



TEM-Wave



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检测
TESTING
CNAS L15153

Report No: TW202407-009

EMC TEST REPORT

Report Number: TW202407-009

Sample Name: Hybrid inverter

Sample Model: EAG12K3L

Applicant Model: EAG12K3L、EAG10K3L、EAG8K3L、

EAG7K3L、EAG6K3L、EAG5K3L

Applicant: Huizhou Foryou Optoelectronics Technology Co., LTD



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1. Abbreviation and definition

No.	Abbreviation	Definition	No.	Abbreviation	Definition
1	H/V	Horizontal and vertical polarization	2	AM	Amplitude modulation
3	EUT	Equipment Under Test	4	AV	Average
5	QP	Quasi-Peak	6	N/A	Not Applicable
7	dB μ V	Decibel microvolts	8	dB μ V/m	Decibel microvolts per meter
9	deg	Degree	/	/	/

2. Summary

2.1 Sample description

Name:	Hybrid inverter	Test Model:	EAG12K3L
Sample No. :	S20240703-04	Serial No. :	/
Rated:	400VAC	Operating condition:	Rated working
Trade Mark:	/		
Application Model:	EAG12K3L、EAG10K3L、EAG8K3L、EAG7K3L、EAG6K3L、EAG5K3L		
Applicant:	Huizhou Foryou Optoelectronics Technology Co., LTD		
Address:	Building 6, B Area, No.1 North Shangxia Road, Dongjiang High-TechIndustry Park Huizhou		
Manufacturer:	Huizhou Foryou Optoelectronics Technology Co., LTD		
Address:	Building 6, B Area, No.1 North Shangxia Road, Dongjiang High-TechIndustry Park Huizhou		
Tel:	/	Fax:	/
Remark:	/		

2.2 Auxiliary equipment information

No	Name	Quantity	Specification/model	Cable length
1	/	/	/	/



2.3 Test result

No	Test items	According to	Result
1	Conducted emission	EN IEC 61000-6-1:2019 EN IEC 61000-6-2:2019 EN IEC 61000-6-3:2021 EN IEC 61000-6-4:2019	Pass
2	Radiated emission		Pass
3	Electrostatic discharge		Pass
4	Radiated, radio-frequency, electromagnetic field		Pass
5	Electrical fast transient/burst		Pass
6	Surge		Pass
7	Conducted disturbances, induced by radio-frequency fields		Pass
8	Power frequency magnetic field		Pass
9	Voltage dips, short interruptions and voltage variations		Pass

Result description:

- 1) The test results meet the standard requirements. Pass
- 2) The test results doesn't meet the standard requirements. Fail



Release Date	2024.07.16
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3. Test equipment

3.1 Conducted emission

No	Name	Type	Parameter	Manufacturer	Cal to
TW/C-003	Receiver	ESR7	9kHz-7GHz	R&S	2024.09.25
TW/C-040	LISN	ENV4200	400V/200A	R&S	2025.03.17
TW/C-063	DC HV LISN	PVDC8301	150kHz-30MHz, 200A,1500VDC	Schwarzbeck	2024.12.20

3.2 Radiated emission

No	Name	Type	Parameter	Manufacturer	Cal to
TW/C-003	Receiver	ESR7	9kHz-7GHz	R&S	2024.09.25
TW/C-004	Antenna	VULB9168	30MHz-2GHz	Schwarzbeck	2024.12.04

3.3 Electrostatic discharge

No	Name	Type	Parameter	Manufacturer	Cal to
TW/C-025	ESD Generator	ONYX30	30kV	Haefely	2024.09.25

3.4 Radiated, radio-frequency, electromagnetic field

No	Name	Type	Parameter	Manufacturer	Cal to
TW/C-017	Signal Generator	SMB100A	100kHz-6GHz	Rohde&Schwarz	2024.09.25
TW/C-015	Amplifier	NTWPA- 00810500E	80MHz-1GHz 500W	RFLIGHT	2024.09.25
TW/C-019	Antenna	STLP9128D	80MHz-3GHz	Schwarzbeck	/
TW/C-016	Amplifier	NTWPA-1060100E	1GHz-6GHz	RFLIGHT	2024.09.25
TW/C-005	Horn Antenna	BBHA9120D	1GHz-18GHz	Schwarzbeck	/
TW/C-018- 1	Power meter	NRP6A	100kHz-6GHz	Rohde&Schwarz	2024.09.25
TW/C-018- 2	Power meter	NRP6A	100kHz-6GHz	Rohde&Schwarz	2024.09.25
TW/C-037	Field Probe	EP601	10kHz- 9.25GHz	Narda	2024.09.25

3.5 Electrical fast transient/burst

No	Name	Type	Parameter	Manufacturer	Cal to
TW/C-026-1	Surge & EFT Generator	AXOS5	5kV,16A	Haefely	2024.09.25



TW/C-042	3-phase EFT Network	CDN-4100	100A	3ctest	2025.03.17
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3.6 Surge

No	Name	Type	Parameter	Manufacturer	Cal to
TW/C-026-1	Surge & EFT Generator	AXOS5	5kV,16A	Haefely	2024.09.25
TW/C-041	3-phase Surge Network	SGN-20	100A	3ctest	2025.03.17

3.7 Conducted disturbances, induced by radio-frequency fields

No	Name	Type	Parameter	Manufacturer	Cal to
TW/C-017	Signal Generator	SMB100A	100kHz-6GHz	Rohde&Schwarz	2024.09.25
TW/C-021	Amplifier	NTWPA-4k04200E	4kHz-400MHz 200W	RFLIGHT	2024.09.25
TW/C-035	Attenuator	100W6dB	9KHz-1000MHz	Ruiming	2024.09.25
TW/C-022	Inject probe	F-120-6A	10kHz-400MHz	FCC	2024.09.25
TW/C-018-1	Power meter	NRP6A	100kHz-6GHz	Rohde&Schwarz	2024.09.25
TW/C-018-2	Power meter	NRP6A	100kHz-6GHz	Rohde&Schwarz	2024.09.25

3.8 Power frequency magnetic field

No	Name	Type	Parameter	Manufacturer	Cal to
TW/C-038	PFMF Generator	PFM-1000	100A/m	Skylark	2024.09.25

3.9 Voltage dips, short interruptions and voltage variations

No	Name	Type	Parameter	Manufacturer	Cal to
TW/C-045	3-phase voltage DIP system	CSS-30P3	3-phase,16A	Skylark	2024.09.25



4. Test

4.1 Conducted emission

4.1.1. Test environment

Location	3 m anechoic room	Time	2024-07-15
Test by	Wang Sijia	Temperature and humidity	20.4°C/73%

4.1.2. Test requirements

- 1) According to EN 61000-6-3:2021
- 2) Test requirements:

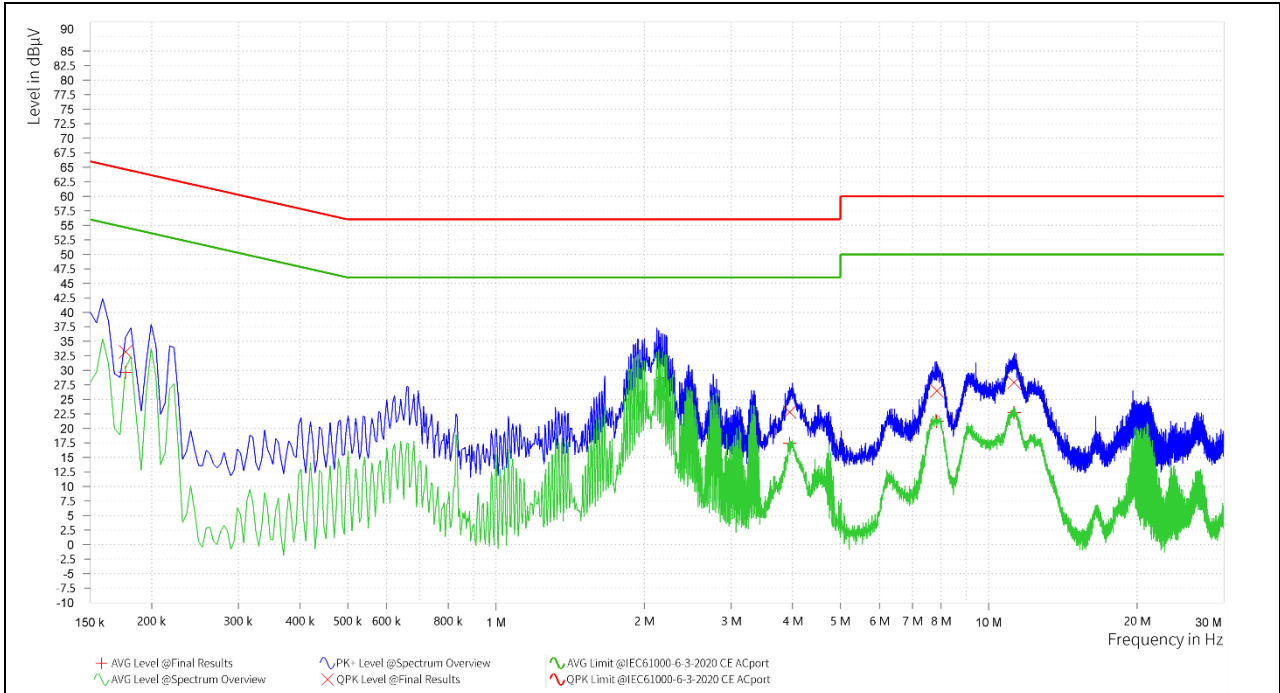
Frequency(MHz)	Limit(dB μ V)			
	AC port		DC port	
	QP	AV	QP	AV
0.15-0.5	66-56	56-46	84-74	74-64
0.5-5	56	46	74	64
5-30	60	50	74	64

- 1) Test method:
Test setup and method according to CISPR16-2-1:2014.



