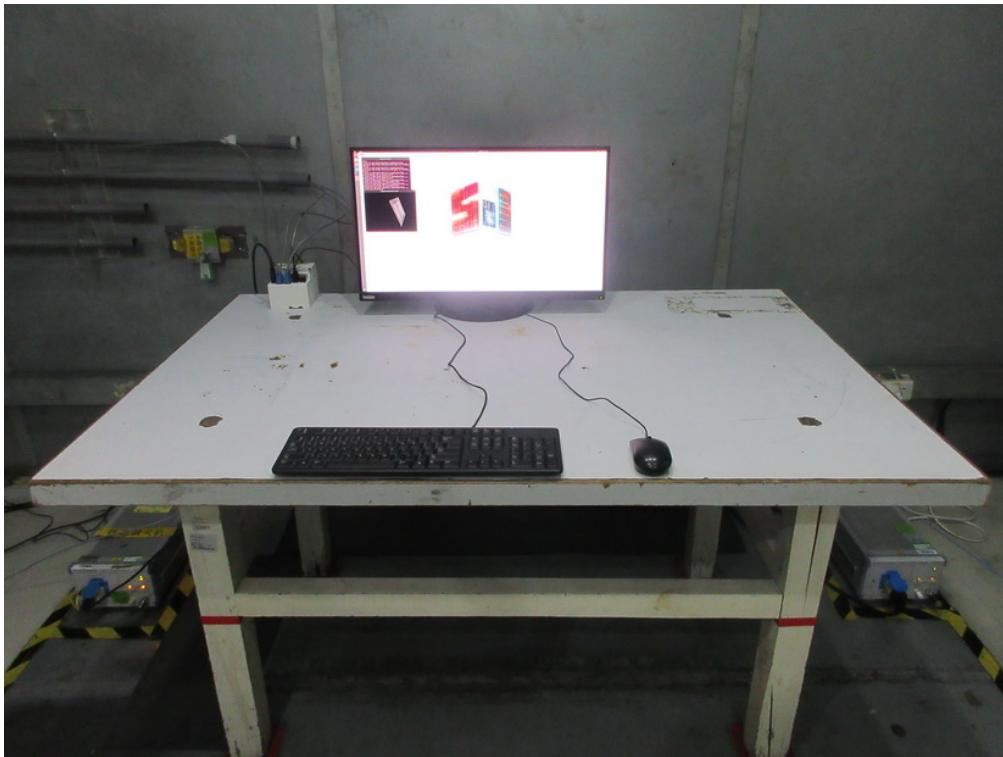
Radiated emissions up to 1 GHz



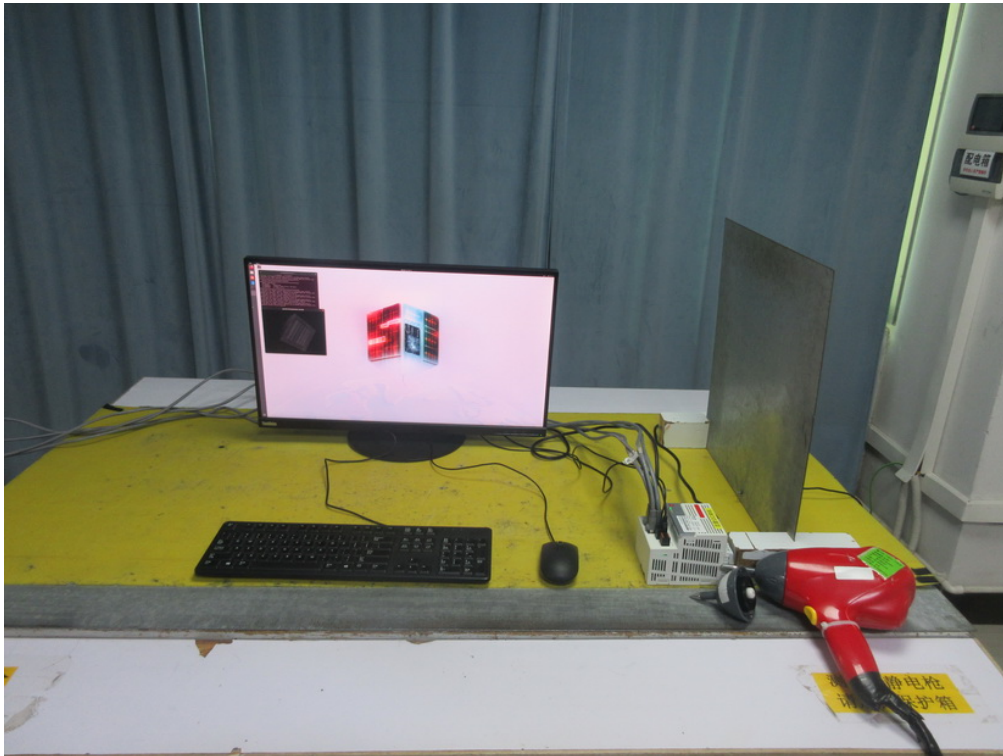
Radiated emissions above 1 GHz



Asymmetric mode conducted emissions_ RJ45



