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CNAS L14701

TEST REPORT

Applicant:	Apex Solar Energy Technology GmbH
Address:	Reisholzer Werftstr. 76, Düsseldorf, 40589 Germany
EUT Name：	Grid-connected PV Inverter
Model Name:	APEX-P3-15K, APEX-P3-12K, APEX-P3-10K, APEX-P3-9000, APEX-P3-8000, APEX-P3-7000, APEX-P3-6000, APEX-P3-5000, APEX-P3-4000, APEX-P3-3000, APEX-P3-3000-G, APEX-P3-4000-G, APEX-P3-5000-G, APEX-P3-6000-G, APEX-P3-7000-G, APEX-P3-8000-G, APEX-P3-9000-G, APEX-P3-10K-G, APEX-P3-12K-G, APEX-P3-15K-G
Brand Name:	APEX
Test Standard:	IEC 61000-6-1:2016, EN IEC 61000-6-1:2019, IEC 61000-6-3:2020, EN 61000-6-3:2007+A1:2011+AC:2012, IEC 61000-6-2:2016, EN IEC 61000-6-2:2019, IEC 61000-6-4:2018, EN IEC 61000-6-4:2019, IEC 61000-3-11:2017, EN IEC 61000-3-11:2019, IEC 61000-3-12:2011, EN 61000-3-12:2011, IEC 61000-3-2:2018+AMD1:2020, EN IEC 61000-3-2:2019, IEC 61000-3-3:2013+AMD1:2017, EN 61000-3-3:2013+A1:2019
Date of receipt of test item:	Aug. 18, 2021
Test Date：	Aug. 18, 2021 ~ Sep. 18, 2021
Date of Issue:	Dec. 30, 2022

ISSUED BY:

Dongguan BALUN Testing Technology Co., Ltd.

Tested by: Yongqing Chen **Checked by:** Tao Zheng **Approved by:** Simon Qi

Revision History

Version	Issue Date	Revisions Content
Rev. 01	Dec. 30, 2022	Initial Issue

TABLE OF CONTENTS

1. GENERAL INFORMATION

1.1. Test Laboratory

Name	Dongguan BALUN Testing Technology Co., Ltd.
Address	Room 104, 204, 205, Building 1, No. 6, Industrial South Road, Songshan Lake District, Dongguan, Guangdong Province, P. R. China 523808

1.2. Test Location

Name	Dongguan BALUN Testing Technology Co., Ltd.
Location	Room 104, 204, 205, Building 1, No. 6, Industrial South Road, Songshan Lake District, Dongguan, Guangdong Province, P. R. China 523808

2. PRODUCT INFORMATION

2.1. Applicant Information

Applicant	Apex Solar Energy Technology GmbH
Address	Reisholzer Werftstr. 76, Düsseldorf, 40589 Germany

2.2. Manufacturer Information

Manufacturer	Apex Solar Energy Technology GmbH
Address	Reisholzer Werftstr. 76, Düsseldorf, 40589 Germany

2.3. Factory Information

Factory	NingBo Deye Inverter Technology Co., Ltd.
Address	No.26 South YongJiang Road, Daqi, Beilun, NingBo, China.

2.4. General Description for Equipment under Test (EUT)

EUT Name	Grid-connected PV Inverter
Mode Name Under Test	APEX-P3-15K
Series Model Name	APEX-P3-15K, APEX-P3-12K, APEX-P3-10K, APEX-P3-9000, APEX-P3-8000, APEX-P3-7000, APEX-P3-6000, APEX-P3-5000, APEX-P3-4000, APEX-P3-3000, APEX-P3-3000-G, APEX-P3-4000-G, APEX-P3-5000-G, APEX-P3-6000-G, APEX-P3-7000-G, APEX-P3-8000-G, APEX-P3-9000-G, APEX-P3-10K-G, APEX-P3-12K-G, APEX-P3-15K-G
Description of Model name differentiation	The variants models have the same appearance, topology, PCB board and software. The number of MPPT will be differentiated according to different power levels. The output power and input power are different which controlled by software. Please refer to the parameter tables and difference tables for specific differences.
Hardware Version	V1.2
Software Version	DSP: 0229 CPLD: 5110

Parameter tables:

Model	APEX-P3-15K	APEX-P3-3000	APEX-P3-4000	APEX-P3-5000	APEX-P3-6000
Input Side					
Max.DC Power(kW)	19.5	3.9	5.2	6.5	7.8
Max.DC Input Voltage(V)	1000				
Start-up DC Input Voltage(V)	250	140			
MPPT operating Range(V)	200~850	120~850			
Max.DC Input Current(A)	13+26	13+13/13		13+13	
Max. Short Circuit Current (A)	19.5+39	19.5+19.5/19.5		19.5+19.5	
Number of MPPT/Strings per MPPT	2/1+2	(2/1)/(1/1)		2/1+1	
Output Side					
Rated Output Power(kW)	15	3	4	5	6
Max.Action Power(kW)	16.5	3.3	4.4	5.5	6.6
Rated AC Grid Voltage(V)	220/380, 230/400				
AC Grid Voltage Range(V)	277 ~ 460 (this may vary with grid standards)				
Rated Grid Frequency(Hz)	50/60				
Operating Phase	Three phase				
Rated AC Grid Output Current(A)	21.7	4.3	5.8	7.2	8.7
Max.AC Output Current(A)	23.9	4.8	6.4	8	9.6
Output Power Factor	0.8 leading~0.8 lagging				
Grid Current THD	<3%				
General Data					
Size(mm, W×H×D)	330×457.5×185				
Weight(kg)	10.8				
Operating temperature	-25 ~ 65℃				
Ingress protection	IP65				
Noise Emission(Typical)	<25 dB				
Cooling Concept	Natural cooling				
Display	LCD1602				
Interface	RS-485/RS-232				

Model	APEX-P3-7000	APEX-P3-8000	APEX-P3-9000	APEX-P3-10K	APEX-P3-12K
Input Side					
Max.DC Power(kW)	9.1	10.4	11.7	13	15.6
Max.DC Input Voltage(V)	1000				
Start-up DC Input Voltage(V)	140				
MPPT operating Range(V)	120~850				200~850
Max.DC Input Current(A)	13+13				
Max. Short Circuit Current (A)	19.5+19.5				
Number of MPPT/Strings per MPPT	2/1+1				
Output Side					
Rated Output Power(kW)	7	8	9	10	12
Max.Action Power(kW)	7.7	8.8	9.9	11	13.2
Rated AC Grid Voltage(V)	220/380, 230/400				
AC Grid Voltage Range(V)	277 ~ 460 (this may vary with grid standards)				
Rated Grid Frequency(Hz)	50/60				
Operating Phase	Three phase				
Rated AC Grid Output Current(A)	10.1	11.6	13	14.5	17.4
Max.AC Output Current(A)	11.1	12.8	14.3	15.9	19.1
Output Power Factor	0.8 leading~0.8 lagging				
Grid Current THD	<3%				
General Data					
Size(mm, W×H×D)	330×457.5×185				
Weight(kg)	10.8				
Operating temperature	-25 ~ 65℃				
Ingress protection	IP65				
Noise Emission(Typical)	<25 dB				
Cooling Concept	Natural cooling				
Display	LCD1602				
Interface	RS-485/RS-232				

Model	APEX-P3-15K-G	APEX-P3-3000-G	APEX-P3-4000-G	APEX-P3-5000-G	APEX-P3-6000-G
Input Side					
Max.DC Power(kW)	19.5	3.9	5.2	6.5	7.8
Max.DC Input Voltage(V)	1000				
Start-up DC Input Voltage(V)	250	140			
MPPT operating Range(V)	200~850	120~850			
Max.DC Input Current(A)	20+26	20/20+20	20+20		
Max. Short Circuit Current (A)	30+39	30/30+30	30+30		
Number of MPPT/Strings per MPPT	2/1+2	(1/1)/(2/1+1)	2/1+1		
Output Side					
Rated Output Power(kW)	15	3	4	5	6
Max.Action Power(kW)	16.5	3.3	4.4	5.5	6.6
Rated AC Grid Voltage(V)	220/380, 230/400				
AC Grid Voltage Range(V)	277 ~ 460 (this may vary with grid standards)				
Rated Grid Frequency(Hz)	50/60				
Operating Phase	Three phase				
Rated AC Grid Output Current(A)	21.7	4.3	5.8	7.2	8.7
Max.AC Output Current(A)	23.9	4.8	6.4	8	9.6
Output Power Factor	0.8 leading~0.8 lagging				
Grid Current THD	<3%				
General Data					
Size(mm, W×H×D)	333×472×202	330×457×185			
Weight(kg)	15	10			
Operating temperature	-25 ~ 65℃				
Ingress protection	IP65				
Cooling Concept	Smart cooling				
Interface	RS-485/RS-232				
Display	LCD1602				

Model	APEX-P3-7000-G	APEX-P3-8000-G	APEX-P3-9000-G	APEX-P3-10K-G	APEX-P3-12K-G
Input Side					
Max.DC Power(kW)	9.1	10.4	11.7	13	15.6
Max.DC Input Voltage(V)	1000				
Start-up DC Input Voltage(V)	140				250
MPPT operating Range(V)	120~850				200~850
Max.DC Input Current(A)	20+20				
Max. Short Circuit Current (A)	30+30				
Number of MPPT/Strings per MPPT	2/1+1				
Output Side					
Rated Output Power(kW)	7	8	9	10	12
Max.Action Power(kW)	7.7	8.8	9.9	11	13.2
Rated AC Grid Voltage(V)	220/380, 230/400				
AC Grid Voltage Range(V)	277 ~ 460 (this may vary with grid standards)				
Rated Grid Frequency(Hz)	50/60				
Operating Phase	Three phase				
Rated AC Grid Output Current(A)	10.1	11.6	13	14.5	17.4
Max.AC Output Current(A)	11.1	12.8	14.3	15.9	19.1
Output Power Factor	0.8 leading~0.8 lagging				
Grid Current THD	<3%				
General Data					
Size(mm, W×H×D)	330×457×185				330×457×205
Weight(kg)	10				11
Operating temperature	-25 ~ 65℃				
Ingress protection	IP65				
Noise Emission(Typical)	<25 dB				
Cooling Concept	Natural cooling				
Display	LCD1602				
Interface	RS-485/RS-232				

2.5. Ancillary Equipment

Note: not applicable.

2.6. Technical Information

Interfaces present on the EUT	AC Ports	From mains to AC port.
	DC Ports	From power supply and battery to EUT.
	Telecom Port	No Telecom Ports.
	Signal Ports	RS-485, which cable length does not exceed 3m.
About the Product		The equipment is Grid-connected PV Inverter , the above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

Labels:

Product Name	Grid-connected PV Inverter
Model	APEX-P3-3000
Max. DC Input Power	3.9kW
Max. DC Input Voltage	1000Vdc
MPPT Voltage Range	120-850Vdc
Max.DC Input Current	2×13Adc
Max. short circuit input current	2×19.5Adc
Rated AC Grid Voltage	3L/N/PE 230/400V
Rated AC Grid Frequency	50/60Hz
Rated AC Output Power	3kW
Max. Active Power	3.3kW
Max. Apparent Output Power	3.3kVA
Max. AC Output Current	4.8Aac
Power Factor	-0.8~+0.8
Operating Temperature Range	-25℃~+65℃
Ingress Protection	IP65
Protection Level	Class I
Standard	IEC/EN 62109-1, IEC/EN 62109-2

Apex Solar Energy Technology GmbH
Add: Reisholzer Werftstr. 76, Düsseldorf, 40589 Germany

Safety Warning

5min *The AC and DC circuits must be disconnected separately, and the maintenance personnel must wait for 5 minutes before they are completely powered off before they can start working.*

It is strictly forbidden for users to open the casing.Professional maintenance is required for internal maintenance of the inverter.

Surface high temperature , Please do not touch the inverter case.

The DC input terminals of the inverter must not be grounded.

Please read the instructions carefully before use.

Product Name	Grid-connected PV Inverter
Model	APEX-P3-4000
Max. DC Input Power	5.2kW
Max. DC Input Voltage	1000Vdc
MPPT Voltage Range	120-850Vdc
Max.DC Input Current	2×13Adc
Max. short circuit input current	2×19.5Adc
Rated AC Grid Voltage	3L/N/PE 230/400V
Rated AC Grid Frequency	50/60Hz
Rated AC Output Power	4kW
Max. Active Power	4.4kW
Max. Apparent Output Power	4.4kVA
Max. AC Output Current	6.4Aac
Power Factor	-0.8~+0.8
Operating Temperature Range	-25℃~+65℃
Ingress Protection	IP65
Protection Level	Class I
Standard	IEC/EN 62109-1, IEC/EN 62109-2

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Product Name	Grid-connected PV Inverter
Model	APEX-P3-5000
Max. DC Input Power	6.5kW
Max. DC Input Voltage	1000Vdc
MPPT Voltage Range	120-850Vdc
Max.DC Input Current	2×13Adc
Max. short circuit input current	2×19.5Adc
Rated AC Grid Voltage	3L/N/PE 230/400V
Rated AC Grid Frequency	50/60Hz
Rated AC Output Power	5kW
Max. Active Power	5.5kW
Max. Apparent Output Power	5.5kVA
Max. AC Output Current	8Aac
Power Factor	-0.8~+0.8
Operating Temperature Range	-25℃~+65℃
Ingress Protection	IP65
Protection Level	Class I
Standard	IEC/EN 62109-1, IEC/EN 62109-2

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Surface high temperature , Please do not touch the inverter case.

The DC input terminals of the inverter must not be grounded.

Please read the instructions carefully before use.

Product Name	Grid-connected PV Inverter
Model	APEX-P3-6000
Max. DC Input Power	7.8kW
Max. DC Input Voltage	1000Vdc
MPPT Voltage Range	120-850Vdc
Max.DC Input Current	2×13Adc
Max. short circuit input current	2×19.5Adc
Rated AC Grid Voltage	3L/N/PE 230/400V
Rated AC Grid Frequency	50/60Hz
Rated AC Output Power	6kW
Max. Active Power	6.6kW
Max. Apparent Output Power	6.6kVA
Max. AC Output Current	9.6Aac
Power Factor	-0.8~+0.8
Operating Temperature Range	-25℃~+65℃
Ingress Protection	IP65
Protection Level	Class I
Standard	IEC/EN 62109-1, IEC/EN 62109-2

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Surface high temperature , Please do not touch the inverter case.

The DC input terminals of the inverter must not be grounded.

Please read the instructions carefully before use.

Product Name	Grid-connected PV Inverter
Model	APEX-P3-7000
Max. DC Input Power	9.1kW
Max. DC Input Voltage	1000Vdc
MPPT Voltage Range	120-850Vdc
Max.DC Input Current	2×13Adc
Max. short circuit input current	2×19.5Adc
Rated AC Grid Voltage	3L/N/PE 230/400V
Rated AC Grid Frequency	50/60Hz
Rated AC Output Power	7kW
Max. Active Power	7.7kW
Max. Apparent Output Power	7.7kVA
Max. AC Output Current	11.1Aac
Power Factor	-0.8~+0.8
Operating Temperature Range	-25℃~+65℃
Ingress Protection	IP65
Protection Level	Class I
Standard	IEC/EN 62109-1, IEC/EN 62109-2

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Surface high temperature , Please do not touch the inverter case.

The DC input terminals of the inverter must not be grounded.

Please read the instructions carefully before use.

Product Name	Grid-connected PV Inverter
Model	APEX-P3-8000
Max. DC Input Power	10.4kW
Max. DC Input Voltage	1000Vdc
MPPT Voltage Range	120-850Vdc
Max.DC Input Current	2×13Adc
Max. short circuit input current	2×19.5Adc
Rated AC Grid Voltage	3L/N/PE 230/400V
Rated AC Grid Frequency	50/60Hz
Rated AC Output Power	8kW
Max. Active Power	8.8kW
Max. Apparent Output Power	8.8kVA
Max. AC Output Current	12.8Aac
Power Factor	-0.8~+0.8
Operating Temperature Range	-25℃~+65℃
Ingress Protection	IP65
Protection Level	Class I
Standard	IEC/EN 62109-1, IEC/EN 62109-2

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The DC input terminals of the inverter must not be grounded.

Please read the instructions carefully before use.

Product Name	Grid-connected PV Inverter
Model	APEX-P3-9000
Max. DC Input Power	11.7kW
Max. DC Input Voltage	1000Vdc
MPPT Voltage Range	120-850Vdc
Max.DC Input Current	2×13Adc
Max. short circuit input current	2×19.5Adc
Rated AC Grid Voltage	3L/N/PE 230/400V
Rated AC Grid Frequency	50/60Hz
Rated AC Output Power	9kW
Max. Active Power	9.9kW
Max. Apparent Output Power	9.9kVA
Max. AC Output Current	14.3Aac
Power Factor	-0.8~+0.8
Operating Temperature Range	-25℃~+65℃
Ingress Protection	IP65
Protection Level	Class I
Standard	IEC/EN 62109-1, IEC/EN 62109-2

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Please read the instructions carefully before use.

Product Name	Grid-connected PV Inverter
Model	APEX-P3-10K
Max. DC Input Power	13kW
Max. DC Input Voltage	1000Vdc
MPPT Voltage Range	120-850Vdc
Max.DC Input Current	2×13Adc
Max. short circuit input current	2×19.5Adc
Rated AC Grid Voltage	3L/N/PE 230/400V
Rated AC Grid Frequency	50/60Hz
Rated AC Output Power	10kW
Max. Active Power	11kW
Max. Apparent Output Power	11kVA
Max. AC Output Current	15.9Aac
Power Factor	-0.8~+0.8
Operating Temperature Range	-25℃~+65℃
Ingress Protection	IP65
Protection Level	Class I
Standard	IEC/EN 62109-1, IEC/EN 62109-2

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The DC input terminals of the inverter must not be grounded.

Please read the instructions carefully before use.

Product Name	Grid-connected PV Inverter
Model	APEX-P3-12K
Max. DC Input Power	15.6kW
Max. DC Input Voltage	1000Vdc
MPPT Voltage Range	200-850Vdc
Max.DC Input Current	2×13Adc
Max. short circuit input current	2×19.5Adc
Rated AC Grid Voltage	3L/N/PE 230/400V
Rated AC Grid Frequency	50/60Hz
Rated AC Output Power	12kW
Max. Active Power	13.2kW
Max. Apparent Output Power	13.2kVA
Max. AC Output Current	19.1Aac
Power Factor	-0.8~+0.8
Operating Temperature Range	-25℃~+65℃
Ingress Protection	IP65
Protection Level	Class I
Standard	IEC/EN 62109-1, IEC/EN 62109-2

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Product Name	Grid-connected PV Inverter
Model	APEX-P3-15K
Max. DC Input Power	19.5kW
Max. DC Input Voltage	1000Vdc
MPPT Voltage Range	200-850Vdc
Max.DC Input Current	13+26Adc
Max. short circuit input current	19.5+39Adc
Rated AC Grid Voltage	3L/N/PE 230/400V
Rated AC Grid Frequency	50/60Hz
Rated AC Output Power	15kW
Max. Active Power	16.5kW
Max. Apparent Output Power	16.5kVA
Max. AC Output Current	23.9Aac
Power Factor	-0.8~+0.8
Operating Temperature Range	-25℃~+65℃
Ingress Protection	IP65
Protection Level	Class I
Standard	IEC/EN 62109-1, IEC/EN 62109-2

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Product Name	Grid-connected PV Inverter
Model	APEX-P3-3000-G
Max. DC Input Power	3.9kW
Max. DC Input Voltage	1000Vdc
MPPT Voltage Range	120-850Vdc
Max.DC Input Current	2×20Adc
Max. short circuit input current	2×30Adc
Rated AC Grid Voltage	3L/N/PE 230/400V
Rated AC Grid Frequency	50/60Hz
Rated AC Output Power	3kW
Max. Active Power	3.3kW
Max. Apparent Output Power	3.3kVA
Max. AC Output Current	4.8Aac
Power Factor	-0.8~+0.8
Operating Temperature Range	-25℃~+65℃
Ingress Protection	IP65
Protection Level	Class I
Standard	IEC/EN 62109-1, IEC/EN 62109-2

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Product Name	Grid-connected PV Inverter
Model	APEX-P3-4000-G
Max. DC Input Power	5.2kW
Max. DC Input Voltage	1000Vdc
MPPT Voltage Range	120-850Vdc
Max.DC Input Current	2×20Adc
Max. short circuit input current	2×30Adc
Rated AC Grid Voltage	3L/N/PE 230/400V
Rated AC Grid Frequency	50/60Hz
Rated AC Output Power	4kW
Max. Active Power	4.4kW
Max. Apparent Output Power	4.4kVA
Max. AC Output Current	6.4Aac
Power Factor	-0.8~+0.8
Operating Temperature Range	-25℃~+65℃
Ingress Protection	IP65
Protection Level	Class I
Standard	IEC/EN 62109-1, IEC/EN 62109-2

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Product Name	Grid-connected PV Inverter
Model	APEX-P3-5000-G
Max. DC Input Power	6.5kW
Max. DC Input Voltage	1000Vdc
MPPT Voltage Range	120-850Vdc
Max.DC Input Current	2×20Adc
Max. short circuit input current	2×30Adc
Rated AC Grid Voltage	3L/N/PE 230/400V
Rated AC Grid Frequency	50/60Hz
Rated AC Output Power	5kW
Max. Active Power	5.5kW
Max. Apparent Output Power	5.5kVA
Max. AC Output Current	8Aac
Power Factor	-0.8~+0.8
Operating Temperature Range	-25℃~+65℃
Ingress Protection	IP65
Protection Level	Class I
Standard	IEC/EN 62109-1, IEC/EN 62109-2

Apex Solar Energy Technology GmbH
Add: Reisholzer Werftstr. 76, Düsseldorf, 40589 Germany

Safety Warning

5min *The AC and DC circuits must be disconnected separately, and the maintenance personnel must wait for 5 minutes before they are completely powered off before they can start working.*

It is strictly forbidden for users to open the casing.Professional maintenance is required for internal maintenance of the inverter.

