TEST REPORT

Application No.:	GZEM2306002842PV
Applicant:	Huizhou Foryou Optoelectronics Technology Co, LTD
Address of Applicant:	Building 6, B Area, No.1 North Shangxia Road, Dongjiang High-Tech Industry Park Huizhou
Manufacturer:	Huizhou Foryou Optoelectronics Technology Co, LTD
Address of Manufacturer:	Building 6, B Area, No.1 North Shangxia Road, Dongjiang High-Tech Industry Park Huizhou
Factory:	Huizhou Foryou Optoelectronics Technology Co, LTD
Address of Factory:	Building 6, B Area, No.1 North Shangxia Road, Dongjiang High-Tech Industry Park Huizhou
Equipment Under Test (EUT):	
EUT Name:	PV Inverter
Model No.:	ED5000, ED4600, ED3600 ♣
♣	Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.
Trade Mark:	ADAYO
Standard(s) :	EN IEC 61000-6-3: 2021
	EN IEC 61000-6-1: 2019
Date of Receipt:	2022-08-31
Date of Test:	2022-10-19 to 2022-10-26
Date of Issue:	2023-06-07
Test Result:	**Pass***

* In the configuration tested, the EUT complied with the standards specified above.

Jerry Chan
Manager

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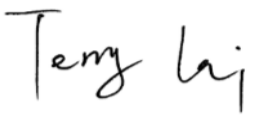
Revision Record			
Version	**Report No.**	**Date**	**Remark**
01	GZEM220800488101	2022-11-18	Original
02	GZEM220800488101C05	2023-06-07	Copy report: Changed applicant, manufacturer and factory information; models and trademark; added appearance photo

Authorized for issue by:				
		 **Simon Cai/Project Engineer**		
		 **Terry Lai/Reviewer**		

2 Test Summary

Emission Part				
Item	**Standard**	**Method**	**Requirement**	**Result**
Conducted Emissions at AC Mains Power Port (150kHz-30MHz)	EN IEC 61000-6-3: 2021	CISPR 16-2-1	Table 4.3	Pass
Conducted Emissions at DC Power Port (150kHz-30MHz)		CISPR 16-2-1	Table 5	Pass
Radiated Emissions (30MHz-1GHz)		CISPR 16-2-3	Table 3.1	Pass
Harmonic Current Emission		EN IEC 61000-3-2: 2019+A1:2021	Class A	Pass
Voltage Fluctuations and Flicker		EN 61000-3-3:2013 +A1:2019+A2:2021	Clause 5	Pass

Immunity Part				
Item	**Standard**	**Method**	**Requirement**	**Result**
Conducted Immunity at AC Mains Power Port (150kHz-80MHz)	EN IEC 61000-6-1: 2019	EN 61000-4-6:2014	3Vrms (emf),80%,1kHz Amp. Mod.	Pass
Conducted Immunity at DC Power Port (150kHz-80MHz)		EN 61000-4-6:2014	3Vrms (emf),80%,1kHz Amp. Mod.	Pass
Electrical Fast Transients Burst at AC Mains Power Port		EN 61000-4-4:2012	1kV 5/50ns Tr/Td 5kHz/100kHz Repetition Frequency	Pass
Electrical Fast Transients Burst at DC Power Port		EN 61000-4-4:2012	0.5kV 5/50ns Tr/Td 5kHz/100kHz Repetition Frequency	Pass
Electrostatic Discharge		EN 61000-4-2:2009	±4kV Contact Discharge, ±8kV Air Discharge	Pass
Radiated Immunity (80MHz-6GHz)		EN IEC 61000-4-3: 2020	3V/m, 80%, 1kHz Amp. Mod.	Pass
Surge at AC Mains Power Port		EN 61000-4-5: 2014+A1:2017	1.2/50μs Tr/Td 1kV Line to Line 2kV Line to Ground	Pass
Voltage Dips and Interruptions		EN IEC 61000-4-11: 2020	0 % UT for 0.5cycle 0 % UT for 1cycle 70 % UT for 25cycles 0 % UT for 250cycles UT is Supply Voltage	Pass
Surge at DC Port		EN 61000-4-5: 2014+A1:2017	1.2/50μs Tr/Td 0.5kV Line to Line 1kV Line to Ground	Pass

Note:

E.U.T./EUT means Equipment Under Test.

Pass means the test result passed the test standard requirement, please find the detailed decision rule in the report relative section.

♣ **Model No.:** GH5000TL, GH4600TL, GH3600TL

According to the declaration from the applicant, the electrical circuit design, layout, components used and internal wiring were identical for all models, with only difference on the rated power limited by software.

GH5000TL: 5kW, GH4600TL: 4.6kW, GH3600TL: 3.6kW.

Therefore, only one model **GH5000TL** was tested in this report.

Remark:

All test data and photos were copied from report **CTS20220137-E** issued by **Shenzhen Chengxin Technology Service Co., Ltd.** The test standard in report CTS20220138-E is **EN 61000-6-1:2007, EN 61000-6-3:2007+A1:2011**.

Reviewed the requirement for the product in this report between newest standards EN IEC 61000-6-3: 2021, EN IEC 61000-6-1: 2019 and old versions EN 61000-6-1:2007, EN 61000-6-3:2007+A1:2011 were identical except Radiated immunity. The Radiated immunity was tested up to 6GHz in report **CTS20220137-E.** Therefore, the product comply with EN IEC 61000-6-3: 2021, EN IEC 61000-6-1: 2019 without further testing. Only newest standards requirement and test data was recorded in this report.

Remark for the report GZEM220800488101C05:

This report GZEM220800488101C05 was a copy report based on original report GZEM220800488101, with the follow changes:

1. Changed applicant information

2. Changed model No: ED5000, ED4600, ED3600

According to the declaration from the applicant, the models in this report and model in original report are totally same, only being different in the model name.

ED5000: 5kW, ED4600: 4.6kW, ED3600: 3.6kW.

3.Changed trademark to: ADAYO

4. Added appearance photo.

Therefore, test data in GZEM220800488101 was kept in this report GZEM220800488101C05.

3 Contents

4 General Information

4.1 Details of E.U.T.

Power supply: PV max Voltage: 500Vdc
PV input voltage range: 150-500Vdc
MPPT Voltage rang: 120-430Vdc
Max input current: 15A/15A
Normal operating voltage: 230Vac
Max operating current: 22.8Aac
Normal operating frequency: 50Hz
Maximum power: 5000W

Cable(s): 2 wires X 1.0m unscreened DC cable
2 wires X 1.0m unscreened AC mains cable

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
DC power	Chuangyao Electronic	SRH40H	TS20090006

4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
Conducted Emissions at AC Mains Power Port	±3.3dB (9kHz to 30MHz)
Radiated Emissions	±4.5dB (30MHz-1GHz) ±4.8dB (above 1GHz)
Remark: The U_{lab} (lab Uncertainty) is less than U_{cispr} (CISPR Uncertainty), so the test results – compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit; – non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.	

4.4 Test Location

All tests were performed at:
Shenzhen Chengxin Technology Service Co., Ltd.
Dafu Factory, No. 13, Aiqun Road, North, Shangwu, Shiyan Street, Bao'an District, Shenzhen, Guangdong China

4.5 Deviation from Standards

None

4.6 Abnormalities from Standard Conditions

None

4.7 EMS Monitor

Visual: LED lighting of EUT

Audio: N/A

5 Equipment List

Description	Manufacturer	Model No.	Serial No.	Cal. Due Date
Test Receiver	ROHDE&SCHWARZ	ESCI 7	TE18080002	2023.03.07
LISN	SCHWARZBECK	NNLK8130	TE18080014	2023.04.18
DC-AN	SCHWARZBECK	PVDC 8301	TE18080079	2023.07.10
Attenuator	ROHDE&SCHWARZ	ESH3-Z2	TE18080089	2023.09.13
3m Chamber	EMC-united	9mx6mx6m	TE21100001	2024.11.19
10m Chamber	EMC-united	21.1x12.4x8.55M(H)	TE18080065	2024.04.16
Broadband Antenna	SCHWARZBECK	VULB 9163	TE18080010	2023.03.04
Preset Amplifier	SONOMA	315	TE18080076	2023.07.06
ESD Test System	TESEQ	NSG 437	TE18080035	2023.03.10
Signal Generator	Agilent	N5181A	TE18080045	2023.07.10
Power Meter	Agilent	N1914A	TE18080058	2023.07.10
EMS Antenna	SCHWARZBECK	STLP 9128 E	TE18080007	2024.02.03
EMS Antenna	SCHWARZBECK	BBHA 9120 J	TE18080005	2024.02.03
Power Amplifier	TESEQ	CBA 1G-1200B	TE18080055	2023.09.13
Power Amplifier	MILMEGA	AS0104-200/200	TE18080063	2023.07.10
Power Amplifier	MILMEGA	CBA 6G-080D	TE18080012	2023.07.10
EFT/Surge Test System	EM TEST	UCS500N7.2	TE18080036	2023.03.07
	EM TEST	CNI503B9.4/100A	TE18080037	2023.03.07
Signal Generator	ROHDE&SCHWARZ	SML01	TE18080048	2022.11.20
Power Amplifier	AMETEK	SCDX150	TE18080013	2023.09.13
CDN	SCHWARZBECK	M2/M3 PE 16A	TE18080020	2023.03.07
Injection probe	TESEQ	CIP 9136A	TE18080029	2023.07.06
Voltage Dip Switch	TESEQ	NSG 2200-3	TE18080054	2023.08.15
Magnetic Field Tester	3C TEST	MFS 1200	TE18080040	2023.07.10
Magnetic Field Test Coil	3C TEST	TCXS 113	TE18080041	2023.07.10
Power Supply	Chroma	61860	TE18080043	2023.07.27
Harmonic Flicker analyzer	TESEQ	CCN1000-3	TE18080052	2023.09.13

6 Emission Test Results

6.1 Conducted Emissions at AC Mains Power Port (150kHz-30MHz)

Test Requirement: EN IEC 61000-6-3: 2021

Test Method: CISPR 16-2-1

Limit:

0.15M-0.5MHz	66dB(μV)-56dB(μV) quasi-peak, 56dB(μV)-46dB(μV) average
0.5M-5MHz	56dB(μV) quasi-peak, 46dB(μV) average
5M-30MHz	60dB(μV) quasi-peak, 50dB(μV) average

Detector: Peak for pre-scan (9kHz resolution bandwidth) 0.15M to 30MHz

6.1.1 E.U.T. Operation

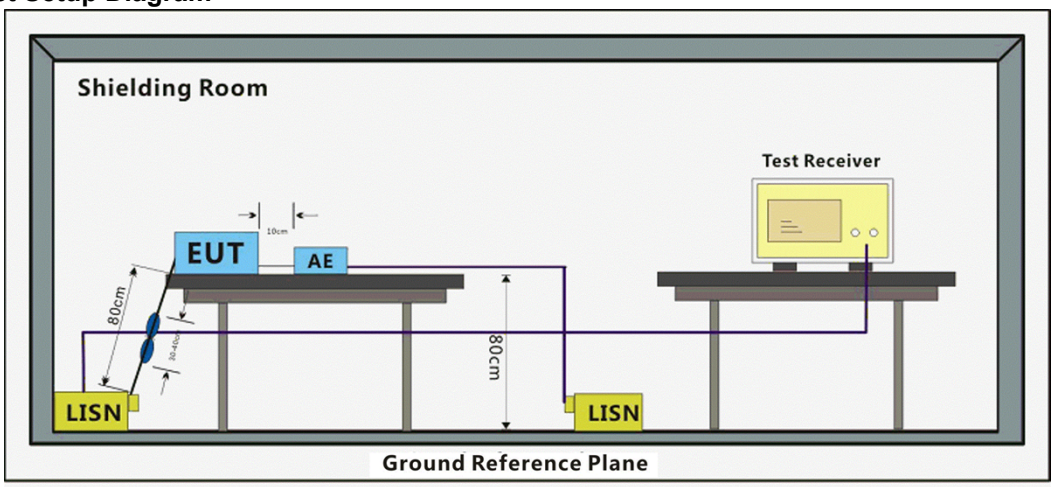
Operating Environment:

Temperature: 22.2 °C Humidity: 51 % RH Atmospheric Pressure: 1015 mbar

6.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Pre-scan	00	Test the EUT in Grid-Connection (100% Load) mode
Final test	01	Test the EUT in Grid-Connection (50% Load) mode
Pre-scan	02	Test the EUT in Charging (100% Load) mode
Pre-scan	03	Test the EUT in Charging (50% Load) mode