4.1.3. Test record

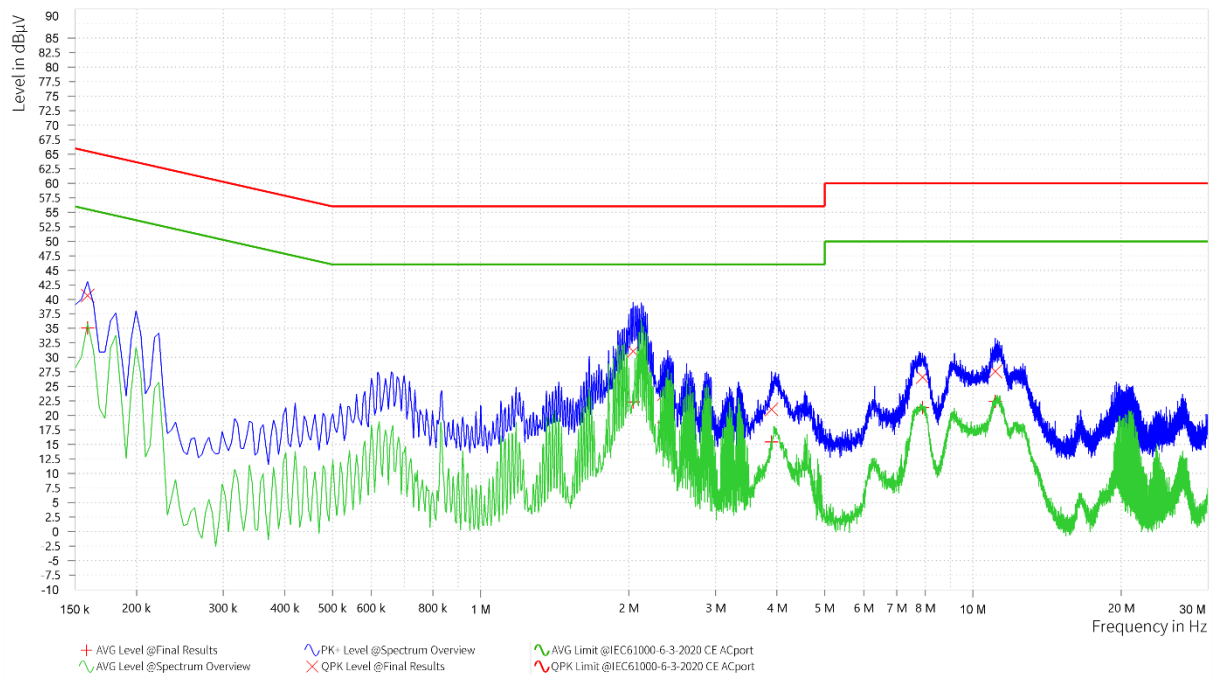
AC port, Phase L



Rg	Frequency [MHz]	QPK Level [dBµV]	QPK Limit [dBµV]	QPK Margin [dB]	AVG Level [dBµV]	AVG Limit [dBµV]	AVG Margin [dB]	Meas. BW [kHz]	Meas. Time [ms]
1	0.177	33.19	64.63	31.44	29.68	54.63	24.95	9.000	1,000.000
1	2.184	31.25	56.00	24.75	28.72	46.00	17.28	9.000	1,000.000
1	2.760	19.24	56.00	36.76	15.10	46.00	30.90	9.000	1,000.000
1	3.944	22.81	56.00	33.19	17.43	46.00	28.57	9.000	1,000.000
1	7.850	26.47	60.00	33.53	21.28	50.00	28.72	9.000	1,000.000
1	11.256	27.96	60.00	32.04	22.79	50.00	27.21	9.000	1,000.000



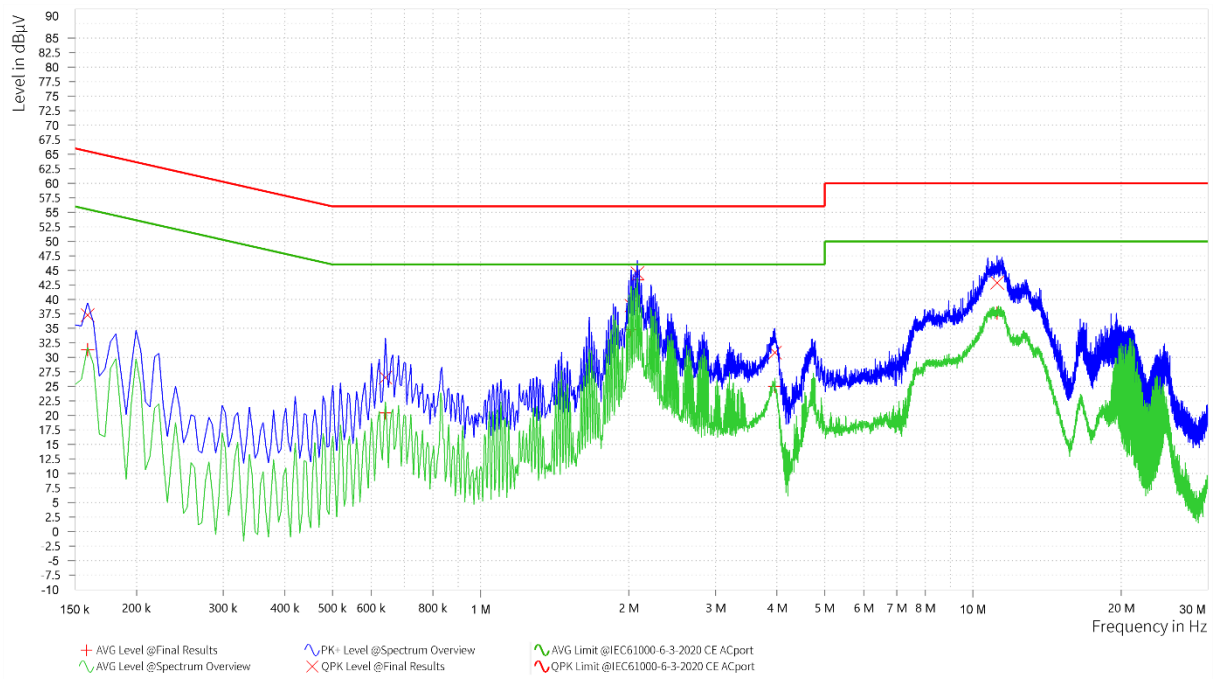
AC port, Phase L2



Rg	Frequency [MHz]	QPK Level [dBµV]	QPK Limit [dBµV]	QPK Margin [dB]	AVG Level [dBµV]	AVG Limit [dBµV]	AVG Margin [dB]	Meas. BW [kHz]	Meas. Time [ms]
1	0.159	40.66	65.52	24.86	35.05	55.52	20.47	9.000	1,000.000
1	2.040	31.05	56.00	24.95	22.35	46.00	23.65	9.000	1,000.000
1	2.360	23.71	56.00	32.29	18.76	46.00	27.24	9.000	1,000.000
1	3.899	21.04	56.00	34.96	15.43	46.00	30.57	9.000	1,000.000
1	7.899	26.62	60.00	33.38	21.35	50.00	28.65	9.000	1,000.000
1	11.103	27.62	60.00	32.38	22.45	50.00	27.55	9.000	1,000.000



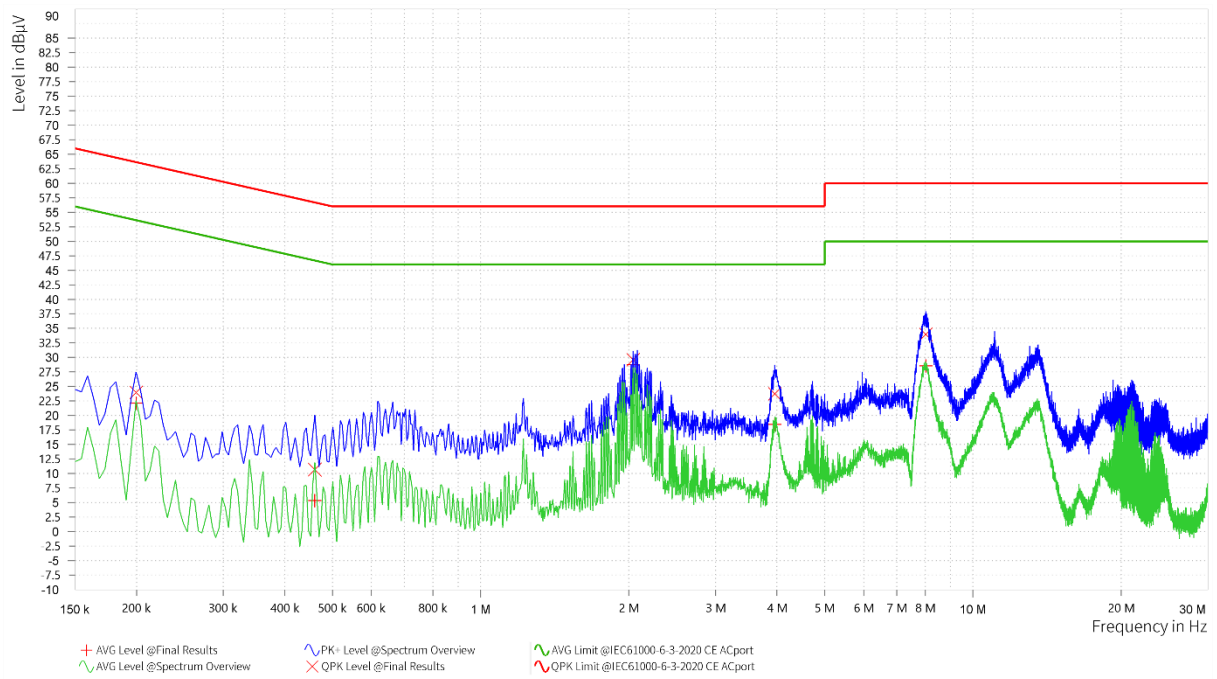
AC port, Phase L3



Rg	Frequency [MHz]	QPK Level [dBµV]	QPK Limit [dBµV]	QPK Margin [dB]	AVG Level [dBµV]	AVG Limit [dBµV]	AVG Margin [dB]	Meas. BW [kHz]	Meas. Time [ms]
1	0.159	37.33	65.52	28.19	31.30	55.52	24.22	9.000	1,000.000
1	0.641	26.53	56.00	29.47	20.45	46.00	25.55	9.000	1,000.000
1	2.022	38.94	56.00	17.06	34.75	46.00	11.25	9.000	1,000.000
1	2.081	44.55	56.00	11.45	43.32	46.00	3.68	9.000	1,000.000
1	3.962	30.85	56.00	25.15	25.02	46.00	20.98	9.000	1,000.000
1	11.202	42.86	60.00	17.14	37.65	50.00	12.35	9.000	1,000.000