Surface high temperature , Please do not touch the inverter case.

The DC input terminals of the inverter must not be grounded.

Please read the instructions carefully before use.

Product Name	Grid-connected PV Inverter
Model	APEX-P3-6000-G
Max. DC Input Power	7.8kW
Max. DC Input Voltage	1000Vdc
MPPT Voltage Range	120-850Vdc
Max.DC Input Current	2×20Adc
Max. short circuit input current	2×30Adc
Rated AC Grid Voltage	3L/N/PE 230/400V
Rated AC Grid Frequency	50/60Hz
Rated AC Output Power	6kW
Max. Active Power	6.6kW
Max. Apparent Output Power	6.6kVA
Max. AC Output Current	9.6Aac
Power Factor	-0.8~+0.8
Operating Temperature Range	-25℃~+65℃
Ingress Protection	IP65
Protection Level	Class I
Standard	IEC/EN 62109-1, IEC/EN 62109-2

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The DC input terminals of the inverter must not be grounded.

Please read the instructions carefully before use.

Product Name	Grid-connected PV Inverter
Model	APEX-P3-7000-G
Max. DC Input Power	9.1kW
Max. DC Input Voltage	1000Vdc
MPPT Voltage Range	120-850Vdc
Max.DC Input Current	2×20Adc
Max. short circuit input current	2×30Adc
Rated AC Grid Voltage	3L/N/PE 230/400V
Rated AC Grid Frequency	50/60Hz
Rated AC Output Power	7kW
Max. Active Power	7.7kW
Max. Apparent Output Power	7.7kVA
Max. AC Output Current	11.1Aac
Power Factor	-0.8~+0.8
Operating Temperature Range	-25℃~+65℃
Ingress Protection	IP65
Protection Level	Class I
Standard	IEC/EN 62109-1, IEC/EN 62109-2

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Surface high temperature , Please do not touch the inverter case.

The DC input terminals of the inverter must not be grounded.

Please read the instructions carefully before use.

Product Name	Grid-connected PV Inverter
Model	APEX-P3-8000-G
Max. DC Input Power	10.4kW
Max. DC Input Voltage	1000Vdc
MPPT Voltage Range	120-850Vdc
Max.DC Input Current	2×20Adc
Max. short circuit input current	2×30Adc
Rated AC Grid Voltage	3L/N/PE 230/400V
Rated AC Grid Frequency	50/60Hz
Rated AC Output Power	8kW
Max. Active Power	8.8kW
Max. Apparent Output Power	8.8kVA
Max. AC Output Current	12.8Aac
Power Factor	-0.8~+0.8
Operating Temperature Range	-25℃~+65℃
Ingress Protection	IP65
Protection Level	Class I
Standard	IEC/EN 62109-1, IEC/EN 62109-2

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Safety Warning

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Surface high temperature , Please do not touch the inverter case.

The DC input terminals of the inverter must not be grounded.

Please read the instructions carefully before use.

Product Name	Grid-connected PV Inverter
Model	APEX-P3-9000-G
Max. DC Input Power	11.7kW
Max. DC Input Voltage	1000Vdc
MPPT Voltage Range	120-850Vdc
Max.DC Input Current	2×20Adc
Max. short circuit input current	2×30Adc
Rated AC Grid Voltage	3L/N/PE 230/400V
Rated AC Grid Frequency	50/60Hz
Rated AC Output Power	9kW
Max. Active Power	9.9kW
Max. Apparent Output Power	9.9kVA
Max. AC Output Current	14.3Aac
Power Factor	-0.8~+0.8
Operating Temperature Range	-25℃~+65℃
Ingress Protection	IP65
Protection Level	Class I
Standard	IEC/EN 62109-1, IEC/EN 62109-2

Apex Solar Energy Technology GmbH
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Surface high temperature , Please do not touch the inverter case.

The DC input terminals of the inverter must not be grounded.

Please read the instructions carefully before use.

Product Name	Grid-connected PV Inverter
Model	APEX-P3-10K-G
Max. DC Input Power	13kW
Max. DC Input Voltage	1000Vdc
MPPT Voltage Range	120-850Vdc
Max.DC Input Current	2×20Adc
Max. short circuit input current	2×30Adc
Rated AC Grid Voltage	3L/N/PE 230/400V
Rated AC Grid Frequency	50/60Hz
Rated AC Output Power	10kW
Max. Active Power	11kW
Max. Apparent Output Power	11kVA
Max. AC Output Current	15.9Aac
Power Factor	-0.8~+0.8
Operating Temperature Range	-25℃~+65℃
Ingress Protection	IP65
Protection Level	Class I
Standard	IEC/EN 62109-1, IEC/EN 62109-2

Apex Solar Energy Technology GmbH
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Safety Warning

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Surface high temperature , Please do not touch the inverter case.

The DC input terminals of the inverter must not be grounded.

Please read the instructions carefully before use.

Product Name	Grid-connected PV Inverter
Model	APEX-P3-12K-G
Max. DC Input Power	15.6kW
Max. DC Input Voltage	1000Vdc
MPPT Voltage Range	200-850Vdc
Max.DC Input Current	2×20Adc
Max. short circuit input current	2×30dc
Rated AC Grid Voltage	3L/N/PE 230/400V
Rated AC Grid Frequency	50/60Hz
Rated AC Output Power	12kW
Max. Active Power	13.2kW
Max. Apparent Output Power	13.2kVA
Max. AC Output Current	19.1Aac
Power Factor	-0.8~+0.8
Operating Temperature Range	-25℃~+65℃
Ingress Protection	IP65
Protection Level	Class I
Standard	IEC/EN 62109-1, IEC/EN 62109-2

Apex Solar Energy Technology GmbH
Add: Reisholzer Werftstr. 76, Düsseldorf, 40589 Germany

Safety Warning

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It is strictly forbidden for users to open the casing.Professional maintenance is required for internal maintenance of the inverter.

Surface high temperature , Please do not touch the inverter case.

The DC input terminals of the inverter must not be grounded.

Please read the instructions carefully before use.

Product Name	Grid-connected PV Inverter
Model	APEX-P3-15K-G
Max. DC Input Power	19.5kW
Max. DC Input Voltage	1000Vdc
MPPT Voltage Range	200-850Vdc
Max.DC Input Current	20+26Adc
Max. short circuit input current	30+39Adc
Rated AC Grid Voltage	3L/N/PE 230/400V
Rated AC Grid Frequency	50/60Hz
Rated AC Output Power	15kW
Max. Active Power	16.5kW
Max. Apparent Output Power	16.5kVA
Max. AC Output Current	23.9Aac
Power Factor	-0.8~+0.8
Operating Temperature Range	-25℃~+65℃
Ingress Protection	IP65
Protection Level	Class I
Standard	IEC/EN 62109-1, IEC/EN 62109-2

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Please read the instructions carefully before use.

3. SUMMARY OF TEST RESULTS

3.1. Test Standards

No.	Identity	Document Title
1	IEC 61000-6-1:2016	Electromagnetic compatibility (EMC) -- Part 6-1: Generic standards - Immunity standard for residential, commercial and light-industrial environments
2	EN IEC 61000-6-1:2019	Electromagnetic compatibility (EMC) -- Part 6-1: Generic standards - Immunity standard for residential, commercial and light-industrial environments
3	IEC 61000-6-3:2020	Electromagnetic compatibility (EMC) -- Part 6-3: Generic standards -- Emission standard for equipment in residential environments
4	EN 61000-6-3:2007 +A1:2011+AC:2012	Electromagnetic compatibility (EMC) -- Part 6-3: Generic standards -- Emission standard for residential, commercial and light-industrial environments
5	IEC 61000-6-2:2016	Electromagnetic compatibility (EMC) -- Part 6-2: Generic standards - Immunity standard for industrial environments
6	EN IEC 61000-6-2:2019	Electromagnetic compatibility (EMC) --Part 6-2: Generic standards -- Immunity standard for industrial environments
7	IEC 61000-6-4:2018	Electromagnetic compatibility (EMC) -- Part 6-4: Generic standards -- Emission standard for industrial environments
8	EN IEC 61000-6-4:2019	Electromagnetic compatibility (EMC) -- Part 6-4: Generic standards -- Emission standard for industrial environments
9	IEC 61000-3-11:2017	Electromagnetic compatibility (EMC) -- Part 3-11: Limits -- Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems -- Equipment with rated current ≤ 75 A and subject to conditional connection
10	EN IEC 61000-3-11:2019	Electromagnetic compatibility (EMC) -- Part 3-11: Limits -- Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems -- Equipment with rated current ≤ 75 A and subject to conditional connection
11	IEC 61000-3-12:2011	Electromagnetic compatibility (EMC) -- Part 3-12: Limits -- Limits for harmonic currents produced by equipment connected to public low-voltage systems with input current > 16 A and ≤ 75 A per phase
12	EN 61000-3-12:2011	Electromagnetic compatibility (EMC) -- Part 3-12: Limits -- Limits for harmonic currents produced by equipment connected to public low-voltage systems with input current > 16 A and ≤ 75 A per phase
13	IEC 61000-3-2:2018 +AMD1:2020	Electromagnetic compatibility (EMC) -- Part 3-2: Limits-Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)
14	EN IEC 61000-3-2:2019	Electromagnetic compatibility (EMC) -- Part 3-2: Limits-Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)
15	IEC 61000-3-3:2013 +AMD1:2017	Electromagnetic compatibility (EMC) -- Part 3-3: Limits- Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current 16 A per phase and not subject to conditional connection
16	EN 61000-3-3:2013 +A1:2019	Electromagnetic compatibility (EMC) -- Part 3-3: Limits- Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current 16 A per phase and not subject to conditional connection

3.2. Verdict

No.	Base Standard	Description		Test Verdict	Result	Remark
Emission						
1	IEC 61000-6-3:2020; EN 61000-6-3:2007 +A1:2011+AC:2012	Radiated Emission	Below 1 GHz	P	Annex A.1	Note 1
2	IEC 61000-6-3:2020; EN 61000-6-3:2007 +A1:2011+AC:2012	Conducted Emission	AC Ports	P	Annex A.2	--
			DC Ports	N		Note 2
			Telecom Ports	N		Note 3
3	IEC 61000-3-2:2018 +AMD1:2020; IEC 61000-3-12:2011	Harmonic Current Emissions		P	Annex A.3	--
4	IEC 61000-3-3:2013 +AMD1:2017; IEC 61000-3-11:2017	Voltage Fluctuations & Flicker		P	Annex A.4	--
Immunity						
5	IEC 61000-4-2:2008	Electrostatic Discharge Immunity		P	Annex A.5	--
6	IEC 61000-4-3:2006 +A1:2007+A2:2010	Radiated RF Electromagnetic Field Immunity		P	Annex A.6	--
7	IEC 61000-4-4:2012	Electrical Fast Transient/Burst Immunity	AC Ports	P	Annex A.7	--
			DC Ports	P		--
			Signal Ports	N		Note 4
8	IEC 61000-4-5:2014	Surge Immunity	AC Ports	P	Annex A.8	--
			DC Ports	P		--
			Signal Ports	N		Note 5
9	IEC 61000-4-6:2013	Immunity to Conducted Disturbances Induced by RF Fields	AC Ports	P	Annex A.9	--
			DC Ports	P		--
			Signal Ports	N		Note 4
10	IEC 61000-4-8:2009	Power-frequency magnetic field		P	Annex A.10	--
11	IEC 61000-4-34:2005 +A1:2009	Voltage Dips and Short Interruptions Immunity	AC Ports	P	Annex A.11	--

Note 1: The highest frequency of the internal sources of the EUT is below 108 MHz, the measurement shall be made below 1 GHz.

Note 2: Applicable only to ports intended for connection to
- a local DC distribution network, or
- a remote battery by a connecting cable exceeding a length of 3m.

The EUT is a Grid-connected PV Inverter, which does not intended for connection to a local DC distribution network or a remote battery.

Note 3: Telecommunications/network port is a point of connection for voice, data and signaling transfers intended to interconnect widely dispersed systems via such means as direct connection to multi-user telecommunications networks, local area networks and similar networks. A port generally intended for

interconnection of components of an ITE system under test and used in accordance with its functional specifications, is not considered to be a telecommunication port. The EUT does not have telecommunication port according to above definition.

Note 4: Signal/control port is a port at which a conductor or cable intended to carry signals is connected to the equipment. Applicable only to ports interfacing with cables whose total length according to the manufacturer's functional specification may exceed 3 m. The signal ports cable length of EUT is less than 2m.

Note 5: Signal/control port is a port at which a conductor or cable intended to carry signals is connected to the equipment. Applicable only to ports interfacing with cables whose total length according to the manufacturer's functional specification may exceed 30 m. The signal ports cable length of EUT is less than 2m.

Note 6: The differences between this report and the report No.BL-DG2191017-401(G1), which was issued by Dongguan BALUN Testing Technology Co., Ltd. on Apr. 11, 2022 is that :
a: Change the applicant information, manufacturer information and series model.
b: Update the labels and EUT external photos.
The sample under test is the same. All test result please refer to report No.BL-DG2191017-401(G1), which was issued by Dongguan BALUN Testing Technology Co., Ltd. on Apr. 11, 2022.

This report judges the test conclusions:

——Not applicable for this test product N

——Meet requirements P

——Does not meet the requirements F

3.3. Test Uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Measurement	Value
Conducted emissions (Mains port)	3.77 dB
Radiated emissions (30 MHz-1 GHz)	4.81 dB

4. GENERAL TEST CONFIGURATIONS

4.1. Test Environments

Environment Parameter	Selected Values During Tests			
	Temperature	Voltage	Relative Humidity	Ambient Pressure
Normal Temperature, Normal Voltage (NTNV)	20.0°C ~ 27.0°C	AC 400V 50Hz; MPPT 200~850V	50% ~ 57%	100.0kPa ~ 100.6kPa

4.2. Test Equipment List

Radiated Emission Test For Frequency Below 1 GHz					
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
EMI Receiver	Keysight	N9038A	MY55330115	2021.03.02	2022.03.01
Test Antenna-Bi-Log	SCHWARZBECK	VULB 9163	9163-1202	2018.12.20	2021.12.19
Anechoic Chamber	YIHENG ELECTRONIC	12.0m*7.0m*7.5m	19009	2019.03.05	2022.03.04
Test Software	Balun	BL410-E (Version: V19.319)	N/A	N/A	N/A

Conducted Emission					
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
EMI Receiver	Keysight	N9038A	MY55330115	2021.03.02	2022.03.01
LISN	SCHWARZBECK	NNLK 8129	8129-462	2020.11.10	2021.11.09
Anechoic Chamber	YIHENG ELECTRONIC	12.0m*7.0m*7.5m	N/A	2019.03.05	2022.03.04
Test Software	Balun	BL410-E (Version: V19.319)	N/A	N/A	N/A

Voltage Fluctuations & Flicker and Harmonic Current Emissions Test					
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Power Analyzer	ZHIYUAN	PA2000mini	PA2004mini-P0400-1632	2020.11.18	2021.11.17
Three-phase Flicker Impedance	HTEC	FI-75A	172101	2020.09.20	2021.09.19

Electrostatic Discharge Immunity Test					
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
ESD Test System	SCHLODER	SESD 30000	607339	2021.03.16	2022.03.15

Radiated RF Electromagnetic Field Immunity Test					
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Anechoic Chamber	YIHENG ELECTRONIC	12.0m*7.0m* 7.5m	19009	2019.03.05	2022.03.04
Signal Generator	ROHDE&SCHWARZ	N5181A	MY50141978	2021.03.18	2022.03.17
Power Amplifier	rflight	NTWPA-00810200E	18093198	2021.03.02	2022.03.01
Power Amplifier	rflight	NTWPA-1060100E	18093195	2021.03.02	2022.03.01
Power Meter	Agilent	E4417A	GB41292042	2021.03.02	2022.03.01
Feld Strength Meter	Narda	EP601	511WX51129	2021.03.16	2022.03.15
Test Antenna-Bi-Log	SCHWARZBECK	VULB 9163	9163-1202	2018.12.20	2021.12.19
Test Antenna-Horn	SCHWARZBECK	BBHA 9120D	9120D-1986	2018.12.20	2021.12.19

Electrical Fast Transient/Burst Immunity Test					
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
EFT Test System	HTEC	HEFT 51	1331011	2021.03.02	2022.03.01
EFT coupling network	HTEC	ECDN 51	150601	2021.03.02	2022.03.01

Transients and Surges Test					
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
SURGE Generator (AC/DC Ports)	HTEC	HCWG 70	151601	2021.03.18	2022.03.17
SURGE coupling network (AC/DC Ports)	HTEC	SCDN303P7	151602	2021.03.18	2022.03.17

Immunity to Conducted Disturbances Induced by RF Fields					
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Conducted Disturbances Test System	Schloder GmbH	CDG 6000	18901932-0101	2020.09.21	2021.09.20
CDN-M5	TESEQ	CDN-M5-100	A2560005/2016	2020.09.21	2021.09.20

Power Frequency Magnetic Fields Immunity					
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Magnetic Field Tester	HEAFELY	HPFMF 1000	183102	2021.03.02	2022.03.01

Voltage Dips and Short Interruptions Immunity Test					
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Voltage Fault Simulating Generator	HTEC	HPFS303P	152301	2021.03.02	2022.03.01
Voltage Fault Coupling Network	HTEC	HV3P30	152302	2021.03.02	2022.03.01

4.3. Test Enclosure list

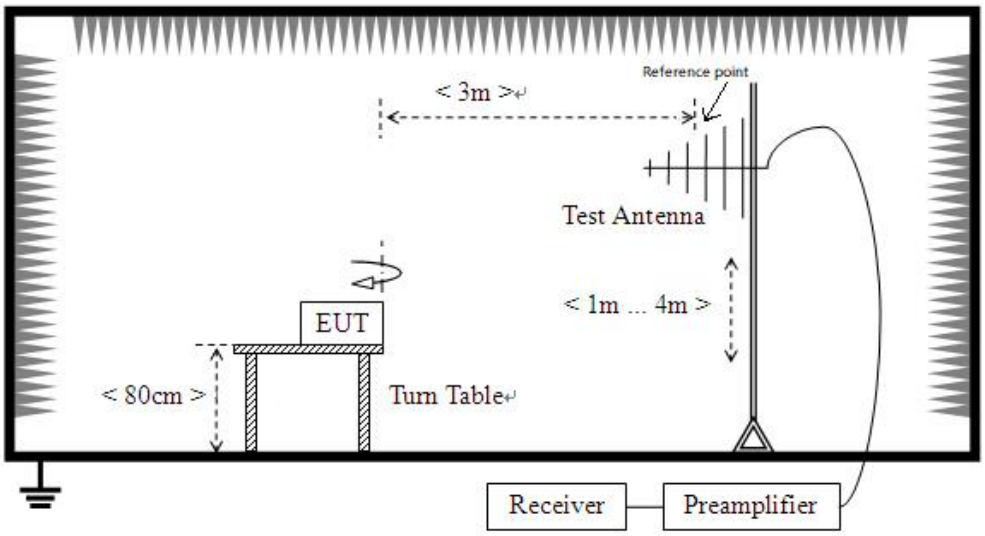
Name	Manufacturer	Model	Serial No.	Length	Description
DC Source	WKDY	WPLA-150KW	W20180626011	N/A	N/A