6.1.3 Test Setup Diagram



6.1.4 Measurement Procedure and Data

Frequency range: 150kHz-30MHz

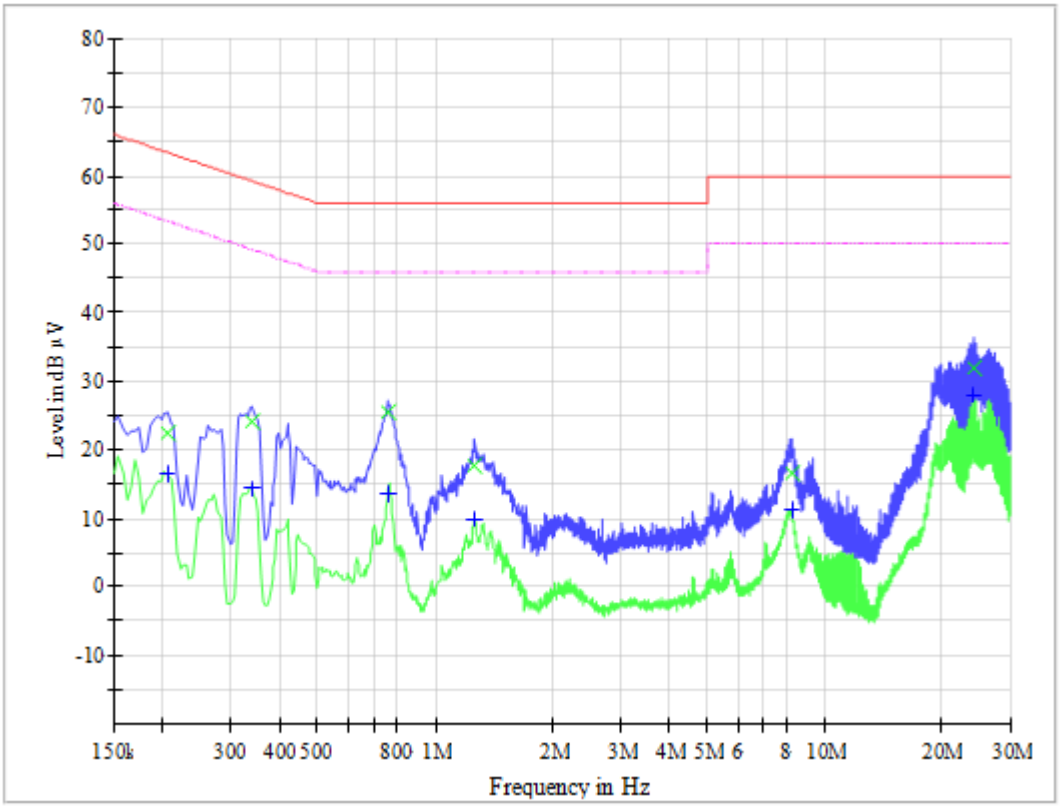
An initial pre-scan was performed with peak detector. Quasi-Peak or Average measurement were performed at the frequencies with maximized peak emission were detected.

The red line show in graphic is the limit in standard used in this section.

Test Mode: 01; Line: Live Line

QP			AV		
Frequency (MHz)	Measurement Value (dBμV)	Limits (dBμV)	Frequency (MHz)	Measurement Value (dBμV)	Limits (dBμV)
0.2060	22.51	63.4	0.2060	16.6	53.4
0.3380	24.16	59.3	0.3380	14.3	49.3
0.7540	25.60	56.0	0.7540	13.7	46.0
1.2660	17.63	56.0	1.2660	10.0	46.0
8.2180	16.61	60.0	8.2180	11.2	50.0
24.0580	32.09	60.0	24.0580	28.1	50.0

Test Curve



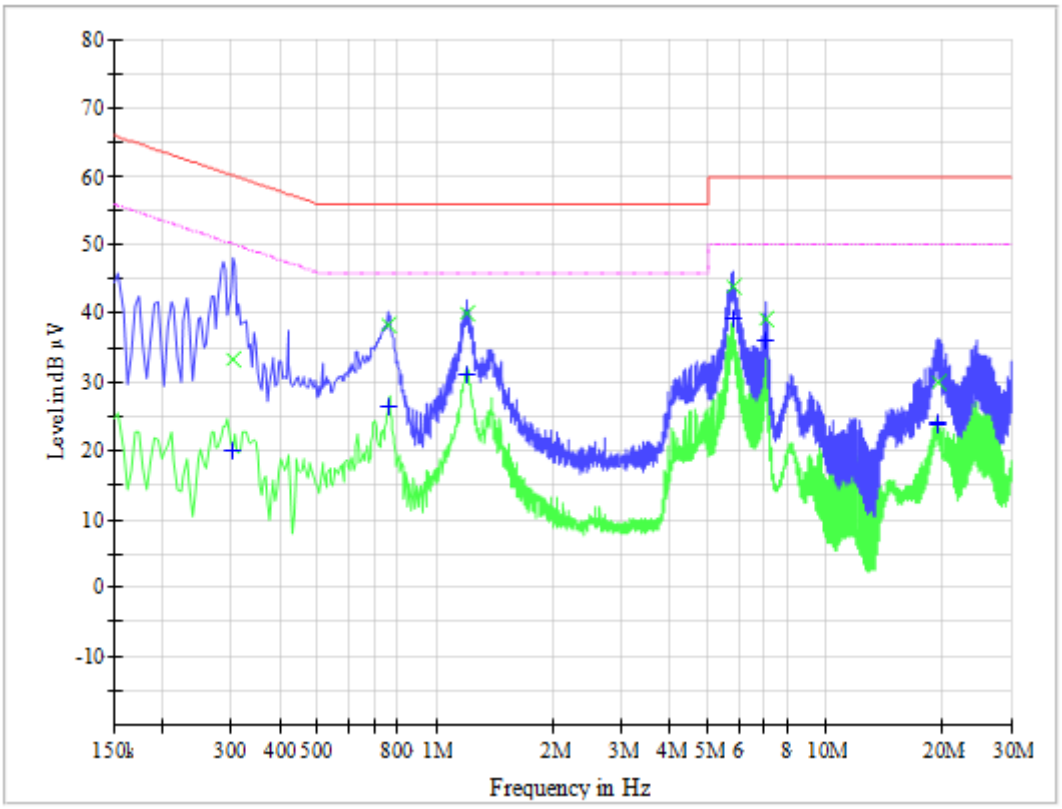
NOTE:

1. The EUT meets the more severe EN 61000-6-3 requirement.
2. The lower limit shall apply at the transition frequencies.
3. QP and AV are abbreviations of the quasi-peak and average individually.
4. The emission levels recorded above is the larger ones of each phase.

Test Mode: 01; Line: Neutral Line

Frequency (MHz)	Measurement Value (dBµV)	Limits (dBµV)	Frequency (MHz)	Measurement Value (dBµV)	Limits (dBµV)
0.3020	33.27	60.2	0.3020	20.0	50.2
0.7540	38.31	56.0	0.7540	26.3	46.0
1.2020	40.13	56.0	1.2020	31.1	46.0
5.7940	43.83	60.0	5.7940	39.1	50.0
7.0420	39.22	60.0	7.0420	36.3	50.0
19.5820	29.91	60.0	19.5820	24.1	50.0

Test Curve



NOTE:

1. The EUT meets the more severe EN 61000-6-3 requirement.
2. The lower limit shall apply at the transition frequencies.
3. QP and AV are abbreviations of the quasi-peak and average individually.
4. The emission levels recorded above is the larger ones of each phase.

6.2 Conducted Emissions at DC Power Port (150kHz-30MHz)

Test Requirement: EN IEC 61000-6-3: 2021

Test Method: CISPR 16-2-1

Limit:

0.15M-0.5MHz	79dB(μV) quasi-peak, 66dB(μV) average
0.5M-30MHz	73dB(μV) quasi-peak, 60dB(μV) average

Detector: Peak for pre-scan (9kHz resolution bandwidth) 0.15M to 30MHz

6.2.1 E.U.T. Operation

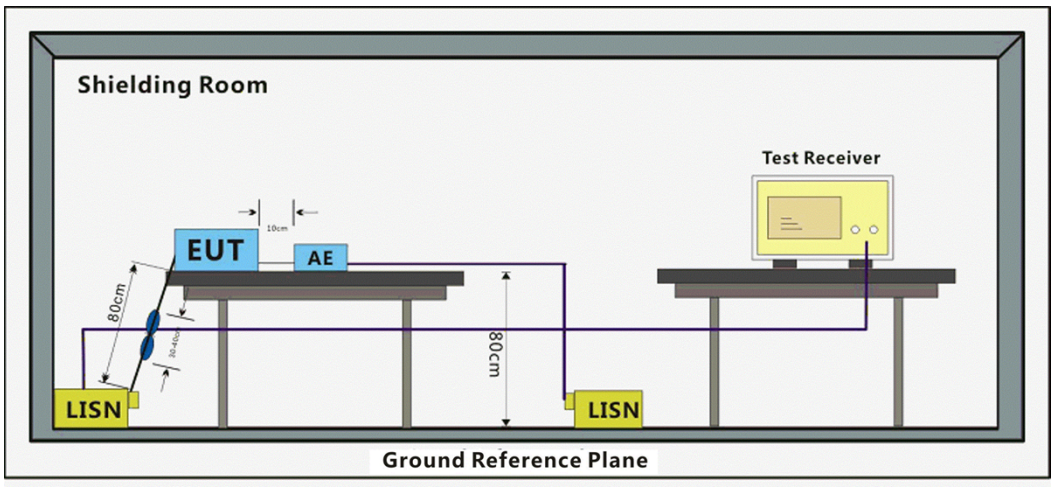
Operating Environment:

Temperature: 22.2 °C Humidity: 51 % RH Atmospheric Pressure: 1015 mbar

6.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Pre-scan	00	Test the EUT in Grid-Connection (100% Load) mode
Final test	01	Test the EUT in Grid-Connection (50% Load) mode
Pre-scan	02	Test the EUT in Charging (100% Load) mode
Pre-scan	03	Test the EUT in Charging (50% Load) mode

6.2.3 Test Setup Diagram



6.2.4 Measurement Procedure and Data

Frequency range: 150kHz-30MHz

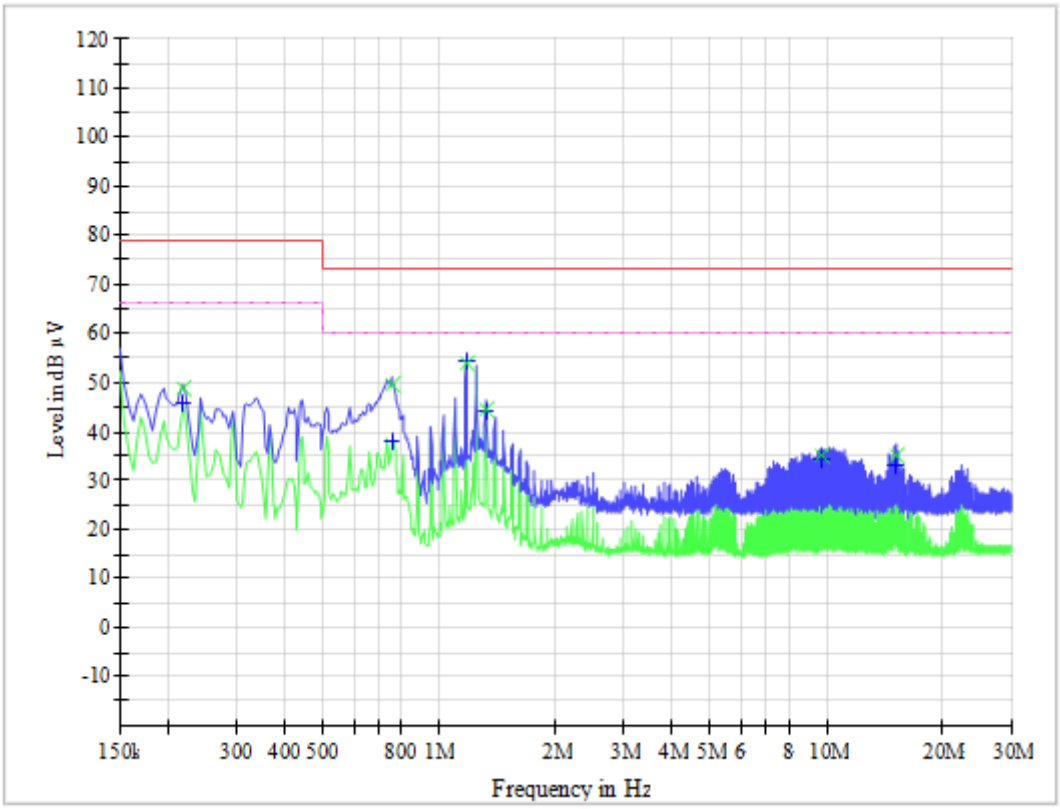
An initial pre-scan was performed with peak detector. Quasi-Peak or Average measurement were performed at the frequencies with maximized peak emission were detected.

The red line show in graphic is the limit in standard used in this section.