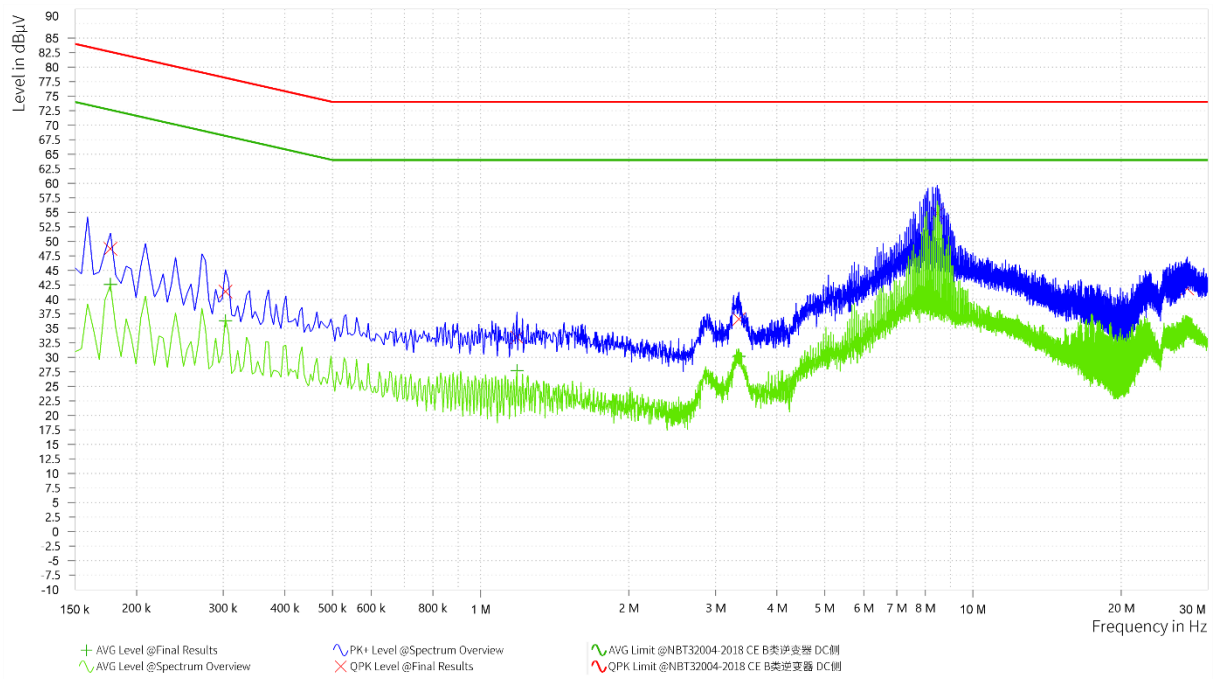
AC port, Phase N



Rg	Frequency [MHz]	QPK Level [dBµV]	QPK Limit [dBµV]	QPK Margin [dB]	AVG Level [dBµV]	AVG Limit [dBµV]	AVG Margin [dB]	Meas. BW [kHz]	Meas. Time [ms]
1	0.200	23.97	63.63	39.67	22.11	53.63	31.52	9.000	1,000.000
1	0.461	10.68	56.68	46.00	5.35	46.68	41.34	9.000	1,000.000
1	2.040	29.59	56.00	26.41	28.75	46.00	17.25	9.000	1,000.000
1	3.957	23.72	56.00	32.28	18.47	46.00	27.53	9.000	1,000.000
1	8.021	33.98	60.00	26.02	28.55	50.00	21.45	9.000	1,000.000



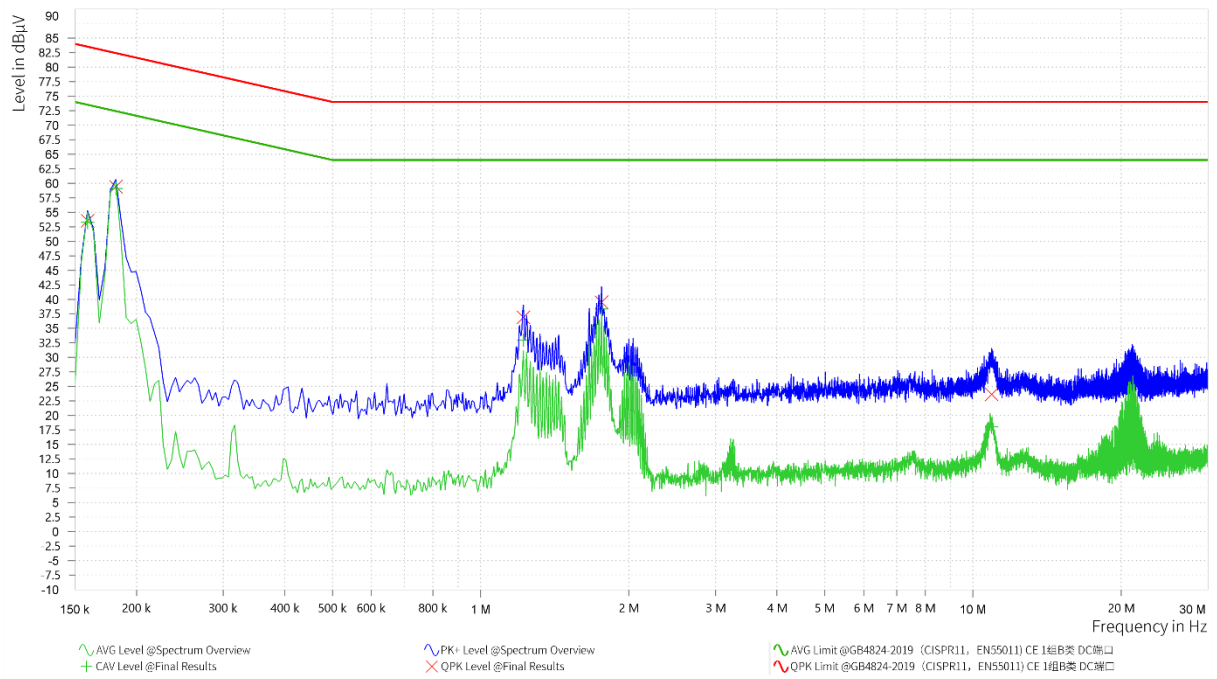
DC port, Positive



Rg	Frequency [MHz]	QPK Level [dBµV]	QPK Limit [dBµV]	QPK Margin [dB]	AVG Level [dBµV]	AVG Limit [dBµV]	AVG Margin [dB]	Meas. BW [kHz]	Meas. Time [ms]
1	0.177	48.72	82.63	33.91	42.57	72.63	9.000	1,000.000	0.200
1	0.303	41.37	78.16	36.79	36.30	68.16	9.000	1,000.000	0.699
1	1.185	33.45	74.00	40.55	27.72	64.00	9.000	1,000.000	1.221
1	3.345	36.60	74.00	37.40	30.19	64.00	9.000	1,000.000	2.900
1	8.462	54.84	74.00	19.16	50.35	64.00	9.000	1,000.000	7.463
1	27.240	41.87	74.00	32.13	35.19	64.00	9.000	1,000.000	10.739



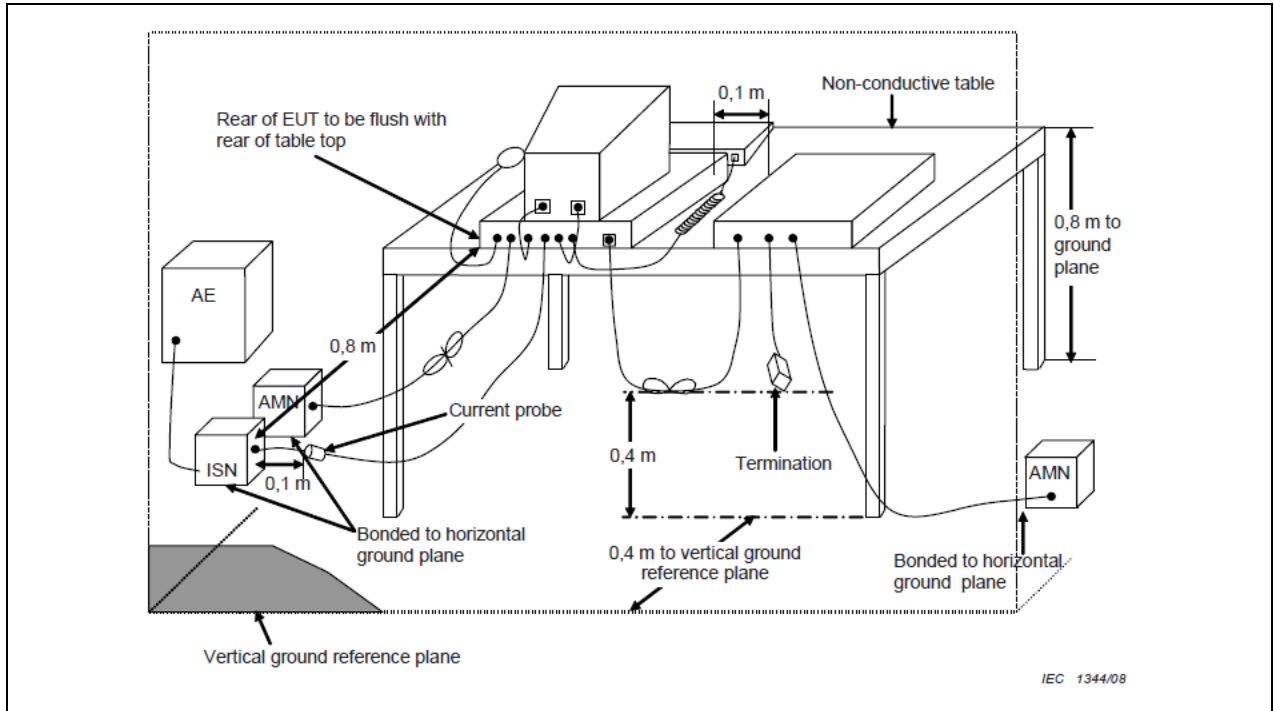
DC port, Negative



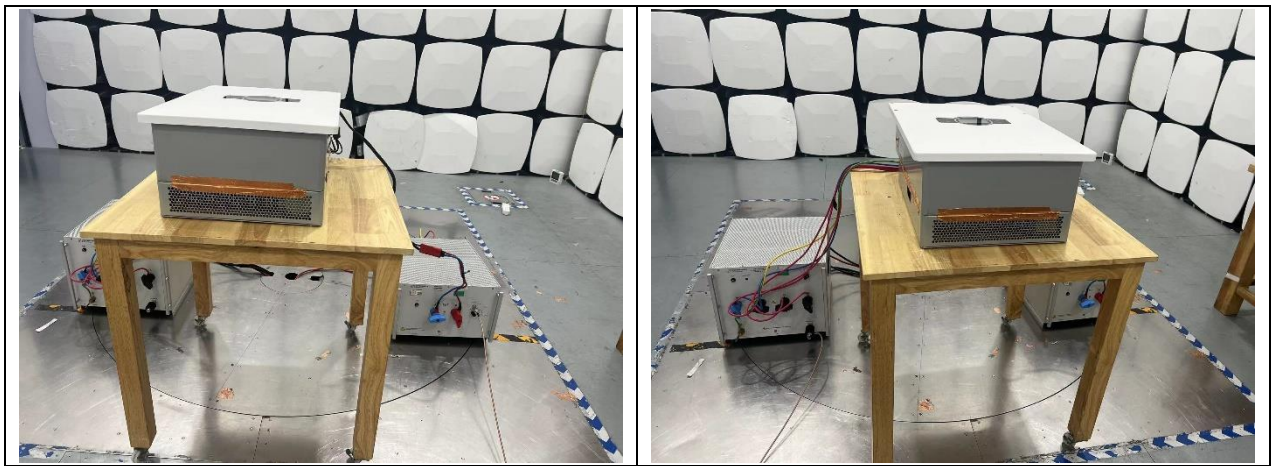
Rg	Frequency [MHz]	QPK Level [dBµV]	QPK Limit [dBµV]	QPK Margin [dB]	AVG Level [dBµV]	AVG Limit [dBµV]	AVG Margin [dB]
1	0.159	53.55	83.52	29.96	53.24	20.28	9.000
1	0.182	59.43	82.42	22.99	59.10	13.32	9.000
1	1.221	36.93	74.00	37.07	32.98	31.02	9.000
1	1.761	39.51	74.00	34.49	38.35	25.65	9.000
1	10.914	23.64	74.00	50.36	18.03	45.97	9.000
1	21.161	27.24	74.00	46.76	24.52	39.48	9.000