Electrostatic discharge immunity



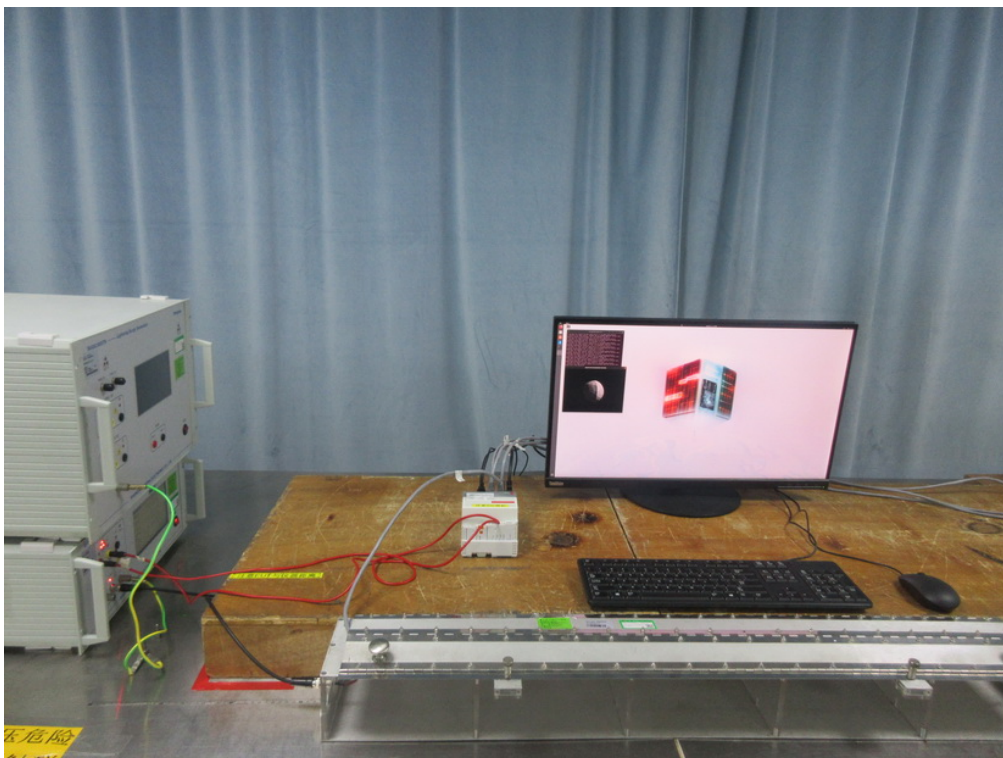
Radiated, radio-frequency, electromagnetic field immunity – Up to 1GHz