Test Mode: 01; Line: Positive Line

QP			AV		
Frequency (MHz)	Measurement Value (dBμV)	Limits (dBμV)	Frequency (MHz)	Measurement Value (dBμV)	Limits (dBμV)
0.2180	48.8	79.0	0.2180	45.9	66.0
0.7540	49.8	73.0	0.7540	37.7	60.0
1.1740	54.1	73.0	1.1740	54.2	60.0
1.3220	44.6	73.0	1.3220	44.0	60.0
9.6820	35.0	73.0	9.6820	34.4	60.0
15.1820	35.0	73.0	15.1820	33.3	60.0

Test Curve



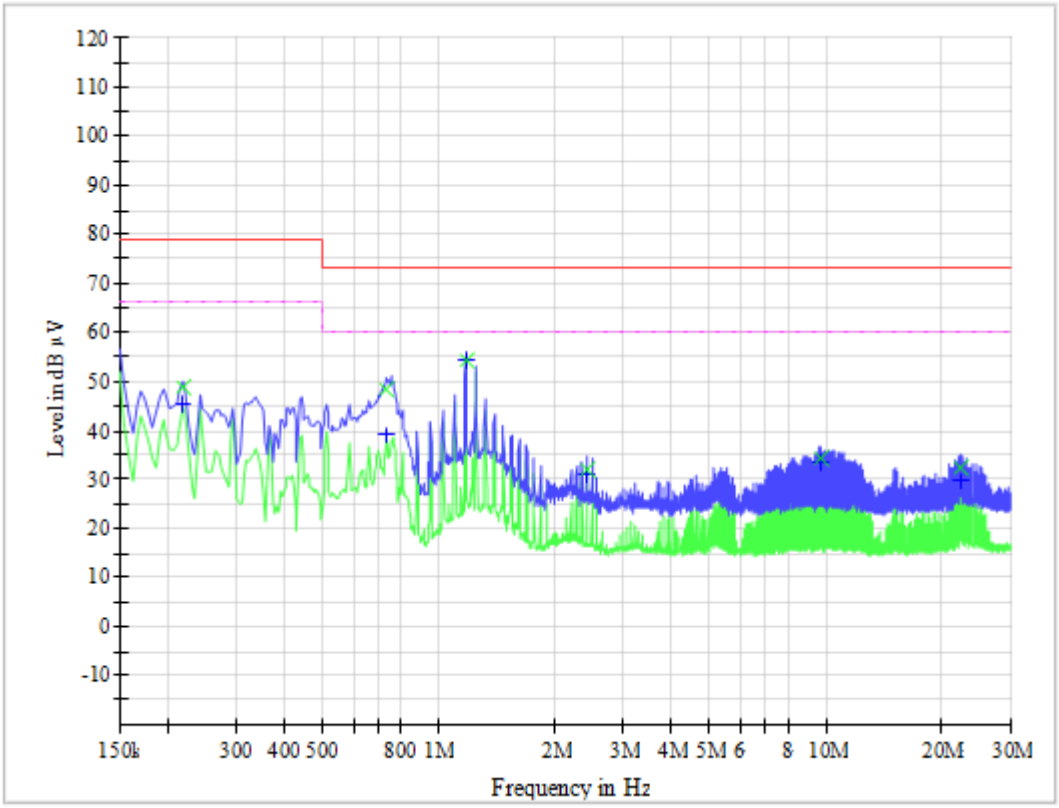
NOTE:

1. The EUT meets the more severe EN 61000-6-3 requirement.
2. The lower limit shall apply at the transition frequencies.
3. QP and AV are abbreviations of the quasi-peak and average individually.
4. The emission levels recorded above is the larger ones of each phase.

Test Mode: 01; Line: Negative Line

QP			AV		
Frequency (MHz)	Measurement Value (dBµV)	Limits (dBµV)	Frequency (MHz)	Measurement Value (dBµV)	Limits (dBµV)
0.2180	48.8	79.0	0.2180	45.4	66.0
0.7340	48.4	73.0	0.7340	39.1	60.0
1.1740	54.3	73.0	1.1740	54.4	60.0
2.4220	31.9	73.0	2.4220	30.9	60.0
9.6820	34.3	73.0	9.6820	33.6	60.0
22.3700	32.2	73.0	22.3700	29.7	60.0

Test Curve



NOTE:

1. The EUT meets the more severe EN 61000-6-3 requirement.
2. The lower limit shall apply at the transition frequencies.
3. QP and AV are abbreviations of the quasi-peak and average individually.
4. The emission levels recorded above is the larger ones of each phase.

6.3 Radiated Emissions (30MHz-1GHz)

Test Requirement: EN IEC 61000-6-3: 2021

Test Method: CISPR 16-2-3

Limit:

Test Distance: 3m

30MHz-230MHz 40 dB(μV/m) quasi-peak

230MHz-1GHz 47 dB(μV/m) quasi-peak

Detector: Peak for pre-scan (120kHz resolution bandwidth) 30MHz to 1000MHz

6.3.1 E.U.T. Operation

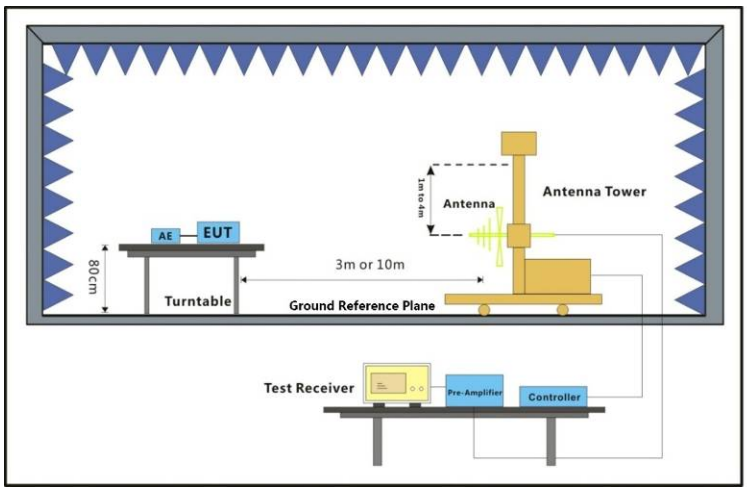
Operating Environment:

Temperature: 22.2 °C Humidity: 51 % RH Atmospheric Pressure: 1015 mbar

6.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Pre-scan	00	Test the EUT in Grid-Connection (100% Load) mode
Final test	01	Test the EUT in Grid-Connection (50% Load) mode
Pre-scan	02	Test the EUT in Charging (100% Load) mode
Pre-scan	03	Test the EUT in Charging (50% Load) mode

6.3.3 Test Setup Diagram



6.3.4 Measurement Procedure and Data

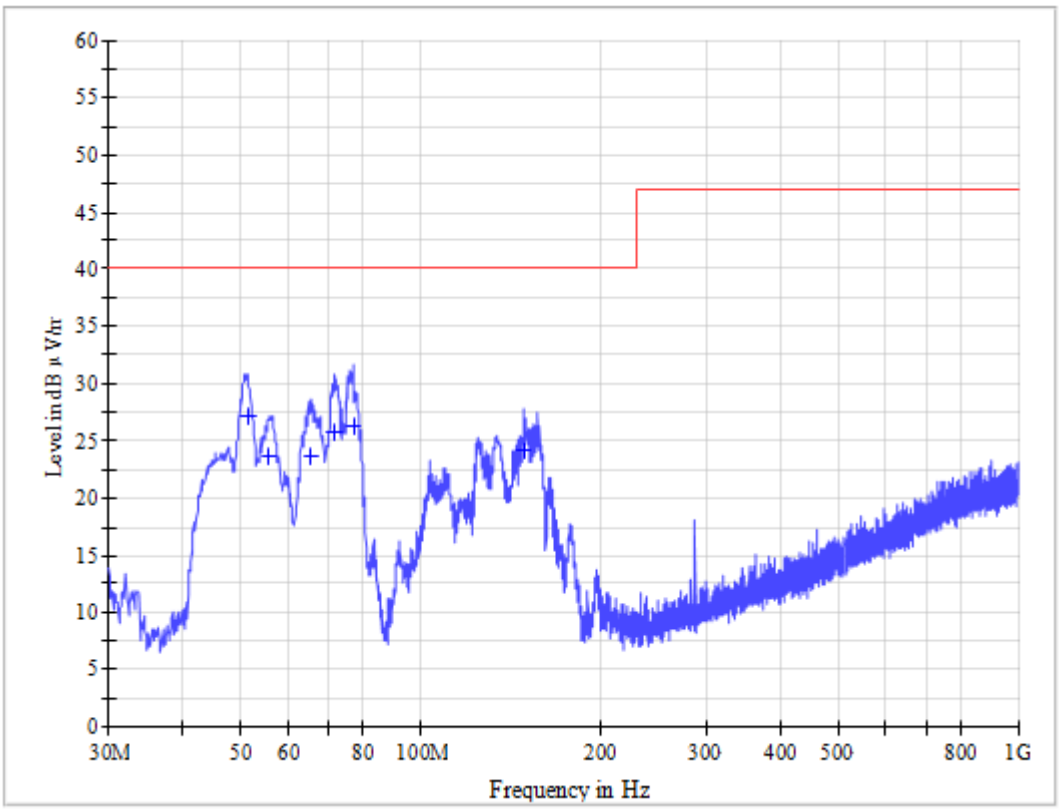
Frequency range: 30MHz-1GHz

An initial pre-scan was performed in the chamber using the spectrum analyser in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by BiConiLog antenna with 2 orthogonal polarities.The red line show in graphic is the limit in standard used in this section.

Test Mode: 01; Polarization: Horizontal

Frequency (MHz)	Antenna Polarization	Antenna Height (cm)	Table Angle (Degree)	Emission Level (dBμV/m)	QP Limits (dBμV/m)
51.48	H	400.0	36.0	27.2	40.0
55.96	H	300.0	120.0	23.7	40.0
65.76	H	400.0	48.0	23.6	40.0
71.84	H	300.0	225.0	25.8	40.0
77.04	H	400.0	35.0	26.3	40.0
148.96	H	400.0	105.0	24.2	40.0

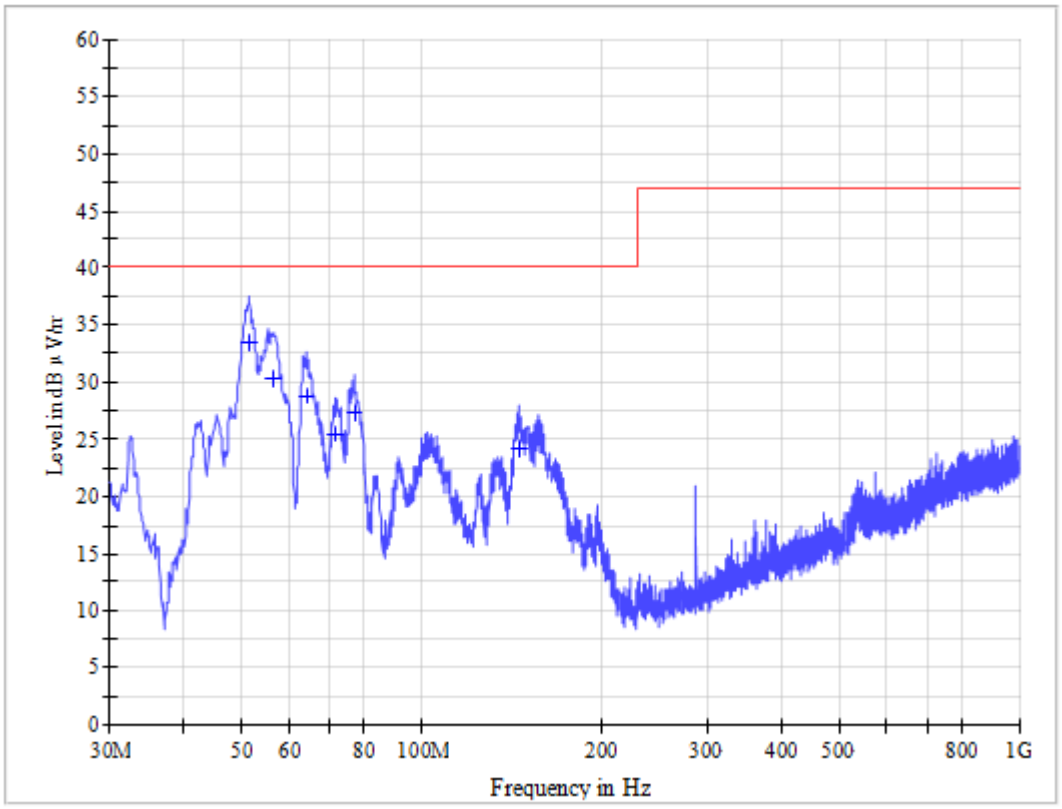
Test Curve



Test Mode: 01; Polarization: Vertical

Frequency (MHz)	Antenna Polarization	Antenna Height (cm)	Table Angle (Degree)	Emission Level (dBμV/m)	QP Limits (dBμV/m)
51.48	V	100.0	26.0	33.5	40.0
56.56	V	100.0	223.0	30.4	40.0
64.20	V	100.0	154.0	28.8	40.0
71.84	V	100.0	20.0	25.5	40.0
77.16	V	200.0	124.0	27.4	40.0
145.92	V	100.0	62.0	24.2	40.0

Test Curve



6.4 Harmonic Current Emission

Test Requirement: EN IEC 61000-6-3: 2021

Test Method: EN IEC 61000-3-2: 2019+A1:2021

6.4.1 E.U.T. Operation

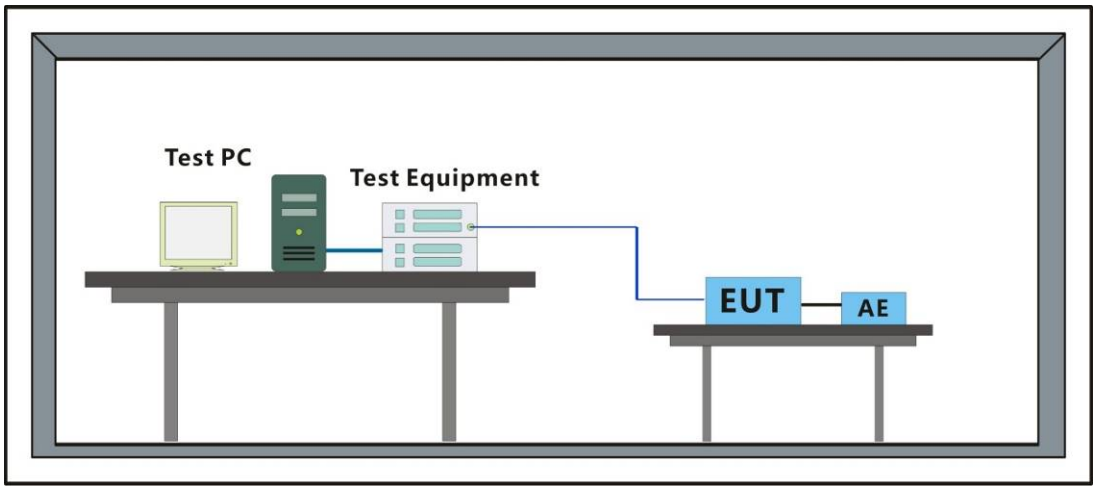
Operating Environment:

Temperature: 23.5 °C Humidity: 53 % RH Atmospheric Pressure: 1015 mbar

6.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Pre-scan	00	Test the EUT in Grid-Connection (100% Load) mode
Final test	01	Test the EUT in Grid-Connection (50% Load) mode
Pre-scan	02	Test the EUT in Charging (100% Load) mode
Pre-scan	03	Test the EUT in Charging (50% Load) mode

6.4.3 Test Setup Diagram



6.4.4 Measurement Procedure and Data

Frequency Range: 100Hz to 2kHz

Test Mode: 01

Harm#	Harms (avg)	100%Limit	%of Limit	Harms (max)	150%Limit	%of Limit	Status
2	0.027	1.768	1.5	0.040	2.651	1.5	Pass
3	0.168	4.772	3.5	0.193	7.158	2.7	Pass
4	0.015	0.884	1.7	0.024	1.326	1.8	Pass
5	0.106	2.364	4.5	0.110	3.546	3.1	Pass
6	0.006	0.589	1.0	0.008	0.884	0.9	Pass
7	0.074	1.591	4.6	0.078	2.386	3.3	Pass
8	0.006	0.442	1.3	0.008	0.663	1.2	Pass
9	0.072	0.840	8.6	0.074	1.259	5.8	Pass
10	0.005	0.354	N/A	0.007	0.530	N/A	Pass
11	0.080	0.685	11.6	0.081	1.027	7.9	Pass
12	0.005	0.295	1.8	0.007	0.442	1.7	Pass
13	0.081	0.442	18.4	0.083	0.663	12.5	Pass
14	0.006	N/A	N/A	0.009	N/A	N/A	N/A
15	0.081	N/A	N/A	0.083	N/A	N/A	N/A
16	0.006	N/A	N/A	0.009	N/A	N/A	N/A
17	0.081	N/A	N/A	0.083	N/A	N/A	N/A
18	0.007	N/A	N/A	0.012	N/A	N/A	N/A
19	0.077	N/A	N/A	0.079	N/A	N/A	N/A
20	0.010	N/A	N/A	0.021	N/A	N/A	N/A
21	0.071	N/A	N/A	0.084	N/A	N/A	N/A
22	0.024	N/A	N/A	0.037	N/A	N/A	N/A
23	0.065	N/A	N/A	0.077	N/A	N/A	N/A
24	0.075	N/A	N/A	0.102	N/A	N/A	N/A
25	0.074	N/A	N/A	0.104	N/A	N/A	N/A
26	0.078	N/A	N/A	0.108	N/A	N/A	N/A
27	0.067	N/A	N/A	0.090	N/A	N/A	N/A
28	0.026	N/A	N/A	0.053	N/A	N/A	N/A
29	0.033	N/A	N/A	0.046	N/A	N/A	N/A
30	0.014	N/A	N/A	0.021	N/A	N/A	N/A
31	0.020	N/A	N/A	0.025	N/A	N/A	N/A
32	0.007	N/A	N/A	0.015	N/A	N/A	N/A
33	0.013	N/A	N/A	0.016	N/A	N/A	N/A
34	0.006	N/A	N/A	0.010	N/A	N/A	N/A
35	0.010	N/A	N/A	0.013	N/A	N/A	N/A
36	0.005	N/A	N/A	0.008	N/A	N/A	N/A
37	0.010	N/A	N/A	0.011	N/A	N/A	N/A
38	0.004	N/A	N/A	0.007	N/A	N/A	N/A
39	0.008	N/A	N/A	0.010	N/A	N/A	N/A
40	0.004	N/A	N/A	0.006	N/A	N/A	N/A

6.5 Voltage Fluctuations and Flicker

Test Requirement: EN IEC 61000-6-3: 2021

Test Method: EN 61000-3-3:2013+A1:2019+A2:2021

6.5.1 E.U.T. Operation

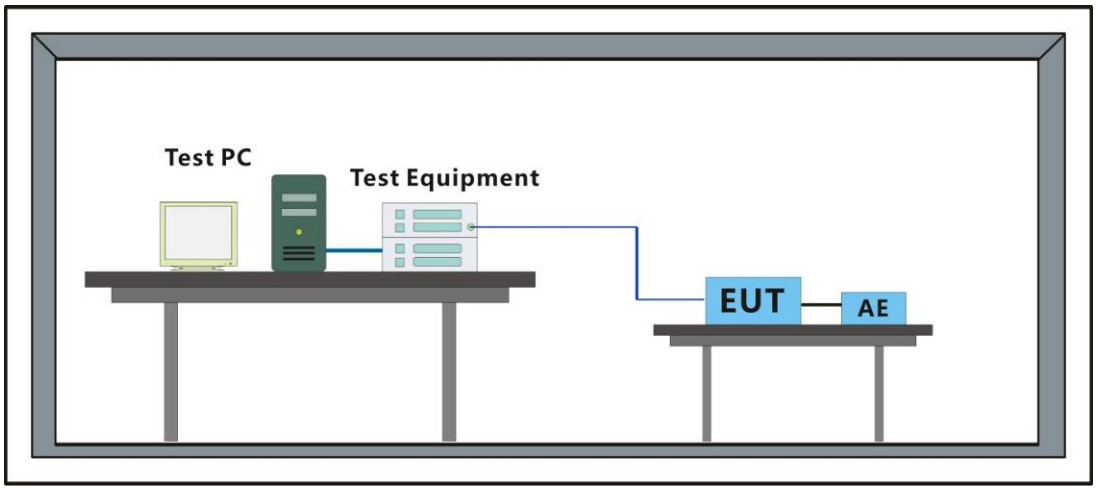
Operating Environment:

Temperature: 23.5 °C Humidity: 53 % RH Atmospheric Pressure: 1015 mbar

6.5.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Pre-scan	00	Test the EUT in Grid-Connection (100% Load) mode
Final test	01	Test the EUT in Grid-Connection (50% Load) mode
Pre-scan	02	Test the EUT in Charging (100% Load) mode
Pre-scan	03	Test the EUT in Charging (50% Load) mode

6.5.3 Test Setup Diagram



6.5.4 Measurement Procedure and Data

Test Mode: 01

Test Frequency:	50Hz	**Test Voltage:**	230Vac
Waveform:	Sine	**Test Time:**	10 minutes (P_{st}); 2 hours (P_{lt})

Test Parameter	Measurement Value	Limit	Remarks
P_{st}	0.201	1.0	Pass
P_{lt}	0.171	0.65	Pass
$T_{dt(s)}$	0.0	0.5	Pass
$d_{max}(\%)$	0.19	4	Pass
$d_c(\%)$	0.00	3.3	Pass

7 Immunity Test Results

Performance Criteria Description in EN IEC 61000-6-1:2019

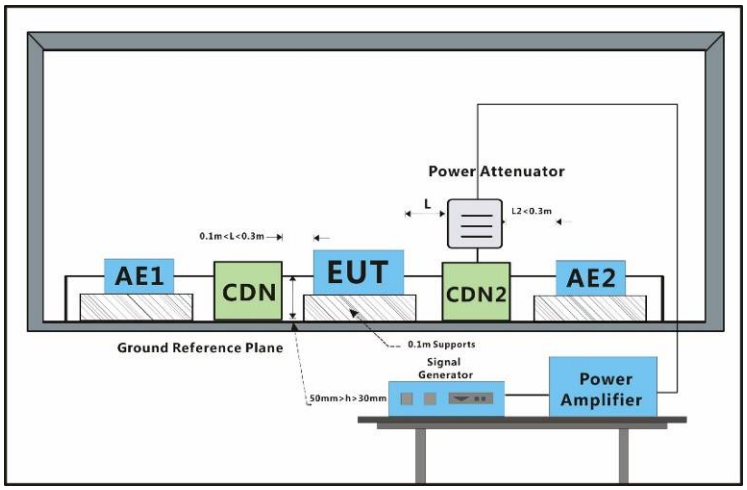
Criterion A	The EUT shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the EUT is used as intended. If the performance level is not specified by the manufacturer, this may be derived from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.
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.
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.

7.1 Conducted Immunity at AC Mains Power Port (150kHz-80MHz)

Test Requirement: EN IEC 61000-6-1: 2019

Test Method: EN 61000-4-6:2014

7.1.1 Test Setup Diagram



7.1.2 E.U.T. Operation

Operating Environment:

Temperature: 23.5 °C Humidity: 53 % RH Atmospheric Pressure: 1015 mbar

7.1.3 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Test the EUT in Grid-Connection (100% Load) mode
Final test	01	Test the EUT in Grid-Connection (50% Load) mode
Final test	02	Test the EUT in Charging (100% Load) mode
Final test	03	Test the EUT in Charging (50% Load) mode
Final test	04	Test the EUT in idle mode

7.1.4 Test Condition and Results:

Performance Criterion: A

Frequency Range: 0.15MHz to 80MHz

Modulation: 80%, 1kHz Amplitude Modulation

Step Size 1%

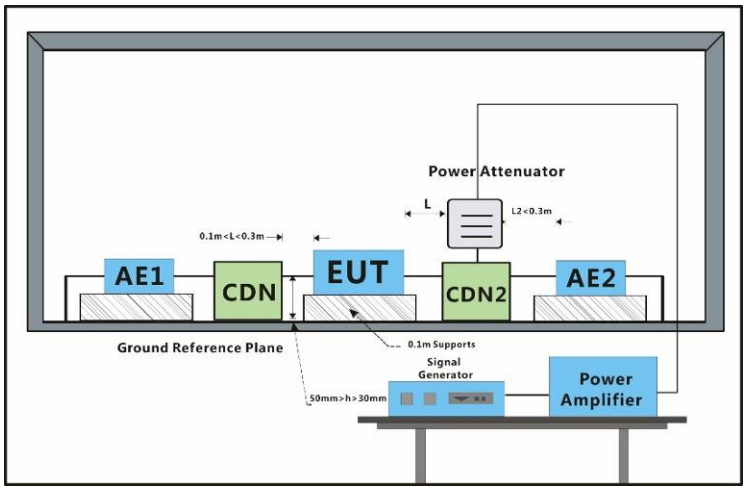
Cable port	Level (Vrms)	CDN/Clamp	Dwell time	Result / Observations
AC power port	3(0.15MHz-80MHz)	CDN	3s	A
A: No degradation in the performance of the EUT was observed				

7.2 Conducted Immunity at DC Power Port (150kHz-80MHz)

Test Requirement: EN IEC 61000-6-1: 2019

Test Method: EN 61000-4-6:2014

7.2.1 Test Setup Diagram



7.2.2 E.U.T. Operation

Operating Environment:

Temperature: 23.5 °C Humidity: 53 % RH Atmospheric Pressure: 1015 mbar

7.2.3 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Test the EUT in Grid-Connection (100% Load) mode
Final test	01	Test the EUT in Grid-Connection (50% Load) mode
Final test	02	Test the EUT in Charging (100% Load) mode
Final test	03	Test the EUT in Charging (50% Load) mode
Final test	04	Test the EUT in idle mode

7.2.4 Test Condition and Results:

Performance Criterion: A

Frequency Range: 0.15MHz to 80MHz

Modulation: 80%, 1kHz Amplitude Modulation

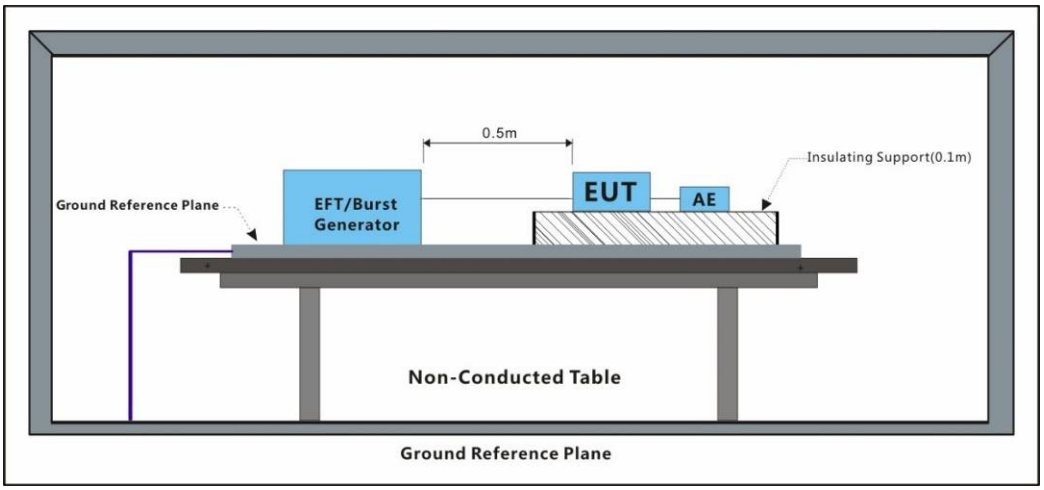
Step Size 1%

Port	Level (Vrms)	CDN/Clamp	Dwell time	Result / Observations
DC Network Power Port	3(0.15MHz-80MHz)	CDN	3s	A
A: No degradation in the performance of the EUT was observed				