4.1.4. Test setup



4.1.5. Test photograph





4.2 Radiated emission

4.2.1. Test environment

Location	3 m anechoic room	Time	2024-07-15
Test by	Wang Sijia	Temperature and humidity	20.4°C/73.1%

4.2.2. Test requirements

1) According to EN 61000-6-3:2021

2) Test requirements:

Frequency(MHz)	Limit(dBμV/m)		
	PK	QP	AV
30-230	/	40	/
230-1000	/	47	/

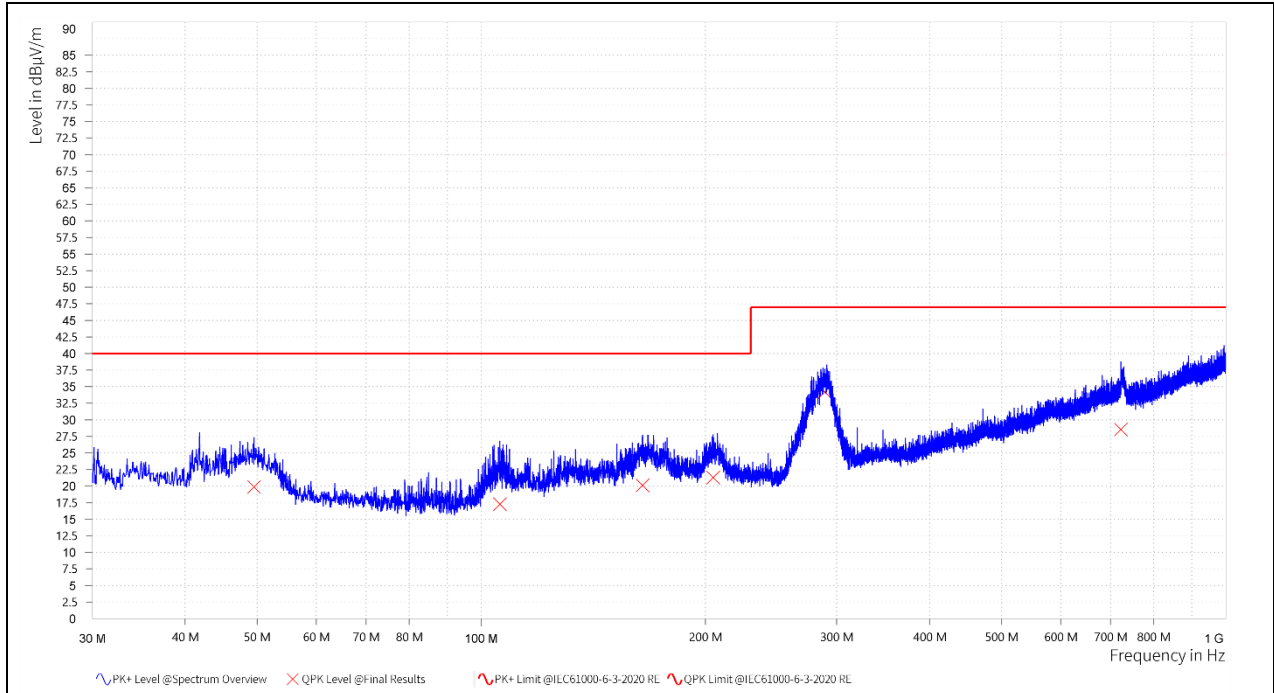
3) Test method:

Test setup and method according to CISPR16-2-3:2016.



4.2.3. Test record

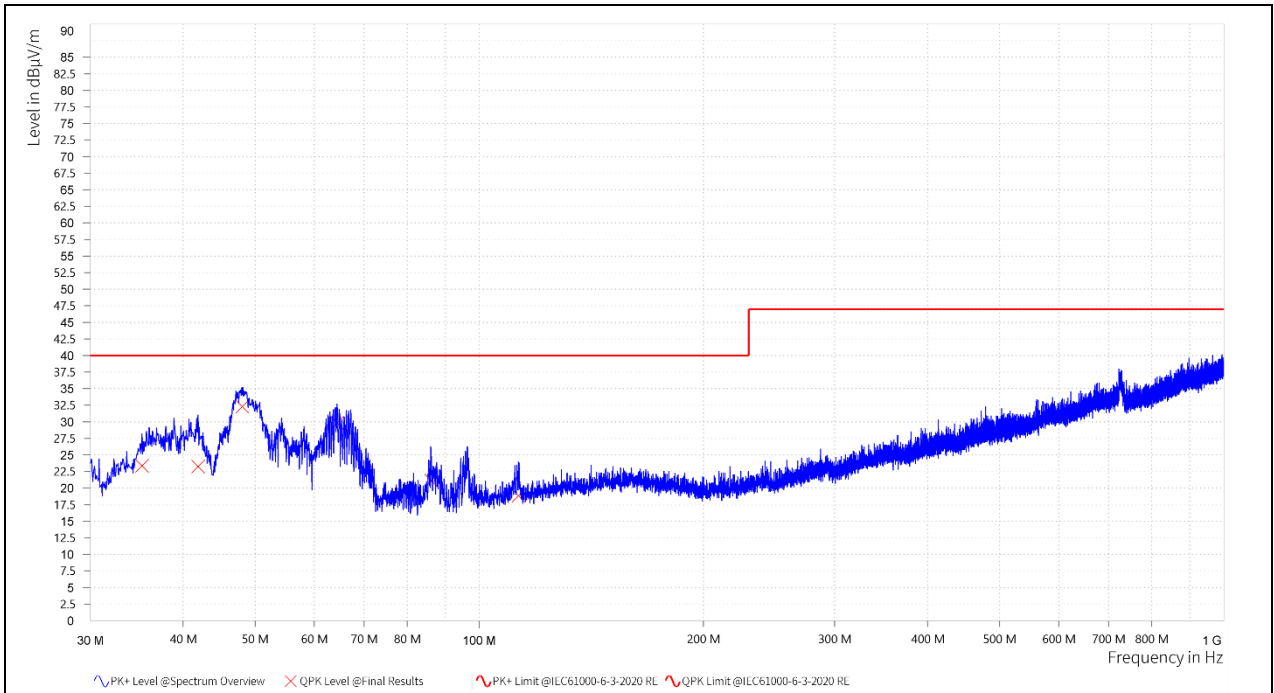
Horizontal



Rg	Frequency [MHz]	QPK Level [dBµV/m]	QPK Limit [dBµV/m]	QPK Margin [dB]	Meas. BW [kHz]	Meas. Time [ms]
1	49.500	19.87	40.00	20.13	120.000	1,000.000
1	105.900	17.25	40.00	22.75	120.000	1,000.000
1	164.580	20.13	40.00	19.87	120.000	1,000.000
1	204.900	21.31	40.00	18.69	120.000	1,000.000
1	289.260	34.20	47.00	12.80	120.000	1,000.000
1	723.060	28.56	47.00	18.44	120.000	1,000.000



