

EMC Test Report

Applicant: EAST Group Co., Ltd.

Address: No.6 Northern Industry Road, Songshan Lake Sci. & Tech. Industrial Park, Dongguan City, Guangdong Province, China

Manufacturer: EAST Group Co., Ltd.

Address: No.6 Northern Industry Road, Songshan Lake Sci. & Tech. Industrial Park, Dongguan City, Guangdong Province, China

Product(s): PV Inverter

Brand(s): EAST or **EAST**

Test Model(s): EA17KTL-S1, EA17KTL-P1

Series Model(s): EA5KTL-S1, EA6KTL-S1, EA8KTL-S1, EA10KTL-S1, EA12KTL-S1, EA15KTL-S1, EA5KTL-P1, EA6KTL-P1, EA8KTL-P1, EA10KTL-P1, EA12KTL-P1, EA15KTL-P1

Test Date: Jun. 27, 2023 ~ Jul. 27, 2023

Issued Date: Aug. 22, 2023

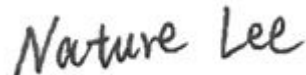
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Standards: EN 55011:2016/A2:2021;
CISPR 11:2015/AMD2:2019;
EN IEC 61000-6-1:2019; IEC 61000-6-1:2016;
EN IEC 61000-6-2:2019; IEC 61000-6-2:2016;
EN IEC 61000-6-3:2019; IEC 61000-6-3:2020;
EN IEC 61000-6-4:2019; IEC 61000-6-4:2018;
EN IEC 61000-3-2:2019+A1:2021; IEC 61000-3-2:2018/AMD1:2020;
EN 61000-3-12:2011; IEC 61000-3-12:2011+AMD1:2021;
EN IEC 61000-3-11:2019; IEC 61000-3-11:2017;
EN 61000-3-3:2013/A2:2021; IEC 61000-3-3:2013/AMD2:2021.

The above equipment has been tested by **Hwa-Hsing (Dongguan) Testing Co., Ltd.** found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

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Release

Ver. 1.5

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Release Control Record

Issue No.	Description	Issued Date
230530JH06-RE-EU-01	Original release.	Aug. 22, 2023

1 Summary of Test Results

EN 55011:2016/A2:2021 EN IEC 61000-6-3:2021 EN IEC 61000-6-4:2019			
Clause	Test Item	Result	Verdict
EN 55032:2015+A1:2020, Class B; CISPR 32:2015/AMD1:2019; EN 55011:2016/A2:2021; CISPR 11:2015/AMD2:2019	AC Power port Conducted Emissions	Minimum passing Class B margin with 4.22dB	Pass
	DC Power port Conducted Emissions	Minimum passing Class B margin with 5.42dB	Pass
	Radiated Emissions 30MHz to 1GHz	Minimum passing Class B margin with 2.92dB	Pass
EN IEC 61000-3-2:2019+ A1:2021; EN 61000-3-12:2011; IEC 61000-3-12:2011+AMD1:2021	Harmonic current emissions	Meets the requirements of limit	Pass
EN IEC 61000-3-11:2019; EN 61000-3-3:2013/A2:2021; IEC 61000-3-3:2013/ AMD2:2021	Voltage fluctuations & flicker	Meets the requirements of limit	Pass
EN 61000-4-2:2009; IEC 61000-4-2:2008	Electrostatic discharge immunity test	Meets the requirements of Performance Criterion A	Pass
EN IEC 61000-4-3:2020	Radiated, radio-frequency, electromagnetic field immunity test	Meets the requirements of Performance Criterion A	Pass
EN 61000-4-4:2012; IEC 61000-4-4:2012 ED. 3.0	Electrical fast transient / burst immunity test.	Meets the requirements of Performance Criterion A	Pass
EN 61000-4-5:2014 + A1:2017; IEC 61000-4-5: 2017 ED. 3.1	Surge immunity test	Meets the requirements of Performance Criterion A	Pass
EN 61000-4-6:2014; IEC 61000-4-6:2013 ED. 4.0	Immunity to conducted disturbances, induced by radio-frequency fields	Meets the requirements of Performance Criterion A	Pass
EN 61000-4-8:2010; IEC 61000-4-8:2009 ED. 2.0	Power frequency magnetic field immunity test.	Meets the requirements of Performance Criterion A	Pass
EN IEC 61000-4-11:2020	Voltage dips, short interruptions and voltage variations immunity tests	Meets the requirements of Performance Criterion A	Pass

Note 1: The length of the DC cable >3m.

Note 2: The EUT Classification as Class B, Group 2 from EN 55011:2016/A2:2021.

Note 3: The Applicant accept the test result of Radiated Emissions 30MHz to 1GHz with 2.06dB margin under limit.

EN IEC 61000-6-1:2019 EN IEC 61000-6-2:2019			
Clause	Test Item	Result	Verdict
EN 61000-4-2:2009; IEC 61000-4-2:2008 ED.2.0	Electrostatic discharge immunity test	Meets the requirements of Performance Criterion A	Pass
EN IEC 61000-4-3:2020	Radiated, radio-frequency, electromagnetic field immunity test	Meets the requirements of Performance Criterion A	Pass
EN 61000-4-4:2012; IEC 61000-4-4:2012 ED. 3.0	Electrical fast transient / burst immunity test.	Meets the requirements of Performance Criterion A	Pass
EN 61000-4-5:2014 + A1:2017; IEC 61000-4-5: 2017 ED. 3.1	Surge immunity test	Meets the requirements of Performance Criterion A	Pass
EN 61000-4-6:2014; IEC 61000-4-6:2013 ED. 4.0	Immunity to conducted disturbances, induced by radio-frequency fields	Meets the requirements of Performance Criterion A	Pass
EN 61000-4-8:2010; IEC 61000-4-8:2009 ED. 2.0	Power frequency magnetic field immunity test.	Meets the requirements of Performance Criterion A	Pass
EN IEC 61000-4-11:2020	Voltage dips, short interruptions and voltage variations immunity tests	Meets the requirements of Performance Criterion A	Pass

Note:

- 1.The length of the DC cable >3m.
- 2.There is no deviation to the applied test methods and requirements covered by the scope of this report.

1.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUTas specified in CISPR 16-4-2:

The listed uncertainties are the worst-case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the Pass/Fail results.

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions	150kHz ~ 30MHz	4.03 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.34 dB

1.2 Modification Record

There were no modifications required for compliance.

2 General Information

2.1 General Description of EUT

Product(s)	PV Inverter
Test Model(s)	EA17KTL-S1, EA17KTL-P1
Series Model(s):	EA5KTL-S1, EA6KTL-S1, EA8KTL-S1, EA10KTL-S1, EA12KTL-S1, EA15KTL-S1, EA5KTL-P1, EA6KTL-P1, EA8KTL-P1, EA10KTL-P1, EA12KTL-P1, EA15KTL-P1
Power Supply Rating	Rated DC input voltage: DC 160~1000V Rated AC output voltage: 400V/380V,3W+N+PE,50Hz/60Hz
Accessory Device	N/A
Cable Supplied	N/A
Highest Operating Frequency	32MHz
I/O Port	Please see the User Manual

1. For a more detailed features description, please refer to the manufacturer's specification or the User's Manual.
2. For the test results, the EUT had been tested with all conditions, and only the worst case was shown in the test report.
3. Please refer to the EUT photo document (Reference No.: 230530JH06) for detailed product photo.
4. Model difference:

Difference term	EA5KTL-P1	EA6KTL-P1	EA8KTL-P1	EA10KTL-P1	EA12KTL-P1	EA15KTL-P1	EA17KTL-P1
BOOST current sensor	STK-20HD/K	STK-20HD/K	STK-20HD/K	STK-20HD/K*2	STK-20HD/K*2	STK-20HD/K*2	STK-20HD/K*2
INV current sensor	STK-32HD/K	STK-32HD/K	STK-32HD/K	STK-32HD/K*2	STK-32HD/K*2	STK-32HD/K*2	STK-32HD/K*2
Boost inductance	5-17k-Bst 1380uH	5-17k-Bst 1380uH	5-17k-Bst 1380uH	5-17k-Bst 1380uH*2	5-17k-Bst 1380uH*2	5-17k-Bst 1380uH*2	5-17k-Bst 1380uH*2
Inverter inductance	12-15K-INV 941uH*3	12-15K-INV 941uH*3	12-15K-INV 941uH*3	12-15K-INV 941uH*3	12-15K-INV 941uH*3	12-15K-INV 941uH*3	12-15K-INV 941uH*3
BUS Capacitors	Film capacitors, 600V,50uF *4	Film capacitors, 600V,50uF *4	Film capacitors, 600V,50uF *4	Film capacitors, 600V,50uF *6	Film capacitors, 600V,50uF *6	Film capacitors, 600V,50uF *6	Film capacitors, 600V,50uF *6
BOOST DIO	FRD,APT60DQ12 0BG,1200V,60A, TO-247	FRD,APT60DQ12 0BG,1200V,60A, TO-247	FRD,APT60DQ12 0BG,1200V,60A, TO-247	FRD,APT60DQ12 0BG,1200V,60A, TO-247) *2	FRD,APT60DQ12 0BG,1200V,60A, TO-247) *2	FRD,APT60DQ12 0BG,1200V,60A, TO-247) *2	FRD,APT60DQ12 0BG,1200V,60A, TO-247) *2
BOOST IGBT	IGBT (1200V,25A) *2	IGBT (1200V,25A) *2	IGBT (1200V,25A)	IGBT (1200V,40A) *4	IGBT (1200V,40A) *4	IGBT (1200V,40A) *4	IGBT (1200V,40A) *4
INV IGBT	IGBT (650V,40A) *6 IGBT (1200V,25A) *6	IGBT (650V,40A) *6 IGBT (1200V,25A) *6	IGBT (650V,40A) *6 IGBT (1200V,25A) *6	IGBT (650V,40A) *6 IGBT (1200V,40A) *6	IGBT (650V,40A) *6 IGBT (1200V,40A) *6	IGBT (650V,40A) *6 IGBT (1200V,40A) *6	IGBT (650V,40A) *6 IGBT (1200V,40A) *6
Internal spoiler fan	N	N	N	N	N	Y	Y
External spoiler fan	N	N	N	N	N	Y	Y

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Difference term	EA5KTL-S1	EA6KTL-S1	EA8KTL-S1	EA10KTL-S1	EA12KTL-S1	EA15KTL-S1	EA17KTL-S1
BOOST current sensor	STK-20HD/K	STK-20HD/K	STK-20HD/K*2	STK-20HD/K*2	STK-20HD/K*2	STK-20HD/K / STK-32HD/K	STK-20HD/K / STK-32HD/K
INV current sensor	STK-32HD/K	STK-32HD/K	STK-32HD/K*2	STK-32HD/K*2	STK-32HD/K*2	STK-32HD/K*2	STK-32HD/K*2
Boost inductance	5-17k-Bst 1380uH	5-17k-Bst 1380uH	5-17k-Bst 1380uH*2	5-17k-Bst 1380uH*2	5-17k-Bst 1380uH*2	5-17k-Bst 1380uH/23k-Bst 835uH	5-17k-Bst 1380uH/23k-Bst 835uH
Inverter inductance	12-15K-INV 941uH*3	12-15K-INV 941uH*3	12-15K-INV 941uH*3	12-15K-INV 941uH*3	12-15K-INV 941uH*3	12-15K-INV 941uH*3	12-15K-INV 941uH*3
BUS Capacitors	Film capacitors,600V, 50uF *4	Film capacitors,600V, 50uF *4	Film capacitors,600V, 50uF *6	Film capacitors,600V, 50uF *6	Film capacitors,600V, 50uF *6	Film capacitors,600V, 50uF *6	Film capacitors,600V, 50uF *6
BOOST DIO	FRD,APT30DQ12 0BG,1200V,30A, TO-247	FRD,APT30DQ12 0BG,1200V,30A, TO-247	FRD(APT60DQ12 0BG,1200V,60A, TO-247) *2	FRD(APT60DQ12 0BG,1200V,60A, TO-247) *2	FRD(APT60DQ12 0BG,1200V,60A, TO-247) *2	FRD(APT60DQ12 0BG,1200V,60A, TO-247) *2	FRD(APT60DQ12 0BG,1200V,60A, TO-247) *2
BOOST IGBT	IGBT (1200V,25A) *2	IGBT (1200V,25A) *2	IGBT (1200V,25A) *4	IGBT (1200V,25A) *4	IGBT (1200V,25A) *4	IGBT (1200V,40A) *4	IGBT (1200V,40A) *4
INV IGBT	IGBT (650V,40A) *6 IGBT (1200V,25A) *6	IGBT (650V,40A) *6 IGBT (1200V,25A) *6	IGBT (650V,40A) *6 IGBT (1200V,40A) *6	IGBT (650V,40A) *6 IGBT (1200V,40A) *6	IGBT (650V,40A) *6 IGBT (1200V,40A) *6	IGBT (650V,40A) *6 IGBT (1200V,40A) *6	IGBT (650V,40A) *6 IGBT (1200V,40A) *6
Internal spoiler fan	N	N	N	N	N	Y	Y
External spoiler fan	N	N	N	N	N	Y	Y

2.2 Operating Modes of EUT

The EUT has been pre-tested under the following test modes, and the worst-case test modewas presented in the report.