7.3 Electrical Fast Transients Burst at AC Mains Power Port

Test Requirement: EN IEC 61000-6-1: 2019
Test Method: EN 61000-4-4:2012

7.3.1 Test Setup Diagram



7.3.2 E.U.T. Operation

Operating Environment:

Temperature: 23.5 °C Humidity: 53 % RH Atmospheric Pressure: 1015 mbar

7.3.3 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Test the EUT in Grid-Connection (100% Load) mode
Final test	01	Test the EUT in Grid-Connection (50% Load) mode
Final test	02	Test the EUT in Charging (100% Load) mode
Final test	03	Test the EUT in Charging (50% Load) mode
Final test	04	Test the EUT in idle mode

7.3.4 Test Condition and Results:

Performance Criterion: B
Repetition Frequency: 5kHz or 100kHz
Burst Period: 300ms
Test Duration: 2 minute per level & polarity

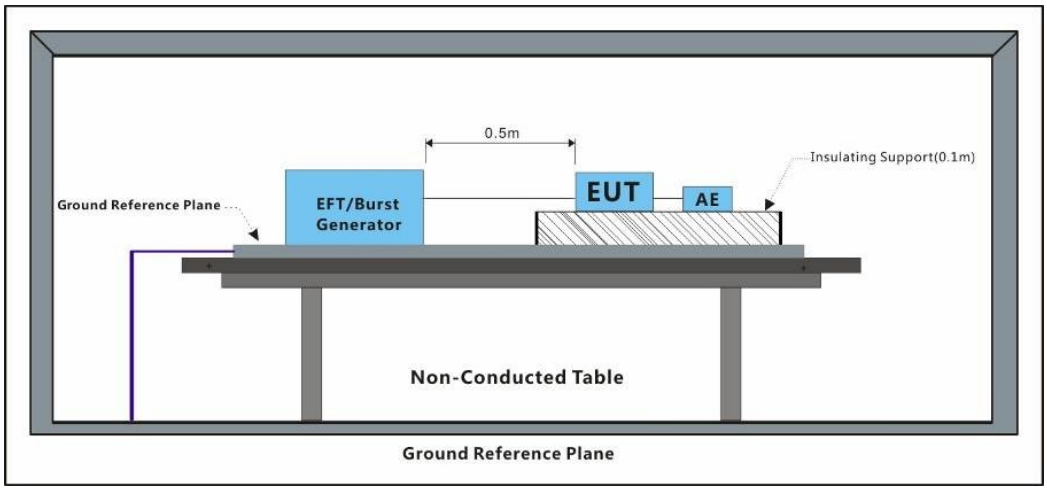
Test Line	Level (kV)	Polarity	CDN/Clamp	Result / Observations
AC power port	1	+	CDN	A
AC power port	1	-	CDN	A
A: No degradation in the performance of the EUT was observed				

7.4 Electrical Fast Transients Burst at DC Power Port

Test Requirement: EN IEC 61000-6-1: 2019

Test Method: EN 61000-4-4:2012

7.4.1 Test Setup Diagram



7.4.2 E.U.T. Operation

Operating Environment:

Temperature: 23.5 °C Humidity: 53 % RH Atmospheric Pressure: 1015 mbar

7.4.3 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Test the EUT in Grid-Connection (100% Load) mode
Final test	01	Test the EUT in Grid-Connection (50% Load) mode
Final test	02	Test the EUT in Charging (100% Load) mode
Final test	03	Test the EUT in Charging (50% Load) mode
Final test	04	Test the EUT in idle mode

7.4.4 Test Condition and Results:

Performance Criterion: B

Repetition Frequency: 5kHz or 100kHz

Burst Period: 300ms

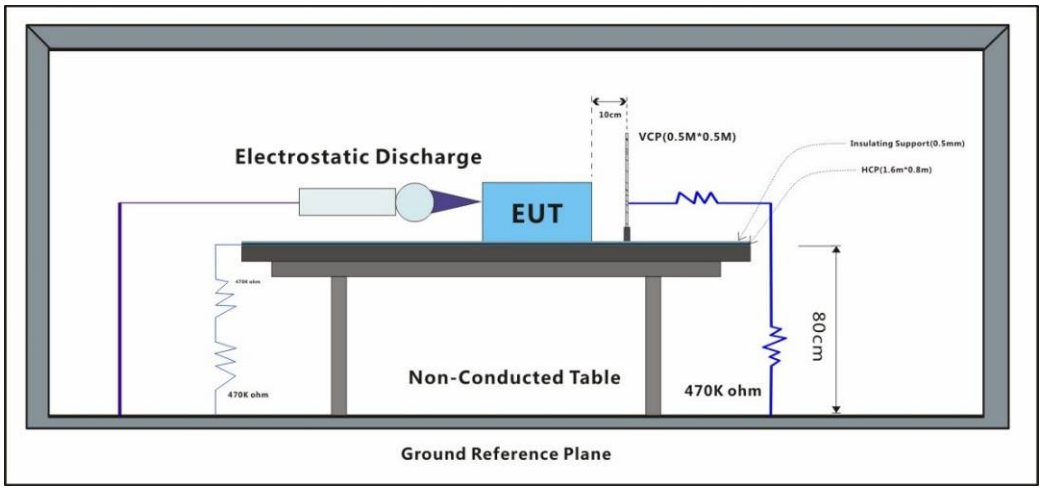
Test Duration: 2 minute per level & polarity

Test Line	Level (kV)	Polarity	CDN/Clamp	Result / Observations
DC power port	0.5	+	CDN	A
DC power port	0.5	-	CDN	A
A: No degradation in the performance of the EUT was observed				

7.5 Electrostatic Discharge

Test Requirement: EN IEC 61000-6-1: 2019
Test Method: EN 61000-4-2:2009

7.5.1 Test Setup Diagram



7.5.2 E.U.T. Operation

Operating Environment:

Temperature: 23.5 °C Humidity: 53 % RH Atmospheric Pressure: 1015 mbar

7.5.3 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Test the EUT in Grid-Connection (100% Load) mode
Final test	01	Test the EUT in Grid-Connection (50% Load) mode
Final test	02	Test the EUT in Charging (100% Load) mode
Final test	03	Test the EUT in Charging (50% Load) mode
Final test	04	Test the EUT in idle mode

7.5.4 Test Condition and Results:

Performance Criterion: B
Discharge Impedance: 330Ω/150pF
Number of Discharge: Minimum 10 times at each test point
Discharge Mode: Single Discharge
Discharge Period: 1 second minimum

Test Point: 1. All insulated enclosure and seams.
2. All accessible metal parts of the enclosure.
3. All side

Discharge type	Level (kV)	Polarity	Test Point	Result / Observations
Air Discharge	2,4,8	+	1	A
Air Discharge	2,4,8	-	1	A
Contact Discharge	4	+	2	A
Contact Discharge	4	-	2	A
Horizontal Coupling	4	+	3	A
Horizontal Coupling	4	-	3	A
Vertical Coupling	4	+	3	A
Vertical Coupling	4	-	3	A
A: No degradation in the performance of the EUT was observed				

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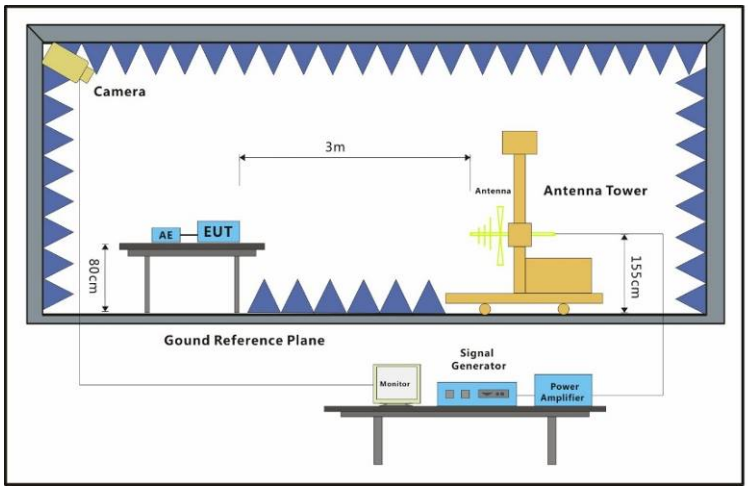
中国·广州·经济技术开发区科学城科珠路198号 邮编: 510663 t (86-20) 82155555 f (86-20) 82075058 sgs.china@sgs.com

7.6 Radiated Immunity (80MHz-6GHz)

Test Requirement: EN IEC 61000-6-1: 2019

Test Method: EN IEC 61000-4-3: 2020

7.6.1 Test Setup Diagram



7.6.2 E.U.T. Operation

Operating Environment:

Temperature: 22.7 °C Humidity: 52 % RH Atmospheric Pressure: 1015 mbar

7.6.3 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Test the EUT in Grid-Connection (100% Load) mode
Final test	01	Test the EUT in Grid-Connection (50% Load) mode
Final test	02	Test the EUT in Charging (100% Load) mode
Final test	03	Test the EUT in Charging (50% Load) mode
Final test	04	Test the EUT in idle mode

7.6.4 Test Condition and Results:

Performance Criterion: A

Antenna Polarisation: Vertical and Horizontal

Modulation: 1kHz, 80% Amp. Mod, 1% increment

Frequency Range:80MHz to 1GHz, 1.4GHz to 6GHz

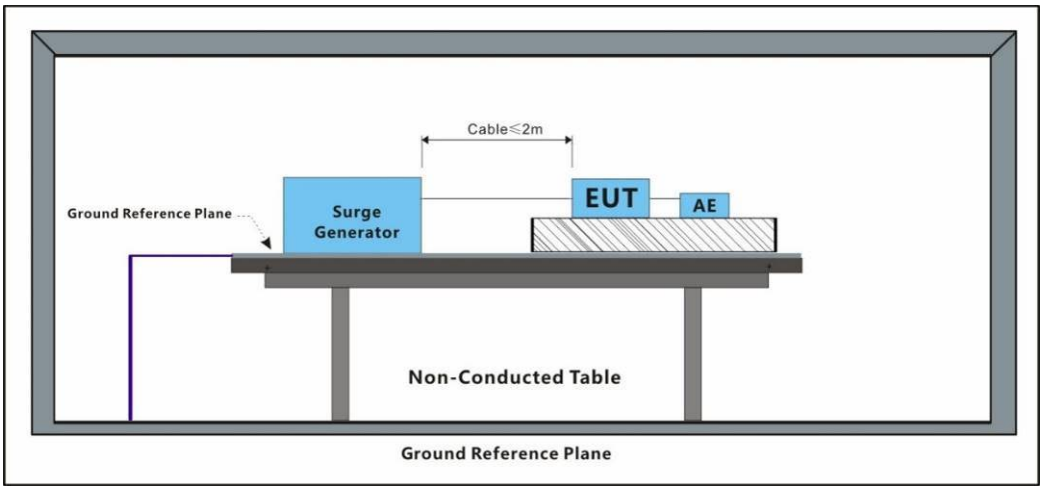
Frequency	Level (V/m)	EUT Face	Dwell time	Result / Observations
80MHz-1GHz	3	Front	2s	A
80MHz-1GHz	3	Back	2s	A
80MHz-1GHz	3	Left	2s	A
80MHz-1GHz	3	Right	2s	A
80MHz-1GHz	3	Top	2s	A
80MHz-1GHz	3	Underside	2s	A
1.4GHz-6GHz	3	Front	2s	A
1.4GHz-6GHz	3	Back	2s	A
1.4GHz-6GHz	3	Left	2s	A
1.4GHz-6GHz	3	Right	2s	A
1.4GHz-6GHz	3	Top	2s	A
1.4GHz-6GHz	3	Underside	2s	A
A: No degradation in the performance of the EUT was observed				

7.7 Surge at AC Mains Power Port

Test Requirement: EN IEC 61000-6-1: 2019

Test Method: EN 61000-4-5:2014+A1:2017

7.7.1 Test Setup Diagram



7.7.2 E.U.T. Operation

Operating Environment:

Temperature: 23.5 °C Humidity: 53 % RH Atmospheric Pressure: 1015 mbar

7.7.3 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Test the EUT in Grid-Connection (100% Load) mode
Final test	01	Test the EUT in Grid-Connection (50% Load) mode
Final test	02	Test the EUT in Charging (100% Load) mode
Final test	03	Test the EUT in Charging (50% Load) mode
Final test	04	Test the EUT in idle mode

7.7.4 Test Condition and Results:

Performance Criterion: B

Interval: 60s between each surge

No. of surges: 5 positive, 5 negative at 0°, 90°, 180°, 270°.