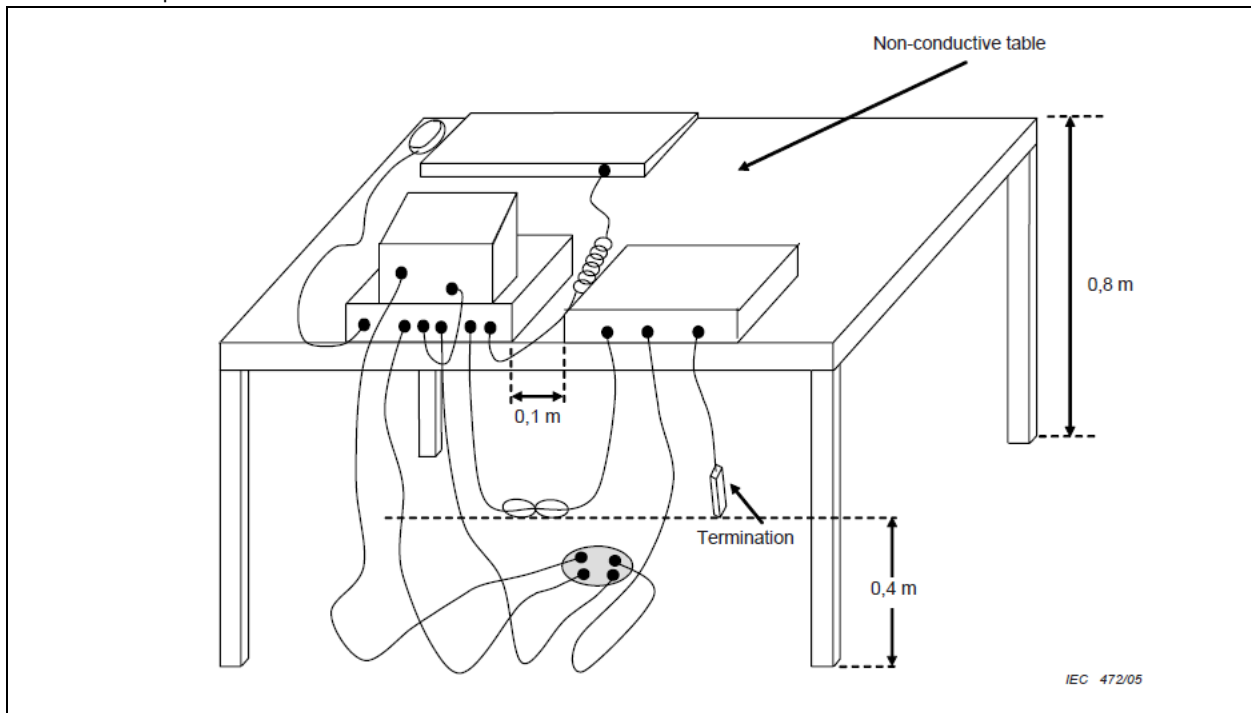
Vertical



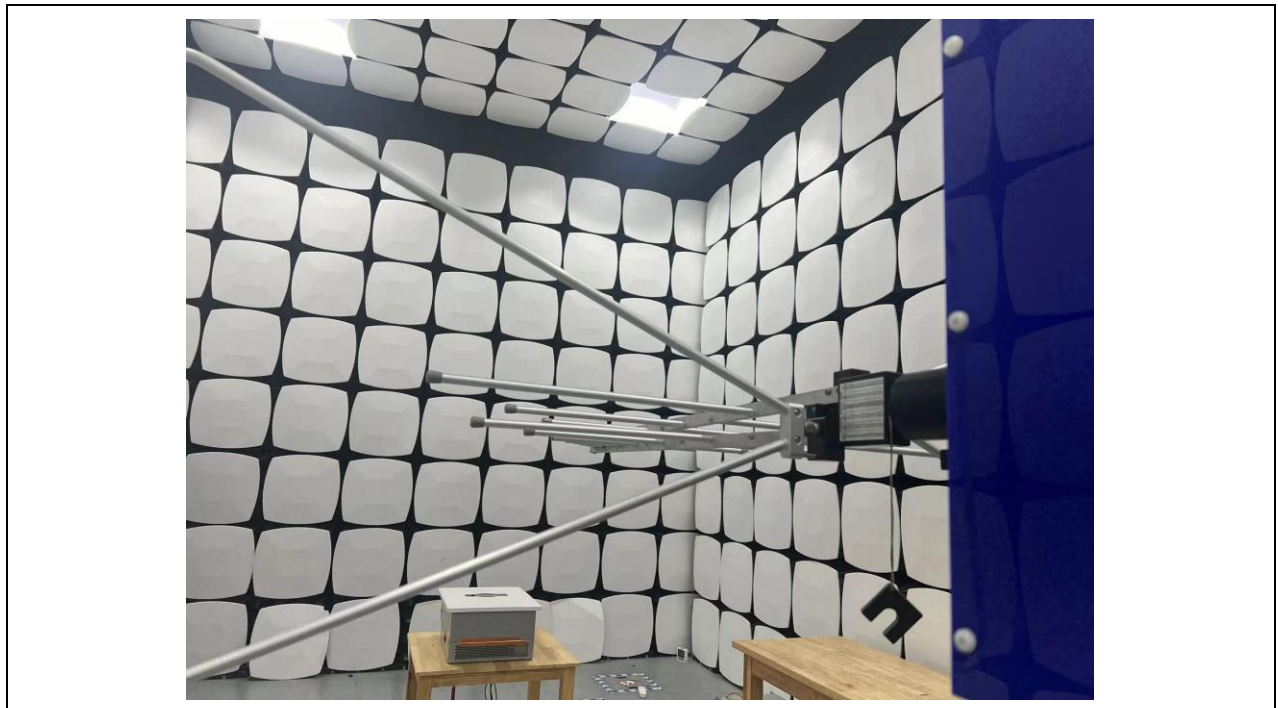
Rg	Frequency [MHz]	QPK Level [dBµV/m]	QPK Limit [dBµV/m]	QPK Margin [dB]	Meas. BW [kHz]	Meas. Time [ms]
1	35.220	23.36	40.00	16.64	120.000	1,000.000
1	41.880	25.25	40.00	14.75	120.000	1,000.000
1	48.000	32.30	40.00	7.70	120.000	1,000.000
1	64.380	29.84	40.00	10.16	120.000	1,000.000
1	86.160	21.13	40.00	18.87	120.000	1,000.000
1	112.800	18.84	40.00	21.16	120.000	1,000.000



Test setup



4.2.4. Test photograph





4.3 Electrostatic discharge

4.3.1. Test environment

Location	ESD room	Time	2024-07-15
Test by	Wang Sijia	Temperature and humidity	28.8°C/43.5%

4.3.2. Test requirements

- 1) According to:
EN IEC 61000-6-1:2019
IEC 61000-4-2:2008

2) Test requirements:

Discharge method	Level	Discharge times	Performance criterion
Air discharge	± 2,4,8 kV	10	B
Contact discharge	± 2,4 kV	10	
Indirect discharge	± 2,4 kV	10	

3) Test method:

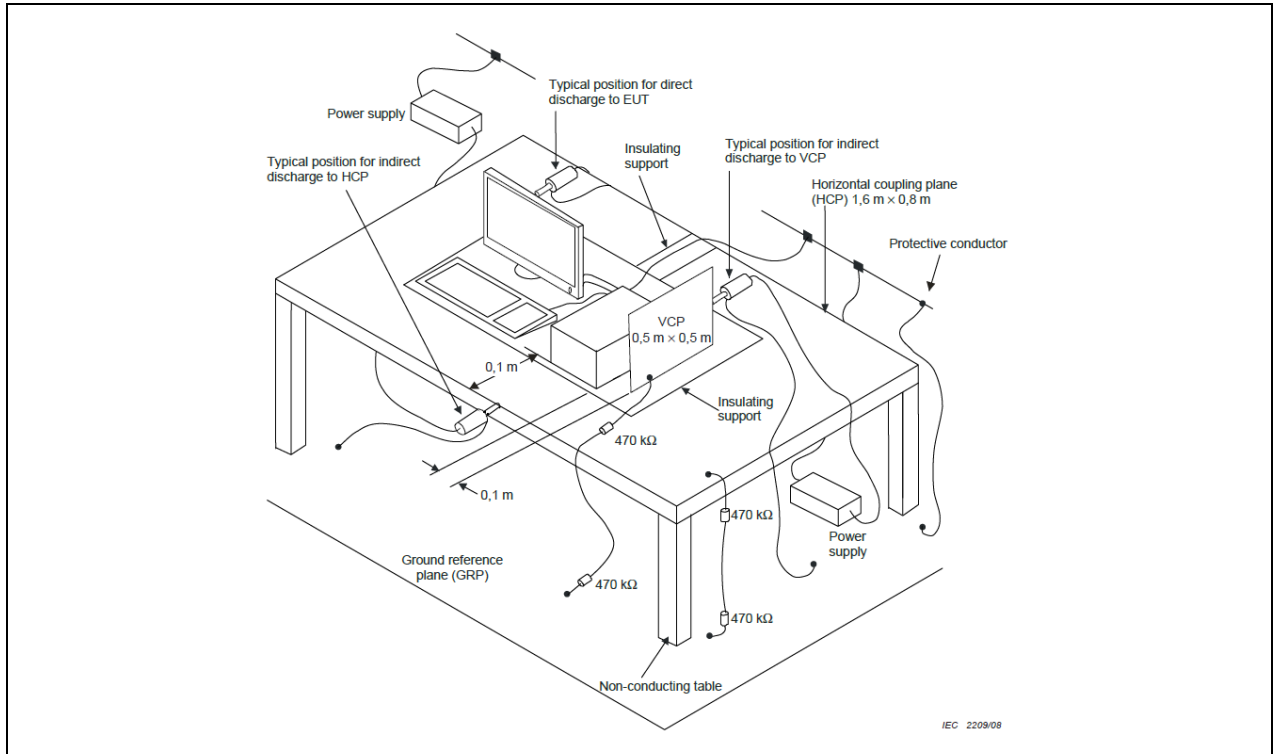
Test setup and method according to IEC 61000-4-2:2008.

4.3.3. Test record

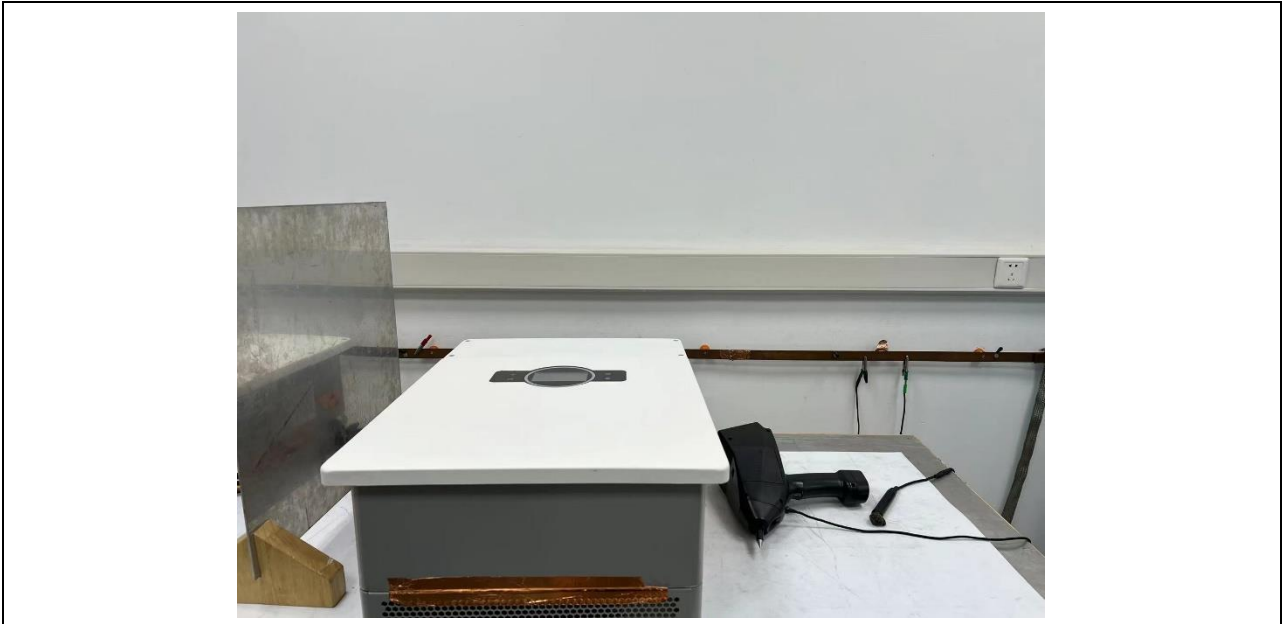
No	Discharge position	Discharge method	Level	Discharge times	Result
1	Connector	Air	± 2,4,8 kV	10	Performance criterion A
2	Enclosure	Contact	± 2,4 kV	10	
3	Screws	Contact	± 2,4 kV	10	
4	Coupling plate	Indirect	± 2,4 kV	10	