Conducted Emission (AC Port)	
Test Date:	2023/07/05
Environmental Conditions:	26.0℃, 54.0%RH
Test By:	Bosco Zhou
Worst case mode (presented in the report):	Mode 3
Mode	Test Condition
1	3*DC 800V Input+AC 230V Full Load Output 22.5KW 30A(EA17KTL-P1)
2	3*DC 800V Input+AC 230V Half Load Output 22.5KW 30A (EA17KTL-P1)
3	3*DC 800V Input+AC 230V no Load Output 22.5KW 30A(EA17KTL-P1)
4	DC 800V Input+AC 230V no Load Output 7.5KW 15A(EA17KTL-P1)
5	2DC 800V Input+AC 230V no Load Output 22.5KW 20A (Series model)
6	DC 800V Input+AC 230V no Load Output 7.5KW 20A (Series model)

Conducted Emission (AC Port)	
Test Date:	2023/07/05
Environmental Conditions:	26.0℃, 54.0%RH
Test By:	Bosco Zhou
Worst case mode (presented in the report):	Mode 2
Mode	Test Condition
1	3*DC 800V Input+AC 230V Full Load Output 22.5KW 30A (EA17KTL-S1)
2	3*DC 800V Input+AC 230V Half Load Output 22.5KW 30A (EA17KTL-S1)
3	3*DC 800V Input+AC 230V no Load Output 22.5KW 30A (EA17KTL-S1)
4	DC 800V Input+AC 230V Half Load Output 7.5KW 15A (EA17KTL-S1)
5	2DC 800V Input+AC 230V Half Load Output 22.5KW 20A (Series model)
6	DC 800V Input+AC 230V Half Load Output 7.5KW 20A (Series model)

Conducted Emission (DC Port)	
Test Date:	2023/07/21
Environmental Conditions:	25.1℃, 45.0%RH
Test By:	CSL
Worst case mode (presented in the report):	Mode 2
Mode	Test Condition
1	3*DC 800V Input+AC 230V Full Load Output 22.5KW 30A(EA17KTL-P1)
2	3*DC 800V Input+AC 230V Half Load Output 22.5KW 30A(EA17KTL-P1)
3	3*DC 800V Input+AC 230V no Load Output 22.5KW 30A(EA17KTL-P1)
4	DC 800V Input+AC 230V Half Load Output 7.5KW 15A(EA17KTL-P1)
5	2DC 800V Input+AC 230V Half Load Output 22.5KW 20A (Series model)
6	DC 800V Input+AC 230V Half Load Output 7.5KW 20A (Series model)

Conducted Emission (DC Port)	
Test Date:	2023/07/21
Environmental Conditions:	25.1℃, 45.0%RH
Test By:	CSL
Worst case mode (presented in the report):	Mode 1
Mode	Test Condition
1	3*DC 800V Input+AC 230V Full Load Output 22.5KW 30A(EA17KTL-S1)
2	3*DC 800V Input+AC 230V Half Load Output 22.5KW 30A (EA17KTL-S1)
3	3*DC 800V Input+AC 230V no Load Output 22.5KW 30A(EA17KTL-S1)
4	DC 800V Input+AC 230V Full Load Output 7.5KW 15A(EA17KTL-S1)
5	2DC 800V Input+AC 230V Full Load Output 22.5KW 20A (Series model)
6	DC 800V Input+AC 230V Full Load Output 7.5KW 20A (Series model)

Radiated Emission Below 1GHz	
Test Date:	2023/07/05
Environmental Conditions:	26℃,54%RH
Test By:	Bosco Zhou
Worst case mode (presented in the report):	Mode 2
Mode	Test Condition
1	3*DC 800V Input+AC 230V Full Load Output 22.5KW 30A(EA17KTL-P1)
2	3*DC 800V Input+AC 230V Half Load Output 22.5KW 30A(EA17KTL-P1)
3	3*DC 800V Input+AC 230V no Load Output 22.5KW 30A(EA17KTL-P1)
4	DC 800V Input+AC 230V Half Load Output 7.5KW 15A(EA17KTL-P1)
5	2DC 800V Input+AC 230V Half Load Output 22.5KW 20A (Series model)
6	DC 800V Input+AC 230V Half Load Output 7.5KW 20A (Series model)

Radiated Emission Below 1GHz	
Test Date:	2023/07/05
Environmental Conditions:	26℃,54%RH
Test By:	Bosco Zhou
Worst case mode (presented in the report):	Mode 3
Mode	Test Condition
1	3*DC 800V Input+AC 230V Full Load Output 22.5KW 30A(EA17KTL-S1)
2	3*DC 800V Input+AC 230V Half Load Output 22.5KW 30A(EA17KTL-S1)
3	3*DC 800V Input+AC 230V no Load Output 22.5KW 30A(EA17KTL-S1)
4	DC 800V Input+AC 230V no Load Output 7.5KW 15A(EA17KTL-S1)
5	2DC 800V Input+AC 230V no Load Output 22.5KW 20A (Series model)
6	DC 800V Input+AC 230V no Load Output 7.5KW 20A (Series model)

Harmonic Current Emissions & Voltage Fluctuations & Flicker	
Test Date: 2023/07/27	
Mode	Test Condition
1	3*DC 800V Input+AC 230V Full Load Output 22.5KW 30A

Immunity Testing			
Test items	Test Date	Environmental Conditions	Test By
ESD	2023-06-30	25°C, 51%RH, 101KPa	Bosco Zhou
RS	2023-06-27	26°C, 58%RH	Loki
EFT/B	2023-07-03	25°C, 61%RH	Bosco Zhou
Surge	2023-07-04	25°C, 61%RH	Bosco Zhou
CS	2023-06-30	25°C, 58%RH	Bosco Zhou
MAG	2023-06-30	25°C, 58%RH	Bosco Zhou

Immunity Testing-AC Port	
ESD -Electrostatic discharge immunity test	
RS -Radiated, radio-frequency, electromagnetic field immunity test	
EFT/B -Electrical fast transient / burst immunity test.	
Surge -immunity test	
CS -Immunity to conducted disturbances, induced by radio-frequency fields*	
MAG -Power frequency magnetic field immunity test	
Dips -Voltage dips, short interruptions and voltage variations immunity tests	
Mode	Test Condition
1	3*DC 800V Input+AC 230V Full Load Output 22.5KW 30A
2	3*DC 800V Input+AC 230V Half Load Output 22.5KW 30A
3	3*DC 800V Input+AC 230V no Load Output 22.5KW 30A

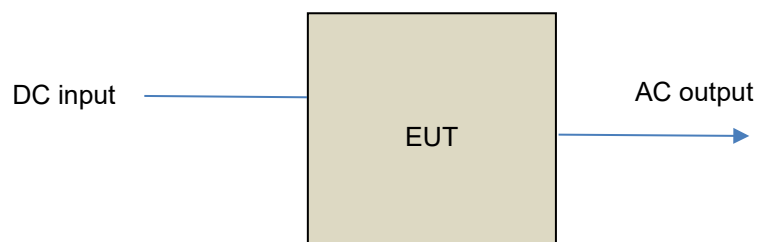
3 Configuration and Connections with EUT

3.1 Test Program Used and Operation Descriptions

- Turned on the power of all equipment.
- EUT was operated according to the type described in manufacturer's specifications or the user's manual.

3.2 Connection Diagram of EUT and Peripheral Devices

The I/O connection port of the product is shown in the figure below. The use of the port is based on the user manual. For the actual test, please see the test photos.



3.3 Configuration of peripheral devices and cable connections

No.	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
2	DC source	Chroma	62180D-1800	/	N/A	N/A
4	AC source	Chroma	61830	/	N/A	N/A

No.	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	AC Line	5	0.6	No	N/A	N/A
2.	DC Line	6	1	No	N/A	N/A

4 Conducted Emissions

4.1 Limits

AC Port				
Frequency (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79	66	66 - 56	56 - 46
0.50 - 5.0	73	60	56	46
5.0 - 30.0	73	60	60	50

Notes: 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases linearly with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

DC Port				
Frequency (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	97 - 89	84 - 76	84 - 74	74 - 64
0.50 - 30.0	89	76	74	64

4.2 Test Instruments

Shenzhen EMTEK Co.,Ltd.:

Equ.No.	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
EE-144	EMI Test Receiver	Rohde & Schwarz	ESCI	101045	2023/5/13	1Year
EE-023-2	PULSE LIMITER	Rohde & Schwarz	ESH3-Z2	100107	2023/5/13	1Year
EE-032	AMN	Rohde & Schwarz	ESH3-Z5	100191	2023/5/10	1Year
EE-156	AMN	Schwarzbeck	NNLK 8129	8129203	2023/5/13	1Year
EE-033	V-Network	Rohde & Schwarz	ESH3-Z6	100011	2023/5/11	1Year
EE-138	V-Network	Rohde & Schwarz	ESH3-Z6	100253	2023/5/11	1Year
ENSE 6382	DC LISN	Schwarzbeck	NNHV 8123-400	00398	2023/5/10	1Year
ENSE 6383	DC LISN	Schwarzbeck	NNHV 8123-400	00397	2023/5/10	1Year
ENSE 7187	DC LISN	Schwarzbeck	PVDC 8301	00075	2023/5/10	1Year

Worldtest (GuangDong)Co., Ltd.

Equipment Name	Model	Manufacturer	Serial No.	Cal. date	Interval
853 Shielding chamber	SR-853	yiheng	853	2022/11/17	3 Years
EMI Receiver	ESCI7	R&S	5950	2022/12/7	1 Year
LISN	ENV216	R&S	102857	2022/12/7	1 Year
ISN Cat3	CAT3 8158	Schwarzbeck	8158	2022/12/7	1 Year
ISN Cat5	CAT5 8158	Schwarzbeck	00312	2022/12/7	1 Year
ISN Cat6	NTFM 8158	Schwarzbeck	00326	2022/12/7	1 Year
Voltage probe	TK9420	Schwarzbeck	01013	2022/12/7	1 Year
attenuator	VTSD 9561 F-N	Schwarzbeck	2W	2022/12/7	1 Year
CE test software	EZ-CE	FARA	N/A	N/A	N/A

Note: 1. The calibration interval of the above test instruments is 12/36 months.
2. The DC port test was performed in Shielded Room (Shenzhen EMTEK Co.,Ltd.)
3. The AC port test was performed in Shielded Room (Worldtest (GuangDong)Co., Ltd.)

Lab: [Hwa-Hsing \(Dongguan\) Testing Co., Ltd.](#)

Address: [No. 101, Building N1, Yuyuan 2 Road, Yuyuan Industrial Park, HuangJiang Town, Dongguan City, People's Republic of China](#)

Tel: [0769-83078199](#)

Web.: [www.hwa-hsing.com](#)

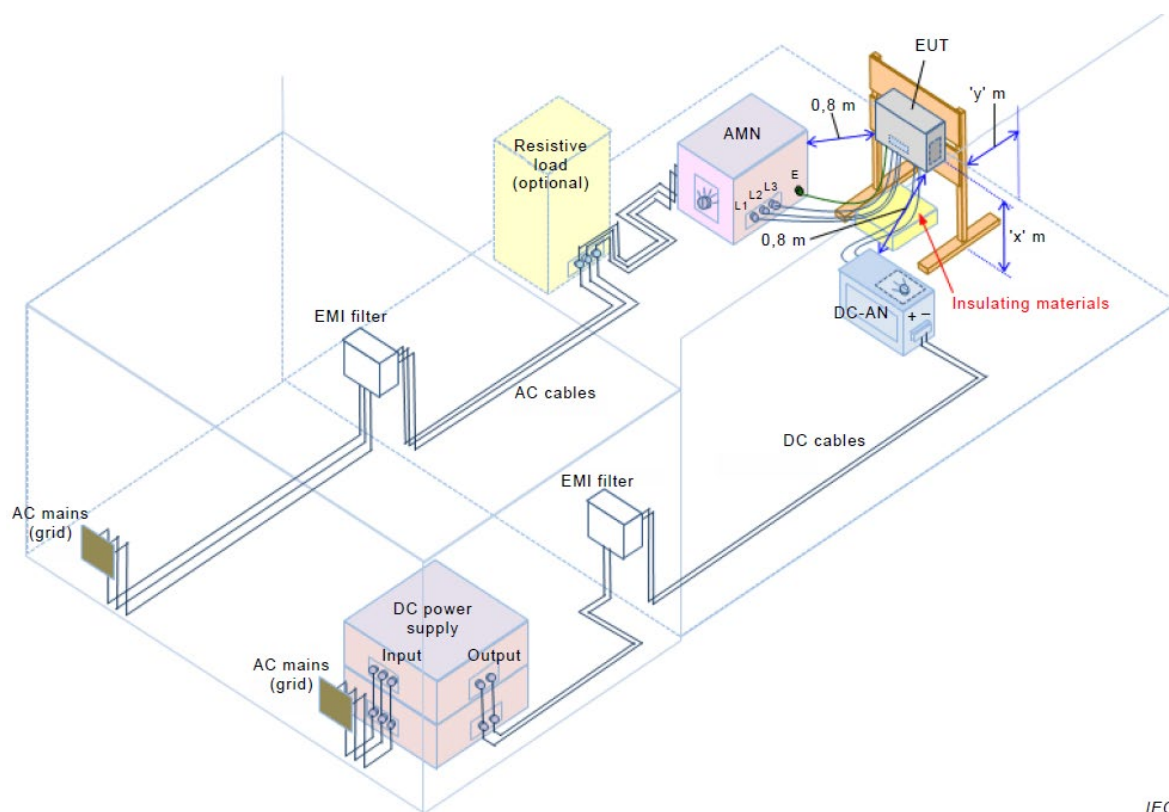
E-Mail: [customerservice.dg@hwa-hsing.com](#)

Release
Ver. 1.5

4.3 Test Procedure

- The EUT was placed 0.4 meters from the conducting wall (VGRP) of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- The test results of conducted emissions at mains ports are recorded of six worst margins for quasi-peak and average values against the limits at the frequencies of interest unless the margin is 20 dB or greater.