4.4. Test Configurations

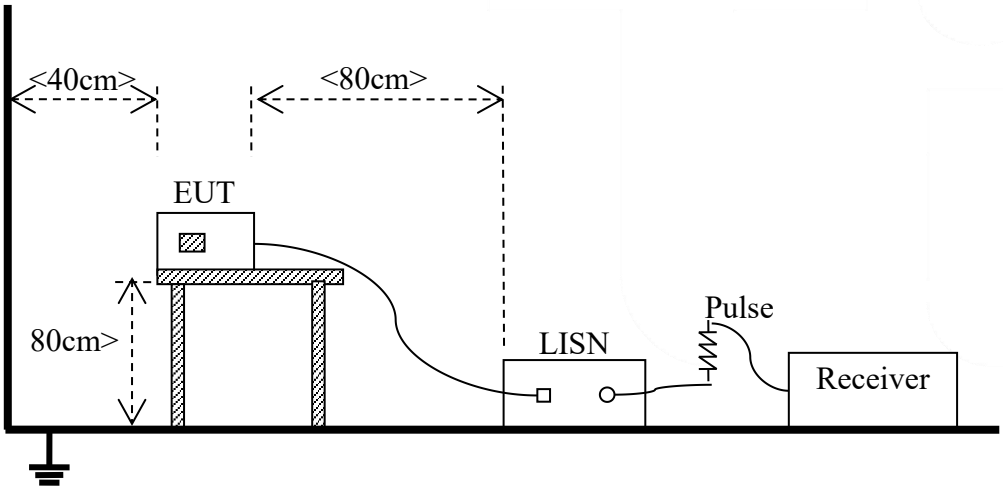
Test Configurations (TC) No.	Description
TC01	Grid-connected (100% Load) EUT+DC Source+AC Grid
TC02	Grid-connected (50% Load) EUT+DC Source+AC Grid
TC03	Standby EUT+DC Source

4.5. Description of Test Setup

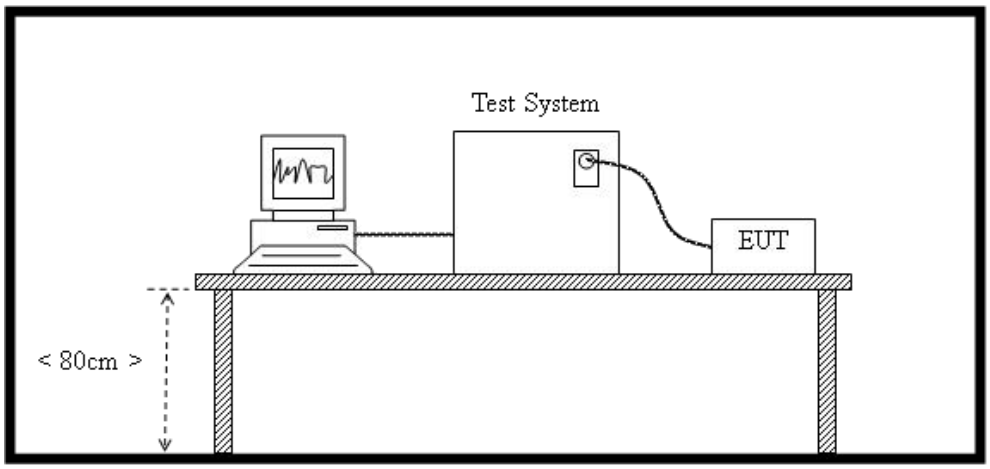
Test Setup 1 For Radiated Emission Test (30 MHz-1 GHz)



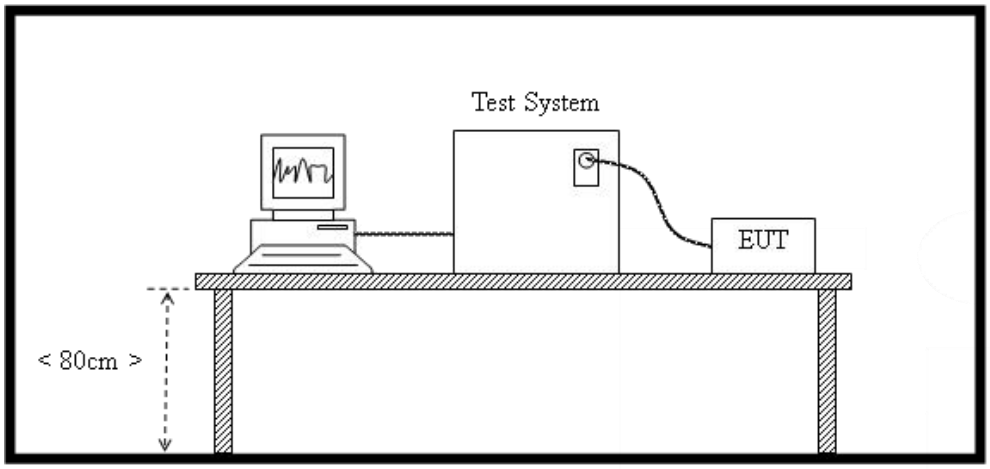
Test Setup 2 For Conducted disturbance voltage at mains terminals Test



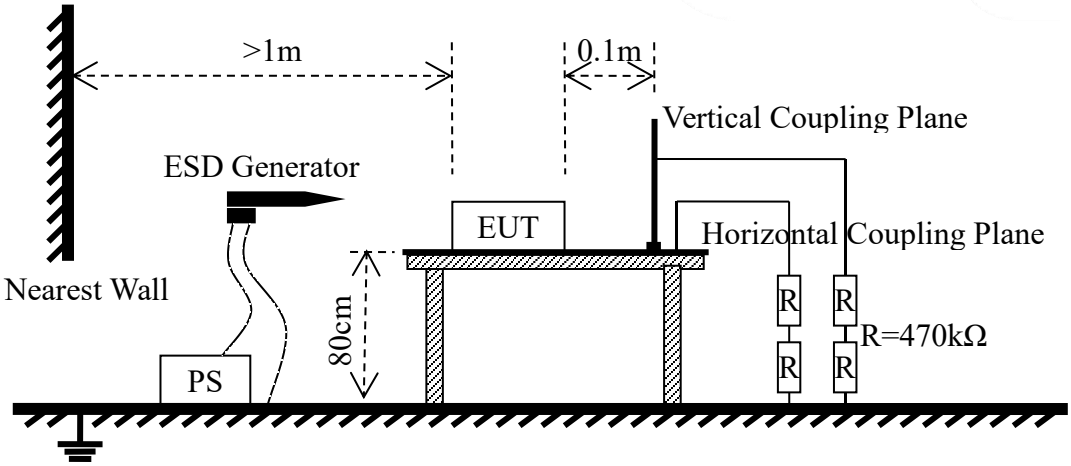
Test Setup 3 For Harmonic Current Emissions Measurement Test



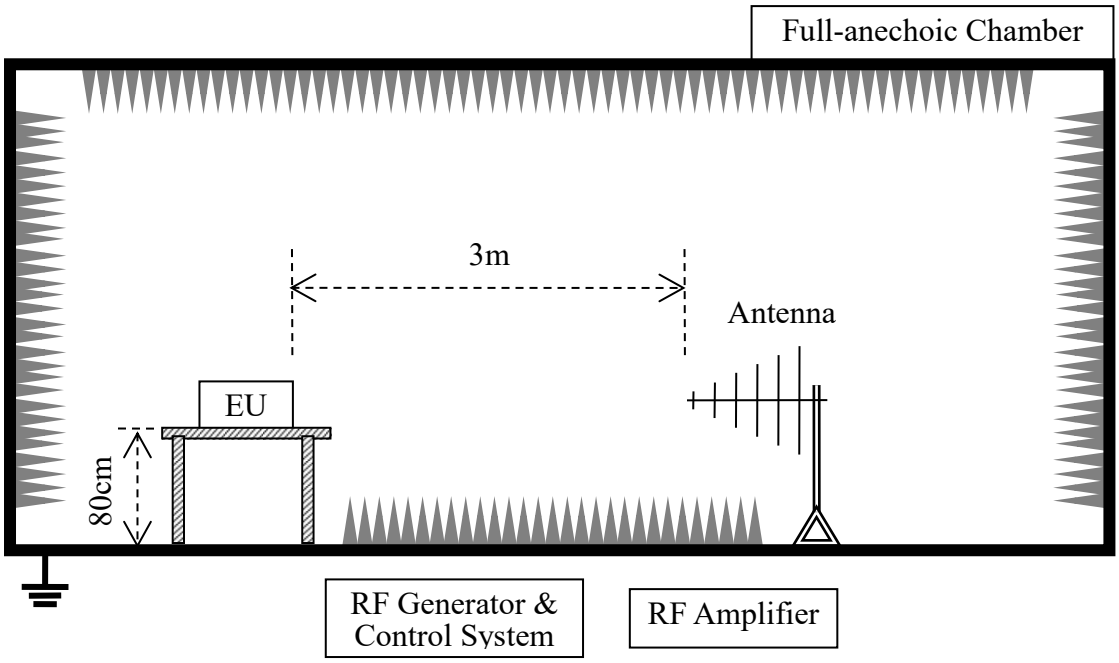
Test Setup 4 For Voltage Fluctuations and Flicker Measurement Test



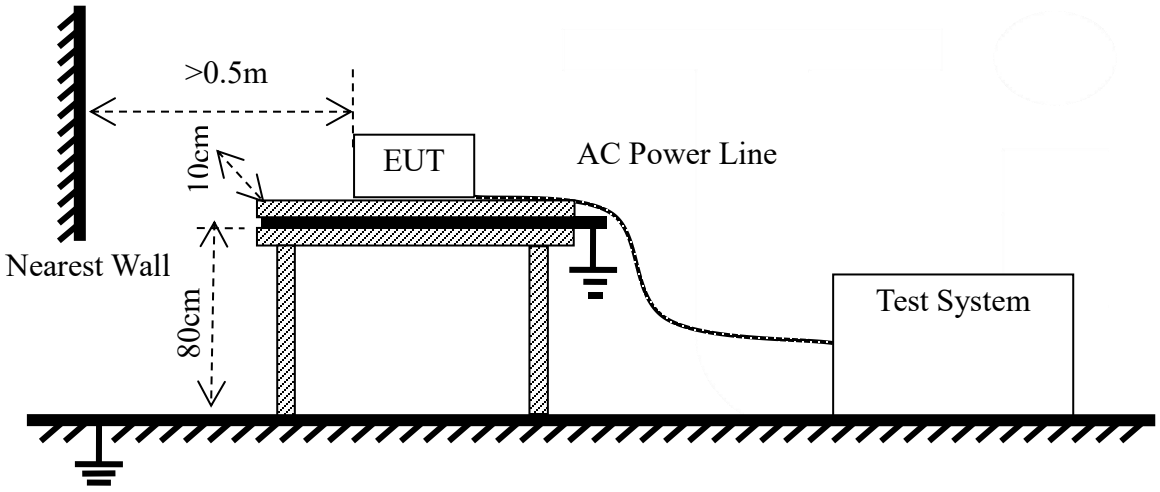
Test Setup 5 For Electrostatic Discharge Immunity Test



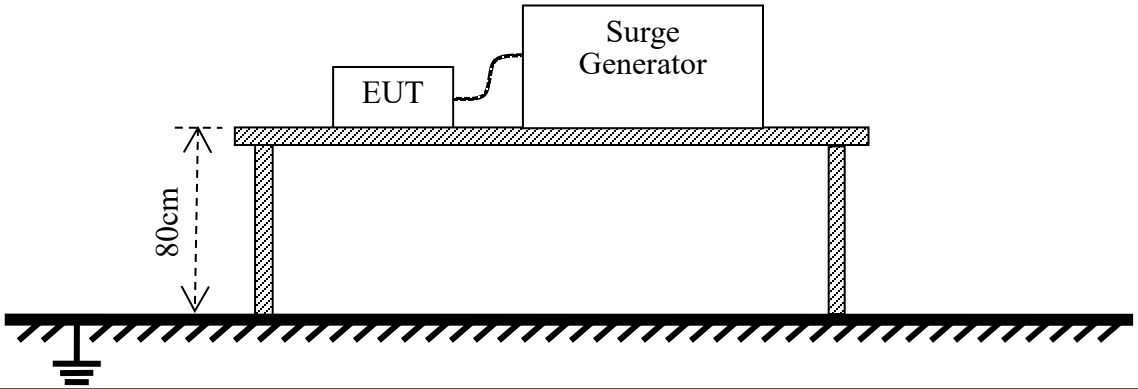
Test Setup 6 For Radiated Immunity Test



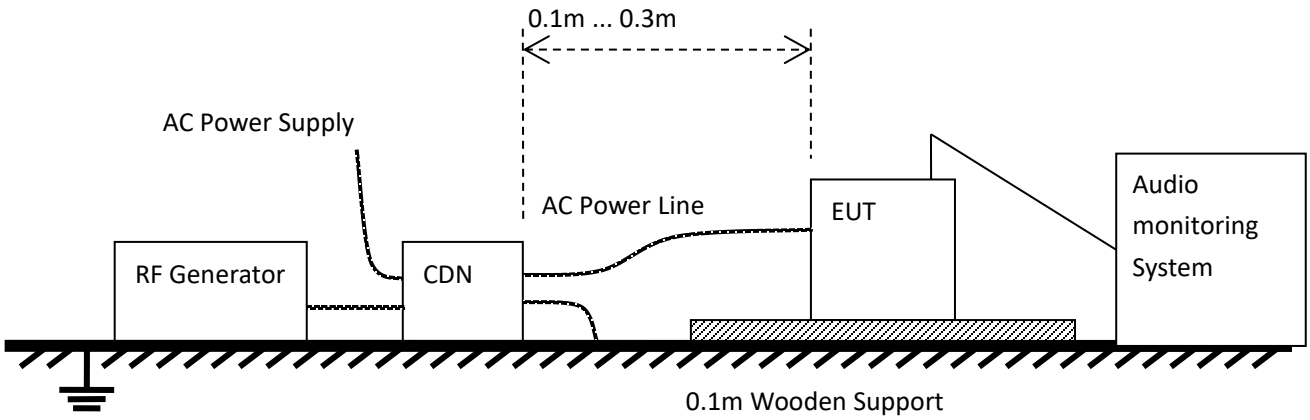
Test Setup 7 For Electrical Fast Transient / Burst Immunity Test



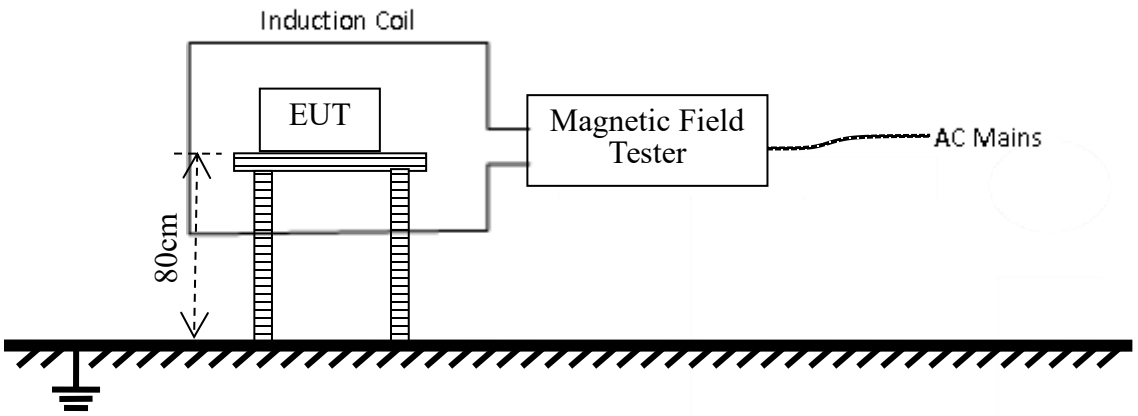
Test Setup 8 For Surge Immunity Test



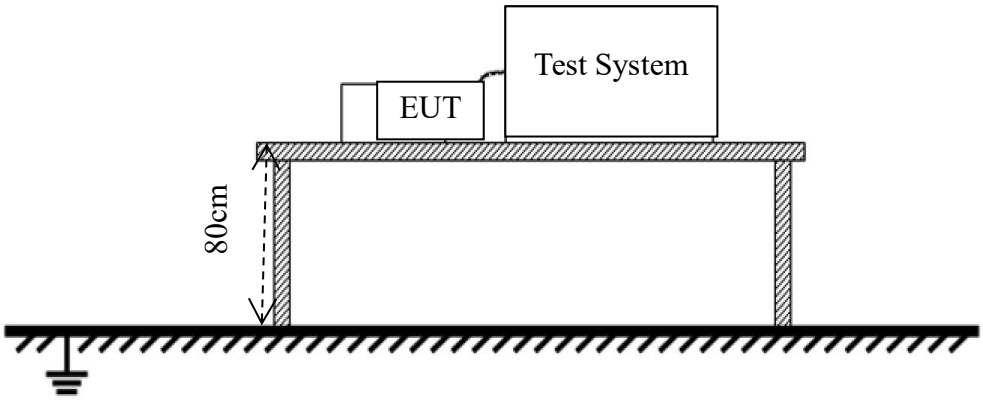
Test Setup 9 For Immunity to Conducted Disturbances Induced By RF Fields Test



Test Setup 10 Power Frequency Magnetic Fields



Test Setup 11 For Voltage Dips and Short Interruptions Immunity Test



4.6. Test Conditions

Test Case	Test Conditions	
Radiated Emission	Test Env.	NTNV
	Test Model	APEX-P3-15K
	Test Setup	Test Setup 1
	Test Configuration	TC01, TC02, TC03
Conducted Emission	Test Env.	NTNV
	Test Model	APEX-P3-15K
	Test Setup	Test Setup 2
	Test Configuration	TC01, TC02
Harmonic Current Emissions	Test Env.	NTNV
	Test Model	APEX-P3-15K, APEX-P3-10K
	Test Setup	Test Setup 3
	Test Configuration	TC01
Voltage Fluctuations & Flicker	Test Env.	NTNV
	Test Model	APEX-P3-15K, APEX-P3-10K
	Test Setup	Test Setup 4
	Test Configuration	TC01
Electrostatic Discharge Immunity	Test Env.	NTNV
	Test Model	APEX-P3-15K
	Test Setup	Test Setup 5
	Test Configuration	TC02
Radiated RF Electromagnetic Field Immunity	Test Env.	NTNV
	Test Model	APEX-P3-15K
	Test Setup	Test Setup 6
	Test Configuration	TC02
Electrical Fast Transient/Burst Immunity	Test Env.	NTNV
	Test Model	APEX-P3-15K
	Test Setup	Test Setup 7
	Test Configuration	TC02
Surge Immunity	Test Env.	NTNV
	Test Model	APEX-P3-15K
	Test Setup	Test Setup 8
	Test Configuration	TC02
Immunity to Conducted Disturbances Induced by RF Fields	Test Env.	NTNV
	Test Model	APEX-P3-15K
	Test Setup	Test Setup 9
	Test Configuration	TC02

Test Case	Test Conditions	
Power-frequency magnetic field	Test Env.	NTNV
	Test Model	APEX-P3-15K
	Test Setup	Test Setup 10
	Test Configuration	TC02
Voltage Dips and Short Interruptions Immunity	Test Env.	NTNV
	Test Model	APEX-P3-15K
	Test Setup	Test Setup 11
	Test Configuration	TC02
Note: Based on client request, all normal using modes of the normal function were tested but only the worst test data of the worst mode is reported by this report. The Grid-connected (100% Load) is the worst test mode in this report.		

5. TEST ITEMS

5.1. Emission Tests

5.1.1. Radiated Emission

5.1.1.1. Limit

Frequency range (MHz)	Distance (at 3 m)	Distance (at 10 m)
	Quasi-Peak Limit (dBμV/m)	Quasi-Peak Limit (dBμV/m)
30 - 230	40	30
230 - 1000	47	37

Frequency range (MHz)	Distance (at 3 m)	
	Peak Limit (dBμV/m)	Average Limit (dBμV/m)
1000-3000	70	50
3000-6000	74	54

NOTE:

1) For apparatus containing devices operating at frequencies less than 9kHz measurements only need to be performed up to 230MHz.

2) If the highest internal frequency of the EUT is less than 108MHz, the measurement shall only be made up to 1GHz; If the highest internal frequency of the EUT is between 108MHz and 500MHz, the measurement shall only be made up to 2GHz; If the highest internal frequency of the EUT is between 500MHz and 1GHz, the measurement shall only be made up to 5GHz; If the highest internal frequency of the EUT is above 1GHz, the measurement shall be made up to 6GHz; Where the highest internal frequency is not known, tests shall be performed up to 6GHz.

3) At transitional frequencies the lower limit applies.

5.1.1.2. Test Procedure

All Radiated Emission tests were performed in the azimuth plane. And test data and plots are recorded in this test report.

An initial pre-scan was performed in the chamber using the EMI Receiver in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by Bi-Log antenna with 2 orthogonal polarities.