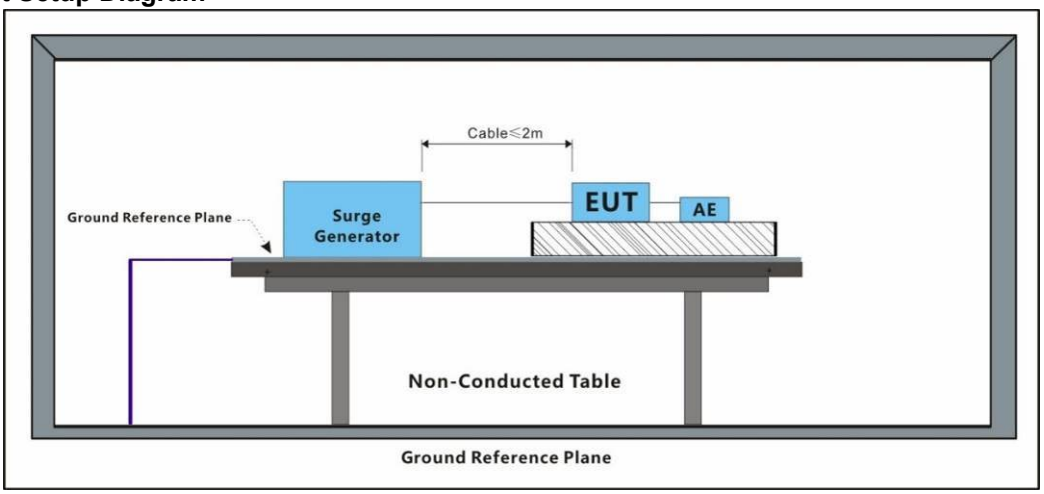
Test Line	Level (kV)	Polarity	Phase (deg)	Result / Observations
L-N	1	+	0°	A
L-N	1	-	0°	A
L-N	1	+	90°	A
L-N	1	-	90°	A
L-N	1	+	180°	A
L-N	1	-	180°	A
L-N	1	+	270°	A
L-N	1	-	270°	A
L-PE	2	+	0°	A
L-PE	2	-	0°	A
L-PE	2	+	90°	A
L-PE	2	-	90°	A
L-PE	2	+	180°	A
L-PE	2	-	180°	A
L-PE	2	+	270°	A
L-PE	2	-	270°	A
N-PE	2	+	0°	A
N-PE	2	-	0°	A
N-PE	2	+	90°	A
N-PE	2	-	90°	A
N-PE	2	+	180°	A
N-PE	2	-	180°	A
N-PE	2	+	270°	A
N-PE	2	-	270°	A
A: No degradation in the performance of the EUT was observed				

7.8 Surge at DC Port

Test Requirement: EN IEC 61000-6-1: 2019

Test Method: EN 61000-4-5:2014+A1:2017

7.8.1 Test Setup Diagram



7.8.2 E.U.T. Operation

Operating Environment:

Temperature: 23.5 °C Humidity: 53 % RH Atmospheric Pressure: 1015 mbar

7.8.3 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Test the EUT in Grid-Connection (100% Load) mode
Final test	01	Test the EUT in Grid-Connection (50% Load) mode
Final test	02	Test the EUT in Charging (100% Load) mode
Final test	03	Test the EUT in Charging (50% Load) mode
Final test	04	Test the EUT in idle mode

7.8.4 Test Condition and Results:

Performance Criterion: B

Interval: 60s between each surge

No. of surges: 5 positive, 5 negative

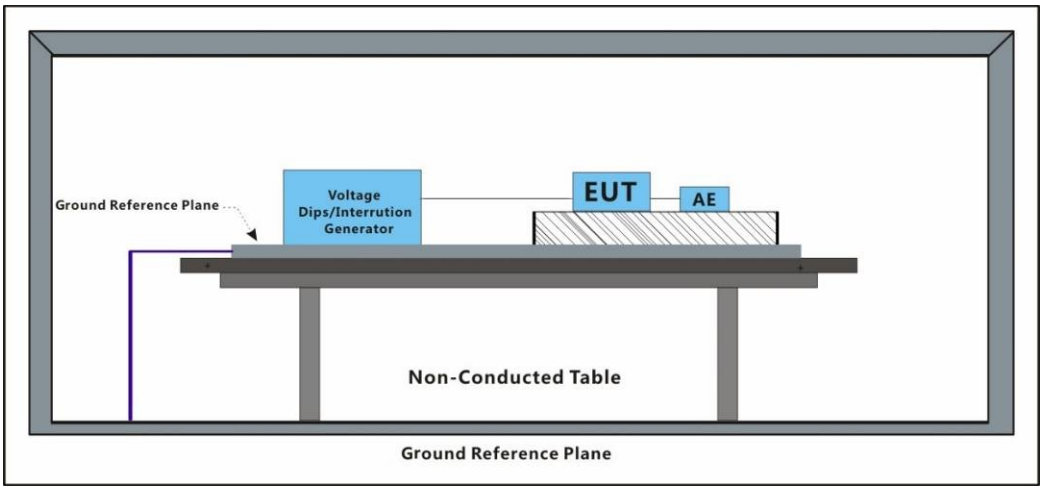
Test Line	Level (kV)	Polarity	Result / Observations
P-N	0.5	+	A
P-N	0.5	-	A
P-G	0.5	+	A
P-G	0.5	-	A
N-G	0.5	+	A
N-G	0.5	-	A
A: No degradation in the performance of the EUT was observed			

7.9 Voltage Dips and Interruptions

Test Requirement: EN IEC 61000-6-1: 2019

Test Method: EN IEC 61000-4-11:2020

7.9.1 Test Setup Diagram



7.9.2 E.U.T. Operation

Operating Environment:

Temperature: 23.5 °C Humidity: 53 % RH Atmospheric Pressure: 1015 mbar

7.9.3 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Test the EUT in Grid-Connection (100% Load) mode
Final test	01	Test the EUT in Grid-Connection (50% Load) mode
Final test	02	Test the EUT in Charging (100% Load) mode
Final test	03	Test the EUT in Charging (50% Load) mode
Final test	04	Test the EUT in idle mode

7.9.4 Test Condition and Results:

Performance Criterion:

0% of UT (Supply Voltage) for 0.5 Cycle: B;

0% of UT for 1 Cycle: B;

0% of UT for 250 Cycles: C;

70% of UT for 25 Cycles: C;

No. of Dips / Interruptions: 3 per Level

Time between dropout: 10s

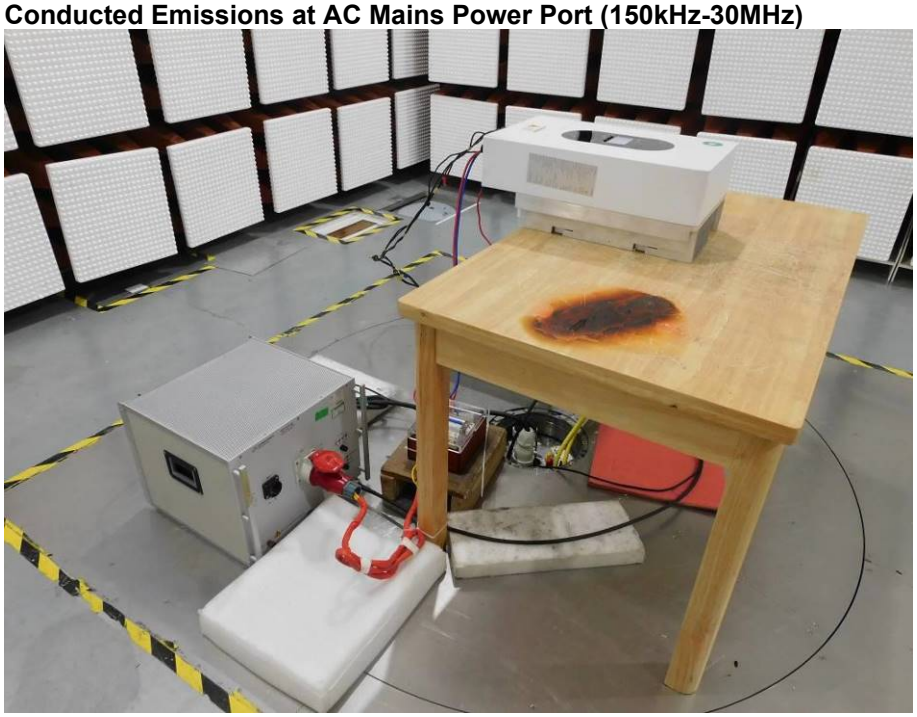
Level % UT	Phase (deg)	Duration	No. of Dips / Interruptions	Result / Observations
0	0°	0.5 Cycles	3	A
0	180°	0.5 Cycles	3	A
0	0°	1 Cycles	3	A
0	180°	1 Cycles	3	A
70	0°	25 Cycles	3	A
70	180°	25 Cycles	3	A
0	0°	250 Cycles	3	B
0	180°	250 Cycles	3	B

A: No degradation in the performance of the EUT was observed

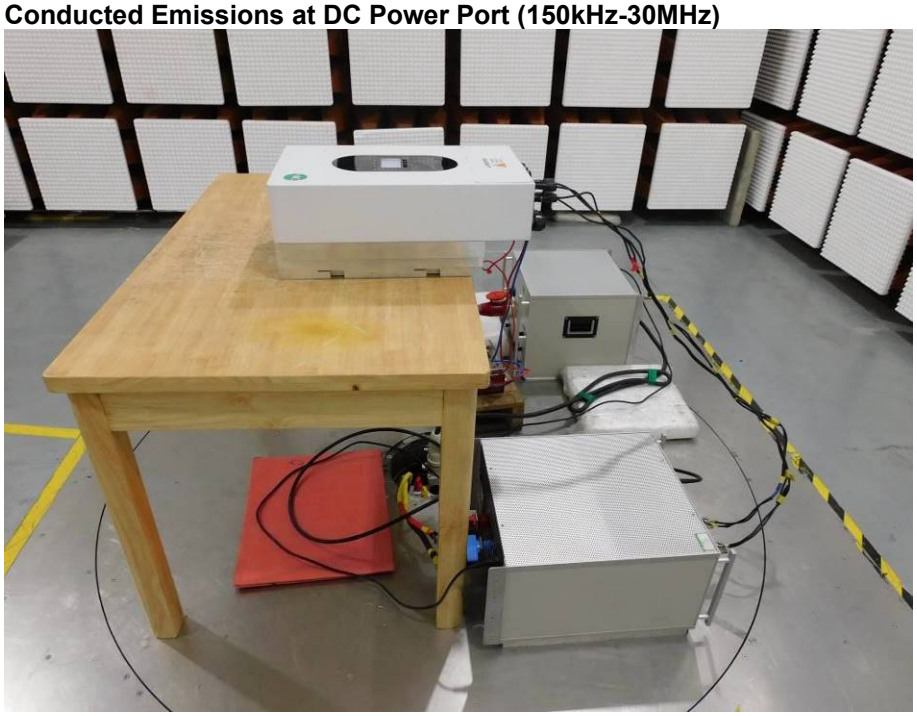
B: During the test, the grid connection is interrupted, and the grid connection state before the test can be automatically restored after the test is completed

8 Test Setup Photo

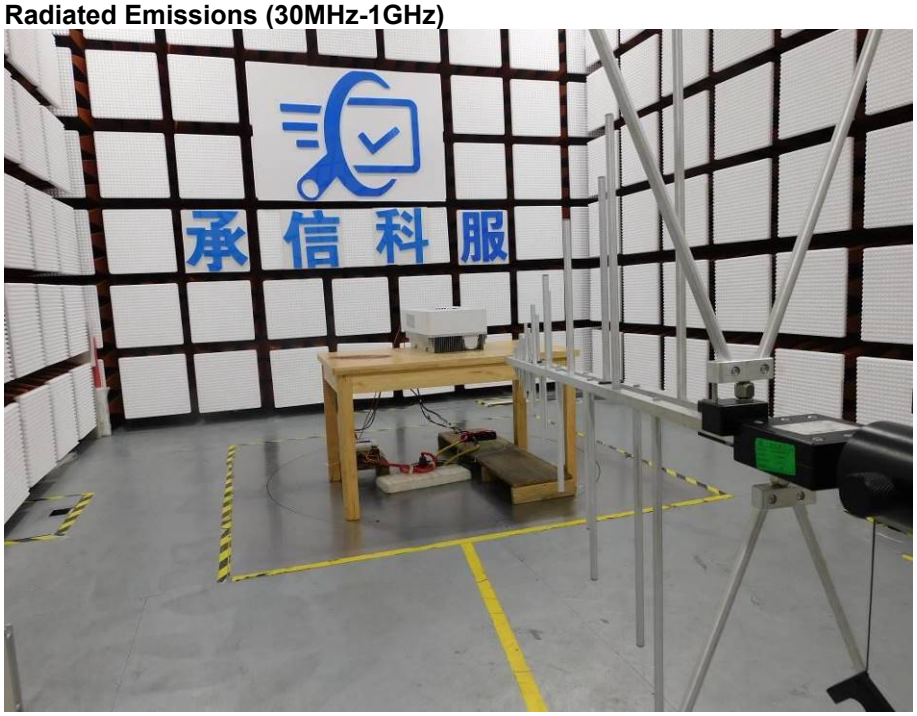
Conducted Emissions at AC Mains Power Port (150kHz-30MHz)