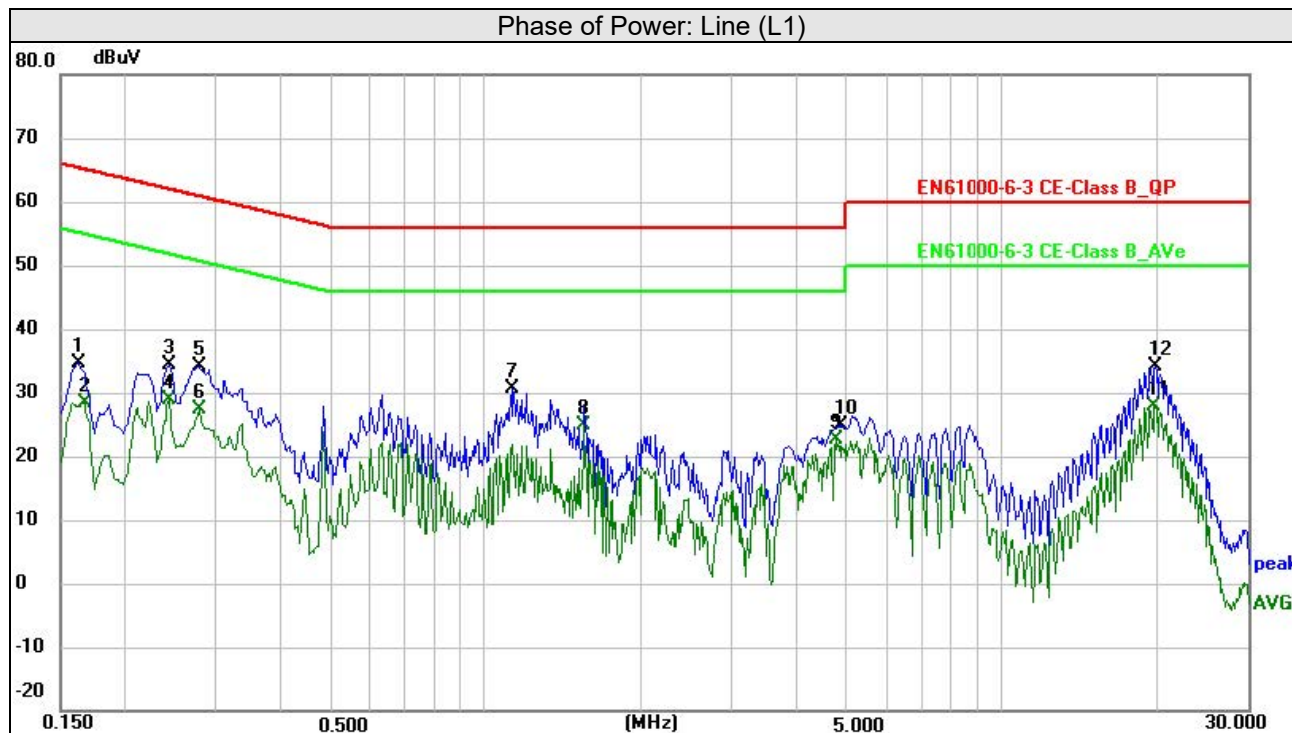
4.4 Test Setup



4.5 Test Results

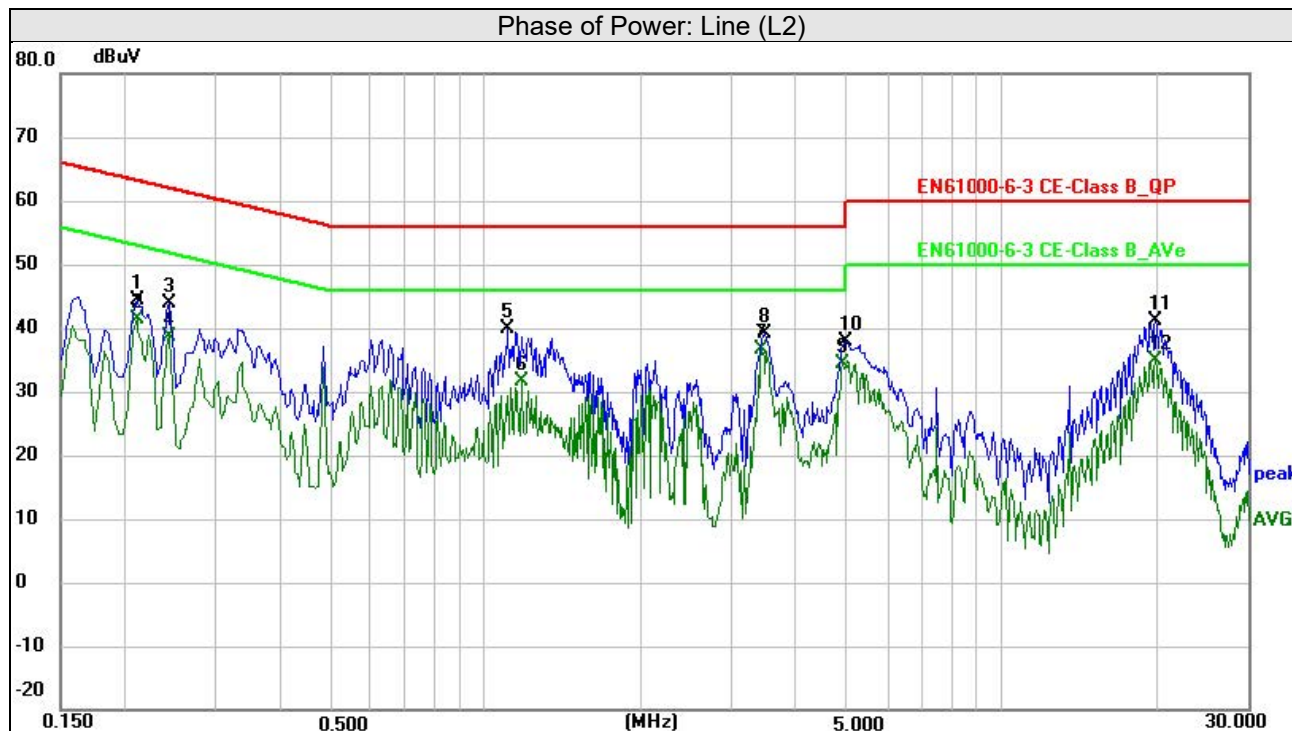
AC Port (EA17KTL-P1)

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / CISPR Average (AV), 9kHz
Test Mode	See the 2.2 section		



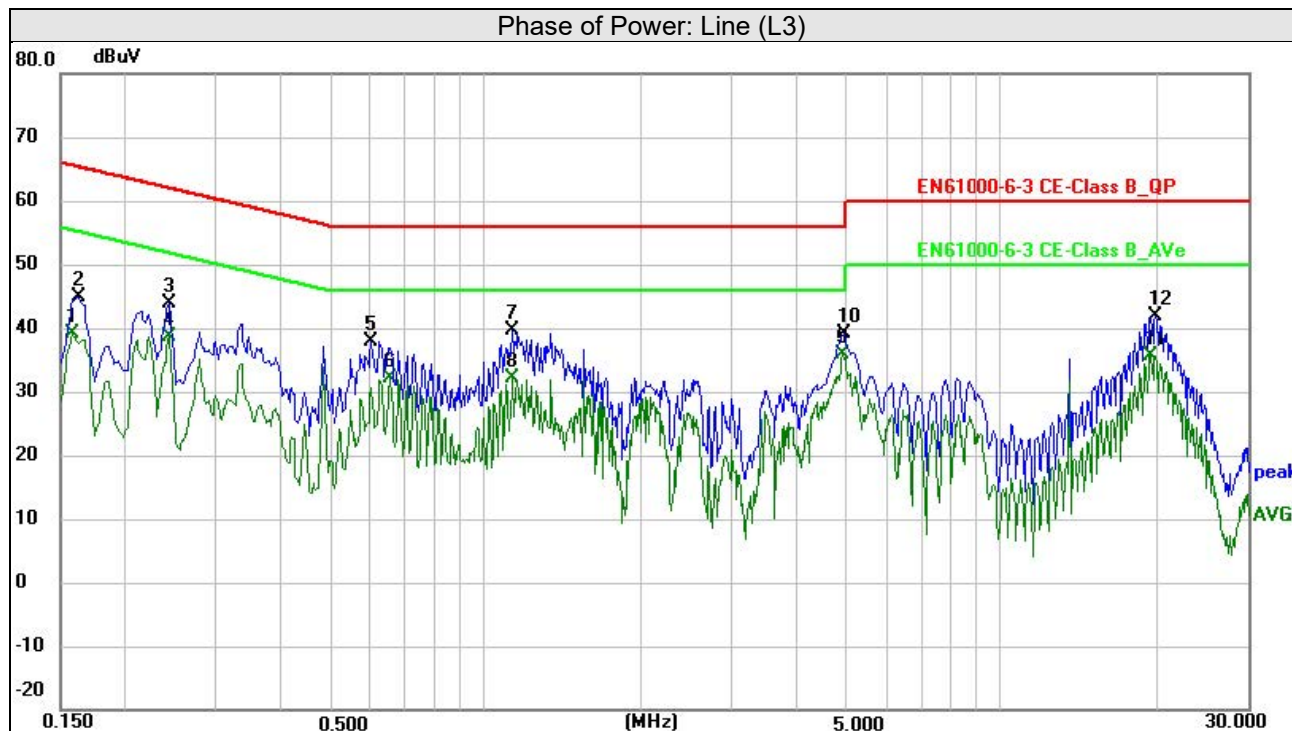
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1620	24.19	10.52	34.71	65.36	-30.65	peak	P	
2	0.1660	17.92	10.52	28.44	55.16	-26.72	AVG	P	
3	0.2420	23.69	10.63	34.32	62.03	-27.71	peak	P	
4	0.2420	18.36	10.63	28.99	52.03	-23.04	AVG	P	
5	0.2780	23.56	10.68	34.24	60.88	-26.64	peak	P	
6	0.2780	16.80	10.68	27.48	50.88	-23.40	AVG	P	
7	1.1340	19.70	11.04	30.74	56.00	-25.26	peak	P	
8	1.5580	13.71	11.07	24.78	46.00	-21.22	AVG	P	
9	4.7940	11.22	11.29	22.51	46.00	-23.49	AVG	P	
10	4.8500	13.55	11.29	24.84	56.00	-31.16	peak	P	
11	19.8180	15.65	12.31	27.96	50.00	-22.04	AVG	P	
12	19.9300	21.78	12.32	34.10	60.00	-25.90	peak	P	

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / CISPR Average (AV), 9kHz
Test Mode	See the 2.2 section		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.2100	33.71	10.59	44.30	63.21	-18.91	peak	P	
2	0.2100	30.75	10.59	41.34	53.21	-11.87	AVG	P	
3	0.2420	33.31	10.63	43.94	62.03	-18.09	peak	P	
4	0.2420	27.89	10.63	38.52	52.03	-13.51	AVG	P	
5	1.1060	28.85	11.04	39.89	56.00	-16.11	peak	P	
6	1.1780	20.50	11.05	31.55	46.00	-14.45	AVG	P	
7	3.4300	25.40	11.20	36.60	46.00	-9.40	AVG	P	
8	3.4740	27.90	11.20	39.10	56.00	-16.90	peak	P	
9	4.9220	23.01	11.30	34.31	46.00	-11.69	AVG	P	
10	5.0020	26.63	11.31	37.94	60.00	-22.06	peak	P	
11	19.8660	28.83	12.31	41.14	60.00	-18.86	peak	P	
12	19.8660	22.58	12.31	34.89	50.00	-15.11	AVG	P	

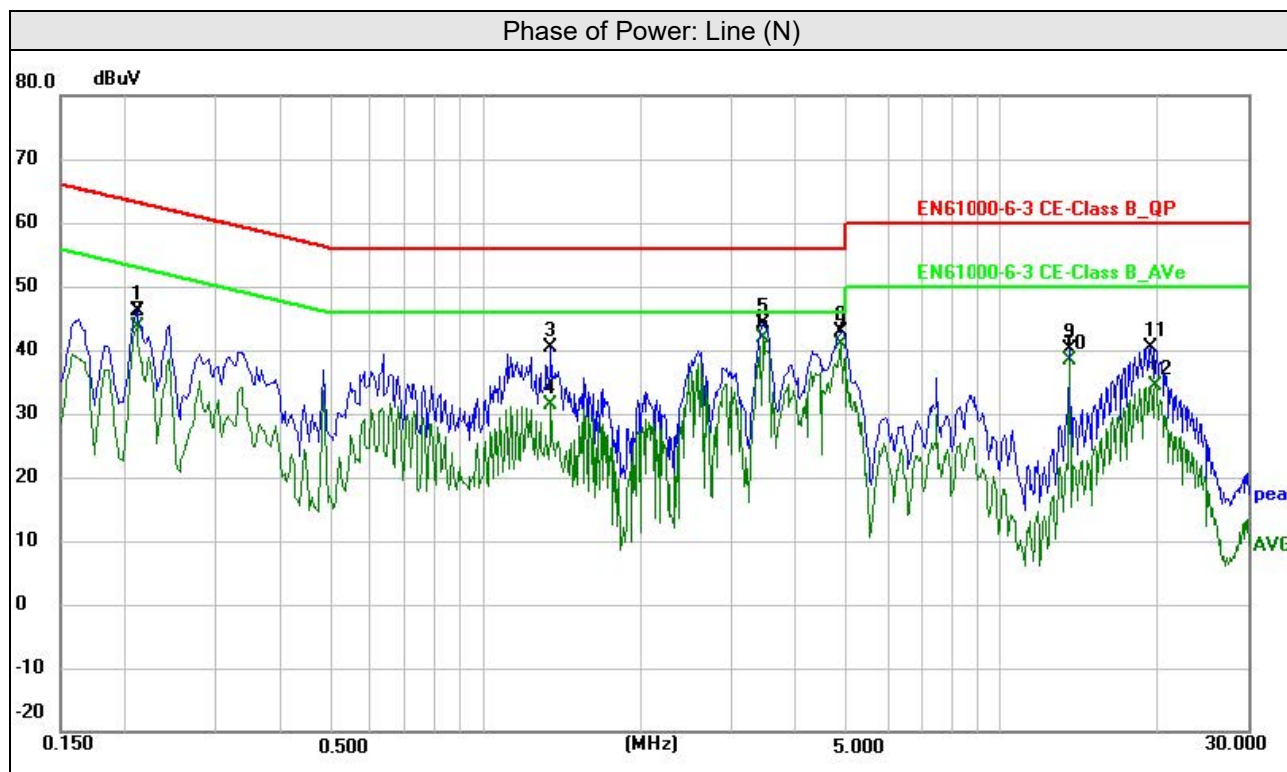
Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / CISPR Average (AV), 9kHz
Test Mode	See the 2.2 section		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1580	28.53	10.51	39.04	55.57	-16.53	AVG	P	
2	0.1620	34.42	10.52	44.94	65.36	-20.42	peak	P	
3	0.2420	33.34	10.63	43.97	62.03	-18.06	peak	P	
4	0.2420	27.89	10.63	38.52	52.03	-13.51	AVG	P	
5	0.6020	26.93	11.01	37.94	56.00	-18.06	peak	P	
6	0.6540	21.14	11.01	32.15	46.00	-13.85	AVG	P	
7	1.1340	28.67	11.04	39.71	56.00	-16.29	peak	P	
8	1.1340	21.02	11.04	32.06	46.00	-13.94	AVG	P	
9	4.9220	24.70	11.30	36.00	46.00	-10.00	AVG	P	
10	4.9500	27.72	11.30	39.02	56.00	-16.98	peak	P	
11	19.4460	23.44	12.28	35.72	50.00	-14.28	AVG	P	
12	19.8780	29.49	12.31	41.80	60.00	-18.20	peak	P	