5.1.2. Conducted Emission

5.1.2.1. Test Limit

AC Port

Frequency range (MHz)	Quasi-peak (dBuV)	Average (dBuV)
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

NOTE:

1) The lower limit shall apply at the band edges.
2) The limit decreases linearly with the logarithm for the frequency in the range 0.15 - 0.50 MHz.
3) It is tested under the low voltage which is for the distribution of AC electric power, the upper limit is generally accepted to be 1000 V.

DC Port

Frequency range (MHz)	Quasi-peak (dBuV)	Average (dBuV)
V - AN		
0.15 - 0.50	79	66
0.50 - 30	73	60
△ - AN		
0.15 - 0.50	84-74	74-64
0.50 - 30	74	64

NOTE:

1) The lower limit shall apply at the band edges.

Telecom Port

Frequency range (MHz)	Quasi-peak (dBuV)	Average (dBuV)
0.15 - 0.50	84-74	74-64
0.50 - 30	74	64

NOTE:

1) The lower limit shall apply at the band edges.
2) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50 MHz.
3) The current and voltage disturbance limits are derived for use with an impedance stabilization network (ISN) which presents a common mode (asymmetric mode) impedance of 150 Ω to telecommunication port under test.

Discontinuous disturbances

The click limit Lq is calculated by increasing the relevant quasi-peak limit L for continuous disturbances (as given in AC Port quasi-peak limit) by:

Frequency (MHz)	Click rate N	
	Click limit Lq (dB) N < 0,2	Click limit Lq (dB) 0,2 ≤ N < 30
0.15 - 30	AC Port quasi-peak limit + 44	AC Port quasi-peak limit + 20 lg (30/N)

5.1.2.2. Test Procedure

The EUT is connected to the power mains through a LISN which provides 50 Ω/50 μH or 150 Ω of coupling impedance for the measuring instrument. The test frequency range is from 150 kHz to 30 MHz. The maximum conducted interference is searched using Peak (PK), Quasi-peak (QP) and Average (AV) detectors; the emission levels that are more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Telecommunication port was checked to find out the maximum conducted emission.

5.1.3. Harmonic Current Emissions (≤16A)

5.1.3.1. Limit

For each harmonic order, all 1.5s smoothed r.m.s. harmonic current values, as defined as follows, shall be either:

a) Less than or equal to 150% of the applicable limits, or

b) Less than or equal to 200% of the applicable limits under the following conditions, which apply all together:

1) The EUT belongs to Class A for harmonics;

2) The excursion beyond 150% of the applicable limits lasts less than 10%of the test observation period or in total 10min (within the test observation period), whichever is smaller, and

3) The average value of the harmonic current, taken over the entire test observation period, is less than 90% of the applicable limits.

Harmonic currents less than 0.6% of the input current measured under the test conditions, or less than 5mA, whichever is greater, are disregarded.

For the 21st and higher odd order harmonica, the average value obtained for each individual odd harmonic over the full observation period, calculated from the 1.5s smoothed r.m.s., may exceed the applicable limits by 50% provided that the following conditions are met:

- The measured partial odd harmonic current does not exceed the partial odd harmonic current which can be calculated from the applicable limits;
- All 1.5s smoothed r.m.s. individual harmonic current values shall be less than or equal to 150% of the applicable limits.

Note: These exemptions (the use of the partial odd harmonic current for the average values and the 200% short term limit for single 1.5s smoothed values) are mutually exclusive and cannot be together.

Limits for Class A equipment				Limits for Class D equipment		
odd harmonic		Even harmonics		Harmonic order (n)	Maximum permissible harmonic current per watt mA/W	Maximum permissible harmonic current A
Harmonic order (n)	Maximum permissible harmonic current A	Harmonic order (n)	Maximum permissible harmonic current A			
3	2.30	2	1.08	3	3.4	2.30
5	1.14	4	0.43	5	1.9	1.14
7	0.77	6	0.30	7	1.0	0.77
9	0.40	8≤n≤40	0.23*(8/n)	9	0.5	0.40
11	0.33			11	0.35	0.33
13	0.21			15≤n≤39 (odd harmonics only)	3.85/n	0.15*(15/n)
15≤n≤39	0.15*(15/n)					
Note: For Class B equipment, the harmonics of the input current shall not exceed the values given in Table “limits for Class A equipment” multiplied by a factor of 1.5.						

For the purpose of harmonic current limitation, equipment is classified as follows:(Note: Class C equipment requirement not include in this standard.)

Class A:

– balanced three-phase equipment;

– household appliances, excluding equipment identified as class D;

– tools, excluding portable tools;

– dimmers for incandescent lamps;

– audio equipment.

Equipment not specified in one of the three other classes shall be considered as class A equipment.

Class B:

– portable tools;

– arc welding equipment which is not professional equipment.

Class C:

– lighting equipment.

Class D:

Equipment having a specified power according to 6.2.2 less than or equal to 600 W, of the following types:

– personal computers and personal computer monitors;

– television receivers.

5.1.3.2. Test Procedure

The EUT is placed on the top of a wooden table 0.8m above the ground and operated to produce the maximum harmonic components under normal operating conditions for each successive harmonic component in turn.

The correspondent test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the necessary for the EUT to be exercised.

5.1.4. Harmonic Current Emissions (＞16A)

5.1.4.1. Limit

S_{SC}

value of the three-phase short-circuit power calculated from the nominal interphase system voltage $U_{nominal}$ and the line impedance Z of the system at the PCC:

$$S_{SC}=U^2_{normimal}/Z$$

where Z is the system impedance at the power frequency

S_{equ}

value calculated from the rated current I_{equ} of the piece of equipment stated by the manufacturer and the rated voltage Up (single phase) or U_l (interphase) as follows:

$S_{equ} = U_p I_{equ}$ for single-phase equipment and the single-phase part of hybrid equipment

$S_{equ} = U_i I_{equ}$ for interphase equipment

$S_{equ} = \sqrt{3}\ U_i I_{equ}$ for balanced three-phase equipment and the three-phase part of hybrid equipment

$S_{equ} = \sqrt{3}\ U_i I_{equ\ max}$ for unbalanced three-phase equipment

S_{sce}

characteristic value of a piece of equipment defined as follows:

$R_{sce} = S_{SC}/(3\ S_{equ})$ for single-phase equipment and the single-phase part of hybrid equipment

$R_{sce} = S_{SC}/(2\ S_{equ})$ for interphase equipment

$R_{sce} = S_{SC}/(S_{equ})$ for all three-phase equipment and the three-phase part of hybrid equipment

The limits given apply to 230/400 V, 50 Hz systems. The limits for the other systems will be added in a future edition of this standard.

NOTE 1 In some non-European countries, the proposed methodology cannot be applied because the short-circuit power data is not always available.

The harmonic current limits specified in the tables apply to each of the line currents and not to current in the neutral conductor.

For equipment with multiple rated currents, an assessment is made for each current.

As an example (for the same equipment):

Rated voltage: 230 V single phase, rated current: x A per phase, assessment and test at 230 V.

Rated voltage: 400 V three phase, rated current: y A per phase, assessment and test at 400 V.

The harmonic current limits are specified in Tables 2 to 5

Equipment complying with the harmonic current emission limits corresponding to R_{sce} = 33 is suitable for connection at any point of the supply system.

NOTE 2 Values are based on a minimum value of Rsce = 33. Short-circuit ratios less than 33 are not considered.

NOTE 3 In order to reduce the depth of commutation notches of converters, a short-circuit ratio higher than 33 may be necessary.

For equipment not complying with the harmonic current emission limits corresponding to R_{sce} = 33, higher emission values are allowed, under the assumption that the short-circuit ratio R_{sce} is greater than 33. It is expected that this will apply to the majority of equipment with input current above 16 A per phase. See requirement for product documentation in Clause 6.

Table 2 is applied to equipment other than balanced three-phase equipment and Tables 3, 4 and 5 are applied to balanced three-phase equipment.

Table 3 may be used for any balanced three-phase piece of equipment.

Table 4 may be used with balanced three-phase equipment if any one of these conditions is met.
a) The 5th and 7th harmonic currents are each less than 5 % of the reference current during the whole test observation period.
b) The design of the piece of equipment is such that the phase angle of the 5th harmonic current has no preferential value over time and can take any value in the whole interval [0°，360°]
c) The phase angle of the 5th harmonic current related to the fundamental phase-to-neutral voltage (see 3.16) is in the range of 90 ° to 150 ° during the whole test observation period.

Table 5 may be used with balanced three-phase equipment if any one of these conditions is met:
d) The 5th and 7th harmonic currents are each less than 3 % of the reference current during the whole test observation period.
e) The design of the piece of equipment is such that the phase angle of the 5th harmonic current has no preferential value over time and can take any value in the whole interval [0 °, 360 °].
f) The phase angle of the 5th harmonic current related to the fundamental phase-to-neutral voltage (see 3.16) is in the range of 150 ° to 210 ° during the whole test observation period.

Table 3, Table 4 or Table 5 can be applied to hybrid equipment in one of the following circumstances:
a) hybrid equipment having a maximum 3rd harmonic current of less than 5 % of the reference current，or
b) there is provision in the construction of hybrid equipment to separate the balanced three- phase and the single-phase or interphase loads for the measurement of supply currents, and when the current is being measured, the part of the equipment being measured draws the same current as under normal operating conditions. In that case, the relevant limits shall be applied separately to the single-phase or interphase part and to the balanced three-phase part. Table 3, Table 4 or Table 5 applies to the current of the balanced three- phase part, even if the rated current of the balanced three-phase part is less than or equal to 16 A per phase. Table 2 applies to the current of the single-phase or interphase part, but if the rated current of the single-phase or interphase part is less than or equal to 16 A, the manufacturer may apply the relevant limits of IEC 61000-3-2 to the single-phase or interphase part instead of the limits stated in Table 2.

For verification purposes, when circumstance b) above applies, the manufacturer shall state in the product documentation the rated current and give in the test report the measured and specified values of the input current as defined in 4.1, for each separate load. The value of R_{sce} for this type of hybrid equipment is determined as follows:
• the minimum R_{sce} value is first determined for each of the two loads, using the reference current of the considered part for the calculation of the harmonic current emissions to be compared to the limit values given in Tables 2 to 5; in case IEC 61000-3-2 is applied to the single-phase or interphase part instead of

Table 2 limits, the minimum R_{sce} value for this part is deemed to be equal to 33;

• then, for each of the two parts, the minimum value of S_{sc} is calculated from its minimum R_{sce} value and its rated current (see 3.11 and 3.14);

• finally, the value of R_{sce} for the hybrid equipment is determined from the highest of both minimum values of S_{sc} and the rated apparent power of the whole hybrid equipment.

Table 2 Current emission limits for equipment other than balanced three-phase equipment

Minimum R_{sce}	Admissible individual harmonic current I_h/I_{ref} [a] %						Admissible harmonic parameters %	
	I_3	I_5	I_7	I_9	I_{11}	I_{13}	THC/I_{ref}	$PWHC/I_{ref}$
33	21.6	10.7	7.2	3.8	3.1	2	23	23
66	24	13	8	5	4	3	26	26
120	27	15	10	6	5	4	30	30
250	35	20	13	9	8	6	40	40
≥350	41	24	15	12	10	8	47	47
The relative values of even harmonics up to order 12 shall not exceed 16/h %. Even harmonics above order 12 are taken into account in THC and PWHC in the same way as odd order harmonics. Linear interpolation between successive R_{sce} values is permitted. a: I_{ref}=reference current; I_h=harmonica current component.								

Table 3 Current emission limits for balanced three-phase equipment

Minimum R_{sce}	Admissible individual harmonic current I_h/I_{ref} [a] %				Admissible harmonic parameters %	
	I_5	I_7	I_{11}	I_{13}	THC/I_{ref}	$PWHC/I_{ref}$
33	10.7	7.2	3.1	2	13	22
66	14	9	5	3	16	25
120	19	12	7	4	22	28
250	31	20	12	7	37	38
≥350	40	25	15	10	48	46
The relative values of even harmonics up to order 12 shall not exceed 16/h %. Even harmonics above order 12 are taken into account in THC and PWHC in the same way as odd order harmonics. Linear interpolation between successive R_{sce} values is permitted. a: I_{ref}=reference current; I_h=harmonica current component.						

Table 4 Current emission for balanced three-phase equipment under specified conditions(a,b,c)

Minimum R_{sce}	Admissible individual harmonic current I_h/I_{ref} [a] %				Admissible harmonic parameters %	
	I_5	I_7	I_{11}	I_{13}	THC/I_{ref}	$PWHC/I_{ref}$
33	10.7	7.2	3.1	2	13	22
≥120	40	25	15	10	48	46
The relative values of even harmonics up to order 12 shall not exceed 16/h %. Even harmonics above order 12 are taken into account in THC and PWHC in the same way as odd order harmonics. Linear interpolation between successive R_{sce} values is permitted. a: I_{ref}=reference current; I_h=harmonica current component.						

Table 5 Current emission for balanced three-phase equipment under specified conditions(d,e,f)

Minimum R_{sce} = 33	Admissible individual harmonic current I_h/I_{ref} [a] %												Admissible harmonic parameters %	
--	I_5	I_7	I_{11}	I_{13}	I_{17}	I_{19}	I_{23}	I_{25}	I_{29}	I_{31}	I_{35}	I_{37}	THC/I_{ref}	$PWHC/I_{ref}$
33	10.7	7.2	3.1	2	2	1.5	1.5	1.5	1	1	1	1	13	22
≥250	25	17.3	12.1	10.7	8.4	7.8	6.8	6.5	5.4	5.2	4.9	4.7	35	70
For R_{sce} equal to 33, the relative values of even harmonics up to order 12 shall not exceed 16/h %. The relative values of all harmonics from I_{14} to I_{40} not listed above shall not exceed 1% of I_{ref}. For R_{sce}≥250, the relative values of even harmonics up to order 12 shall not exceed 16/h %. The relative values of all harmonics from I_{14} to I_{40} not listed above shall not exceed 3% of I_{ref}. Linear interpolation between both R_{sce} values is permitted. a: I_{ref}=reference current; I_h=harmonica current component.														

5.1.5. Voltage Fluctuations and Flicker

5.1.5.1. Limit

The following limits apply:

- The value of P_{st} shall not be greater than 1.0;
- The value of P_{lt} shall not be greater than 0.65;
- T_{max}, the accumulated time value of d(t) with a deviation exceeding 3.3% during a single voltage change at the EUT terminals, shall not exceed 500ms;
- The maximum relative steady-state voltage change, dc, shall not exceed 3.3%;
- The maximum relative voltage change d_{max}, shall not exceed:

a) 4% without additional conditions;

b) 6% for equipment which is:

— switched manually, or

— switched automatically more frequently than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds), or manual restart, after a power supply interruption.

Note: The cycling frequency is further limited by the P_{st} and P_{lt} limits.

c) 7% for equipment which is:

— attended whilst in use, or

— switched on automatically, or is intended to be switched on manually, no more than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds) or manual restart, after a power supply interruption.

In the case of equipment having several separately controlled circuits with limits b) and c) shall apply only if there is delayed or manual restart after a power supply interruption; for all equipment with automatic switching which is energized immediately on restoration of supply after a power supply interruption, limits a) shell apply; for all equipment with manual switching, limits b) or c) shall apply depending on the rate of switching.

P_{st} and P_{lt} requirement shall not be applied to voltage changes caused by manual switching.

The limits shall not be applied to voltage changes associated with emergency switching or emergency interruptions.

5.1.5.2. Test Procedure

During the Flicker measurement, the measure time shall include that part of whole operation changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours. The test specifications refer the next table.

No.	Specification	Value
1	Test Frequency	50 Hz
2	Test Voltage	230 VAC
3	Waveform	Sine
4	Test Time	10 minutes for Pst; 2 hours for Plt

5.2. Immunity Tests

5.2.1. Test Performance Criteria for Immunity Test

5.2.1.1. General Performance Criteria

Type	Description
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.

5.2.2. Electrostatic Discharge Immunity

5.2.2.1. Test Specification

Specification	Value
Basic Standard	IEC 61000-4-2:2008
Discharge Impedance	330 Ohm / 150 pF
Discharge Voltage	Air Discharge: 2 kV; 4 kV; 8 kV; Contact Discharge: 2 kV; 4 kV
Polarity	Positive / Negative
Number of Discharge	Minimum 20 times at each test point
Discharge Mode	Single discharge
Discharge Period	1 second minimum

5.2.2.2. Test Procedure

1. Electrostatic discharges are applied only to those points and surfaces of the EUT that are accessible to users during normal operation.

2. The test is performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.

3. The time interval between two successive single discharges is at least 1 second.

4. The ESD generator is held perpendicularly to the surface to which the discharge is applied and the return cable is at least 0.2 meters from the EUT.

5. Contact discharges are applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.

6. Air discharges are applied with the round discharge tip of the discharge electrode approaching the EUT as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator is removed from the EUT and re-triggered for a new single discharge. The test is repeated until all discharges were completed.

7. At least ten single discharges (in the most sensitive polarity) are applied to the Horizontal Coupling Plane at points on each side of the EUT. The ESD generator is positioned vertically at a distance of 0.1 meters from the EUT with the discharge electrode touching the HCP.

8. At least ten single discharges (in the most sensitive polarity) are applied to the center of one vertical edge of the Vertical Coupling Plane in sufficiently different positions that the four faces of the EUT were completely illuminated. The VCP (dimensions 0.5 m*0.5 m) is placed vertically to and 0.1 meters from the EUT.

5.2.3. Radio Frequency Electromagnetic Field Immunity

5.2.3.1. Test Specification

Specification	Value	
Basic Standard	IEC 61000-4-3:2006+A1:2007+A2:2010	
Frequency Range	80 MHz to 1000 MHz	1.4 GHz to 6.0 GHz
Field Strength	10 V/m (unmodulated, r.m.s)	3 V/m (unmodulated, r.m.s)
Modulation	1 kHz sine wave, 80%, AM modulation	
Frequency Step	1% of fundamental	
Polarity of Antenna	Horizontal and Vertical	
Test Distance	3 m	
Antenna Height	1.5 m	
Dwell Time	3 seconds	

5.2.3.2. Test Procedure

1. The testing is performed in a fully anechoic chamber. The transmit antenna is located at a distance of 3 meters from the EUT.

2. The test signal is 80% amplitude modulated with a 1 kHz sine wave.

3. The frequency range is swept from 80 MHz to 1000 MHz and 1400 MHz to 6000 MHz with the exception of the exclusion band for transmitters, receivers and duplex transceivers. The rate of sweep does not exceed 1.5*10-3 decade/s. Where the frequency range is swept incrementally, the step size is 1% of fundamental.

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

5. The field strength level is 10 V/m for 80 MHz to 1000MHz, 1 V/m for 1400 MHz to 6000 MHz.

6. The test is performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides,but only the worst side data is reported in this report.

5.2.4. Electrical Fast Transient / Burst Immunity

5.2.4.1. Test Specification

Specification	Value	
Basic Standard	IEC 61000-4-4:2012	
Test Voltage	AC Power Port: 2 kV.	
	DC Power Port: 1 kV.	
	Signal Port: 1 kV.	
Polarity	Positive / Negative	
Impulse Frequency	5 kHz	100 kHz
Impulse Wave Shape	5/50 ns	
Burst Duration	15 ms	0.75 ms
Burst Period	300 ms	
Test Duration	> 1 min	

NOTE:

1) The signal ports tests apply only to ports interfacing with cables whose total length according to the manufacturer's functional specification may exceed 3 m.

2) The DC ports test not applicable to input ports intended for connection to a battery or a rechargeable battery which must be removed or disconnected from the apparatus for recharging.

3) The EUT with a DC power input port intended for use with an AC-DC power adaptor shall be tested on the AC power input of the AC-DC power adaptor specified by the manufacturer or where none is so specified, using a typical AC-DC power adaptor.

4) The test applicable to DC power input ports and signal ports intended to be connected permanently to cables longer than 3 m.

5.2.4.2. Test Procedure

1. The EUT is tested with 2000 V discharges to the AC power input leads, 1000 V for signal port and DC port.

2. Both positive and negative polarity discharges are applied.

3. The length of the "hot wire" from the coaxial output of the EFT generator to the terminals on the EUT should not exceed 1 m.

4. The duration time of each test sequential is 1min.

5. The transient / burst waveform is in accordance with IEC 61000-4-4:2012, 5/50 ns.

5.2.5. Surge Immunity

5.2.5.1. Test Specification

Specification		Value		
Ports class		AC Power Port	DC Power Port	Signal Port
Basic Standard		IEC 61000-4-5:2014		
Waveform		Voltage: 1.2/50 μs; Current: 8/20 μs		
Test Voltage	line to ground	0.5 kV, 1 kV, 2 kV;	0.5 kV, 1 kV	0.5 kV, 1 kV
	line to line	0.5 kV, 1 kV	0.5 kV	/
Polarity		Positive / Negative		
Phase Angle		0°, 90°, 180°, 270°	N/A	
Repetition Rate		60 seconds		
Times		5 times per condition		

NOTE:

1) The Signal ports test not applicable to ports interfacing with long distance lines which inside a building is longer than 30 m, or which leaves the building (including a line installed outdoors).