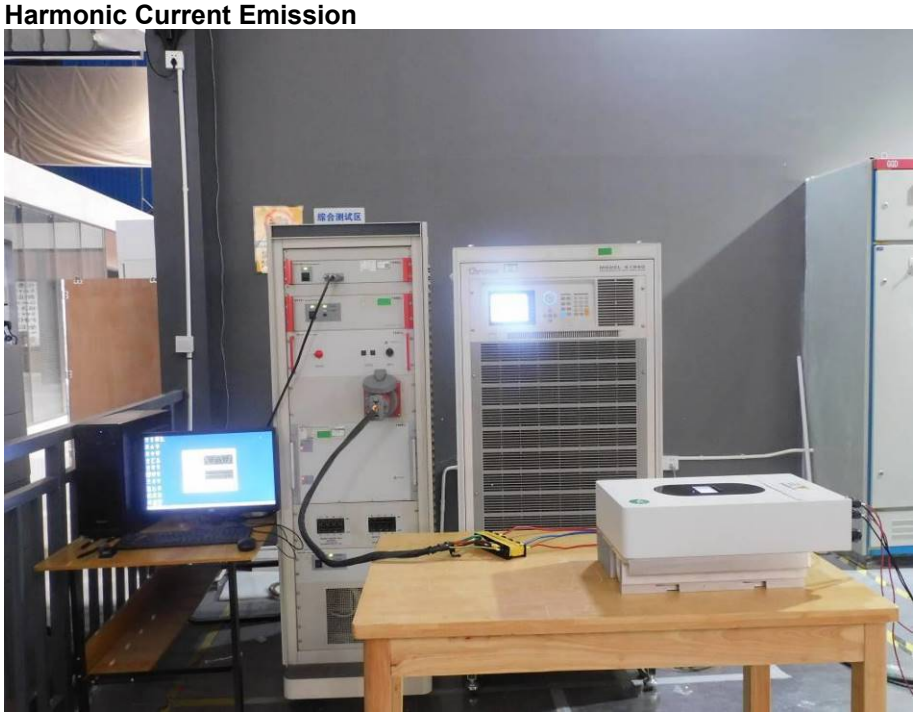
Conducted Emissions at DC Power Port (150kHz-30MHz)



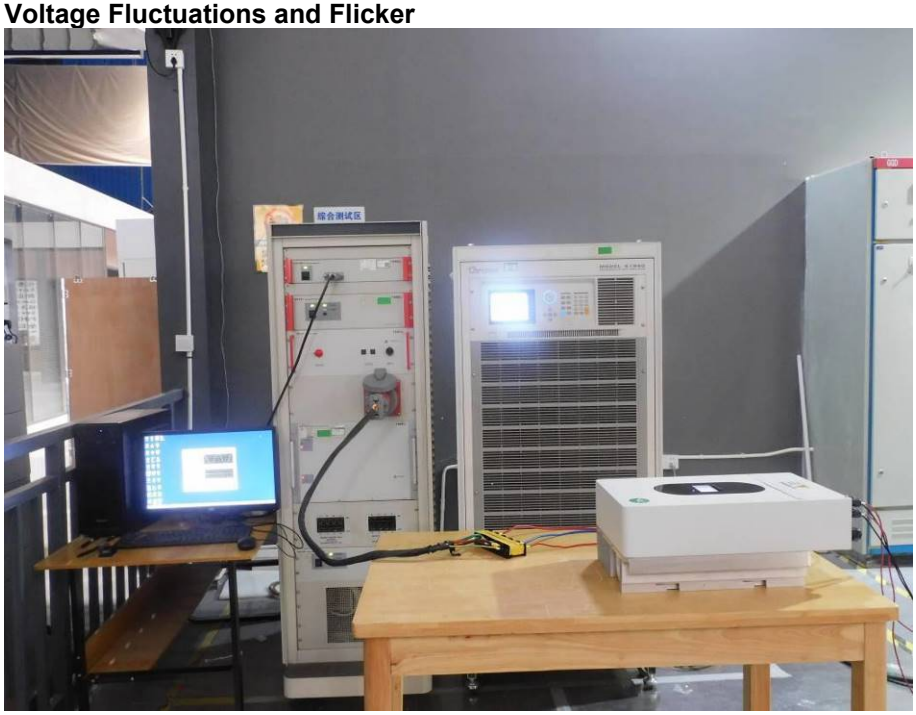
Radiated Emissions (30MHz-1GHz)



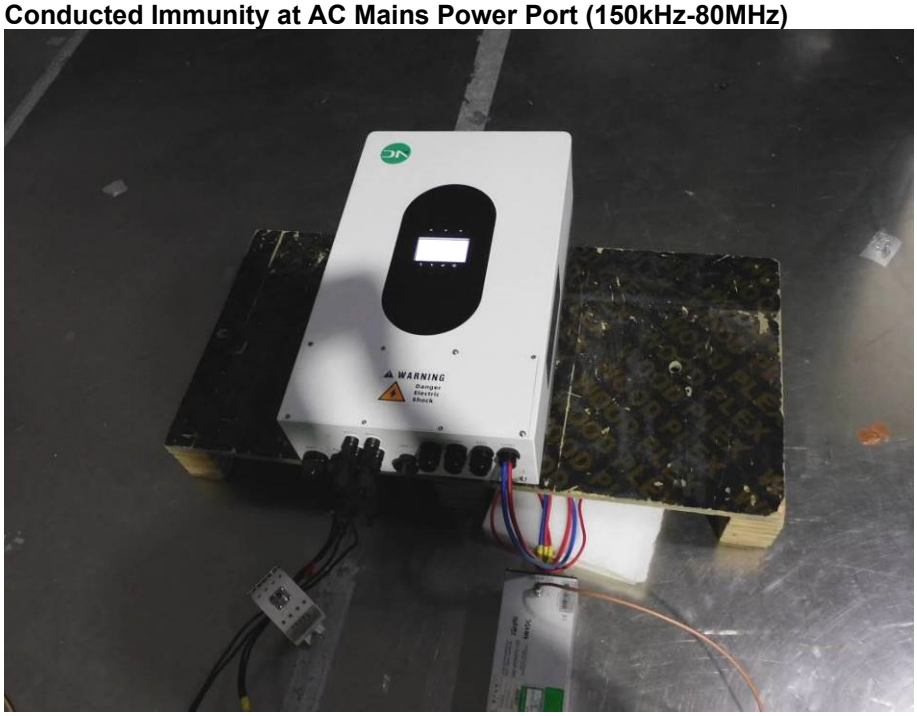
Harmonic Current Emission



Voltage Fluctuations and Flicker



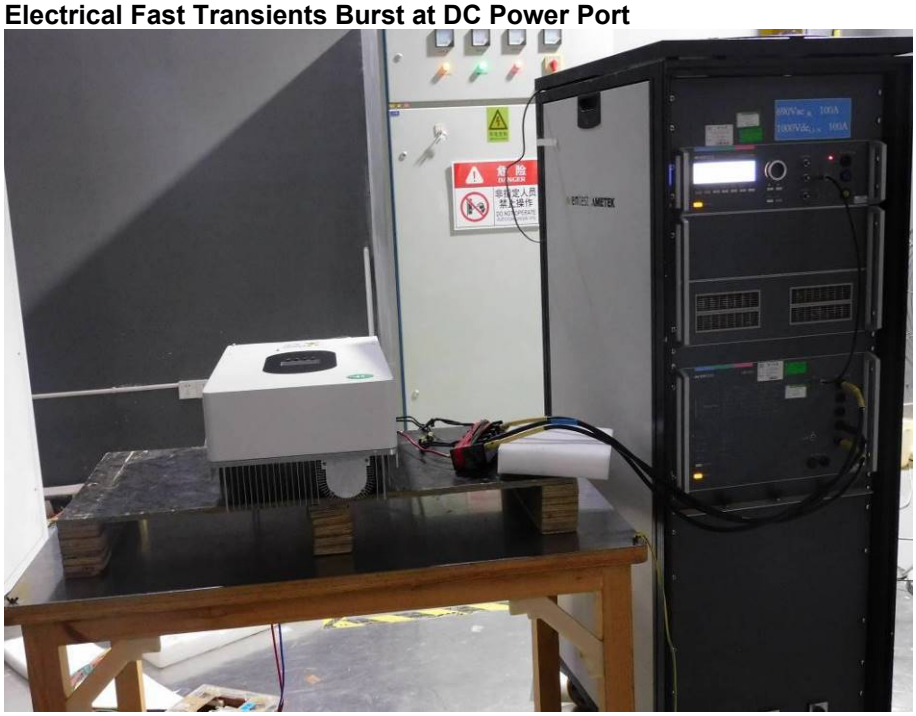
Conducted Immunity at AC Mains Power Port (150kHz-80MHz)



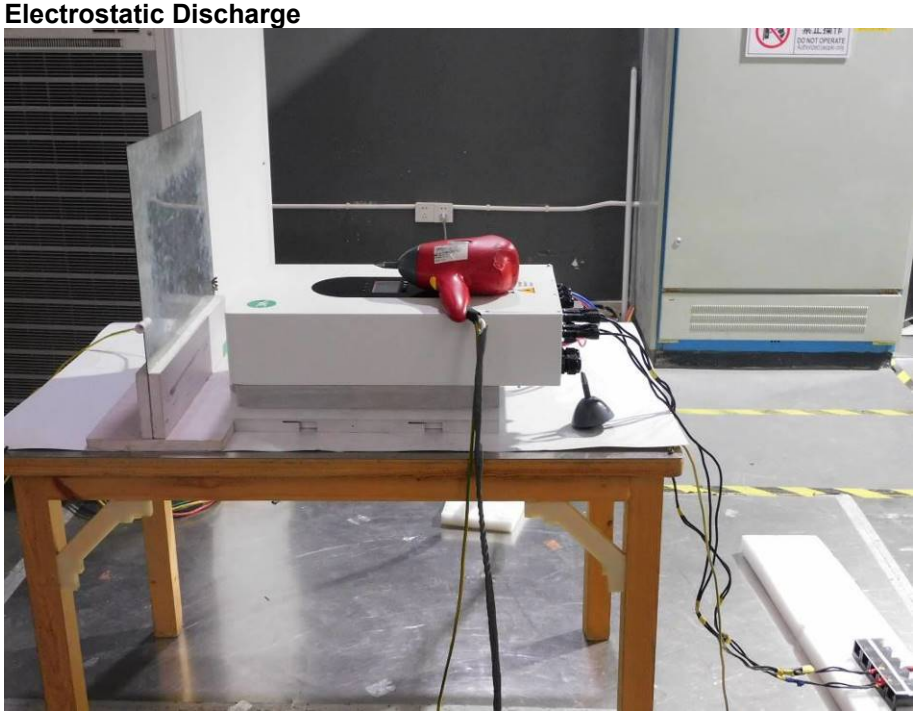
Conducted Immunity at DC Power Port (150kHz-80MHz)

Electrical Fast Transients Burst at AC Mains Power Port

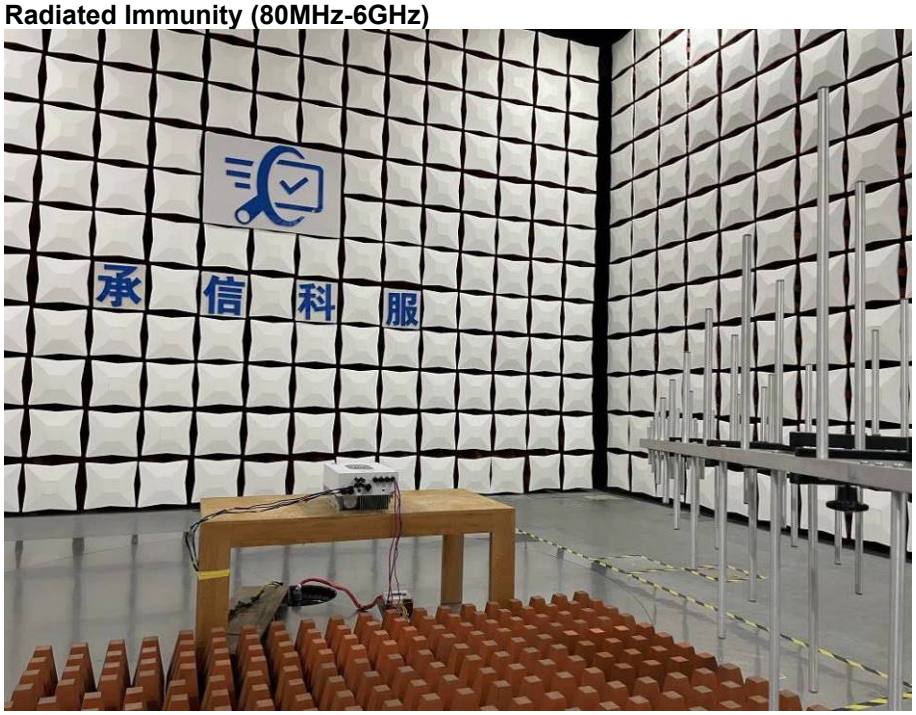
Electrical Fast Transients Burst at DC Power Port