Test Report No.: 230530JH06-RE-EU-01

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / CISPR Average (AV), 9kHz
Test Mode	See the 2.2 section		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.2100	35.43	10.59	46.02	63.21	-17.19	peak	P	
2	0.2100	33.11	10.59	43.70	53.21	-9.51	AVG	P	
3	1.3420	29.32	11.06	40.38	56.00	-15.62	peak	P	
4	1.3420	20.42	11.06	31.48	46.00	-14.52	AVG	P	
5	3.4460	32.92	11.20	44.12	56.00	-11.88	peak	P	
6	3.4460	30.58	11.20	41.78	46.00	-4.22	AVG	P	
7	4.8700	29.58	11.30	40.88	46.00	-5.12	AVG	P	
8	4.8940	31.55	11.30	42.85	56.00	-13.15	peak	P	
9	13.5620	28.33	11.89	40.22	60.00	-19.78	peak	P	
10	13.5620	26.40	11.89	38.29	50.00	-11.71	AVG	P	
11	19.4700	28.11	12.29	40.40	60.00	-19.60	peak	P	
12	19.8940	21.99	12.31	34.30	50.00	-15.70	AVG	P	

AC Port (EA17KTL-S1)

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / CISPR Average (AV), 9kHz
Test Mode	See the 2.2 section		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1620	47.75	10.52	58.27	65.36	-7.09	peak	P	
2	0.2020	33.41	10.57	43.98	53.53	-9.55	AVG	P	
3	0.3340	22.92	10.76	33.68	49.35	-15.67	AVG	P	
4	0.4820	28.15	10.97	39.12	56.30	-17.18	peak	P	
5	1.2140	21.15	11.05	32.20	46.00	-13.80	AVG	P	
6	2.4740	24.89	11.13	36.02	46.00	-9.98	AVG	P	
7	2.5060	36.54	11.14	47.68	56.00	-8.32	peak	P	
8	4.5580	36.98	11.28	48.26	56.00	-7.74	peak	P	
9	4.6180	27.80	11.28	39.08	46.00	-6.92	AVG	P	
10	6.4740	38.69	11.41	50.10	60.00	-9.90	peak	P	
11	7.3580	30.60	11.46	42.06	50.00	-7.94	AVG	P	
12	7.4740	39.90	11.47	51.37	60.00	-8.63	peak	P	

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / CISPR Average (AV), 9kHz
Test Mode	See the 2.2 section		



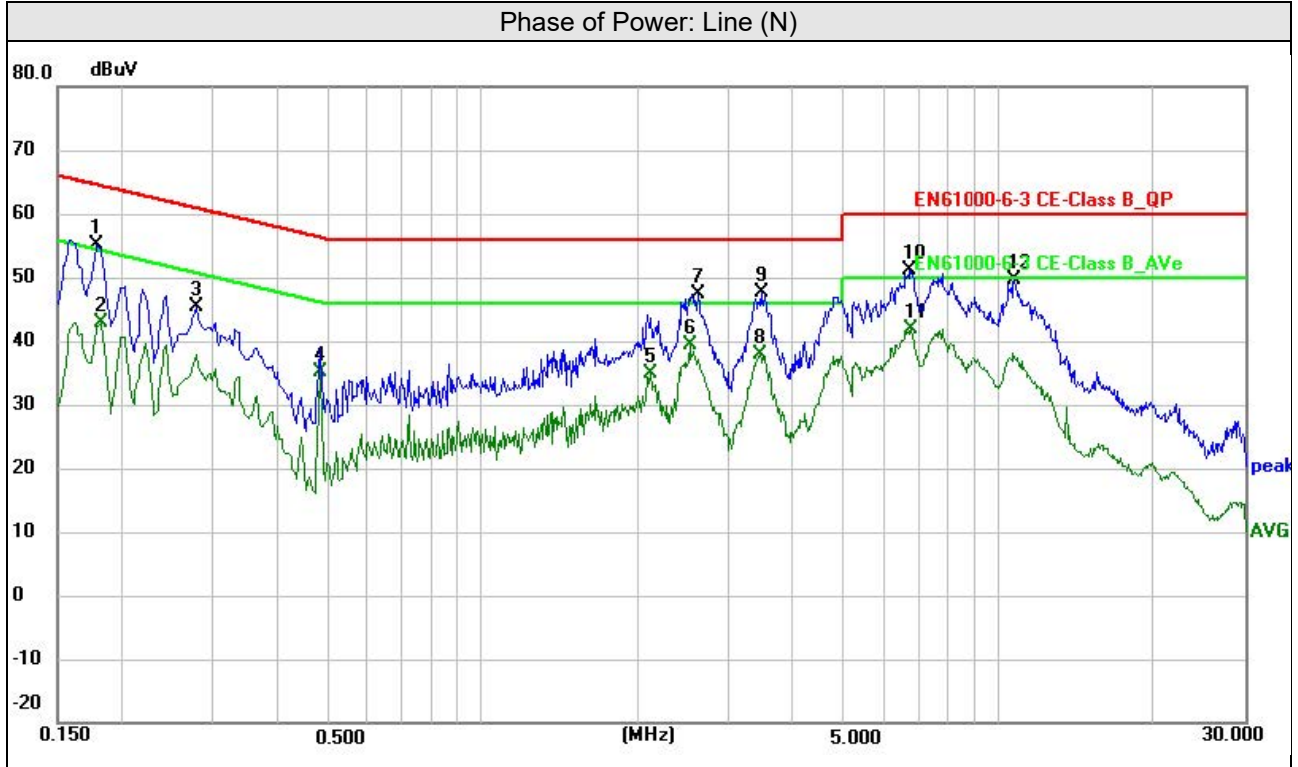
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1580	46.39	10.51	56.90	65.57	-8.67	peak	P	
2	0.1620	38.23	10.52	48.75	55.36	-6.61	AVG	P	
3	0.3340	23.83	10.76	34.59	49.35	-14.76	AVG	P	
4	0.4820	29.70	10.97	40.67	56.30	-15.63	peak	P	
5	2.5460	37.82	11.14	48.96	56.00	-7.04	peak	P	
6	2.5540	29.13	11.14	40.27	46.00	-5.73	AVG	P	
7	3.3940	29.37	11.20	40.57	46.00	-5.43	AVG	P	
8	3.9100	38.66	11.23	49.89	56.00	-6.11	peak	P	
9	4.9260	38.34	11.30	49.64	56.00	-6.36	peak	P	
10	6.5820	30.45	11.41	41.86	50.00	-8.14	AVG	P	
11	7.7820	39.06	11.49	50.55	60.00	-9.45	peak	P	
12	7.8260	30.03	11.50	41.53	50.00	-8.47	AVG	P	

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / CISPR Average (AV), 9kHz
Test Mode	See the 2.2 section		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1620	45.82	10.52	56.34	65.36	-9.02	peak	P	
2	0.1620	38.26	10.52	48.78	55.36	-6.58	AVG	P	
3	0.3340	23.68	10.76	34.44	49.35	-14.91	AVG	P	
4	0.4820	28.08	10.97	39.05	56.30	-17.25	peak	P	
5	2.5540	35.80	11.14	46.94	56.00	-9.06	peak	P	
6	2.5540	27.89	11.14	39.03	46.00	-6.97	AVG	P	
7	4.7420	27.43	11.29	38.72	46.00	-7.28	AVG	P	
8	4.7500	37.62	11.29	48.91	56.00	-7.09	peak	P	
9	6.8580	28.12	11.43	39.55	50.00	-10.45	AVG	P	
10	7.0340	37.50	11.44	48.94	60.00	-11.06	peak	P	
11	10.9700	37.17	11.71	48.88	60.00	-11.12	peak	P	
12	10.9700	23.76	11.71	35.47	50.00	-14.53	AVG	P	

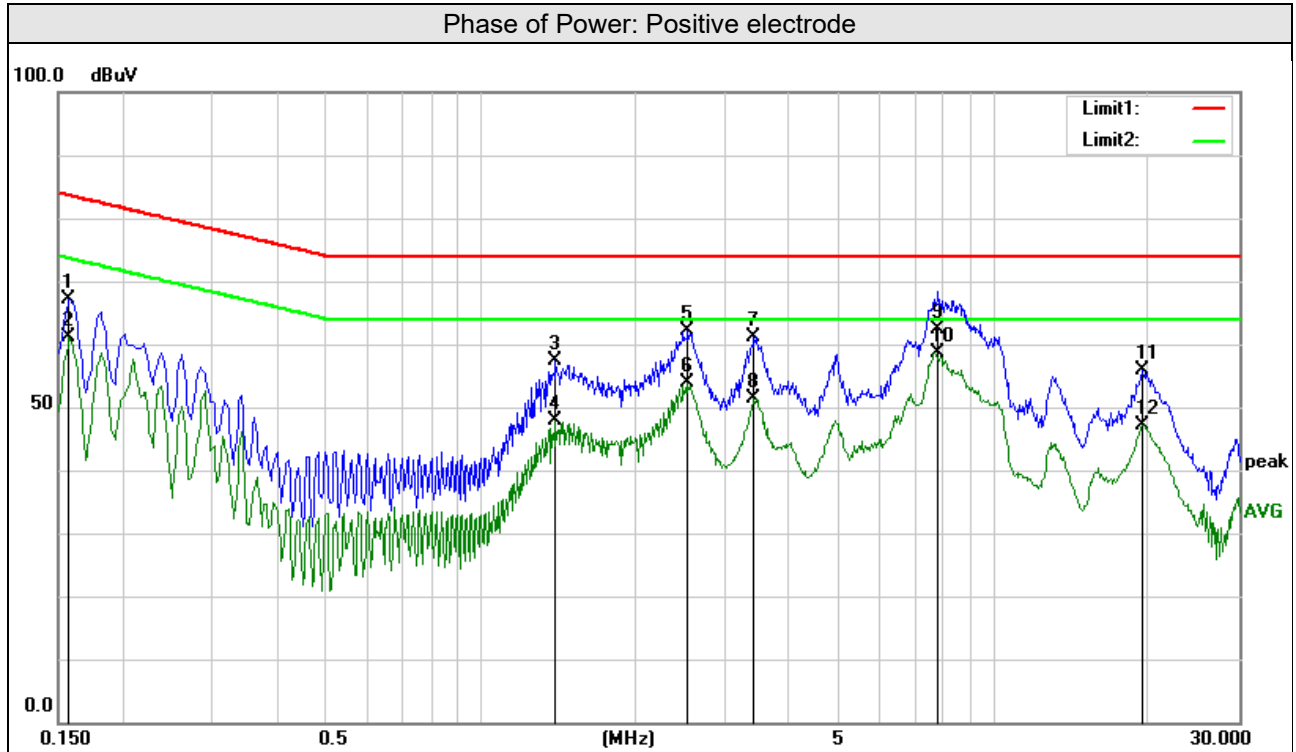
Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / CISPR Average (AV), 9kHz
Test Mode	See the 2.2 section		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1780	44.62	10.54	55.16	64.58	-9.42	peak	P	
2	0.1820	32.31	10.55	42.86	54.39	-11.53	AVG	P	
3	0.2780	34.71	10.68	45.39	60.88	-15.49	peak	P	
4	0.4820	24.14	10.97	35.11	46.30	-11.19	AVG	P	
5	2.1180	23.78	11.11	34.89	46.00	-11.11	AVG	P	
6	2.5140	28.21	11.14	39.35	46.00	-6.65	AVG	P	
7	2.6140	36.23	11.14	47.37	56.00	-8.63	peak	P	
8	3.4380	26.63	11.20	37.83	46.00	-8.17	AVG	P	
9	3.4620	36.46	11.20	47.66	56.00	-8.34	peak	P	
10	6.7060	39.74	11.42	51.16	60.00	-8.84	peak	P	
11	6.7420	30.37	11.42	41.79	50.00	-8.21	AVG	P	
12	10.7420	37.91	11.69	49.60	60.00	-10.40	peak	P	