2) Signal ports directly connected to AC power network shall be treated as AC power ports.

3) The DC ports test not applicable to input ports intended for connection to a battery or a rechargeable battery which must be removed or disconnected from the apparatus for recharging.

4) The EUT with a DC power input port intended for use with an AC-DC power adaptor shall be tested on the AC power input of the AC-DC power adaptor specified by the manufacturer or where none is so specified, using a typical AC-DC power adaptor.

5.2.5.2. Test Procedure

The EUT and the auxiliary equipment are placed on a table of 0.8 m heights above a metal ground reference plane. The size of ground plane is greater than 1 m*1 m and project beyond the EUT by at least 0.1 m on all sides. The ground plane is connected to the protective earth. The length of power cord between the coupling device and the EUT is less than 2 meters (provided by the manufacturer).

The EUT is connected to the power mains through a coupling device that directly couples the surge interference signal. The surge noise is applied synchronized to the voltage phase at the zero crossing and the peak value of the AC voltage wave (positive and negative).

The surges are applied line to line and line(s) to earth. When testing line to earth the test voltage is applied successively between each of the lines and earth. Set up to the test level specified increased the test voltage. All lower levels including the selected test level are tested. The polarity of each surge level included positive and negative test pulses.

5.2.6. Immunity to Conducted Disturbances Induced by RF Fields

5.2.6.1. Test Specification

Specification	Value		
Basic Standard	IEC 61000-4-6:2013		
Frequency Range	0.15 MHz – 80 MHz		
Test Voltage	10 V (unmodulated, r.m.s)		
Modulation	1 kHz sine wave, 80% AM		
Frequency Step	1% of fundamental		
Coupled Cable	AC Power Line	DC Power Line	Signal Line
Coupling Device	CDN-M1/2/3/4/5, Capacitive clamp		

NOTE:

1) The DC port and Signal port only apply to ports interfacing with cables whose total length according to the manufacturers functional specification may exceed 3 m.

2) The test level can also be defined as the equivalent current into a 150 Ω load at signal ports.

5.2.6.2. Test Procedure

The EUT shall be tested within its intended operating and climatic conditions.

The test shall be performed with the test generator connected to each of the coupling and decoupling devices in turn, while the other non-excited RF input ports of the coupling devices are terminated by a 150 Ohm load resistor.

The test signal is 80% amplitude modulated with a 1 kHz sine wave.

The frequency range is swept from 150 kHz to 80 MHz, using the signal level established during the setting process and with a disturbance signal of 80% amplitude. The sweep rate shall not exceed 1.5*10-3 decades/s. The step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value where the frequency is swept incrementally.

The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised, and able to respond. Sensitive frequencies such as clock frequencies and harmonics or frequencies of dominant interest, shall be analyzed separately.

Attempts should be made to fully exercise the EUT during test, and to fully interrogate all exercise modes selected for susceptibility.

5.2.7. Power Frequency Magnetic Fields Immunity

5.2.7.1. Test Specification

Specification	Value
Basic Standard	IEC 61000-4-8:2009
Field Frequency	50/60 Hz
Test Level	30 A/m
Polarity	Horizontal and Vertical
Test Duration	5 min

NOTE:

1) The test shall be carried out at the frequencies appropriate to the power supply frequency. Equipment intended for use in areas supplied only at one of these frequencies need only be tested at that frequency.

2) Applicable only to apparatus containing devices susceptible to magnetic fields.

5.2.7.2. Test Procedure

The EUT shall be subjected to the test magnetic field by using the induction coil of standard dimensions (1 m*1 m) and shown in Section 15.1. The induction coil shall then be rotated by 90° in order to expose the EUT to the test field with different orientations.

5.2.8. Voltage Dips and Short Interruptions Immunity

5.2.8.1. Test Specification

AC Ports

Specification	Value
Basic Standard	IEC 61000-4-34:2005+A1:2009
Frequency	50/60Hz
Voltage Dips	100% reduction: 10 ms 100% reduction: 20 ms 60% reduction: 200/240 ms 30% reduction: 500/600 ms
Voltage Interruptions	100% reduction: 5000/6000 ms
Voltage Phase Angle	0°

NOTE:

1) Applicable only to AC input ports.

5.2.8.2. Test Procedure

The power cord is used as supplied by the manufacturer. The EUT was connected to the line output of the Voltage Dips and Interruption Generator.

The EUT is tested for a) 100% voltage dip of supplied voltage with duration of 10 ms; b) 100% voltage dip of supplied voltage with duration of 20 ms; c) 60% voltage dip of supplied voltage with duration of 200 or 240 ms; d) 30% voltage dip of supplied voltage and duration 500 or 600 ms. Both of the dip tests are carried out for a sequence of three voltage dips with intervals of 10 seconds.

100% voltage interruption of supplied voltage with duration of 5000 or 6000 ms is followed, which is a sequence of three voltage interruptions with intervals of 10 seconds.

Voltage reductions occur at 0 degrees crossover point of the voltage waveform. The performance of the EUT is checked after the voltage dip or interruption.

ANNEX A TEST RESULTS

A.1 Radiated Emission

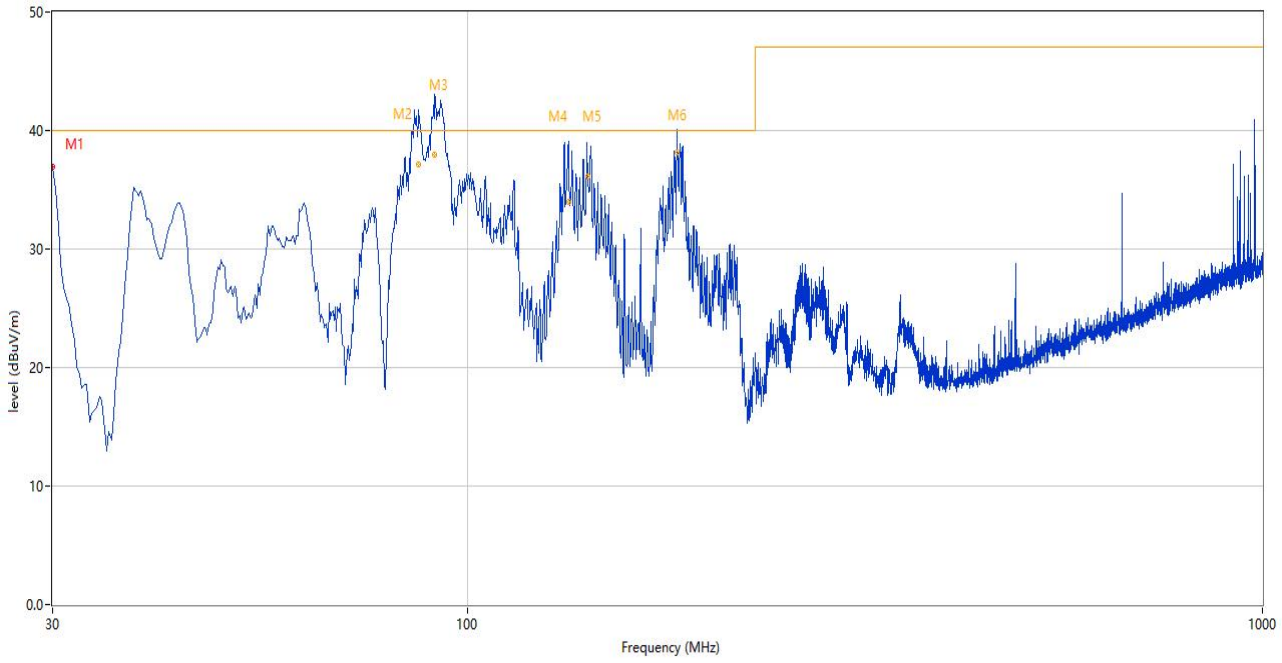
Note 1: The symbol of "--" in the table which means not application.

Note 2: Measurements shall be made with a quasi-peak measuring receiver in the frequency range 30 MHz to 1000 MHz. To reduce the testing time, a peak measuring receiver may be used instead of a quasi-peak measuring receiver. In case of dispute, measurement with a quasi-peak measuring receiver will take precedence.

Test Data and Plots- (Below 1 GHz)

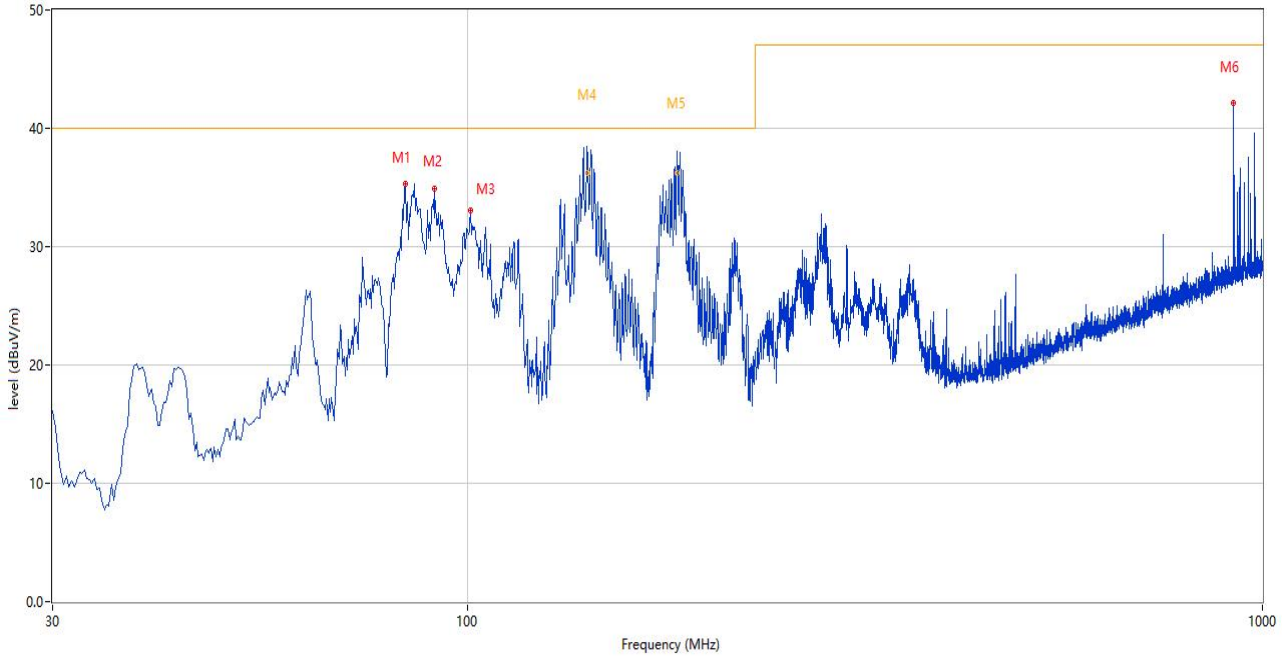
The worst test mode: Grid-connection(100% Load)

A.1.1 Test Antenna Vertical, 30 MHz – 1 GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	30.000	36.98	-24.93	40.0	-3.02	Peak	172.00	100	Vertical	P
2*	86.745	36.84	-25.71	40.0	-3.16	QP	192.00	142	Vertical	P
3*	90.625	37.52	-24.60	40.0	-2.48	OP	266.00	164	Vertical	P
4*	133.772	33.95	-26.45	40.0	-6.05	QP	239.00	111	Vertical	P
5*	141.348	36.13	-26.63	40.0	-3.87	QP	199.00	102	Vertical	P
6*	183.502	37.28	-24.37	40.0	-2.72	OP	232.00	112	Vertical	P

A.1.2 Test Antenna Horizontal, 30 MHz – 1 GHz



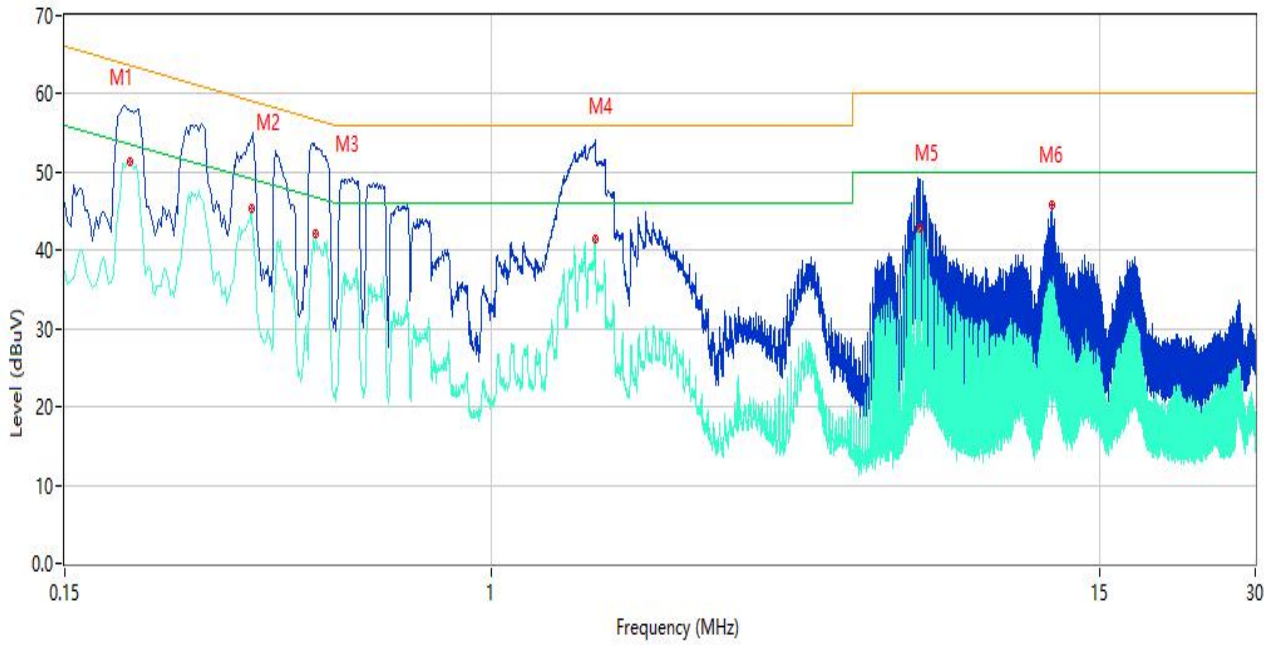
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	83.350	35.29	-26.53	40.0	-4.71	Peak	117.00	200	Horizontal	P
2	90.625	34.86	-24.60	40.0	-5.14	Peak	271.00	300	Horizontal	P
3	100.810	33.02	-23.09	40.0	-6.98	Peak	123.00	200	Horizontal	P
4*	141.341	36.19	-26.63	40.0	-3.81	QP	271.00	233	Horizontal	P
5*	183.449	36.25	-24.37	40.0	-3.75	QP	252.00	128	Horizontal	P
6	919.975	42.17	-6.81	47.0	-4.83	Peak	38.00	200	Horizontal	P

A.2 Conducted Emission

Test Data and Plots-AC Port

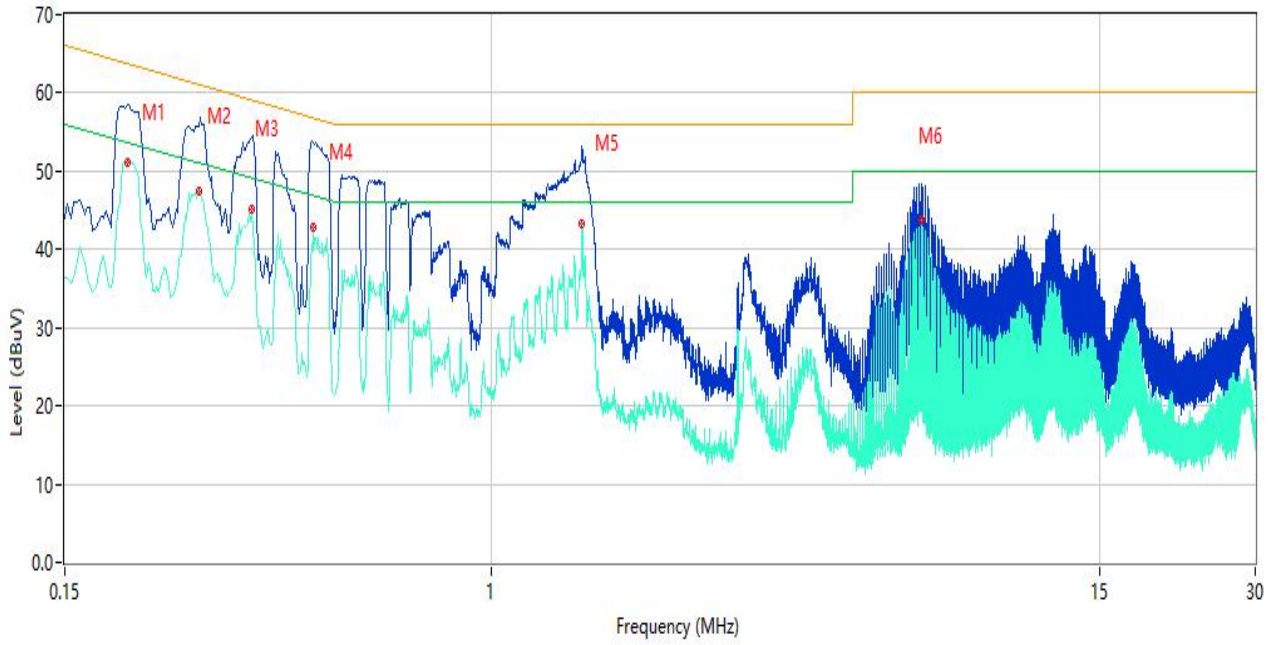
The worst test mode: Grid-connection (100% Load)

A.2.1 L1 Phase



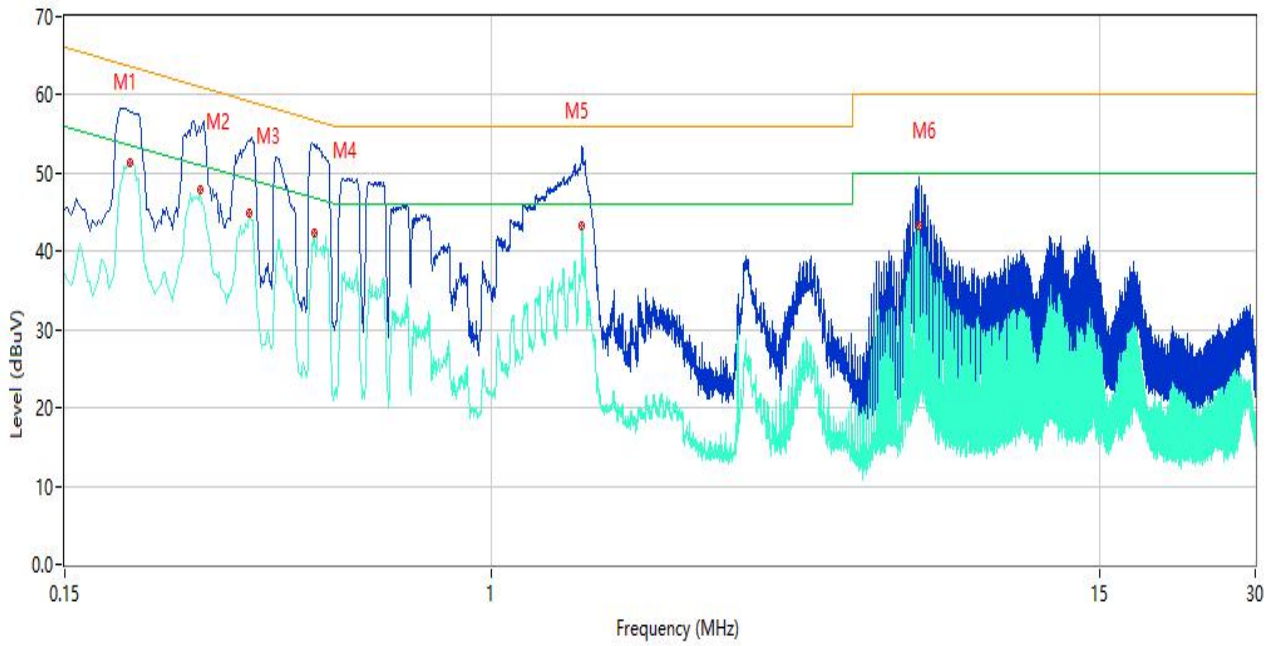
No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Over Limit (dB)	Detector	Line	Verdict
1	0.200	57.86	9.91	63.61	-5.75	Peak	L1	P
1**	0.200	51.24	9.91	53.61	-2.37	AV	L1	P
2	0.344	54.43	10.12	59.11	-4.68	Peak	L1	P
2**	0.344	45.28	10.12	49.11	-3.83	AV	L1	P
3	0.458	53.07	9.97	56.73	-3.66	Peak	L1	P
3**	0.458	42.05	9.97	46.73	-4.68	AV	L1	P
4*	1.588	50.55	10.05	56.00	-5.45	QP	L1	P
4**	1.588	41.37	10.05	46.00	-4.63	AV	L1	P
5	6.766	48.03	9.98	60.00	-11.97	Peak	L1	P
5**	6.766	42.81	9.98	50.00	-7.19	AV	L1	P
6	12.112	45.74	10.00	60.00	-14.26	Peak	L1	P
6**	12.112	35.01	10.00	50.00	-14.99	AV	L1	P