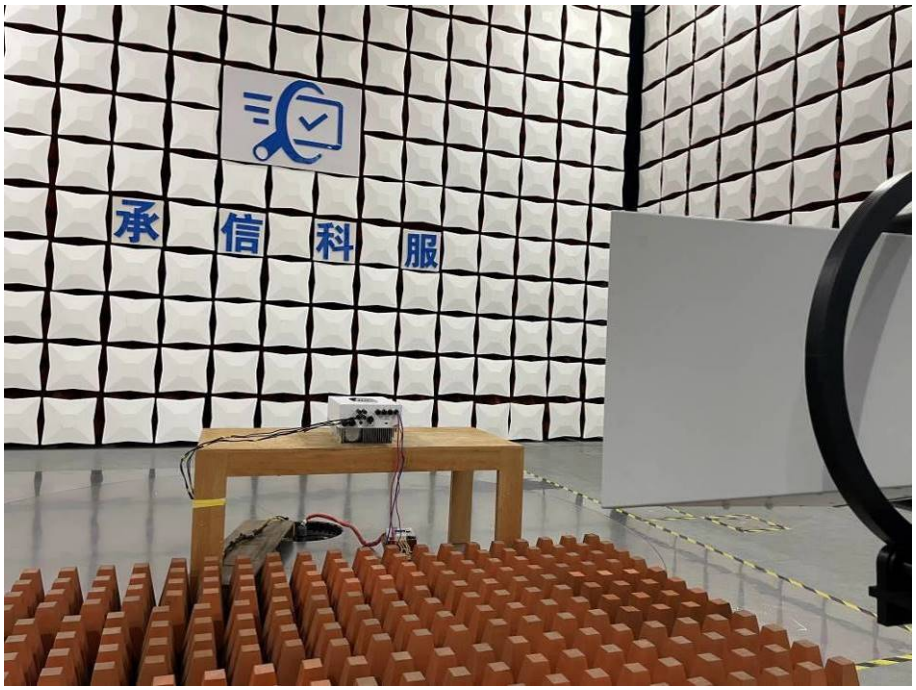


Electrostatic Discharge

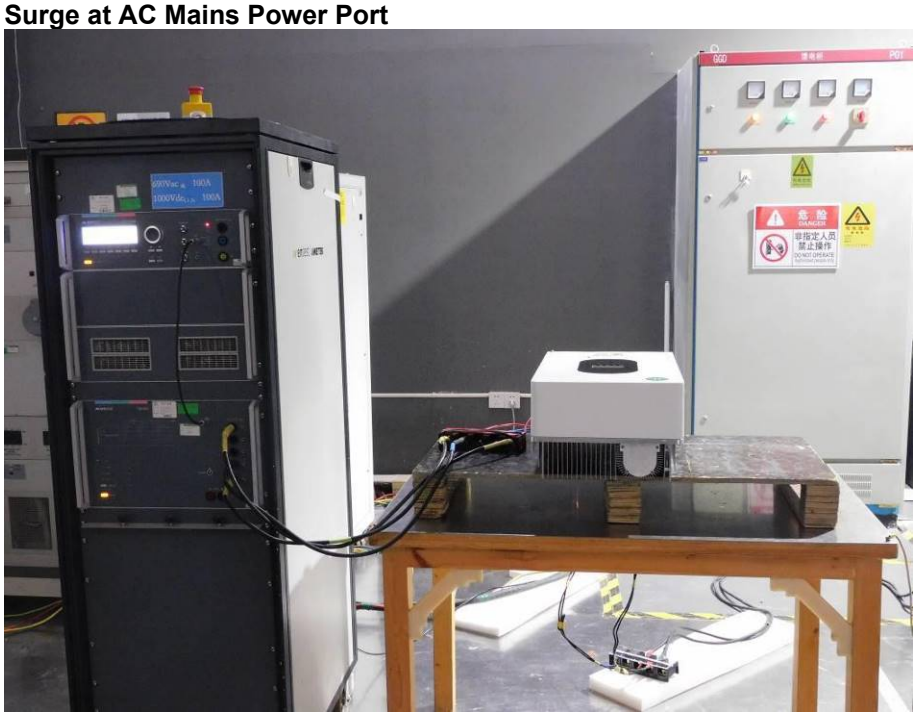


Radiated Immunity (80MHz-6GHz)



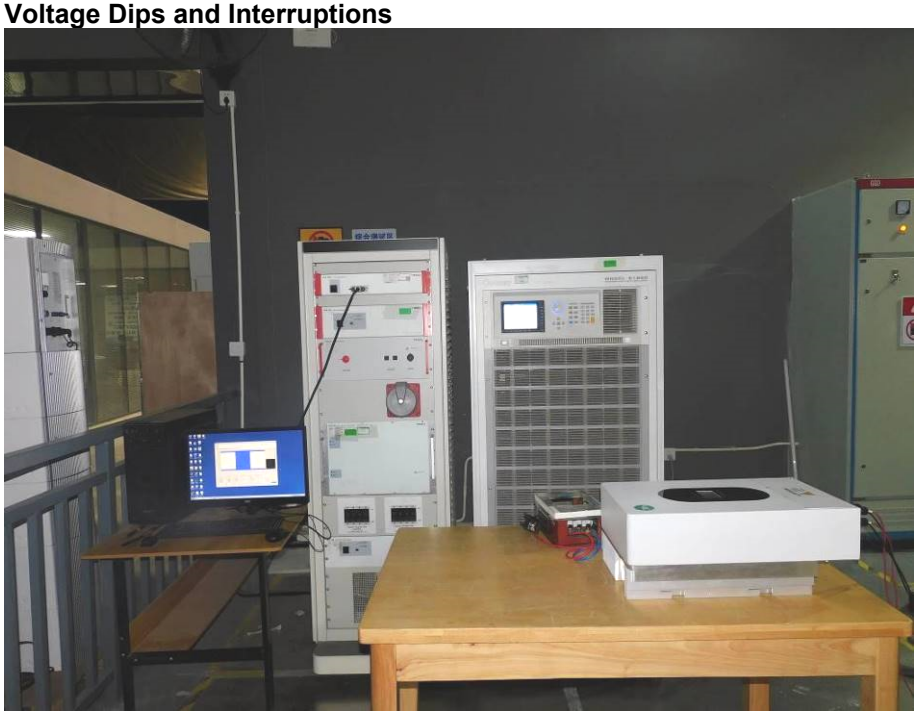


Surge at AC Mains Power Port



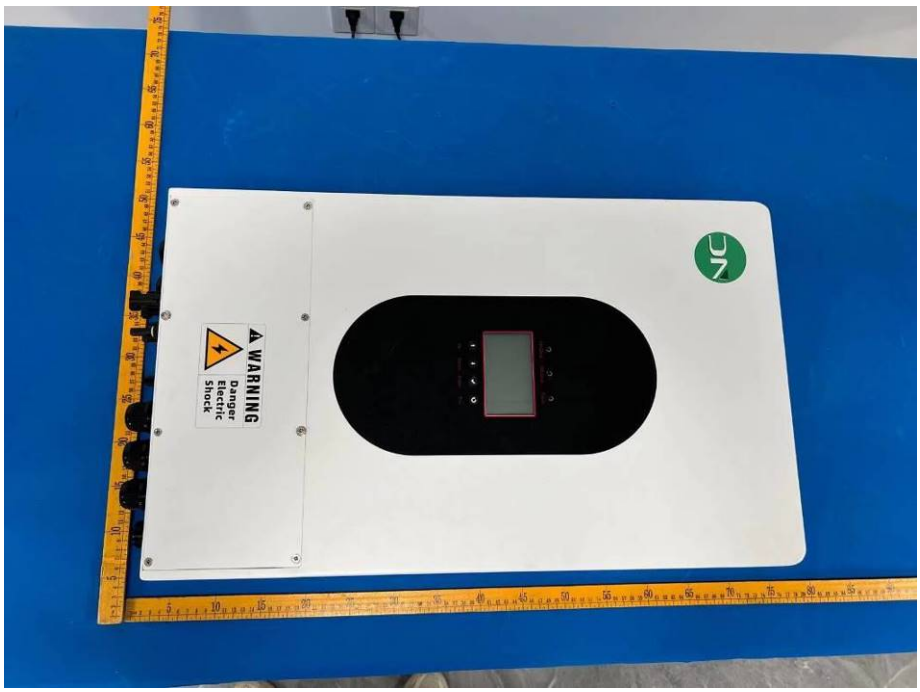
Surge at DC Port

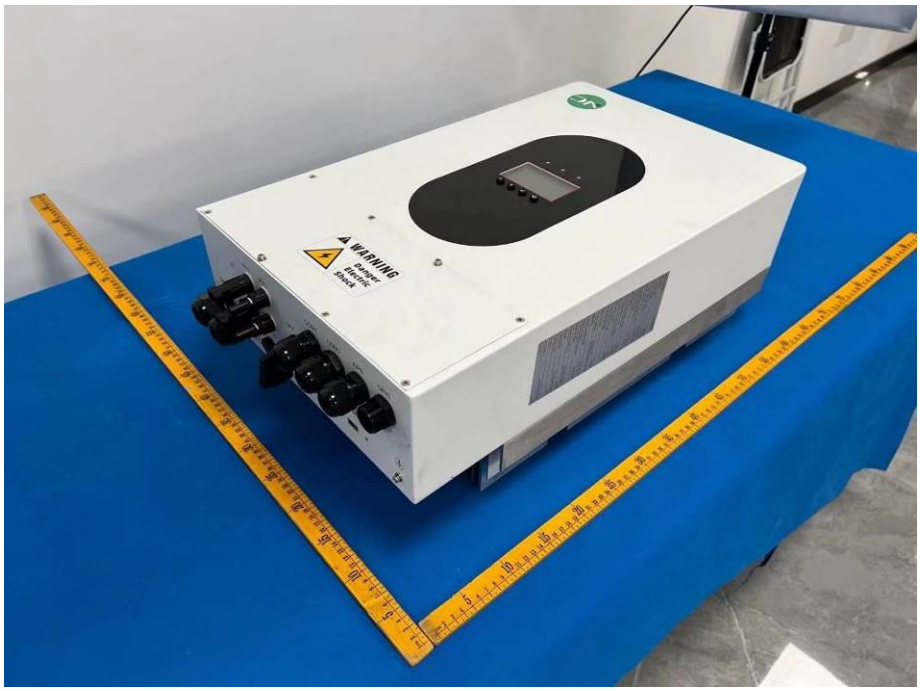
Voltage Dips and Interruptions



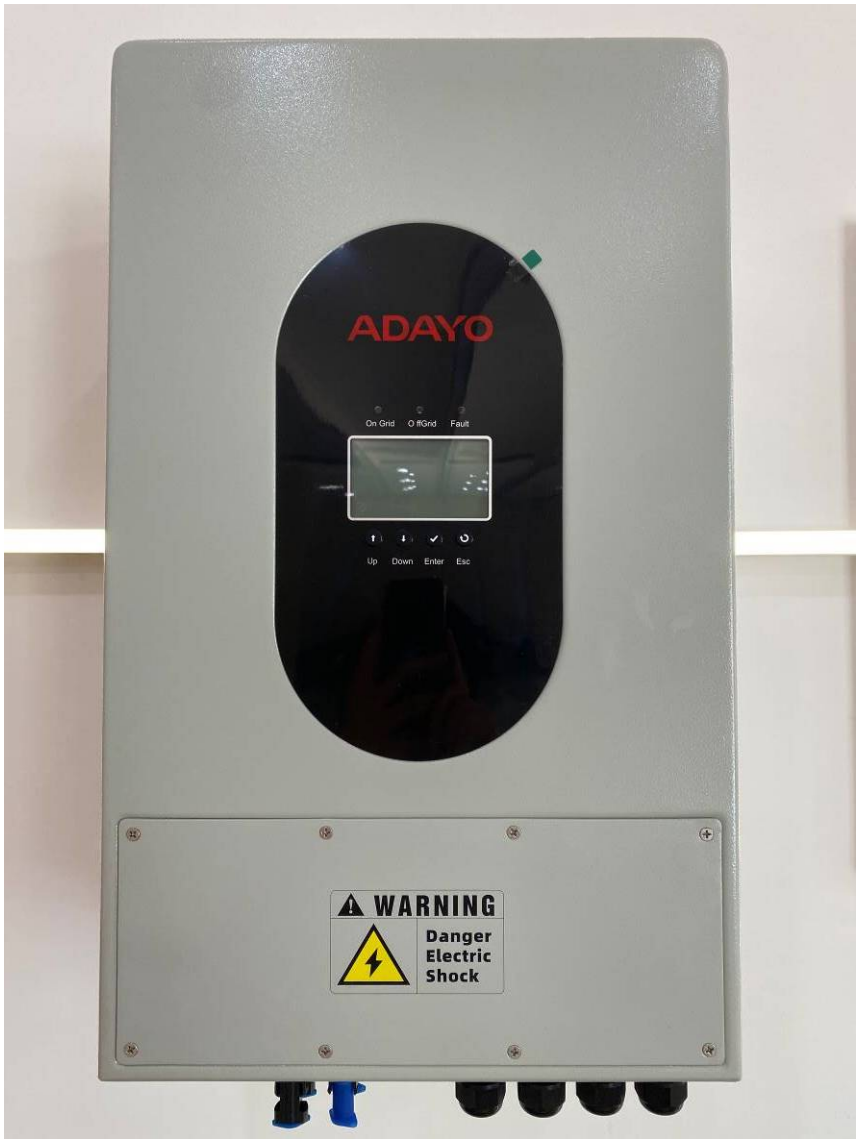
9 EUT Constructional Details (EUT Photos)

For report GZEM220800488101:





For report GZEM220800488101C05:



- End of the Report -