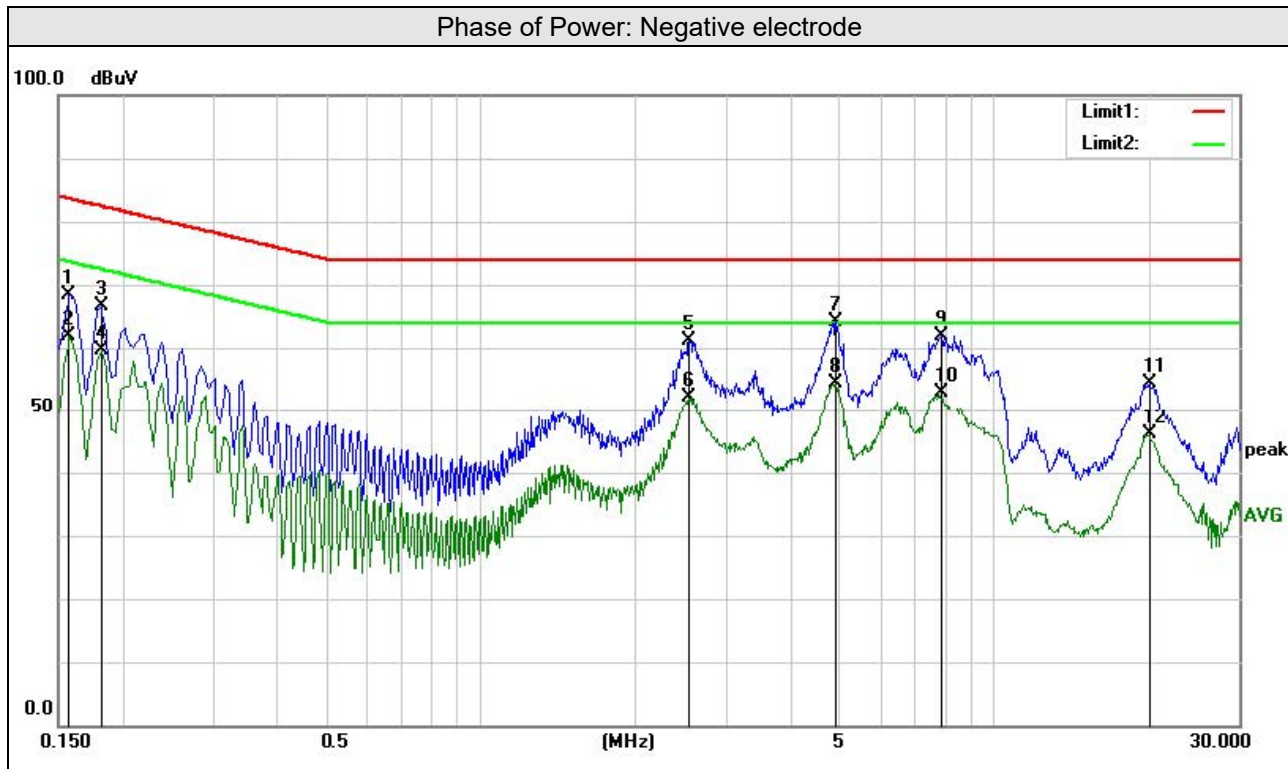
DC Port (EA17KTL-P1)

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / CISPR Average (AV), 9kHz
Test Mode	See the 2.2 section		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1580	47.20	20.05	67.25	83.57	-16.32	QP	P	
2	0.1580	41.05	20.05	61.10	73.57	-12.47	AVG	P	
3	1.4020	37.61	19.72	57.33	74.00	-16.67	QP	P	
4	1.4020	28.07	19.72	47.79	64.00	-16.21	AVG	P	
5	2.5380	41.99	20.08	62.07	74.00	-11.93	QP	P	
6	2.5380	33.80	20.08	53.88	64.00	-10.12	AVG	P	
7	3.4060	40.98	20.24	61.22	74.00	-12.78	QP	P	
8	3.4060	31.19	20.24	51.43	64.00	-12.57	AVG	P	
9	7.7940	42.98	19.42	62.40	74.00	-11.60	QP	P	
10	7.7940	39.09	19.42	58.51	64.00	-5.49	AVG	P	
11	19.4620	36.49	19.42	55.91	74.00	-18.09	QP	P	
12	19.4620	27.81	19.42	47.23	64.00	-16.77	AVG	P	

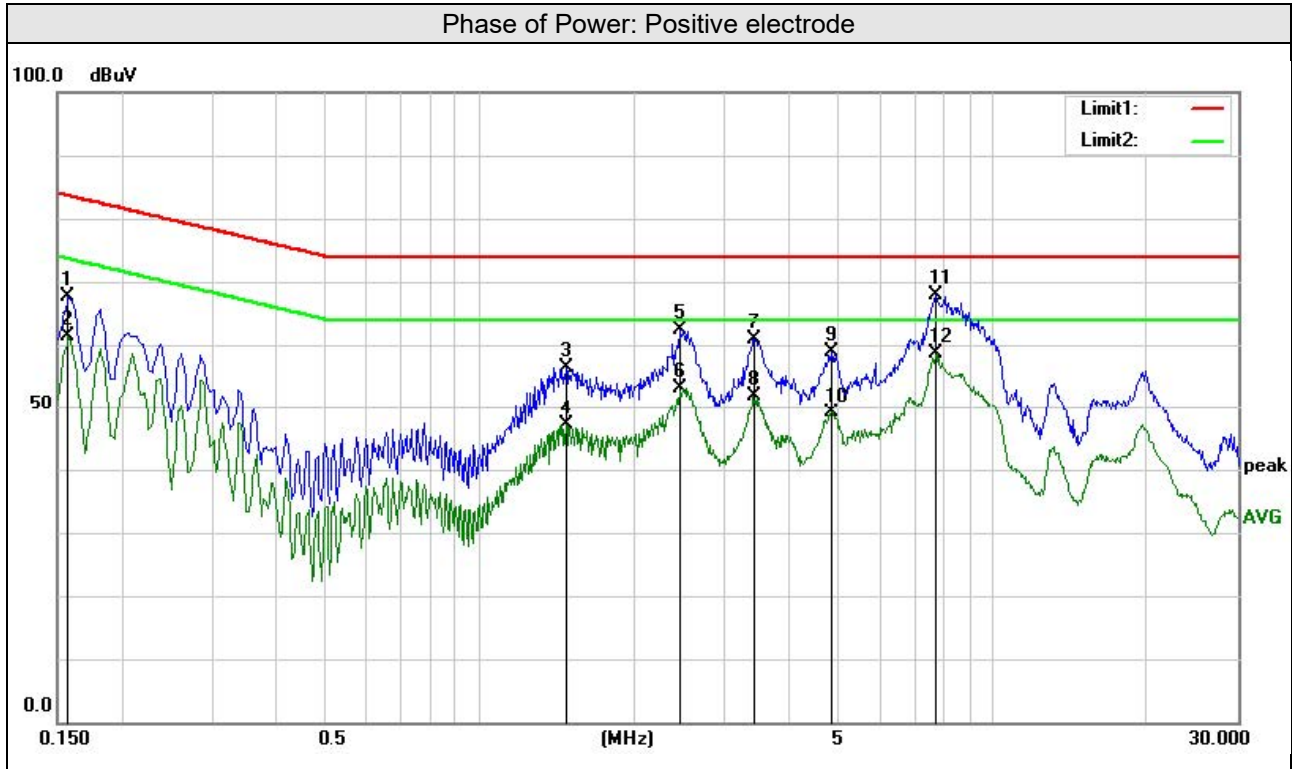
Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / CISPR Average (AV), 9kHz
Test Mode	See the 2.2 section		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1580	48.43	20.05	68.48	83.57	-15.09	QP	P	
2	0.1580	41.73	20.05	61.78	73.57	-11.79	AVG	P	
3	0.1820	46.64	20.01	66.65	82.39	-15.74	QP	P	
4	0.1820	39.67	20.01	59.68	72.39	-12.71	AVG	P	
5	2.5420	40.96	20.08	61.04	74.00	-12.96	QP	P	
6	2.5420	31.98	20.08	52.06	64.00	-11.94	AVG	P	
7	4.9100	43.82	20.33	64.15	74.00	-9.85	QP	P	
8	4.9100	34.02	20.33	54.35	64.00	-9.65	AVG	P	
9	7.8540	42.42	19.42	61.84	74.00	-12.16	QP	P	
10	7.8540	33.41	19.42	52.83	64.00	-11.17	AVG	P	
11	20.1180	34.99	19.38	54.37	74.00	-19.63	QP	P	
12	20.1180	26.63	19.38	46.01	64.00	-17.99	AVG	P	

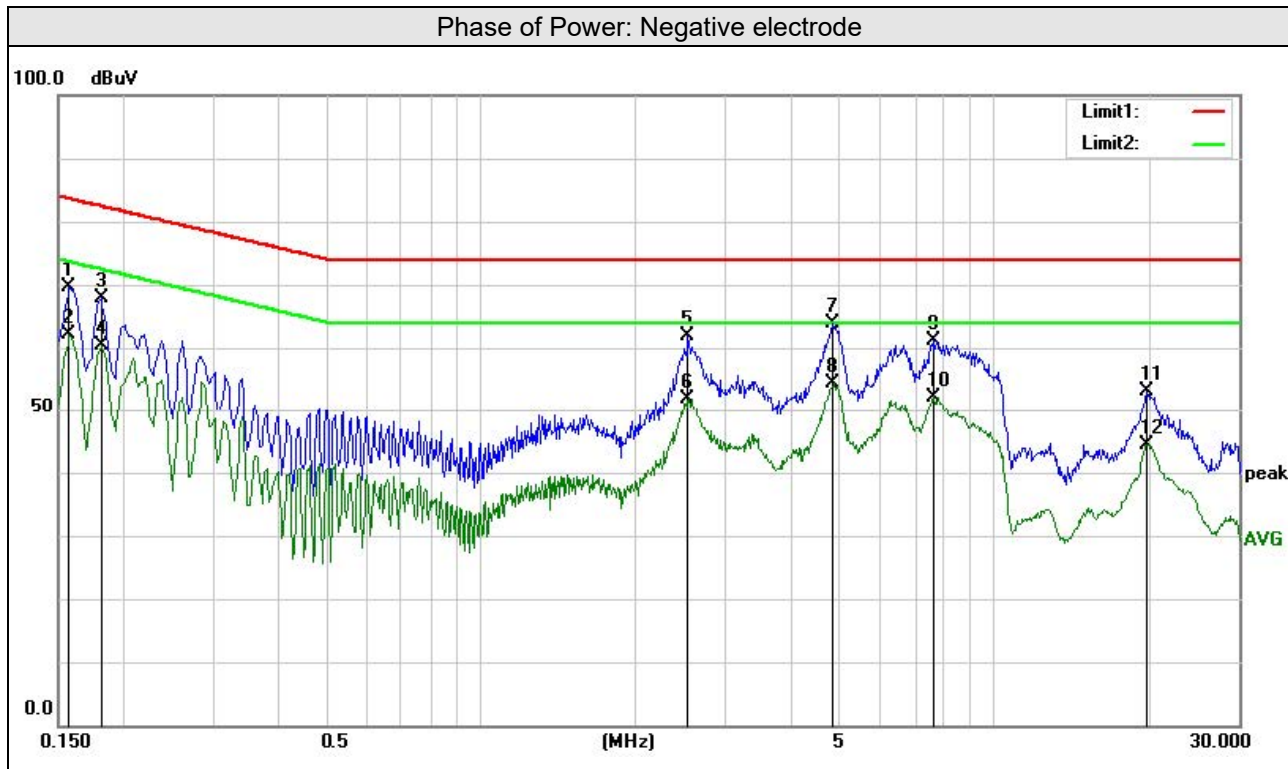
DC Port (EA17KTL-S1)

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / CISPR Average (AV), 9kHz
Test Mode	See the 2.2 section		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1580	47.48	20.05	67.53	83.57	-16.04	QP	P	
2	0.1580	41.25	20.05	61.30	73.57	-12.27	AVG	P	
3	1.4780	36.62	19.75	56.37	74.00	-17.63	QP	P	
4	1.4780	27.37	19.75	47.12	64.00	-16.88	AVG	P	
5	2.4580	42.42	20.05	62.47	74.00	-11.53	QP	P	
6	2.4580	33.06	20.05	53.11	64.00	-10.89	AVG	P	
7	3.4180	40.65	20.24	60.89	74.00	-13.11	QP	P	
8	3.4180	31.56	20.24	51.80	64.00	-12.20	AVG	P	
9	4.8340	38.64	20.33	58.97	74.00	-15.03	QP	P	
10	4.8340	28.79	20.33	49.12	64.00	-14.88	AVG	P	
11	7.6940	48.56	19.42	67.98	74.00	-6.02	QP	P	
12	7.6940	39.16	19.42	58.58	64.00	-5.42	AVG	P	

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / CISPR Average (AVG), 9kHz
Test Mode	See the 2.2 section		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1580	49.48	20.05	69.53	83.57	-14.04	QP	P	
2	0.1580	42.01	20.05	62.06	73.57	-11.51	AVG	P	
3	0.1820	47.85	20.01	67.86	82.39	-14.53	QP	P	
4	0.1820	40.31	20.01	60.32	72.39	-12.07	AVG	P	
5	2.5380	41.74	20.08	61.82	74.00	-12.18	QP	P	
6	2.5380	31.88	20.08	51.96	64.00	-12.04	AVG	P	
7	4.8340	43.66	20.33	63.99	74.00	-10.01	QP	P	
8	4.8340	34.11	20.33	54.44	64.00	-9.56	AVG	P	
9	7.5940	41.79	19.41	61.20	74.00	-12.80	QP	P	
10	7.5940	32.84	19.41	52.25	64.00	-11.75	AVG	P	
11	19.8500	33.64	19.39	53.03	74.00	-20.97	QP	P	
12	19.8500	25.09	19.39	44.48	64.00	-19.52	AVG	P	

5 Radiated Emissions up to 1 GHz

5.1 Limits

Frequencies (MHz)	EN 55032, Class A(3m)	EN 55032, Class B(3m)
	Quasi-peak (dBuV)	Quasi-peak (dBuV)
30– 230	50	40
230 – 1000	57	47

Notes: 1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).