A.2.2 L2 Phase



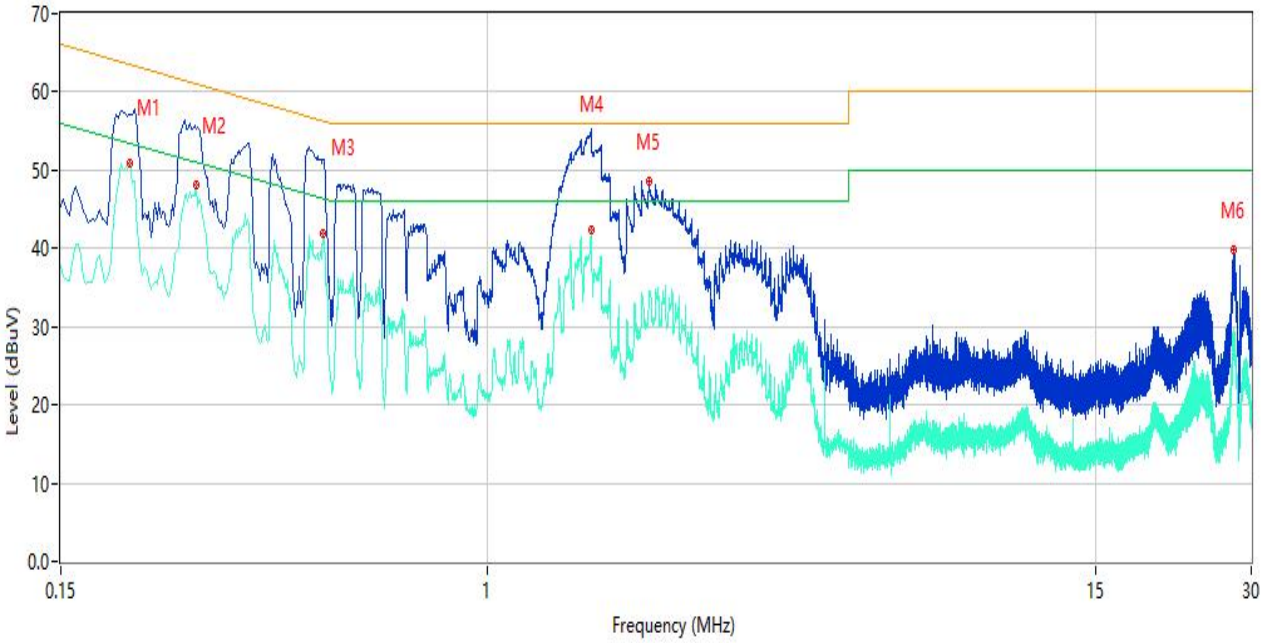
No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Over Limit (dB)	Detector	Line	Verdict
1	0.198	58.47	9.96	63.69	-5.22	Peak	L2	P
1**	0.198	51.20	9.96	53.69	-2.49	AV	L2	P
2	0.272	55.64	9.97	61.06	-5.42	Peak	L2	P
2**	0.272	47.52	9.97	51.06	-3.54	AV	L2	P
3	0.344	54.27	10.12	59.11	-4.84	Peak	L2	P
3**	0.344	45.21	10.12	49.11	-3.90	AV	L2	P
4	0.454	53.60	9.99	56.80	-3.20	Peak	L2	P
4**	0.454	42.85	9.99	46.80	-3.95	AV	L2	P
5*	1.500	51.40	10.04	56.00	-4.60	QP	L2	P
5**	1.500	43.21	10.04	46.00	-2.79	AV	L2	P
6	6.780	48.37	9.95	60.00	-11.63	Peak	L2	P
6**	6.780	43.70	9.95	50.00	-6.30	AV	L2	P

A.2.3 L3 Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Over Limit (dB)	Detector	Line	Verdict
1	0.200	57.90	9.91	63.61	-5.71	Peak	L3	P
1**	0.200	51.45	9.91	53.61	-2.16	AV	L3	P
2	0.274	55.18	9.97	61.00	-5.82	Peak	L3	P
2**	0.274	47.88	9.97	51.00	-3.12	AV	L3	P
3	0.340	54.05	10.12	59.20	-5.15	Peak	L3	P
3**	0.340	44.90	10.12	49.20	-4.30	AV	L3	P
4	0.456	53.72	9.98	56.77	-3.05	Peak	L3	P
4**	0.456	42.42	9.98	46.77	-4.35	AV	L3	P
5*	1.500	51.53	10.04	56.00	-4.47	QP	L3	P
5**	1.500	43.39	10.04	46.00	-2.61	AV	L3	P
6	6.728	48.43	9.97	60.00	-11.57	Peak	L3	P
6**	6.728	43.31	9.97	50.00	-6.69	AV	L3	P

A.2.4 N Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Over Limit (dB)	Detector	Line	Verdict
1	0.204	57.22	9.85	63.45	-6.23	Peak	N	P
1**	0.204	50.98	9.85	53.45	-2.47	AV	N	P
2	0.274	55.20	9.97	61.00	-5.80	Peak	N	P
2**	0.274	48.02	9.97	51.00	-2.98	AV	N	P
3	0.482	51.39	10.08	56.30	-4.91	Peak	N	P
3**	0.482	41.94	10.08	46.30	-4.36	AV	N	P
4*	1.588	51.25	10.05	56.00	-4.75	QP	N	P
4**	1.588	42.42	10.05	46.00	-3.58	AV	N	P
5	2.052	48.66	10.05	56.00	-7.34	Peak	N	P
5**	2.052	32.50	10.05	46.00	-13.50	AV	N	P
6	27.738	39.86	10.00	60.00	-20.14	Peak	N	P
6**	27.738	28.54	10.00	50.00	-21.46	AV	N	P

A.3 Harmonic Current Emissions

Test Model:APEX-P3-15K EUT Category : Balanced three-phase equipment Phase: L1						
Power Rsce	33		Frequency		50.01	Hz
Average			Maximum			
Voltage（rms）	230.34	V	Voltage（rms）		230.35	V
Current（rms）	21.86	A	Current（rms）		22.00	A
Power Factor	0.997	--	Power Factor		0.997	--
Active power	5035.38	W	Active power		5067.11	W
THC	1.80	A	THC		1.80	A
Harmonic Number	Limit Current/%	Average/%	%Limit	Max Value/%	%Limit	Verdict
2	8	0.299	3.74%	0.656	5.47%	P
3	--	0.385	--	1.089	--	--
4	4	0.891	22.28%	1.159	19.32%	P
5	10.7	5.492	51.32%	6.313	39.33%	P
6	2.66	0.154	5.80%	0.300	7.53%	P
7	7.2	3.908	54.27%	4.767	44.14%	P
8	2	0.244	12.19%	0.506	16.87%	P
9	--	0.220	--	0.474	--	--
10	1.6	0.232	14.51%	0.420	17.51%	P
11	3.1	2.129	68.68%	2.486	53.46%	P
12	1.33	0.116	8.69%	0.207	10.38%	P
13	2	1.620	81.00%	1.880	62.66%	P
THC/I_1	13	8.222	63.25%	8.170	41.90%	P
$PWHC/I_1$	22	5.709	25.95%	6.166	18.69%	P

Test Model:APEX-P3-15K EUT Category : Balanced three-phase equipment Phase: L2						
Power R_{sce}	33		Frequency		50.01	Hz
Average			Maximum			
Voltage（rms）	230.34	V	Voltage（rms）		230.35	V
Current（rms）	21.83	A	Current（rms）		22.00	A
Power Factor	0.998	--	Power Factor		0.998	--
Active power	5028.95	W	Active power		5067.10	W
THC	1.80	A	THC		1.80	A
Harmonic Number	Limit Current/%	Average/%	%Limit	Max Value/%	%Limit	Verdict
2	8	0.689	8.61%	1.034	8.62%	P
3	--	0.520	--	0.976	--	--
4	4	0.835	20.86%	1.149	19.15%	P
5	10.7	5.630	52.62%	6.488	40.42%	P
6	2.66	0.201	7.57%	0.440	11.02%	P
7	7.2	4.037	56.06%	4.783	44.29%	P
8	2	0.286	14.30%	0.569	18.98%	P
9	--	0.159	--	0.432	--	--
10	1.6	0.498	31.12%	0.708	29.49%	P
11	3.1	2.215	71.45%	2.492	53.59%	P
12	1.33	0.118	8.84%	0.293	14.69%	P
13	2	1.533	76.67%	1.789	59.63%	P
THC/I_1	13	8.231	63.32%	8.171	41.90%	P
$PWHC/I_1$	22	6.398	29.08%	7.117	21.57%	P

Test Model:APEX-P3-15K EUT Category : Balanced three-phase equipment Phase: L3						
Power R_{sce}	33		Frequency		50.01	Hz
Average			Maximum			
Voltage（rms）	230.45	V	Voltage（rms）		230.47	V
Current（rms）	21.61	A	Current（rms）		21.91	A
Power Factor	0.997	--	Power Factor		0.997	--
Active power	4979.01	W	Active power		5048.53	W
THC	1.80	A	THC		1.80	A
Harmonic Number	Limit Current/%	Average/%	%Limit	Max Value/%	%Limit	Verdict
2	8	0.655	8.18%	1.097	9.14%	P
3	--	0.441	--	1.212	--	--
4	4	0.767	19.18%	0.969	16.15%	P
5	10.7	5.577	52.13%	6.259	39.00%	P
6	2.66	0.120	4.52%	0.337	8.46%	P
7	7.2	3.488	48.44%	4.136	38.30%	P
8	2	0.490	24.48%	0.807	26.89%	P
9	--	0.218	--	0.362	--	--
10	1.6	0.531	33.17%	0.780	32.49%	P
11	3.1	2.126	68.59%	2.351	50.56%	P
12	1.33	0.137	10.32%	0.286	14.36%	P
13	2	1.451	72.57%	1.664	55.47%	P
THC/I_1	13	8.318	63.99%	8.205	42.08%	P
$PWHC/I_1$	22	6.087	27.67%	6.889	20.88%	P

Test Model:APEX-P3-10K EUT classification: Class A equipment Phase: L1 Frequency:50.00Hz						
Average			Maximum			
Voltage（rms）	230.14	V	Voltage（rms）		230.15	V
Current（rms）	14.86	A	Current（rms）		15.00	A
Active power	3420.05	W	Active power		3451.81	W
Power Factor	0.997	--	Power Factor		0.997	--
Harmonic Number	Limit Current/A	Average/A	%Limit	Max Value/A	%Limit	Verdict
2	1.080	0.065	6.06%	0.144	13.37%	P
3	2.300	0.084	3.66%	0.239	10.41%	P
4	0.430	0.195	45.30%	0.255	59.31%	P
5	1.140	0.854	74.93%	1.049	92.00%	P
6	0.300	0.053	17.77%	0.111	37.12%	P
7	0.770	0.048	6.24%	0.104	13.54%	P
8	0.230	0.051	22.06%	0.092	40.21%	P
9	0.400	0.184	45.98%	0.217	54.17%	P
10	0.184	0.025	13.73%	0.046	24.76%	P
11	0.330	0.159	48.04%	0.188	56.93%	P
12	0.153	0.023	14.71%	0.055	35.84%	P
13	0.210	0.056	26.83%	0.087	41.40%	P
14	0.131	0.020	14.96%	0.036	27.49%	P
15	0.150	0.060	40.25%	0.077	51.32%	P
16	0.115	0.018	15.93%	0.039	34.31%	P
17	0.132	0.048	36.01%	0.079	59.86%	P
18	0.102	0.014	14.03%	0.027	26.64%	P
19	0.118	0.019	16.22%	0.041	34.56%	P
20	0.092	0.008	8.43%	0.019	20.99%	P
21	0.107	0.048	44.53%	0.088	82.59%	P
22	0.084	0.008	9.87%	0.019	22.58%	P
23	0.098	0.060	60.89%	0.077	78.71%	P
24	0.077	0.006	7.25%	0.014	17.69%	P
25	0.090	0.009	9.98%	0.023	25.09%	P
26	0.071	0.013	18.97%	0.025	35.06%	P
27	0.083	0.031	36.89%	0.041	48.91%	P
28	0.066	0.005	7.00%	0.012	18.61%	P
29	0.078	0.029	36.85%	0.040	51.47%	P
30	0.061	0.009	14.29%	0.017	27.26%	P
31	0.073	0.007	9.74%	0.017	23.59%	P
32	0.058	0.008	13.65%	0.014	24.58%	P
33	0.068	0.025	36.53%	0.033	48.32%	P
34	0.054	0.006	11.21%	0.015	27.79%	P
35	0.064	0.021	33.11%	0.029	45.58%	P
36	0.051	0.005	10.54%	0.012	22.56%	P
37	0.061	0.006	9.35%	0.012	19.68%	P
38	0.048	0.007	15.13%	0.014	29.07%	P
39	0.058	0.018	31.87%	0.027	46.63%	P
40	0.046	0.005	11.83%	0.010	21.96%	P

Test Model:APEX-P3-10K EUT classification: Class A equipment Phase: L2 Frequency:50.01Hz						
Average			Maximum			
Voltage（rms）	230.14	V	Voltage（rms）		230.15	V
Current（rms）	14.97	A	Current（rms）		15.10	A
Active power	3444.45	W	Active power		3474.82	W
Power Factor	0.998	--	Power Factor		0.998	--
Harmonic Number	Limit Current/A	Average/A	%Limit	Max Value/A	%Limit	Verdict
2	1.080	0.063	5.82%	0.100	9.26%	P
3	2.300	0.078	3.38%	0.252	10.98%	P
4	0.430	0.152	35.43%	0.253	58.75%	P
5	1.140	0.878	76.98%	1.009	88.49%	P
6	0.300	0.052	17.21%	0.100	33.29%	P
7	0.770	0.047	6.08%	0.099	12.92%	P
8	0.230	0.049	21.46%	0.092	40.21%	P
9	0.400	0.108	27.10%	0.217	54.17%	P
10	0.184	0.024	13.19%	0.046	24.76%	P
11	0.330	0.096	29.16%	0.100	30.30%	P
12	0.153	0.022	14.30%	0.052	34.24%	P
13	0.210	0.055	26.26%	0.079	37.81%	P
14	0.131	0.019	14.18%	0.036	27.49%	P
15	0.150	0.059	39.45%	0.077	51.32%	P
16	0.115	0.018	15.52%	0.039	34.31%	P
17	0.132	0.047	35.24%	0.079	59.86%	P
18	0.102	0.014	13.95%	0.023	22.23%	P
19	0.118	0.019	15.91%	0.041	34.56%	P
20	0.092	0.008	8.40%	0.019	20.99%	P
21	0.107	0.046	43.35%	0.080	74.24%	P
22	0.084	0.008	9.81%	0.019	22.58%	P
23	0.098	0.059	60.11%	0.077	78.71%	P
24	0.077	0.005	6.96%	0.015	19.00%	P
25	0.090	0.009	9.94%	0.022	24.73%	P
26	0.071	0.014	19.09%	0.022	31.75%	P
27	0.083	0.029	34.48%	0.041	48.91%	P
28	0.066	0.004	6.82%	0.012	18.61%	P
29	0.078	0.027	34.17%	0.040	51.47%	P
30	0.061	0.009	14.19%	0.017	27.26%	P
31	0.073	0.007	9.58%	0.017	23.59%	P
32	0.058	0.008	13.54%	0.014	24.74%	P
33	0.068	0.023	33.16%	0.033	48.32%	P
34	0.054	0.006	10.94%	0.015	27.79%	P
35	0.064	0.021	32.34%	0.023	35.66%	P
36	0.051	0.005	10.24%	0.012	22.56%	P
37	0.061	0.006	9.07%	0.012	19.68%	P
38	0.048	0.007	14.78%	0.014	29.07%	P
39	0.058	0.018	31.95%	0.023	39.33%	P
40	0.046	0.005	11.38%	0.010	21.96%	P

Test Model:APEX-P3-10K EUT classification: Class A equipment Phase: L3 Frequency:50.00Hz						
Average			Maximum			
Voltage（rms）	230.35	V	Voltage（rms）		230.37	V
Current（rms）	15.05	A	Current（rms）		15.20	A
Active power	3466.09	W	Active power		3501.12	W
Power Factor	0.997	--	Power Factor		0.997	--
Harmonic Number	Limit Current/A	Average/A	%Limit	Max Value/A	%Limit	Verdict
2	1.080	0.063	5.79%	0.088	8.15%	P
3	2.300	0.077	3.35%	0.250	10.89%	P
4	0.430	0.147	34.32%	0.251	58.28%	P
5	1.140	0.878	77.19%	1.001	87.82%	P
6	0.300	0.051	16.98%	0.088	29.33%	P
7	0.770	0.046	6.01%	0.088	11.42%	P
8	0.230	0.049	21.50%	0.087	37.93%	P
9	0.400	0.098	24.58%	0.217	54.17%	P
10	0.184	0.024	13.10%	0.044	23.67%	P
11	0.330	0.088	26.55%	0.088	26.67%	P
12	0.153	0.022	14.13%	0.052	34.24%	P
13	0.210	0.055	26.33%	0.077	36.64%	P
14	0.131	0.018	13.78%	0.036	27.49%	P
15	0.150	0.059	39.35%	0.077	51.13%	P
16	0.115	0.017	14.66%	0.039	34.31%	P
17	0.132	0.046	35.09%	0.077	58.14%	P
18	0.102	0.013	12.80%	0.025	24.19%	P
19	0.118	0.018	15.20%	0.043	36.40%	P
20	0.092	0.008	8.15%	0.012	13.58%	P
21	0.107	0.046	43.01%	0.077	71.85%	P
22	0.084	0.008	9.66%	0.012	14.94%	P
23	0.098	0.059	59.97%	0.077	78.42%	P
24	0.077	0.005	6.93%	0.012	16.23%	P
25	0.090	0.009	9.47%	0.024	26.95%	P
26	0.071	0.012	17.33%	0.024	34.58%	P
27	0.083	0.030	35.54%	0.043	51.71%	P
28	0.066	0.004	6.72%	0.012	18.91%	P
29	0.078	0.027	35.30%	0.040	51.47%	P
30	0.061	0.009	14.57%	0.012	20.34%	P
31	0.073	0.007	9.59%	0.012	17.18%	P
32	0.058	0.008	13.79%	0.012	21.64%	P
33	0.068	0.024	34.50%	0.033	48.32%	P
34	0.054	0.006	10.92%	0.012	23.01%	P
35	0.064	0.020	31.30%	0.025	38.77%	P
36	0.051	0.005	10.07%	0.012	24.30%	P
37	0.061	0.005	9.03%	0.012	20.43%	P
38	0.048	0.007	14.75%	0.012	25.70%	P
39	0.058	0.016	27.99%	0.025	42.79%	P
40	0.046	0.005	11.11%	0.012	26.96%	P

A.4 Voltage Fluctuations & Flicker

Test Model	APEX-P3-10K		
Voltage(V)	230.55	Frequency(Hz)	50.00
Current (A)	14.86	Coupling Line	L1
Test Parameter	Limit	Measurement Value	Verdict
P_{st}	1.0	0.057	P
P_{lt}	0.65	0.056	P
T_{dt}	0.5	0	P
d_{max} (%)	4	0.146	P
d_c (%)	3.3	0.070	P

Test Model	APEX-P3-10K		
Voltage(V)	230.46	Frequency(Hz)	50.00
Current (A)	14.97	Coupling Line	L2
Test Parameter	Limit	Measurement Value	Verdict
P_{st}	1.0	0.069	P
P_{lt}	0.65	0.068	P
T_{dt}	0.5	0	P
d_{max} (%)	4	0.154	P
d_c (%)	3.3	0.067	P