4.3.4. Test setup



4.3.5. Test photograph





4. 4 Radiated, radio-frequency, electromagnetic field

4.4.1. Test environment

Location	3 m anechoic room	Time	2024-07-15
Test by	Wang Sijia	Temperature and humidity	20.4°C/73.1%

4.4.2. Test requirements

1) According to:
 EN IEC 61000-6-1:2019
 IEC 61000-4-3:2020

2) Test requirements:

Polarity	EUT direction	Frequency	Level	Modulation	Performance criterion
H/V	4 direction	80-1000 MHz	3V/m	1 kHz, 80% AM	A
H/V	4 direction	1400-6000 MHz	3V/m	1 kHz, 80% AM	

3) Test method:

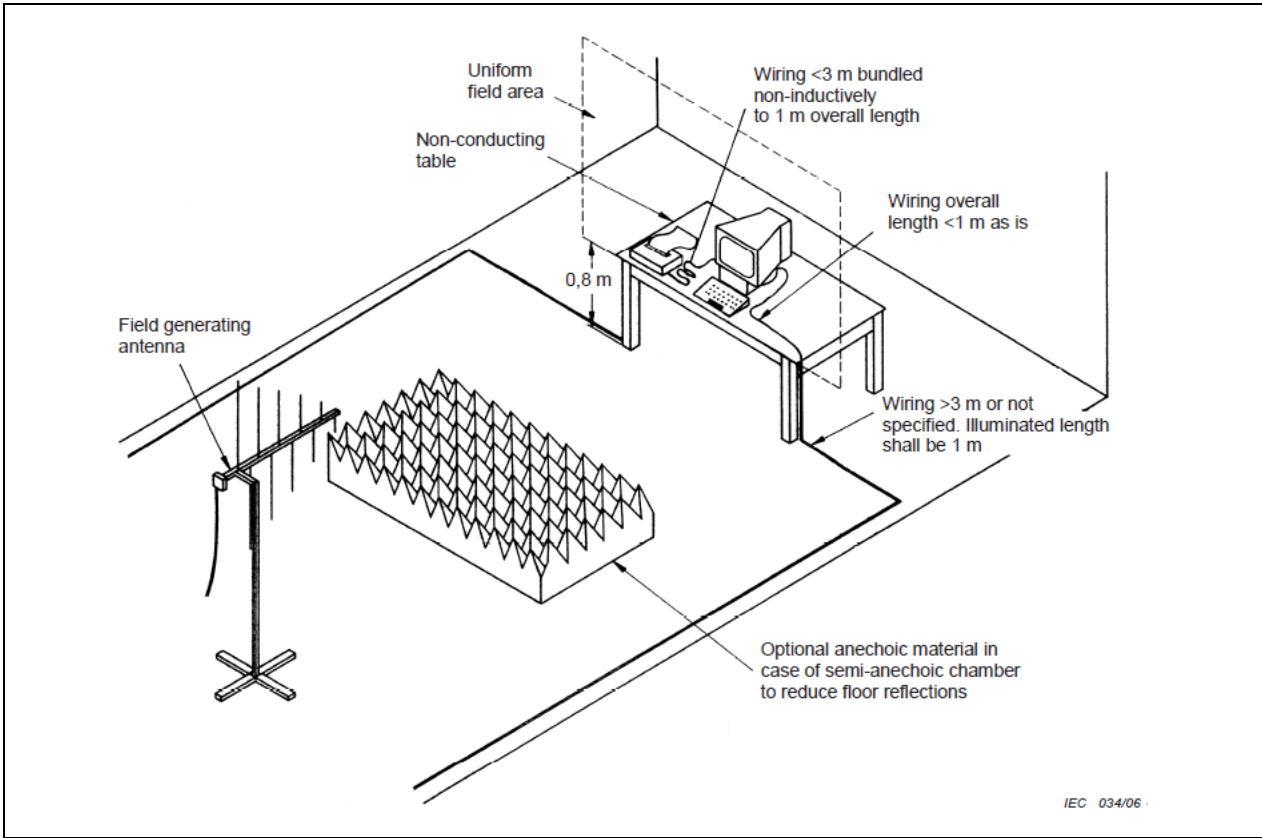
Test setup and method according to IEC 61000-4-3:2020.

4.4.3. Test record

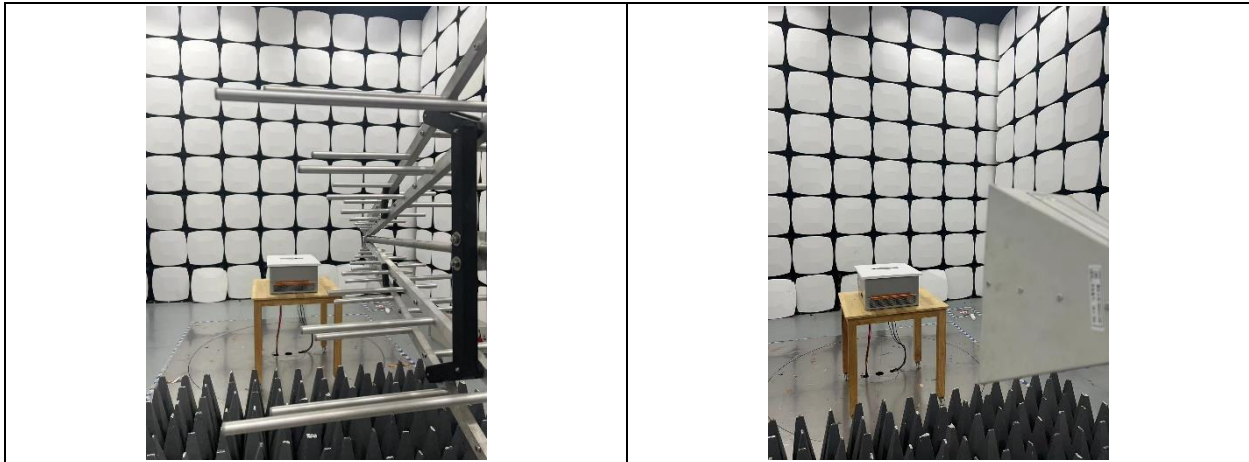
Polarity	EUT direction	Frequency	Level	Modulation	Result
H	4 direction	80-1000 MHz	3V/m	1 kHz, 80% AM	Performance criterion A
H	4 direction	1400-6000 MHz	3V/m	1 kHz, 80% AM	
V	4 direction	80-1000 MHz	3V/m	1 kHz, 80% AM	
V	4 direction	1400-6000 MHz	3V/m	1 kHz, 80% AM	



4.4.4. Test setup



4.4.5. Test photograph





4.5 Electrical fast transient/burst

4.5.1. Test environment

Location	Immunity room	Time	2024-07-15
Test by	Wang Sijia	Temperature and humidity	24.0°C/75.6%

4.5.2. Test requirements

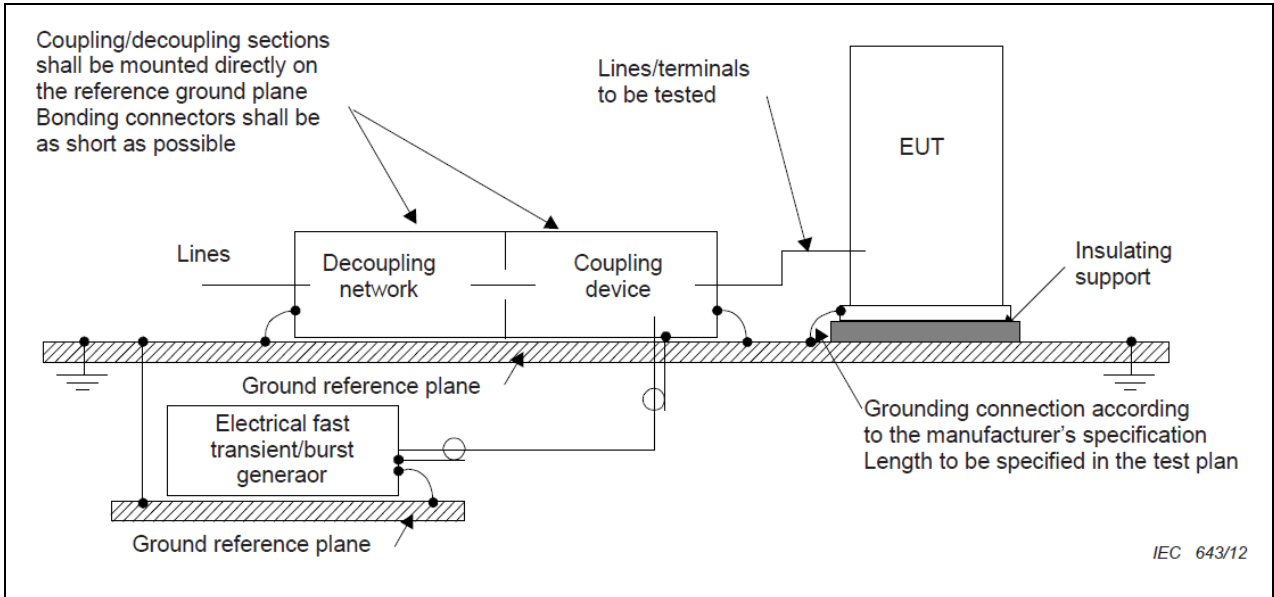
1) According to: EN IEC 61000-6-1:2019 IEC 61000-4-4:2012 2) Test requirements:				
Terminal	Level	Coupling method	Requirements	Performance criterion
DC Power port	± 0.5kV	Contact	5/50 ns,5kHz	B
AC Power port	± 1kV	Contact	5/50 ns,5kHz	B
3) Test method: Test setup and method according to IEC 61000-4-4:2012.				