5.2 Test Instruments

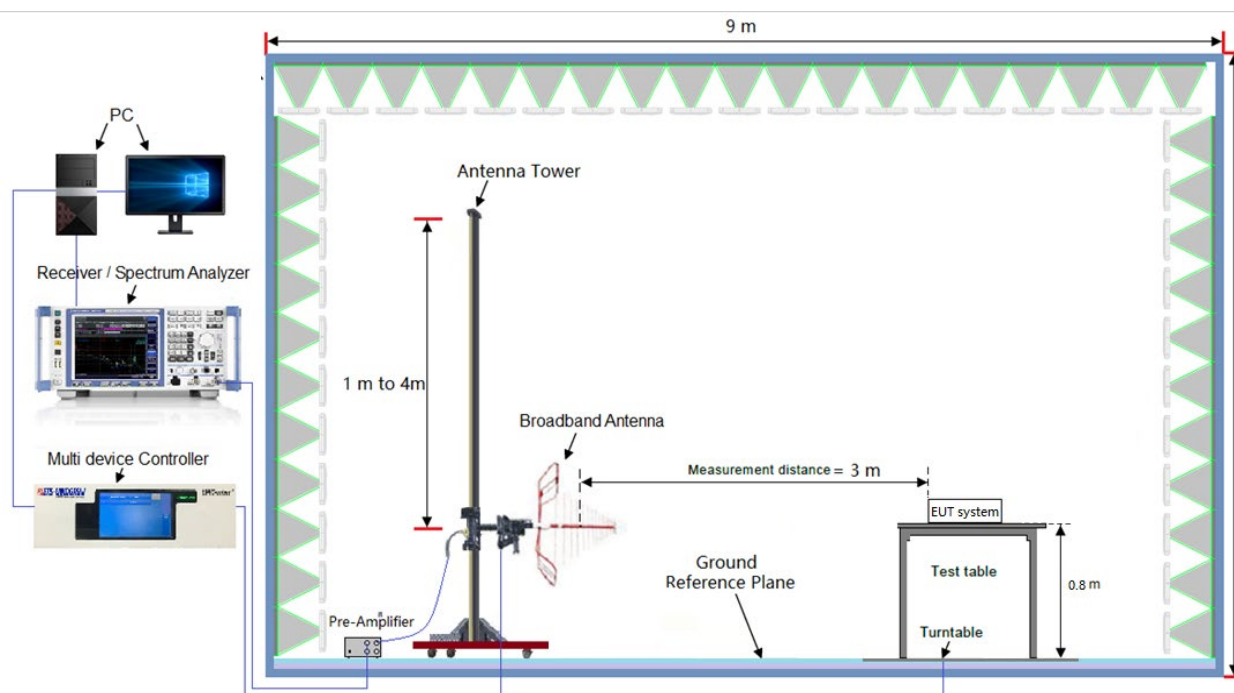
Equipment Name	Model	Manufacturer	Serial No.	Cal. date	Interval
3m semi-anechoic chamber	3m SAC	yiheng	966	2022/11/7	3 Years
EMI Receiver	ESPI3	R&S	100605	2022/12/7	1 Year
Spectrum analyzer	N9010A	Agilent	MY50483285	2022/12/7	1 Year
60cm Loop Antenna	FMZB 1513-60	Schwarzbeck	00006	2023/3/3	3 Years
log-periodic antenna	VULB 9168	Schwarzbeck	1314	2022/12/9	3 Years
Horn Antenna	BBHA 9120D	Schwarzbeck	2557	2022/12/8	3 Years
Horn Antenna	BBHA 9170	Schwarzbeck	1173	2022/12/9	3 Years
Pre-amplifier	RP01	Emtrace	1917	2022/12/7	1 Year
Pre-amplifier	TAP011804 5	Tonscend	6150	2022/12/7	1 Year
Pre-amplifier	TAP- 184050	Tonscend	6214	2022/12/7	1 Year
9kHz~1GHz cable 7m	LMR400UF	NMNM	N/A	2022/12/7	1 Year
9kHz~1GHz cable 1.5m	LMR400UF	NMNM	N/A	2022/12/7	1 Year
9kHz~1GHz cable 1m	LMR400UF	NMNM	N/A	2022/12/7	1 Year
9kHz~1GHz cable 1.5m	LMR400UF	NMNM	N/A	2022/12/7	1 Year
1~18GHz cable 1.5m	SFT205PU R	NMNM	N/A	2022/12/7	1 Year
1~18GHz cable 2.0m	HF160	NMNM	N/A	2022/12/7	1 Year
1~18GHz cable 0.3m	SFT205PU R	NMSWSM	N/A	2022/12/7	1 Year
1~18GHz cable 7.0m	SFT205PU R	NMSWSM	N/A	2022/12/7	1 Year
RE test software	EZ-RE	FARA	N/A	N/A	N/A

Note: 1. The calibration interval of the above test instruments is 12/36 months.
2. The test was performed in Shielded Room (Worldtest (GuangDong)Co., Ltd.)

5.3 Test Procedure

- The EUT was placed on the top of a rotating table 0.1 meters above the ground reference plane at an accredited test facility. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground reference plane to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum emissions.
- The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

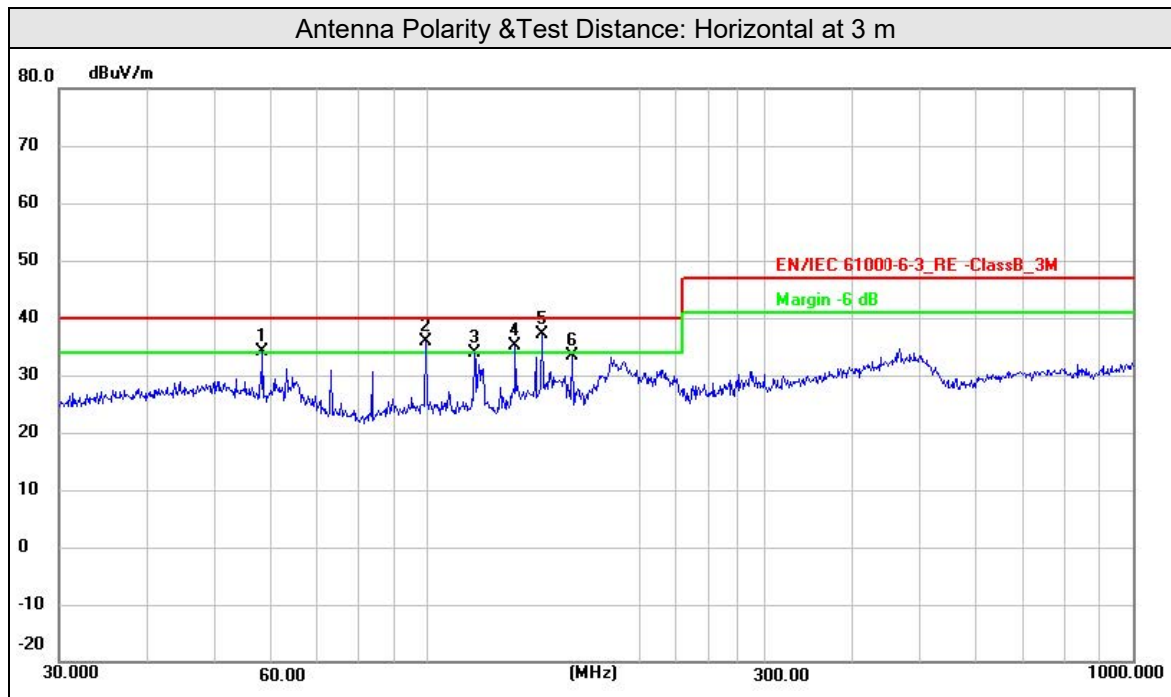
5.4 Test Setup



5.5 Test Results

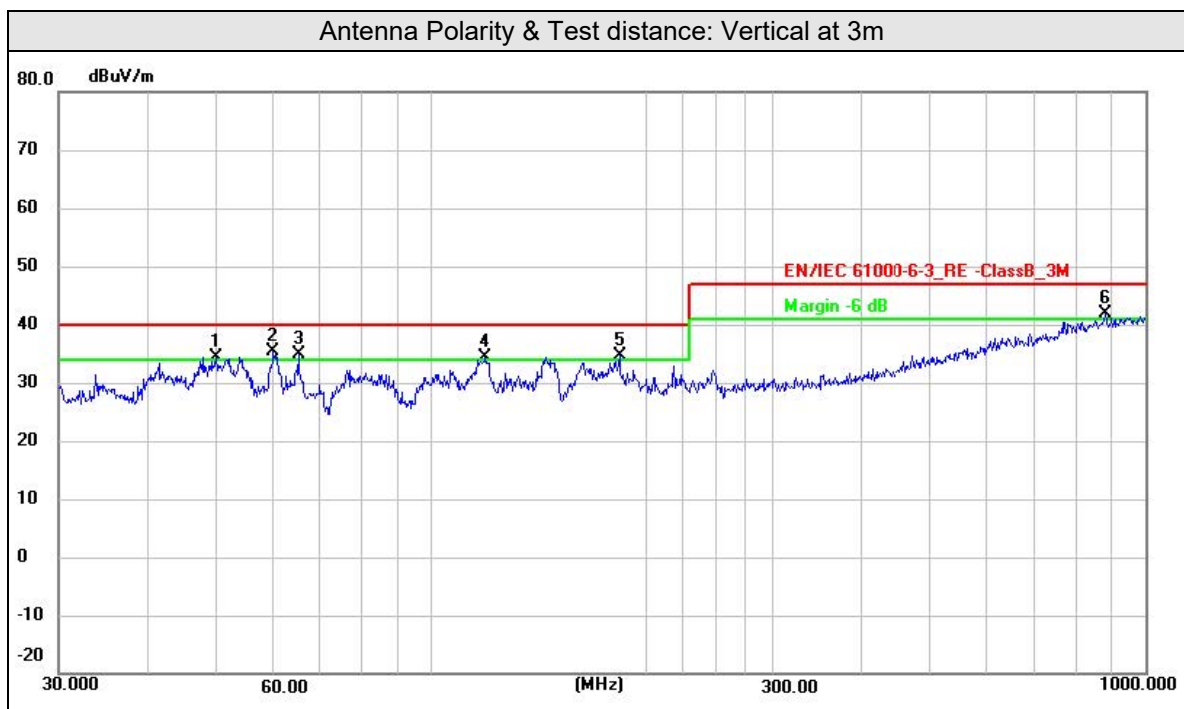
EA17KTL-P1

Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Test mode	See section 2.2		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)
1	58.2030	21.20	12.90	34.10	40.00	-5.90	peak	200	230
2	99.5281	25.13	10.70	35.83	40.00	-4.17	peak	200	169
3	116.5400	23.35	10.60	33.95	40.00	-6.05	peak	300	340
4	133.1510	24.66	10.50	35.16	40.00	-4.84	peak	300	248
5	145.3505	26.66	10.42	37.08	40.00	-2.92	peak	200	196
6	160.3456	22.94	10.33	33.27	40.00	-6.73	peak	300	180

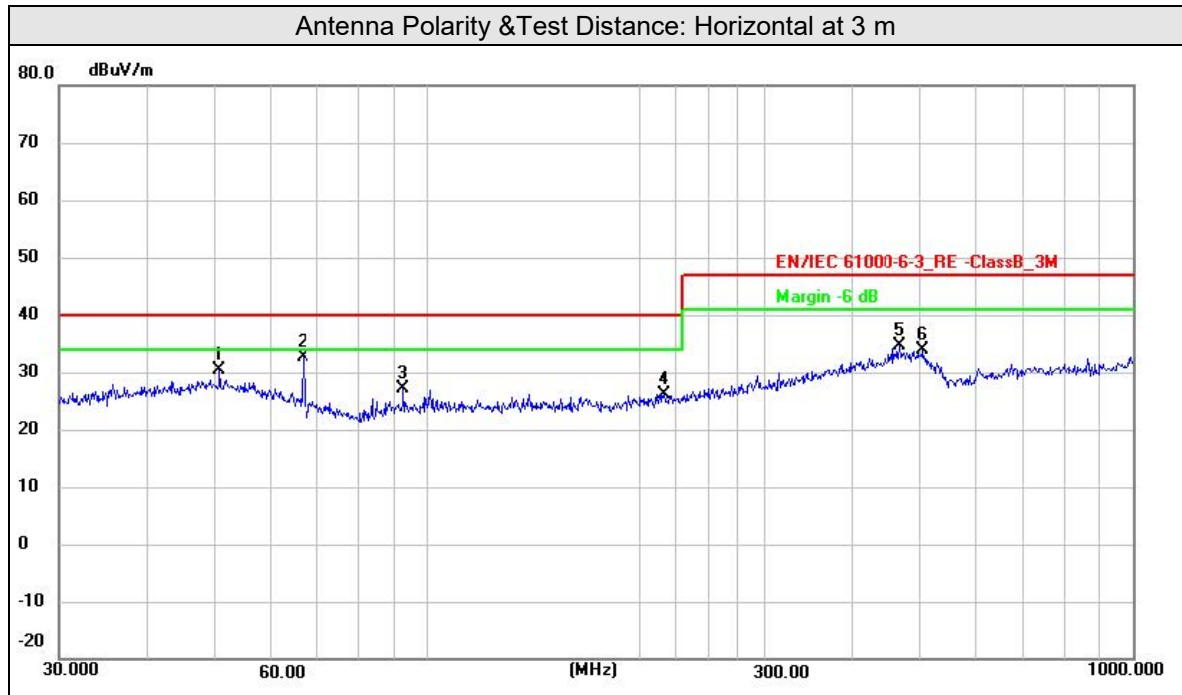
Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Test mode	See section 2.2		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)
1	49.8814	19.84	14.63	34.47	40.00	-5.53	peak	100	244
2	59.8588	22.88	12.54	35.42	40.00	-4.58	peak	100	267
3	64.8865	23.26	11.62	34.88	40.00	-5.12	peak	200	300
4	119.0180	22.46	12.04	34.50	40.00	-5.50	peak	100	255
5	183.2005	23.09	11.63	34.72	40.00	-5.28	peak	200	240
6	878.3214	16.60	25.23	41.83	47.00	-5.17	peak	200	154