Test Model	APEX-P3-10K		
Voltage(V)	230.51	Frequency(Hz)	50.00
Current (A)	15.05	Coupling Line	L3
Test Parameter	Limit	Measurement Value	Verdict
P_{st}	1.0	0.084	P
P_{lt}	0.65	0.085	P
T_{dt}	0.5	0	P
d_{max} (%)	4	0.175	P
d_c (%)	3.3	0.059	P

Test Model	APEX-P3-15K		
Voltage(V)	230.10	Frequency(Hz)	50.00
Current (A)	21.86	Coupling Line	L1
Test Parameter	Limit	Measurement Value	Verdict
P_{st}	1.0	0.086	P
P_{lt}	0.65	0.085	P
T_{dt}	0.5	0	P
d_{max} (%)	4	0.172	P
d_c (%)	3.3	0.073	P

Test Model	APEX-P3-15K		
Voltage(V)	230.07	Frequency(Hz)	50.00
Current (A)	21.83	Coupling Line	L2
Test Parameter	Limit	Measurement Value	Verdict
P_{st}	1.0	0.103	P
P_{lt}	0.65	0.101	P
T_{dt}	0.5	0	P
d_{max} (%)	4	0.198	P
d_c (%)	3.3	0.062	P

Test Model	APEX-P3-15K		
Voltage(V)	230.11	Frequency(Hz)	50.00
Current (A)	21.61	Coupling Line	L3
Test Parameter	Limit	Measurement Value	Verdict
P_{st}	1.0	0.126	P
P_{lt}	0.65	0.124	P
T_{dt}	0.5	0	P
d_{max} (%)	4	0.174	P
d_c (%)	3.3	0.042	P

A.5 Electrostatic Discharge Immunity

Test Points	Discharge Level (kV)	Discharge Mode	Number of Discharge	Met Criteria	Required Criteria	Verdict
HCP	±2, 4	Connect discharge	100	A	B	P
VCP	±2, 4	Connect discharge	100	A	B	P
Metal screw	±2, 4	Connect discharge	160	A	B	P
Heat sink	±2, 4	Connect discharge	160	A	B	P
Display screen	±2, 4, 8	Air discharge	160	A	B	P
Button	±2, 4, 8	Air discharge	160	A	B	P
Gap	±2, 4, 8	Air discharge	160	A	B	P

A.6 Radio Frequency Electromagnetic Field Immunity

Antenna Polarity	Frequency (MHz)	Side	Field Strength (V/m)	Met Criteria	Required Criteria	Verdict
Vertical	80 - 1000	Front, Back, Left, Right	10	A	A	P
Horizontal	80 - 1000	Front, Back, Left, Right	10	A	A	P
Vertical	1400 - 6000	Front, Back, Left, Right	3	A	A	P
Horizontal	1400 - 6000	Front, Back, Left, Right	3	A	A	P

A.7 Electrical Fast Transient/Burst Immunity

Test Data (AC Power Port)

Burst Parameters	5/50ns	Pulse Frequency	5kHz	Pulse group action time	15ms		Burst interval	300ms
			100kHz		0.75ms			
Test Port	Coupling Line			Polarity	Test Level (kV)	Met Criteria	Required Criteria	Verdict
AC Port	L1+L2+L3+N+PE			+ / -	0.5, 1, 2	A	B	P

Test Data (DC Power Port)

Burst Parameters	5/50ns	Pulse Frequency	5kHz	Pulse group action time	15ms		Burst interval	300ms
			100kHz		0.75ms			
Test Port	Coupling Line			Polarity	100kHz	Met Criteria	Required Criteria	Verdict
DC Port	P+&P-			+ / -	0.5,1	A	B	P

A.8 Surge Immunity

Test Data (AC Power Port)

Times	5 times for positive and negative		Time interval		60s		
Test Port	Coupling Line	Polarity	Voltage (kV)	Test Waveform	Met Criteria	Required Criteria	Verdict
AC Port	L1-N, L2-N, L3-N, L1-L2, L1-L3, L2-L3	+ / -	0.5, 1	1.2/50us	A	B	P
AC Port	L1-PE, L2-PE, L3-PE, N-PE	+ / -	0.5, 1, 2	1.2/50us	B	B	P

Test Data (DC Power Port)

Times	5 times for positive and negative		Time interval		60s		
Test Port	Coupling Line	Polarity	Voltage (kV)	Test Waveform	Met Criteria	Required Criteria	Verdict
DC Port	P+ to P-	+ / -	0.25, 0.5	1.2/50us	A	B	P
DC Port	P+ to PE, P- to PE	+ / -	0.5, 1	1.2/50us	B	B	P

A.9 Immunity to Conducted Disturbances Induced by RF Fields

Test Data (AC Power Port)

Test Port	Frequency (MHz)	Test Voltage(V)	Met Criteria	Required Criteria	Verdict
AC Port	0.15 - 80	10	A	A	P

Test Data (DC Power Port)

Test Port	Frequency (MHz)	Test Voltage(V)	Met Criteria	Required Criteria	Verdict
DC Port	0.15 - 80	10	A	A	P

A.10 Power Frequency Magnetic Fields Immunity

Test direction	Test level(A/m)	Met Criteria	Required Criteria	Verdict
X, Y, Z	30	A	A	P

A.11 Voltage Dips and Short Interruptions Immunity

Test Mode	Residual voltage (%)	Duration (ms)	Times	Interval (sec)	Met Criteria	Required Criteria	Verdict
Voltage Dips	0	10	3	10	A	B	P
Voltage Dips	0	20	3	10	A	B	P
Voltage Dips	40	200	3	10	B	C	P
Voltage Dips	70	500	3	10	B	C	P
Voltage Interruptions	0	5000	3	10	B	C	P

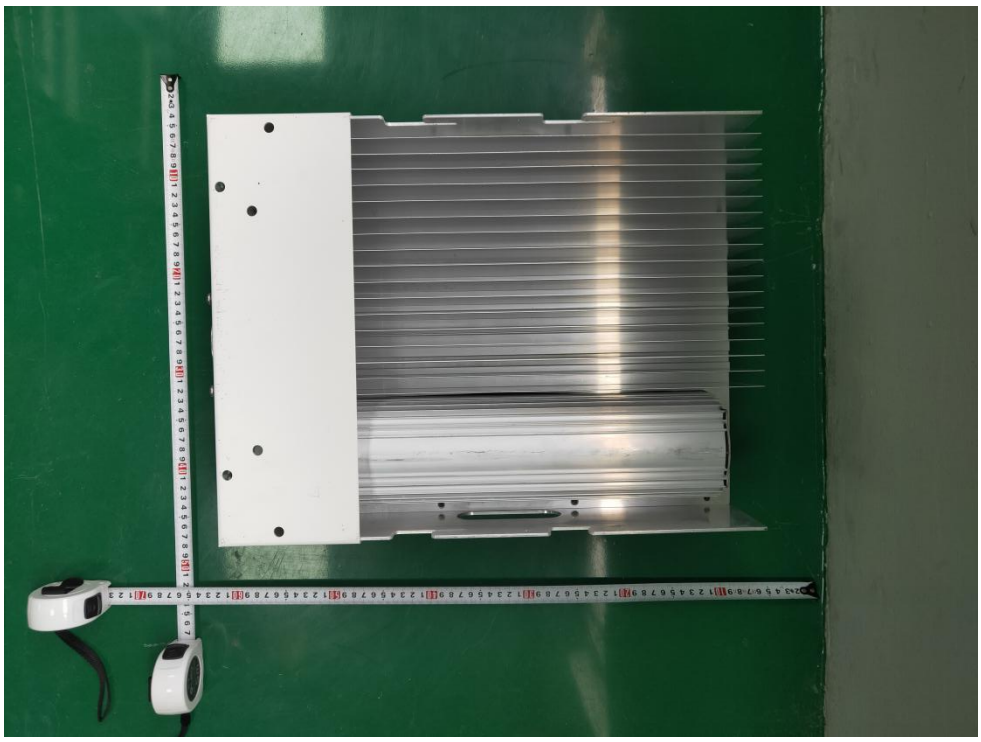
ANNEX B TEST SETUP PHOTOS

Note: TEST SETUP PHOTOS please refer to original test report No.BL-DG2191017-401(G1), which was issued by Dongguan BALUN Testing Technology Co., Ltd. on Apr. 11, 2022 section ANNEX B TEST SETUP PHOTOS.