4.5.3. Test record

No	Coupling path	Level	Terminal	Requirements	Duration	Result
1	CDN	± 0.5kV	DC Power port	5/50 ns,5kHz	120 s	Performance criterion A
2	CDN	± 1kV	AC Power port	5/50 ns,5kHz	120 s	



4.5.4. Test setup



4.5.5. Test photograph





4.6 Surge

4.6.1. Test environment

Location	Immunity room	Time	2024-07-15
Test by	Wang Sijia	Temperature and humidity	24.0°C/75.6%

4.6.2. Test requirements

- 1) According to:
EN IEC 61000-6-1:2019
IEC 61000-4-5:2014+A1:2017

2) Test requirements:

Terminal	Level	Coupling method	Requirements	Performance criterion
DC Power port	±0.5kV	Differential	1.2/50 μs, 2Ω	B
DC Power port	±0.5kV、±1kV	Common	1.2/50 μs, 12Ω	B
AC Power port	±0.5kV、±1kV	Differential	1.2/50 μs, 2Ω	B
AC Power port	±0.5kV、±1kV、±2kV	Common	1.2/50 μs, 12Ω	B

3) Test method:

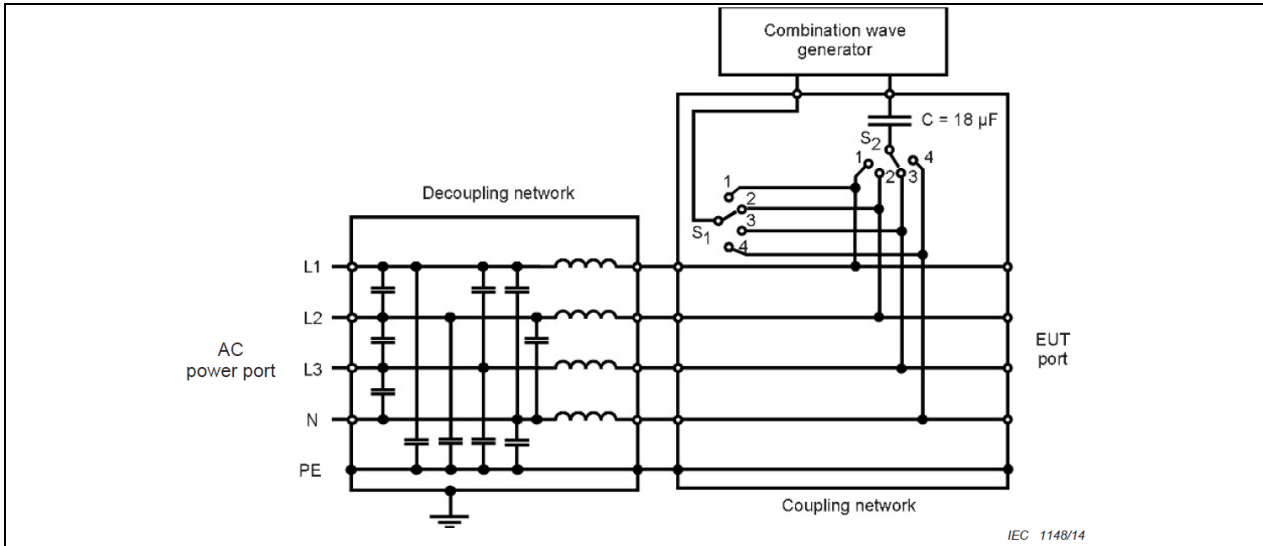
Test setup and method according to IEC 61000-4-5:2014+A1:2017.

4.6.3. Test record

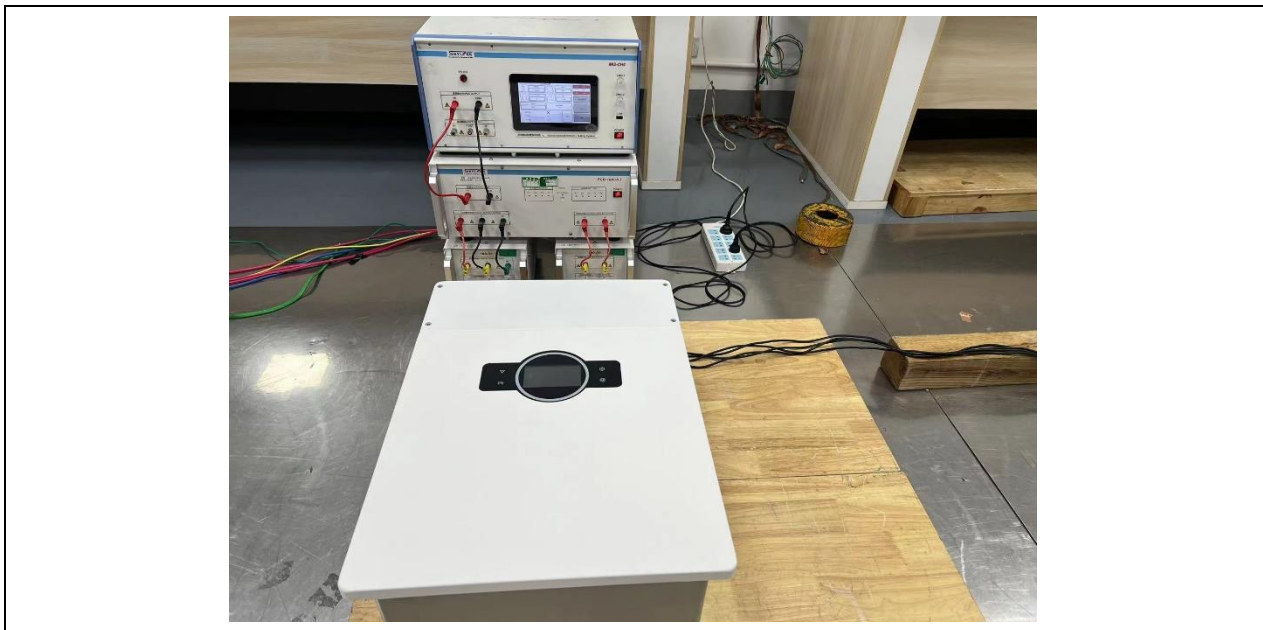
No	Coupling path	Level	Terminal	Times	Duration	Direction	Result
1	Differential	±0.5kV	DC Power port	5	60s	±0, 90, 180, 270°	Performance criterion A
2	Common	±0.5kV、±1kV	DC Power port	5	60s	±0, 90, 180, 270°	
3	Differential	±0.5kV、±1kV	AC Power port	5	60s	±0, 90, 180, 270°	
4	Common	±0.5kV、±1kV、±2kV	AC Power port	5	60s	±0, 90, 180, 270°	



4.6.4. Test setup



4.6.5. Test photograph





4.7 Conducted disturbances, induced by radio-frequency fields

4.7.1. Test environment

Location	3 m anechoic room	Time	2024-07-15
Test by	Wang Sijia	Temperature and humidity	20.4°C/73.1%

4.7.2. Test requirements

1) According to:
 EN IEC 61000-6-1:2019
 IEC 61000-4-6:2013

2) Test requirements:

Terminal	Level	Modulation	Step	Dwell time	Source impedance	Performance criterion
DC Power port	3V	1kHz,80%AM	1%	3S	150Ω	A
AC Power port	3V	1kHz,80%AM	1%	3S	150Ω	A

3) Test method:

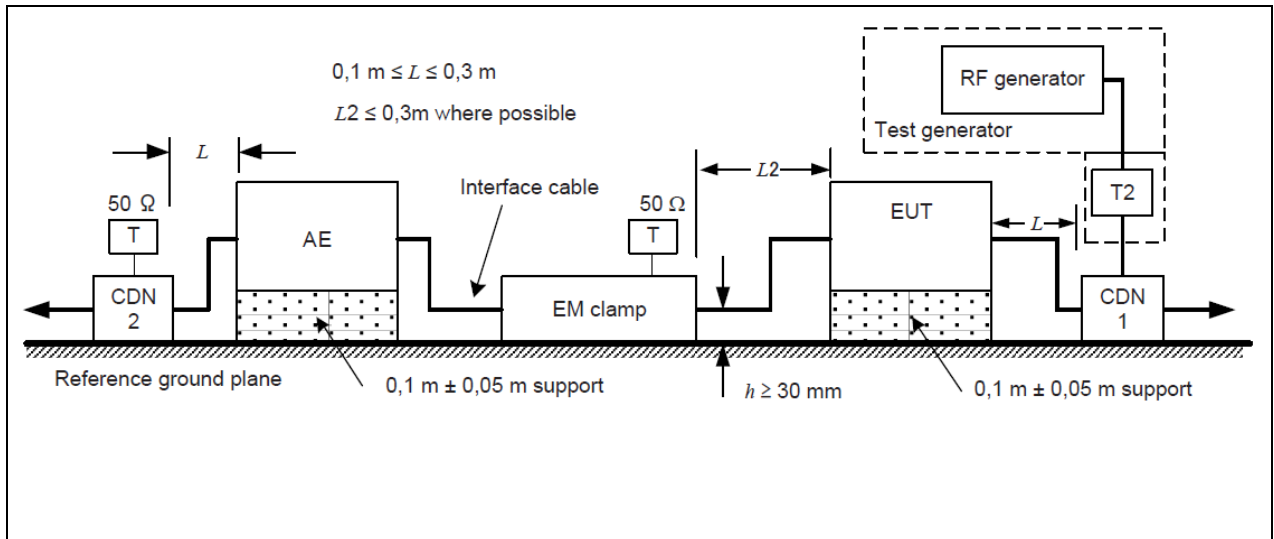
Test setup and method according to IEC 61000-4-6:2013.