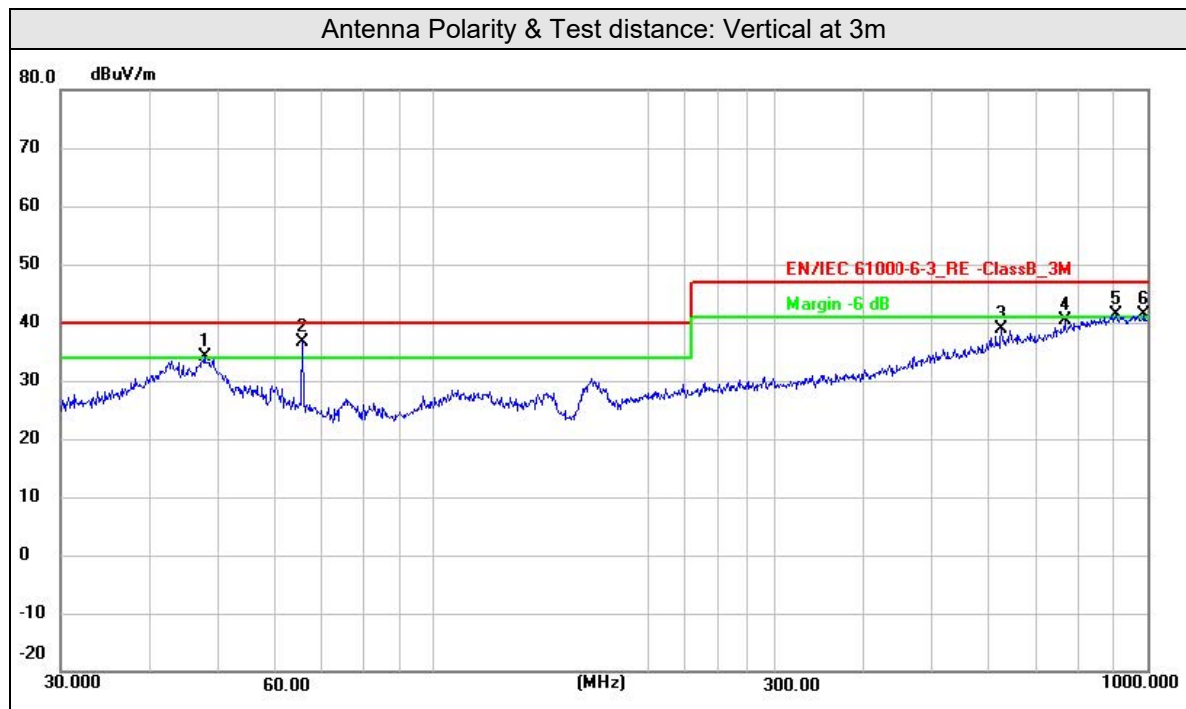
EA17KTL-S1

Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Test mode	See section 2.2		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)
1	50.5860	15.79	14.52	30.31	40.00	-9.69	peak	200	340
2	66.4990	21.24	11.33	32.57	40.00	-7.43	peak	200	160
3	92.4624	16.49	10.73	27.22	40.00	-12.78	peak	300	244
4	216.0240	14.84	11.41	26.25	40.00	-13.75	peak	200	168
5	467.2350	15.99	18.52	34.51	47.00	-12.49	peak	200	170
6	504.7062	15.18	18.64	33.82	47.00	-13.18	peak	300	295

Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Test mode	See section 2.2		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)
1	47.6584	19.67	14.37	34.04	40.00	-5.96	peak	100	120
2	65.3431	25.19	11.53	36.72	40.00	-3.28	peak	200	80
3	625.0780	17.34	21.44	38.78	47.00	-8.22	peak	200	140
4	766.0571	16.66	23.62	40.28	47.00	-6.72	peak	100	50
5	903.3093	15.86	25.46	41.32	47.00	-5.68	peak	100	170
6	989.5354	15.83	25.50	41.33	47.00	-5.67	peak	200	268

6 Harmonics Current Measurement

6.1 Limits

EN 61000-3-12:2011; IEC 61000-3-12:2011+AMD1:2021

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 = harmonic current component.

EN IEC 61000-3-2:2019+A1:2021;

Limits for Class A equipment		Limits for Class D equipment		
Harmonic Order n	Max. permissible harmonics current A	Harmonic Order n	Max. permissible harmonics current per watt mA/W	Max. permissible harmonics current A
Odd harmonics		Odd Harmonics only		
3	2.30	3	3.4	2.30
5	1.14	5	1.9	1.14
7	0.77	7	1.0	0.77
9	0.40	9	0.5	0.40
11	0.33	11	0.35	0.33
13	0.21	13	0.30	0.21
15≤n≤39	0.15x15/n	15≤n≤39	3.85/n	0.15x15/n
Even harmonics		*Class A and Class D are classified according to section 5 of EN IEC 61000-3-2. * According to section 7 of EN IEC 61000-3-2, the above limits for all equipment except for lighting equipment having an active input power > 75 W and no limits apply for equipment with an active input power up to and including 75 W.		
2	1.08			
4	0.43			
6	0.30			
8≤n≤40	0.23x8/n			

6.2 Test Instruments

Equipment	Manufacturer	Model No.	Serial No.	Cal. Due
Precision Power Analyzer	YOKOGAWA	WT3000	N/A	2023-10-18

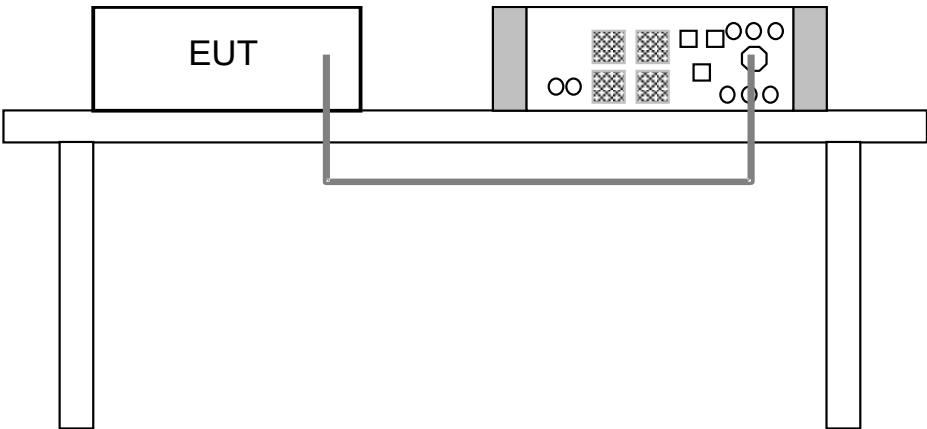
Note:

- 1. The calibration interval of the above test instruments is 12 months.
- 2. The test was performed in Shielded Room (EAST Group Co., Ltd.)

6.3 Test Procedure

- a. The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under normal operating conditions for each successive harmonic component in turn.
- b. 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 time necessary for the EUT to be exercised.

6.4 Test setup



6.5 Test Results

Harmonic order n (EA17KTL-P1)	Harmonic current Limit EN61000-3-2 Class A [A]	Current Magnitude [A] At 100% rated output power	Verdict
1	--	--	--
2	0.138	0.574	Pass
3	0.119	0.495	Pass
4	0.102	0.422	Pass
5	0.329	1.364	Pass
6	0.228	0.947	Pass
7	0.182	0.753	Pass
8	0.097	0.402	Pass
9	0.117	0.484	Pass
10	0.022	0.093	Pass
11	0.249	1.034	Pass
12	0.025	0.102	Pass
13	0.134	0.554	Pass
14	0.021	0.088	Pass
15	0.048	0.197	Pass
16	0.04	0.167	Pass
17	0.087	0.359	Pass
18	0.024	0.1	Pass
19	0.087	0.361	Pass
20	0.016	0.067	Pass
21	0.046	0.192	Pass
22	0.031	0.129	Pass
23	0.078	0.322	Pass
24	0.016	0.065	Pass
25	0.02	0.083	Pass
26	0.012	0.049	Pass
27	0.035	0.146	Pass
28	0.016	0.067	Pass
29	0.036	0.15	Pass
30	0.016	0.068	Pass
31	0.028	0.117	Pass
32	0.007	0.027	Pass
33	0.025	0.102	Pass
34	0.027	0.11	Pass
35	0.031	0.128	Pass
36	0.011	0.048	Pass
37	0.033	0.136	Pass
38	0.012	0.048	Pass
39	0.022	0.091	Pass
40	0.015	0.061	Pass
THD [%]	2.599	1.585	Pass

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 Tel: [0769-83078199](#)

 Web.: [www.hwa-hsing.com](#)

 E-Mail: [customerservice.dg@hwa-hsing.com](#)

Release

[Ver. 1.5](#)

Harmonic order n (EA17KTL-S1)	Harmonic current Limit EN61000-3-2 Class A [A]	Current Magnitude [A] At 100% rated output power	Verdict
1	--	--	--
2	0.13	0.56	Pass
3	0.321	1.384	Pass
4	0.136	0.586	Pass
5	0.487	2.099	Pass
6	0.4	1.725	Pass
7	0.226	0.973	Pass
8	0.202	0.871	Pass
9	0.134	0.579	Pass
10	0.094	0.403	Pass
11	0.305	1.313	Pass
12	0.03	0.13	Pass
13	0.093	0.399	Pass
14	0.038	0.166	Pass
15	0.011	0.048	Pass
16	0.035	0.15	Pass
17	0.111	0.478	Pass
18	0.057	0.247	Pass
19	0.057	0.245	Pass
20	0.039	0.168	Pass
21	0.027	0.118	Pass
22	0.038	0.163	Pass
23	0.075	0.322	Pass
24	0.043	0.186	Pass
25	0.038	0.165	Pass
26	0.015	0.065	Pass
27	0.031	0.135	Pass
28	0.02	0.086	Pass
29	0.047	0.202	Pass
30	0.022	0.093	Pass
31	0.028	0.12	Pass
32	0.01	0.042	Pass
33	0.034	0.147	Pass
34	0.013	0.056	Pass
35	0.008	0.033	Pass
36	0.023	0.099	Pass
37	0.04	0.171	Pass
38	0.007	0.029	Pass
39	0.025	0.107	Pass
40	0.02	0.084	Pass
THD [%]	3.897	1.814	Pass

7 Voltage Fluctuations and Flicker Measurement

7.1 Limits

Test item	Limit	Note
P_{st}	1.0	P_{st} : short-term flicker severity.
P_{lt}	0.65	P_{lt} : long-term flicker severity.
T_{max} (ms)	500	T_{max} : maximum time duration during the observation period that the voltage deviation $d(t)$ exceeds the limit for d_c .
d_{max} (%)	4	d_{max} : maximum absolute voltage change during an observation period.
d_c (%)	3.3	d_c : maximum steady state voltage change during an observation period.

7.2 Test Instruments

Equipment	Manufacturer	Model No.	Serial No.	Cal. Due
power analyzer	ZLG	PA6000H	N/A	2023-11-30

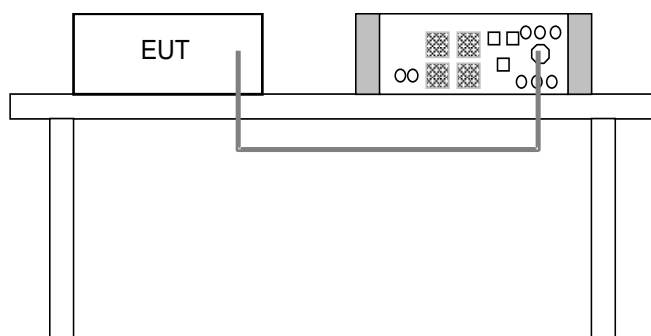
Note:

1. The calibration interval of the above test instruments is 12 months.
2. The test was performed in Shielded Room (EAST Group Co., Ltd.)

7.3 Test Procedure

- a. The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the most unfavorable sequence of voltage changes under normal operating conditions.
- b. During the flick measurement, the measure time shall include that part of whole operation cycle in which the EUT produce the most unfavorable sequence of voltage changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.

7.4 Test setup



7.5 Test Results

Observation (T_p)	10 min.
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Lab: [Hwa-Hsing \(Dongguan\) Testing Co., Ltd.](#)

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Test Report No.: 230530JH06-RE-EU-01

Fundamental Voltage/Ampere	230.27Vrms	Power Frequency	50.00Hz
Test Mode	See section 2.2		

EA17KTL-P1:

Test Parameter	Measurement Value	Limit	Verdict
P _{st}	0.115	1.00	Pass
P _{lt}	0.111	0.65	Pass
T _{max} (ms)	0.0	500	Pass
d _{max} (%)	0.254	4	Pass
d _c (%)	0.122	3.3	Pass

EA17KTL-S1:

Test Parameter	Measurement Value	Limit	Verdict
P _{st}	0.284	1.00	Pass
P _{lt}	0.145	0.65	Pass
T _{max} (ms)	0.0	500	Pass
d _{max} (%)	0.239	4	Pass
d _c (%)	0.119	3.3	Pass

- Note: (1) P_{st} means short-term flicker indicator.
(2) P_{lt} means long-term flicker indicator.
(3) T_{max} means accumulated time value of d(t) with a deviation exceeding 3.3 %.
(4) d_{max} means maximum relative voltage change.
(5) d_c means maximum relative steady-state voltage change.