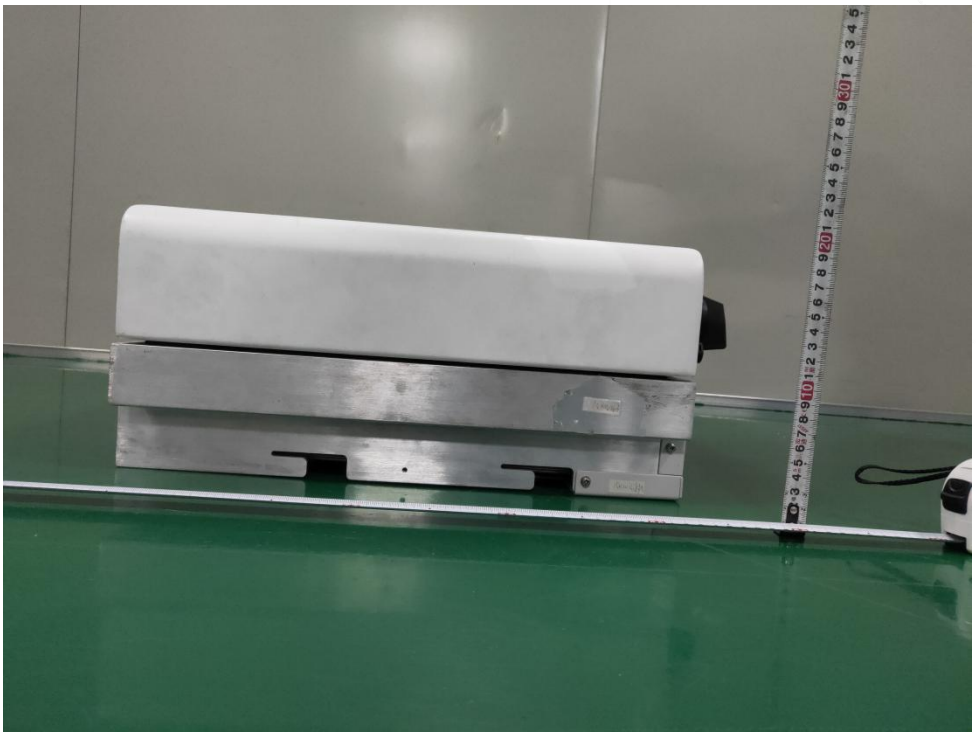
ANNEX C EUT EXTERNAL PHOTOS

Front

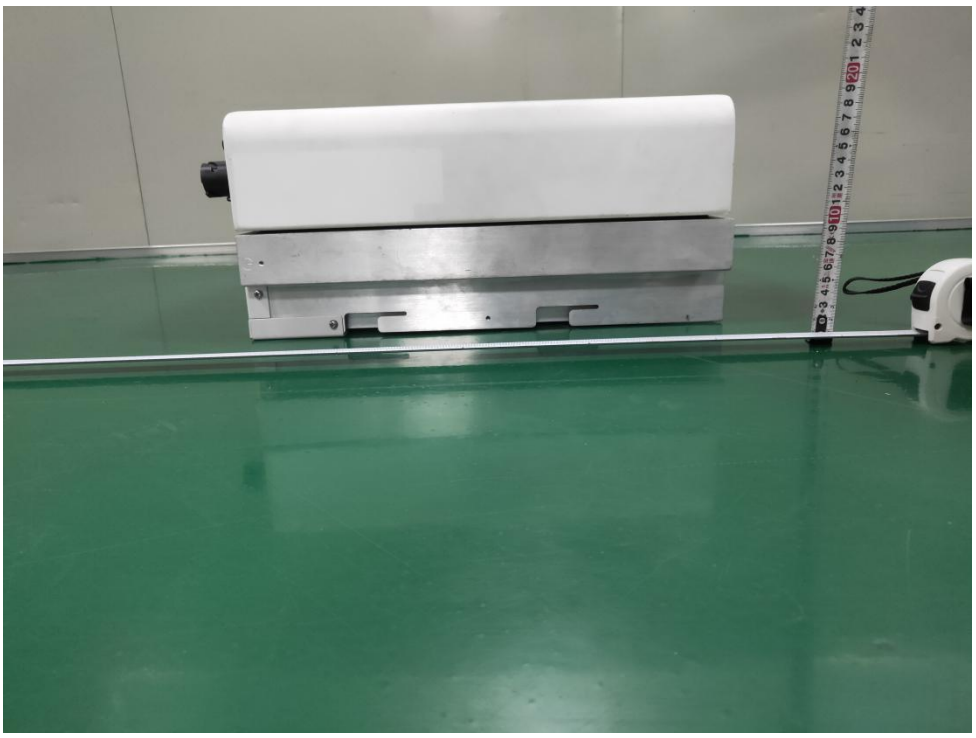
Back



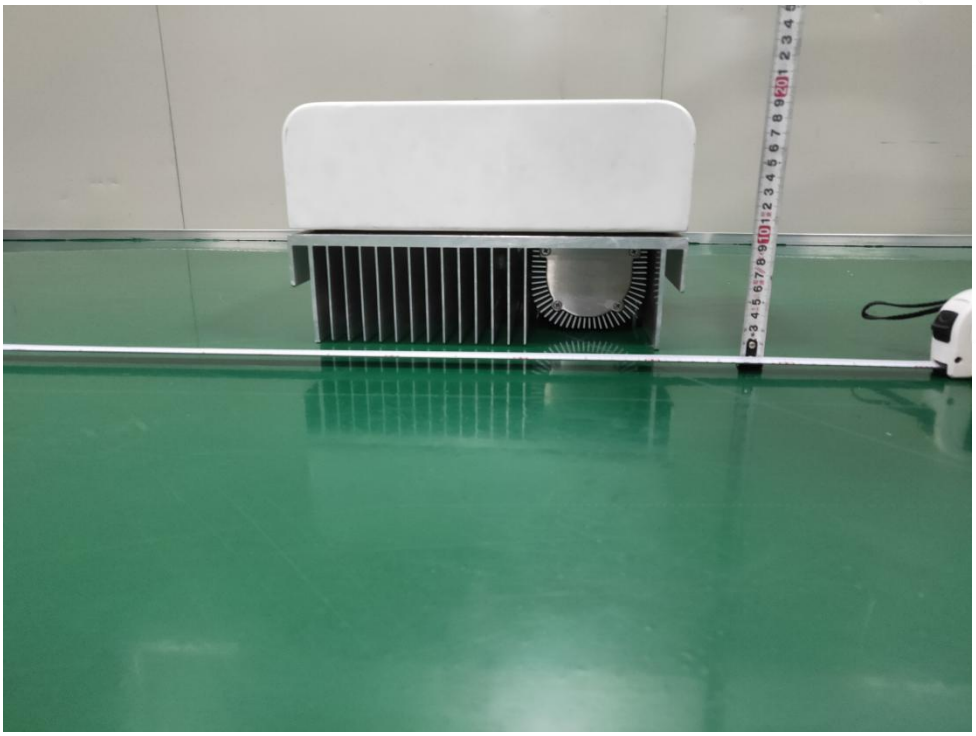
Left



Right



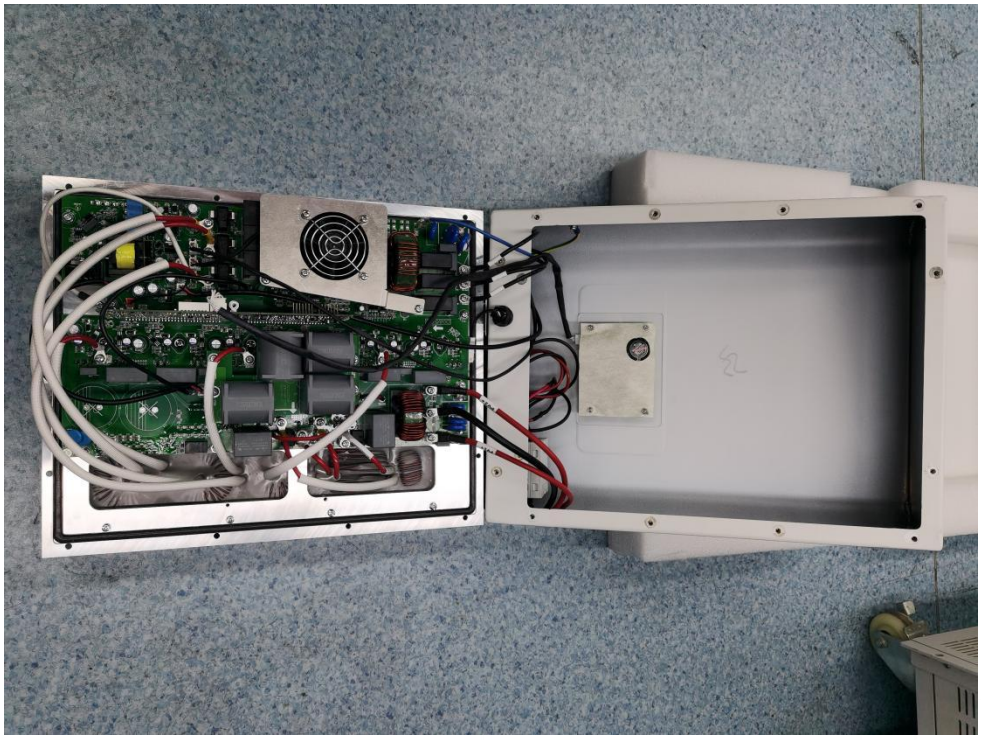
Top



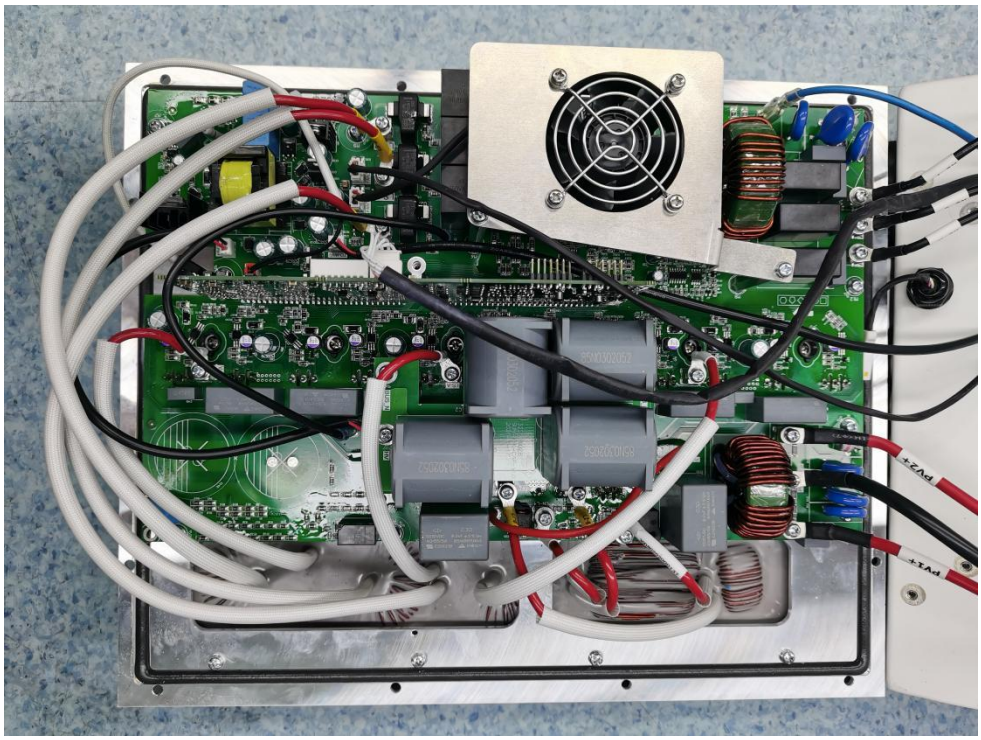
Interface

ANNEX D EUT INTERNAL PHOTOS

Internal

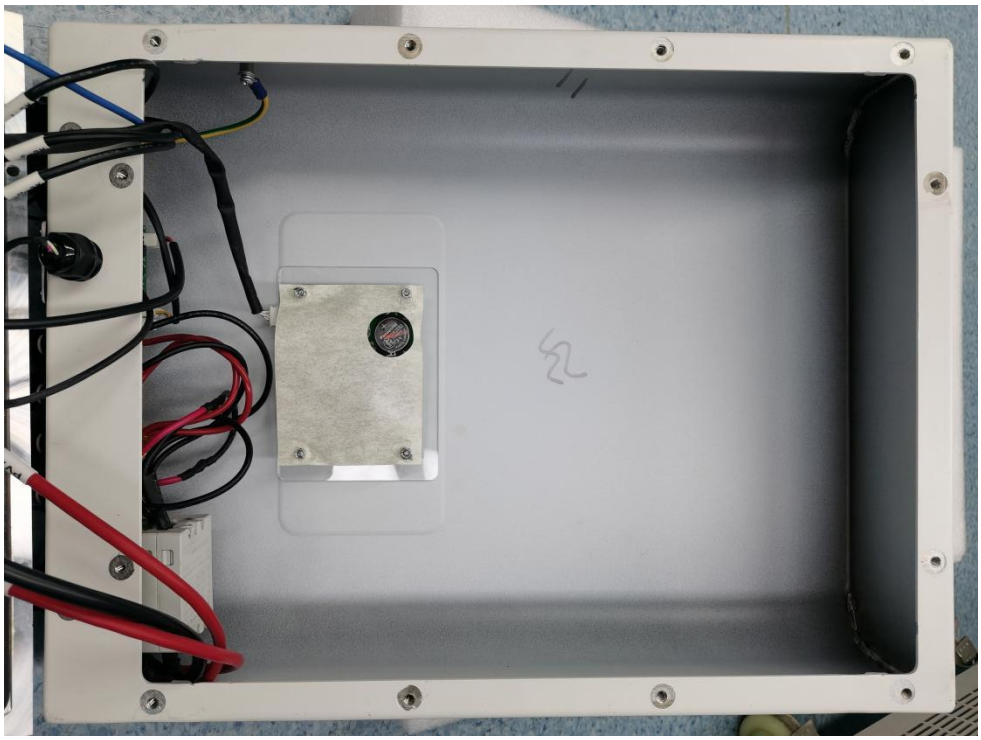


Internal

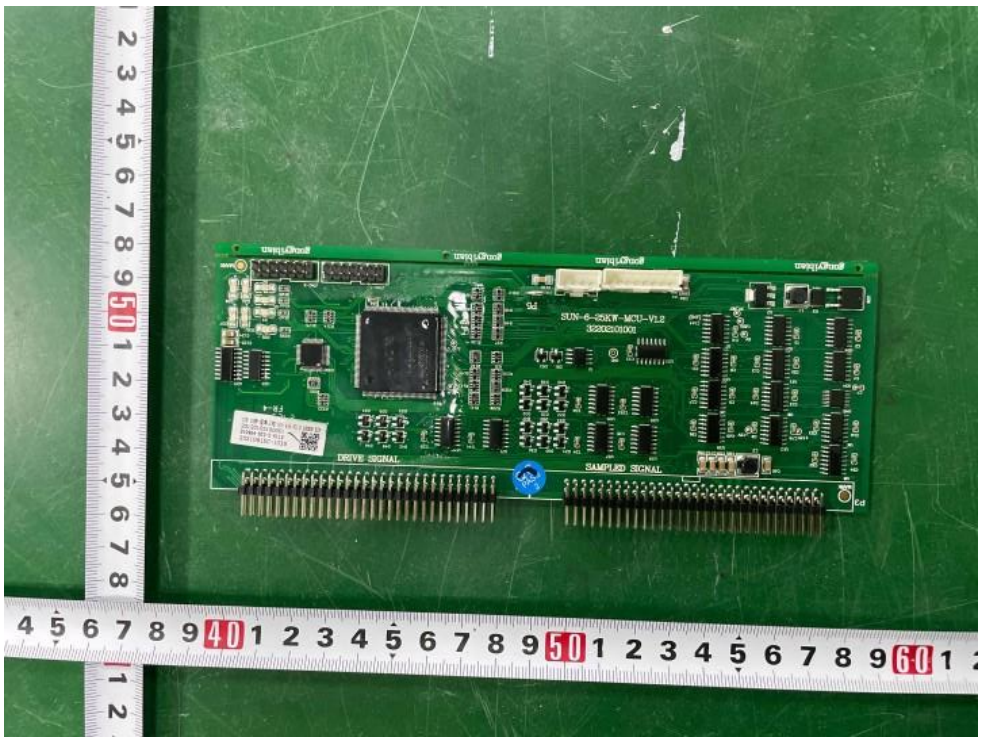


Internal

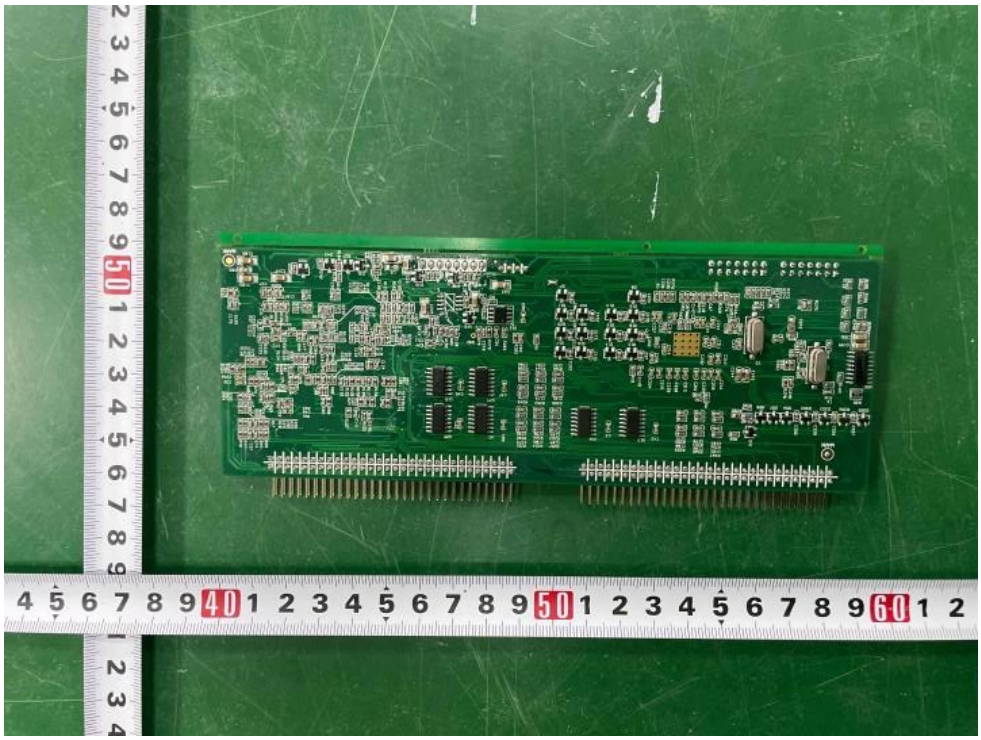
Internal



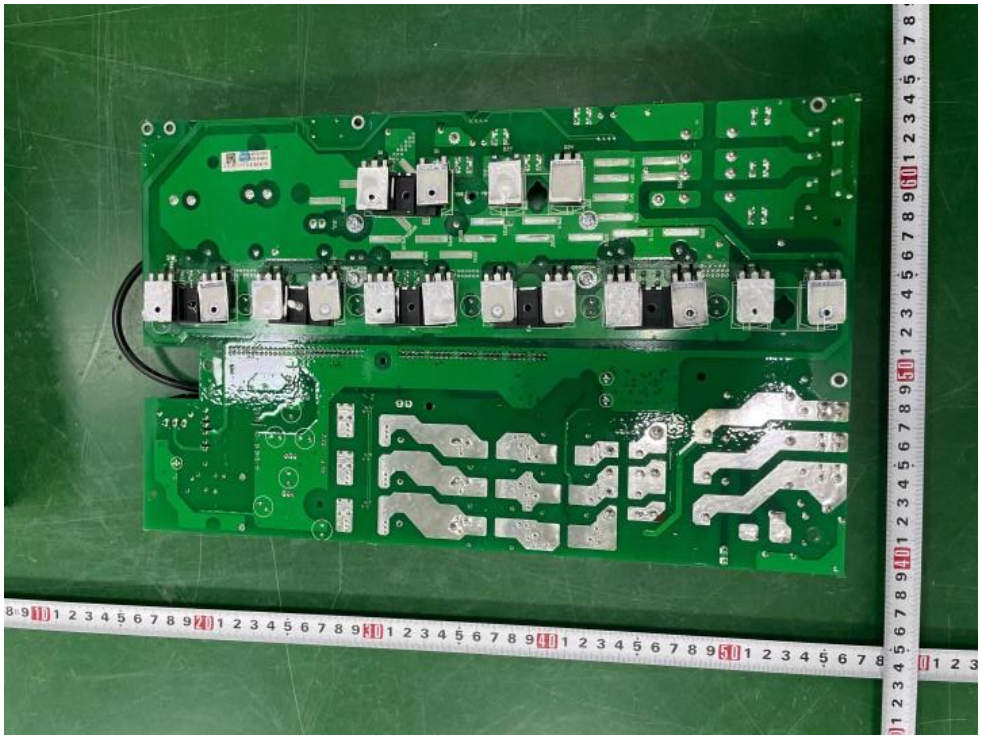
The front view of control board



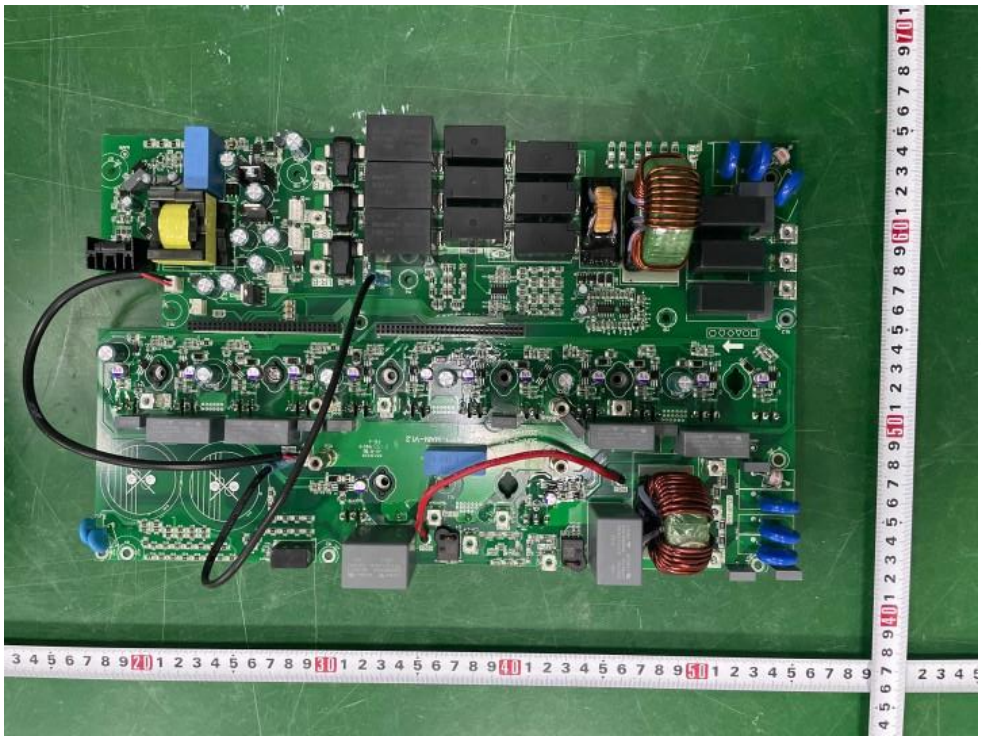
The back view of control board



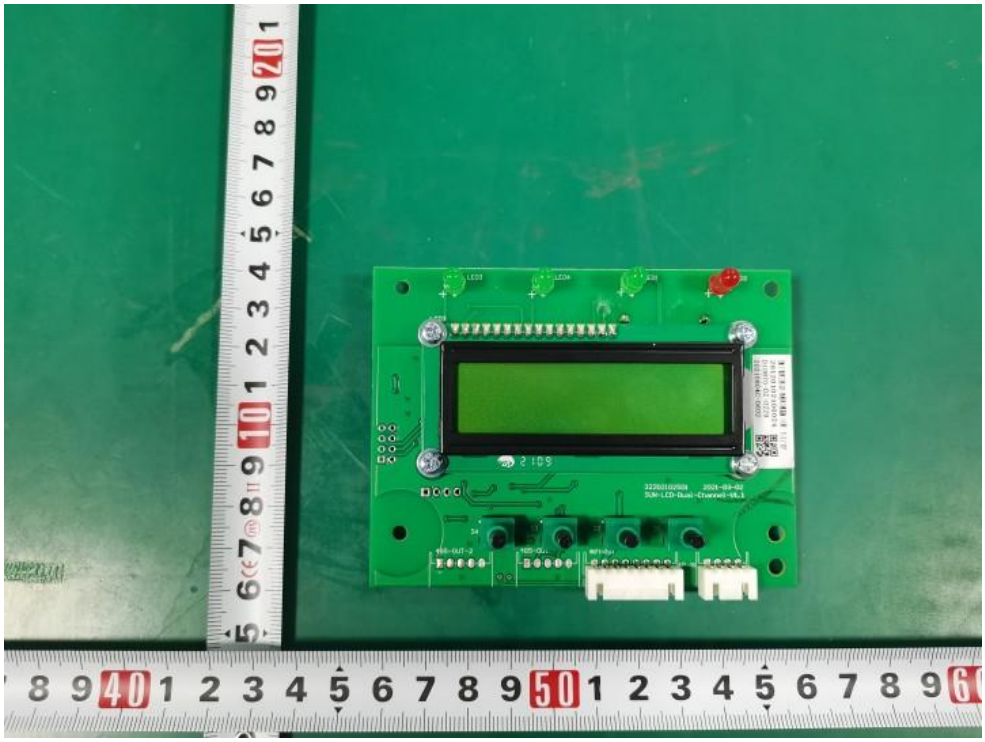
The front view of main control board



The back view of main control board

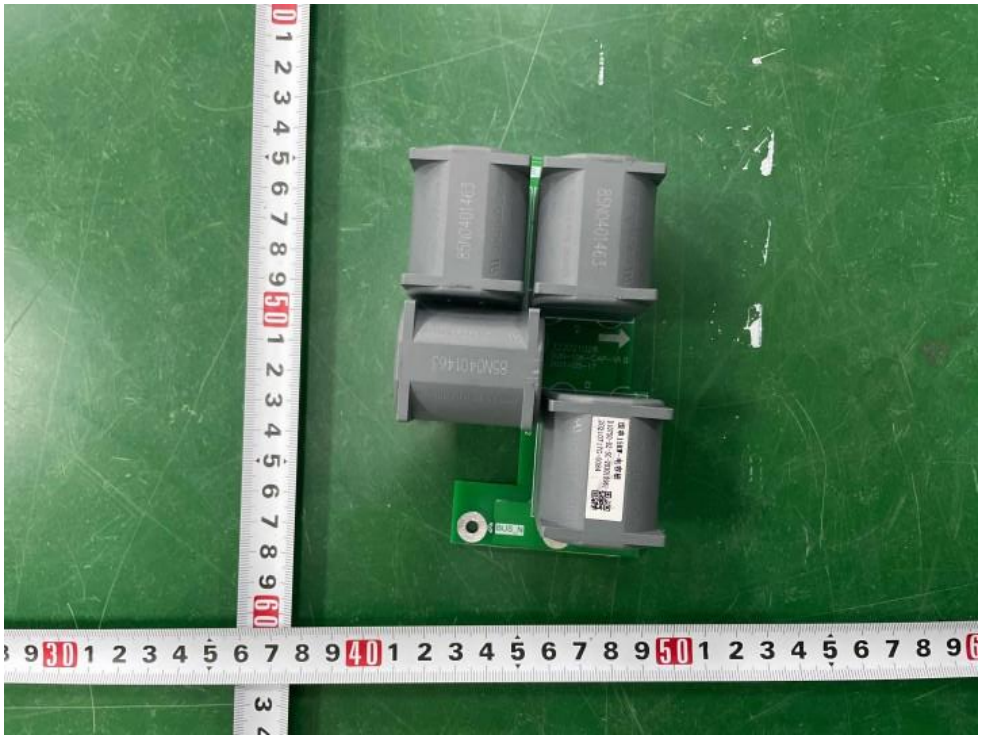


The front view of display screen board

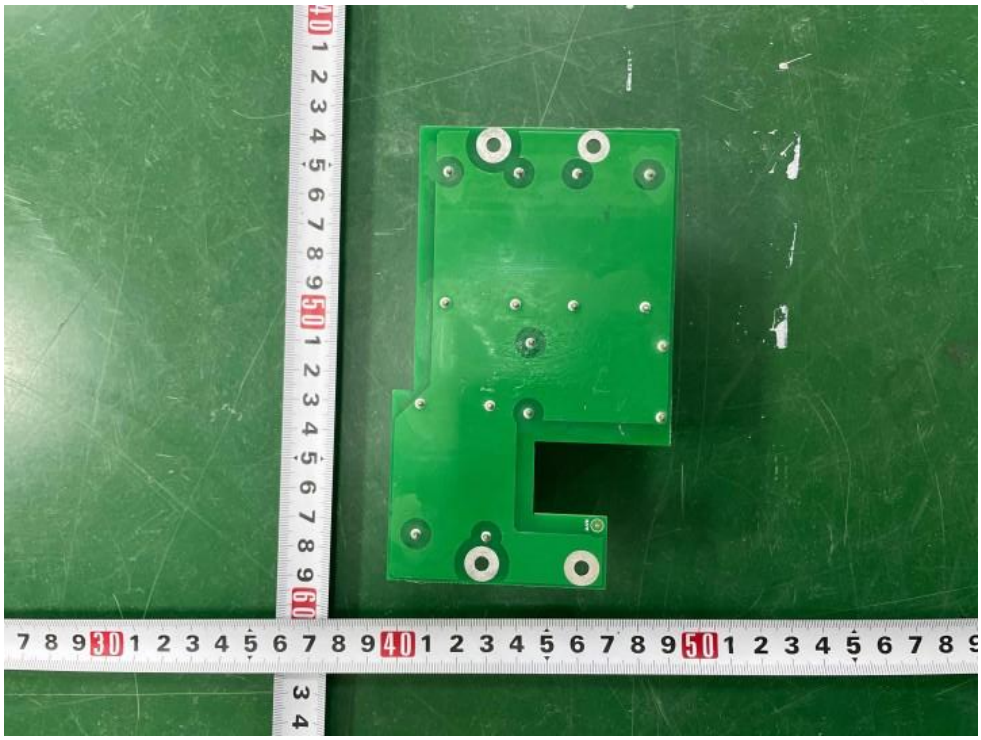


The back view of display screen board

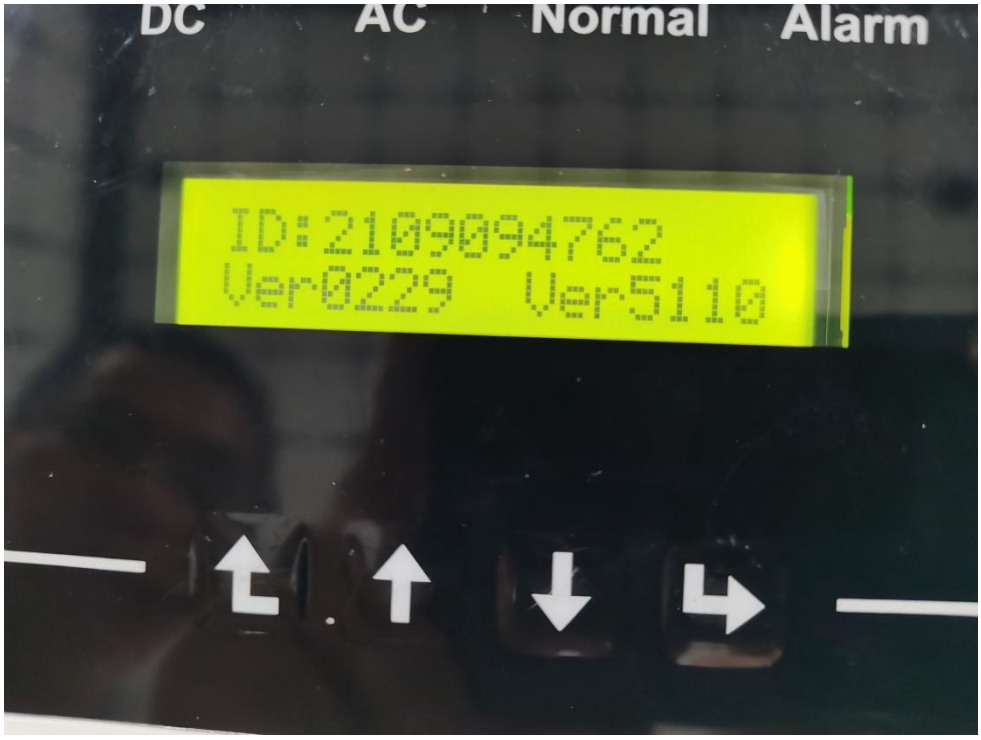
The front view of capacitance board



The back view of capacitance board



Serial number & Software version



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