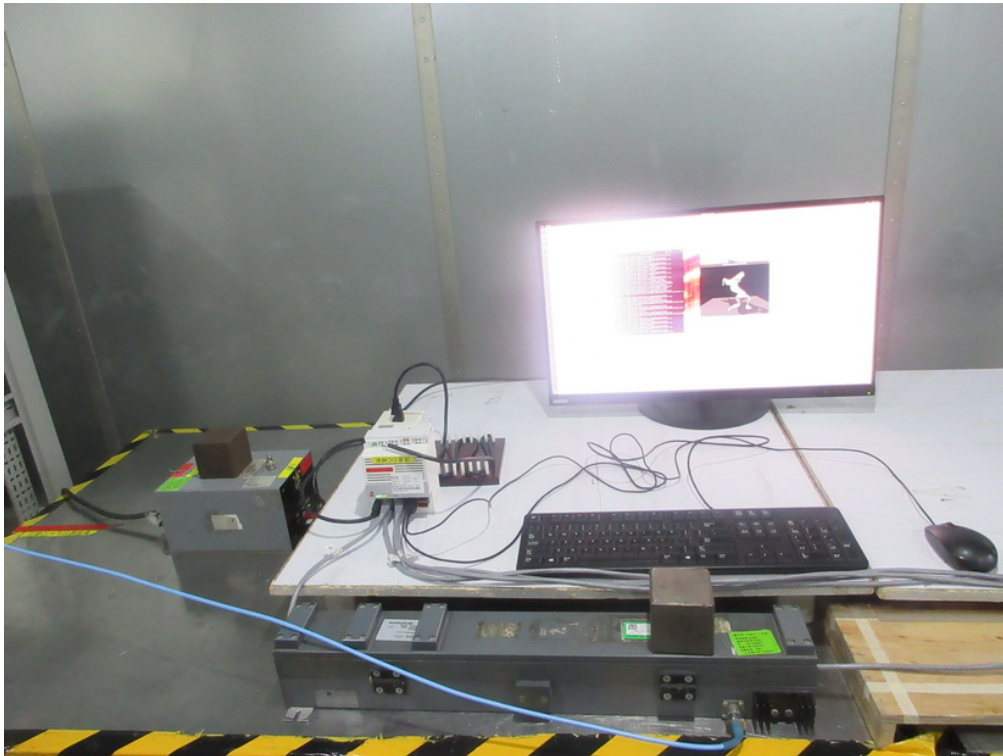
Radiated, radio-frequency, electromagnetic field immunity – Above 1GHz



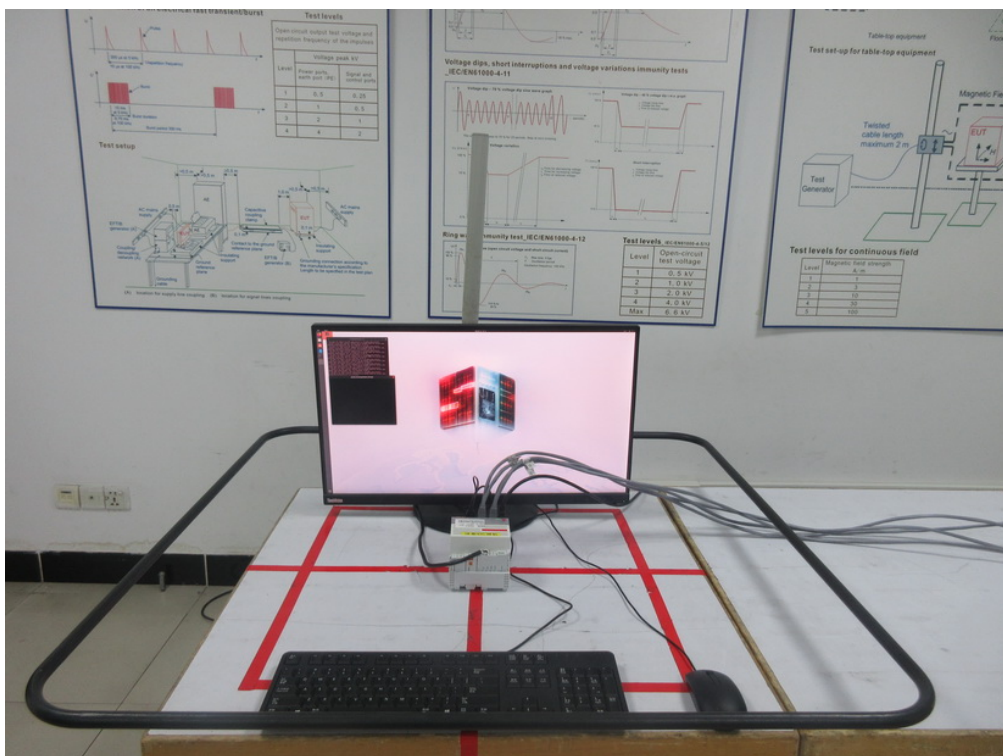
Electrical fast transient/burst immunity(RJ45)



Immunity to conducted disturbances, induced by radio-frequency fields(RJ45)



Power frequency magnetic field immunity



End of Test Report