4.7.3. Test record

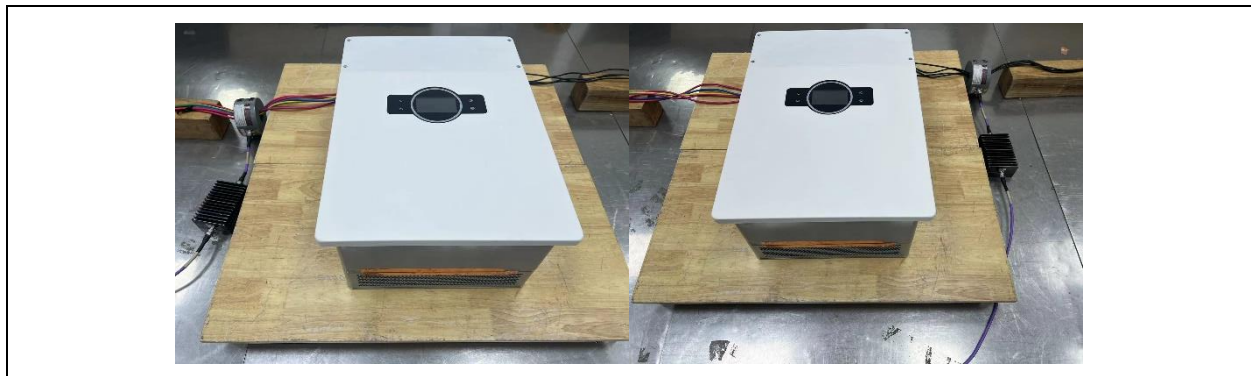
No	Coupling path	Terminal	Modulation	Step	Dwell time	Result
1	Probe	DC Power port	1kHz,80%AM	1%	3S	Performance criterion A
2	Probe	AC Power port	1kHz,80%AM	1%	3S	



4.7.4. Test setup



4.7.5. Test photograph





4.8 Power frequency magnetic field

4.8.1. Test environment

Location	Immunity room	Time	2024-07-15
Test by	Wang Sijia	Temperature and humidity	24.0°C/75.6%

4.8.2. Test requirements

1) According to:
 EN IEC 61000-6-1:2019
 IEC 61000-4-8:2009

2) Test requirements:

Polarity	Level	Frequency	Performance criterion
X、Y、Z	3A/m	50Hz	A

3) Test method:

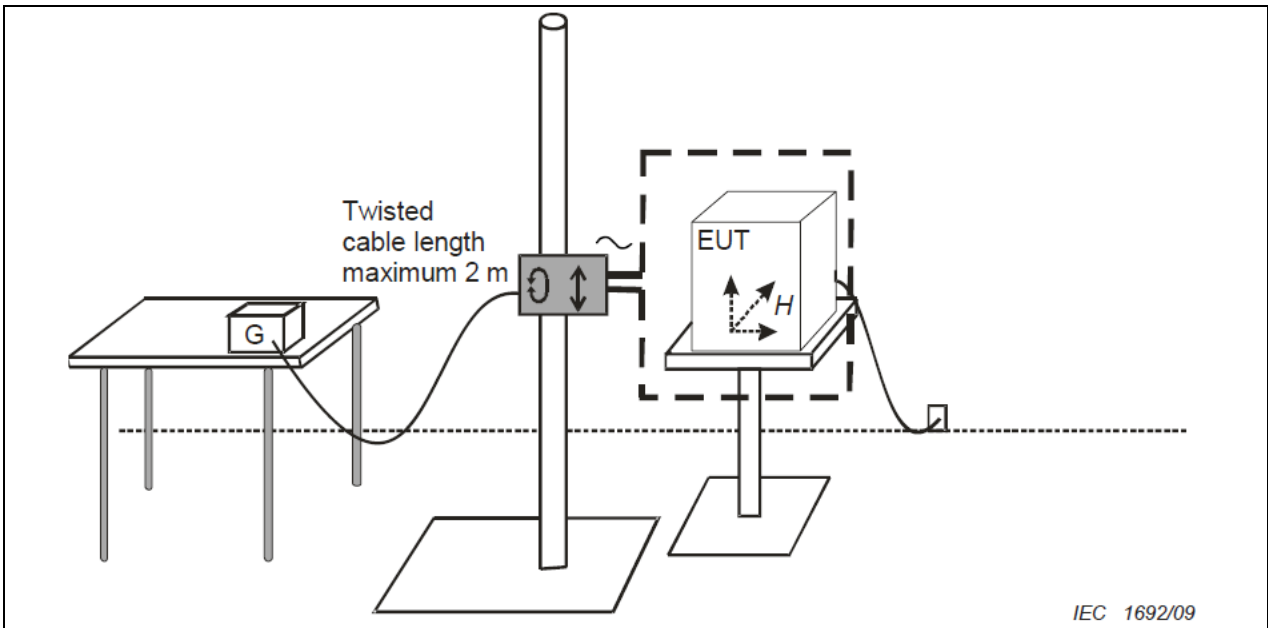
Test setup and method according to IEC 61000-4-8:2009.

4.8.3. Test record

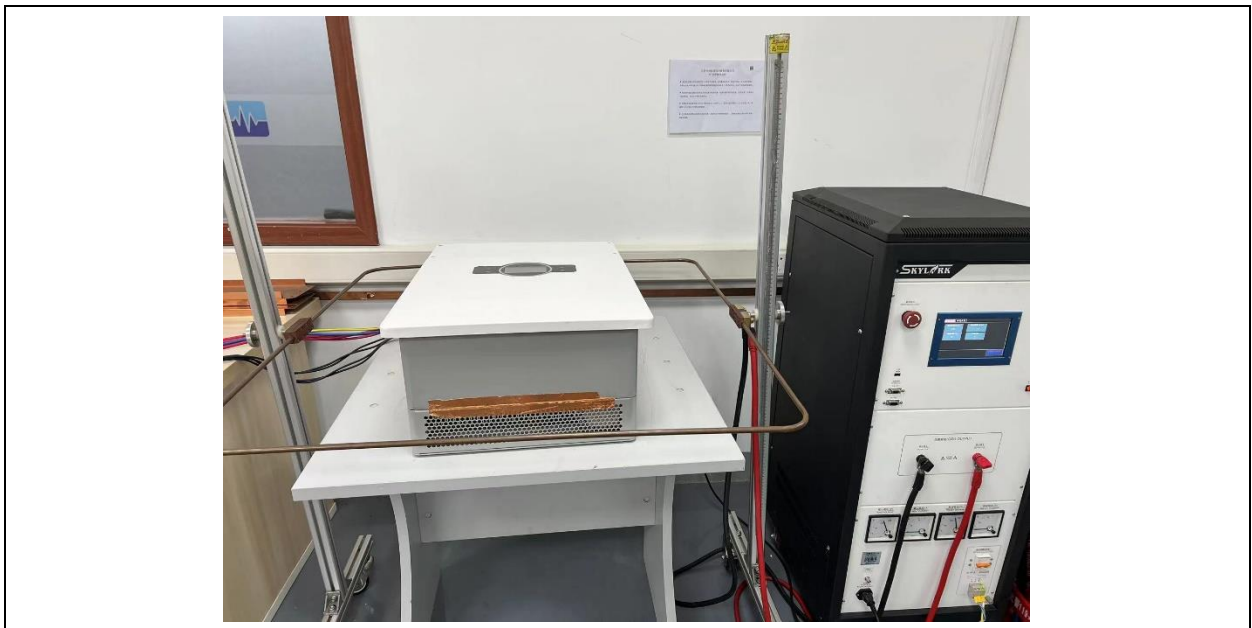
Polarity	Level	Frequency	Dwell time	Result
X、Y、Z	3A/m	50Hz	10 min	Performance criterion A



4.8.4. Test setup



4.8.5. Test photograph





4.9 Voltage dips, short interruptions and voltage variations

4.9.1. Test environment

Location	Immunity room	Time	2024-07-15
Test by	Wang Sijia	Temperature and humidity	24.0°C/75.6%

4.9.2. Test requirements

4) According to:
 EN IEC 61000-6-1:2019
 IEC 61000-4-11:2004+A1:2007

5) Test requirements:

Residual voltage	Cycle	Performance criterion
0%	0.5	B
0%	1	B
70%	25	C
0%	250	C

6) Test method:

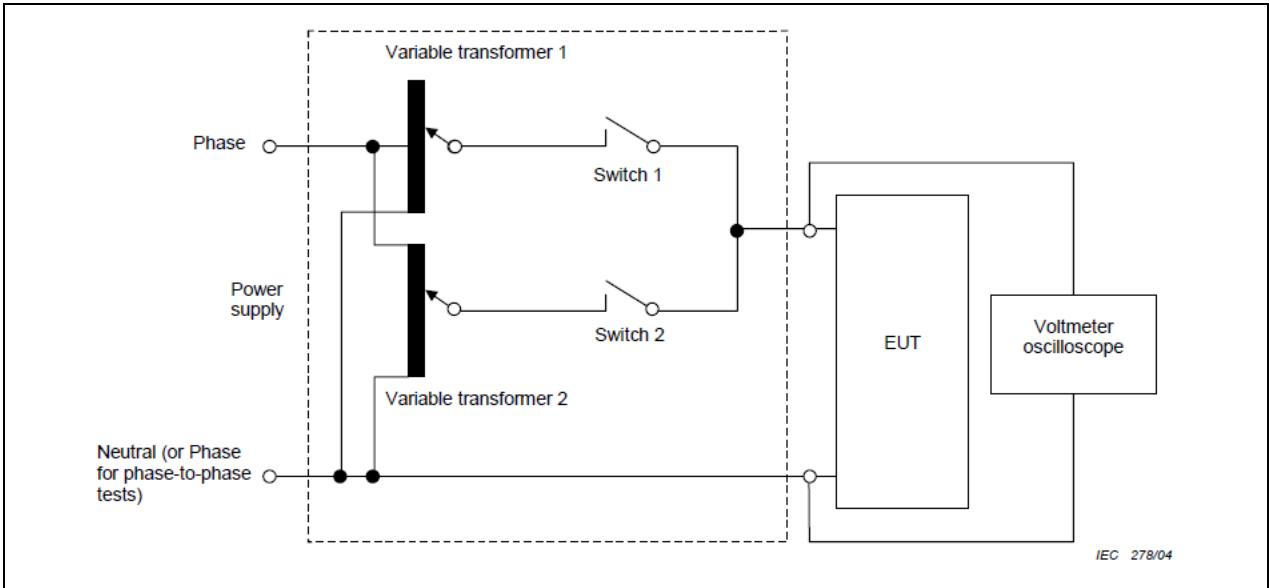
Test setup and method according to IEC 61000-4-11:2004+A1:2007.

4.9.3. Test record

Residual voltage	Cycle	Performance criterion	Comment
0%	0.5	B	During the testing, EUT powered off ,once remove the interference, it can recover itself.
0%	1	B	
70%	25	B	
0%	250	B	



4.9.4. Test setup



4.9.5. Test photograph





5. Statement

5.1 Report statement

If the report without "stamp only for testing" or "official seal" is invalid.

If the copy report without "stamp only for testing" or "official seal" is invalid.

If the Report without signatures of "prepared", "reviewed" and "released" are invalid.

The Report Is Invalid If Altered.

The Report is only responsible for the sample.

5.2 Statement of measurement uncertainty

The data and Result referenced in this document are true and accurate.

The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for measurements listed in this test report according to CISPR16-4:2002 " Uncertainty in EMC measurements " and is documented in Jiangsu TEM-Wave Testing Service Ltd. Product Service Quality System according to ISO/IEC17025.

Furthermore, variability of component and process may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the product.

5.3 Statement of performance criterion

Performance Criterion A:

The EUT 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 EUT is used as intended. If the performance level is not specified by the manufacturer, this may be derived from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.

Performance Criterion B:

The EUT 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 EUT is used as intended. The performance level may be replaced by a permissible loss of performance. However, during the test degradation of performance is allowed but 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 equipment if used as intended.

Performance Criterion C:

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

----- End of report -----