8 Immunity test

8.1 General description

Product Standard	EN IEC 61000-6-1:2019; EN IEC 61000-6-2:2019	
Basic Standard, specification requirement, and Performance Criteria:	IEC 61000-4-2	Electrostatic Discharge – ESD: ● 4kV Contact discharge, ● 8kV air discharge, Performance Criterion B
	IEC 61000-4-3	Radio-Frequency Electromagnetic Field Susceptibility Test – RS: ● 80-1000 MHz, 10V/m, 80% AM (1kHz), ● 1400-6000 MHz, 3V/m, 80% AM (1kHz), Performance Criterion A
	IEC 61000-4-4	Electrical Fast Transient/Burst – EFT ● AC Power line: 2kV, ● DC Power line: 2kV ● Signal line: 1kV Performance Criterion B
	IEC 61000-4-5	Surge Immunity Test: 1.2/50 us Open Circuit Voltage, 8 /20 us Short Circuit Current, 10/700 us Open Circuit Voltage, 5 /320 us Short Circuit Current, ● AC Power Line: line to line 1 kV, ● AC Power Line: Line to earth 2kV ● Signal line: 1kV ● Shielded line and DC line: 0.5kV Performance Criterion B
	IEC 61000-4-6	Conducted Radio Frequency Disturbances Test – CS: ● 0.15-80 MHz, 10Vrms, 80% AM, 1kHz Performance Criterion A
	IEC 61000-4-8	Power Frequency Magnetic Field Test, ● 50 Hz, 30A/m, Performance Criterion A
	IEC 61000-4-11	Meets the requirements of Voltage Dips: ● Reduction for >95% in 1cycle; Performance Criterion B ● Reduction for 60% in 10/12cycle; Performance Criterion C ● Reduction for 30% in 25/30cycle; Performance Criterion C Meets the requirements of Voltage Interruptions: ● 250/300cycle at 50/60Hz; Performance Criterion C

8.2 Performance criteria**EN IEC 61000-6-1; EN IEC 61000-6-2**

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.

8.3 Electrostatic discharge immunity test

8.3.1 Test specification

Basic Standard:	IEC 61000-4-2, EN 61000-4-2
Discharge Impedance:	330 ohm / 150 pF
Discharge Voltage:	Air Discharge: 2, 4, 8 kV (Direct) Contact Discharge: 4 kV (Direct and Indirect)
Polarity:	Positive & Negative
Number of Discharge:	20 times on each test points
Discharge Mode:	Single Discharge
Discharge Period:	1 second

8.3.2 Test instrument

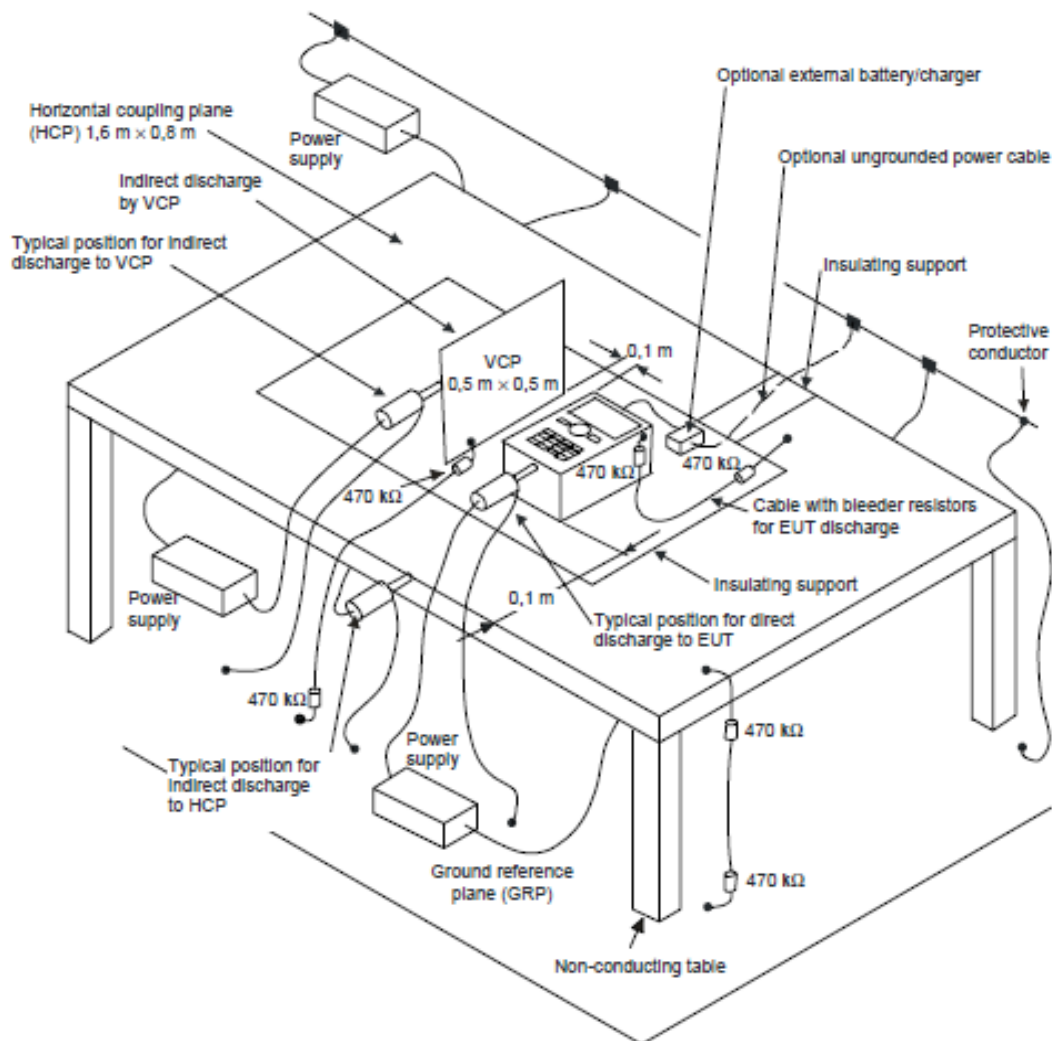
Equipment Name	Model	Manufacturer	Serial No.	Cal. date	Interval
ESD generator	SKS-0220GS	SANKI	020413019E321	2022/12/1	1 Year

- Note:** 1. The calibration interval of the above test instruments is 12 months.
2. The test was performed in Shielded Room (Worldtest (GuangDong)Co., Ltd.)

8.3.3 Test Procedure

- Electrostatic discharges were applied only to those points and surfaces of the EUT that are accessible to users during normal operation.
- The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.
- The time interval between two successive single discharges was at least 1 second.
- The discharge return cable of the generator shall be kept at a distance of at least 0.2 m from the EUT whilst the discharge is being applied and should not be held by the operator.
- Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.
- Air discharges were 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 was removed from the EUT and re-triggered for a new single discharge. The test was repeated until all discharges were complete.
- At least ten single discharges (in the most sensitive polarity) were applied to the **Horizontal Coupling Plane** at points on each side of the EUT. The ESD generator was positioned horizontally at a distance of 0.1 meters from the EUT with the discharge electrode touching the **HCP**.
- At least ten single discharges (in the most sensitive polarity) were 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 0.5m x 0.5m) was placed vertically to and 0.1 meters from the EUT.

8.3.4 Test setup



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

Note:

Table-Top Equipment

The configuration consisted of a wooden table 0.8 meters high standing on the **Ground Reference Plane**. The **GRP** consisted of a sheet of aluminum at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system. A **Horizontal Coupling Plane** (1.6m x 0.8m) was placed on the table and attached to the **GRP** by means of a cable with 940kΩ total impedance. The equipment under test, was installed in a representative system as described in section 7 of EN 61000-4-2 and its cables were placed on the **HCP** and isolated by an insulating support of 0.5mm thickness. The distance of 0.8 minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

8.3.5 Deviation from test standard

No deviation.

8.3.6 Test result

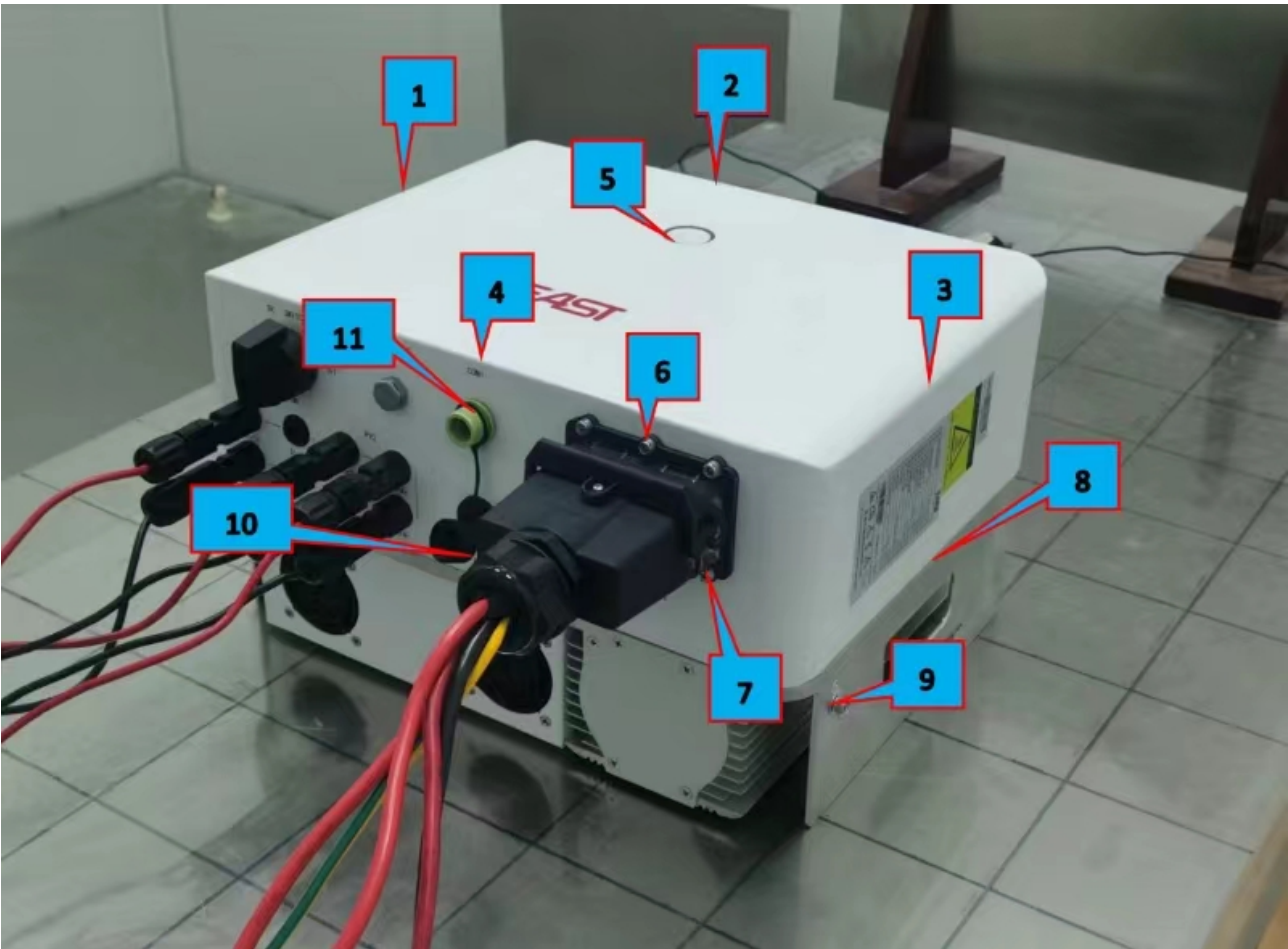
Test Mode	See section 2.2
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Direct Discharge Application				
Test Level (kV)	Polarity	Test Point	Test Result of Contact Discharge	Test Result of Air Discharge
4	+ / -	All metal parts	A	N/A
8	+ / -	All non-metal parts	N/A	A

Indirect Discharge Application				
Discharge Level (kV)	Polarity	Test Point	Test Result of HCP	Test Result of VCP
4	+ / -	HCP	A	N/A
4	+ / -	VCP	N/A	A

Note:

Test Result of **A**: That was no change compared with initial operation during the test.



8.4 Radiated, radio-frequency, electromagnetic field immunity test

8.4.1 Test specification

Basic Standard:	IEC 61000-4-3; EN 61000-4-3
Frequency Range:	80-1000MHz, 1400-6000MHz,
Field Strength:	3 V/m; 10V/m
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of fundamental
Polarity of Antenna:	Horizontal and Vertical
Antenna Height:	1.5m
Dwell Time:	3 seconds

8.4.2 Test instrument

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Signal Generator	Agilent	N5181A	MY47070160	Mar. 13, 2023	1 Year
2	RF Switch	SKET	N/A	N/A	N/A	N/A
3	Power Amplifier	SKET	HAP801000M 250W	201804008	N/A	N/A
4	Power Amplifier	SKET	HAP0103G_7 5W	201804009	N/A	N/A
5	Power Amplifier	SKET	HAP0306G_5 0W	201804010	N/A	N/A
6	Power Meter	Agilent	E4419B	GB40201469	Mar. 13, 2023	1 Year
7	Power Sensor	Agilent	E9304A	MY41498919	Mar. 13, 2023	1 Year
8	Power Sensor	Agilent	E9300A	US39211259	Mar. 13, 2023	1 Year
9	E-Field Probe	Narda	EP-601	N/A	Mar. 23, 2023	1 Year
10	Antenna	Schwarzbeck	STLP 9129	9129071	N/A	N/A
11	Audio Analyzer	Rohde & Schwarz	UPV	100894	Mar. 13, 2023	1 Year
12	Chamber	Chengyu	7*5*3.5m	N/A	Apr. 25, 2021	3 Year
13	Test Software	SKET	EMC-S, V1.5.0.1	N/A	N/A	N/A

- Note:** 1. The calibration interval of the above test instruments is 12/36 months.
2. The test was performed in Shielded Room (Dongguan NTC Co., Ltd.)

8.4.3 Test procedure

The test procedure was in accordance with EN 61000-4-3.

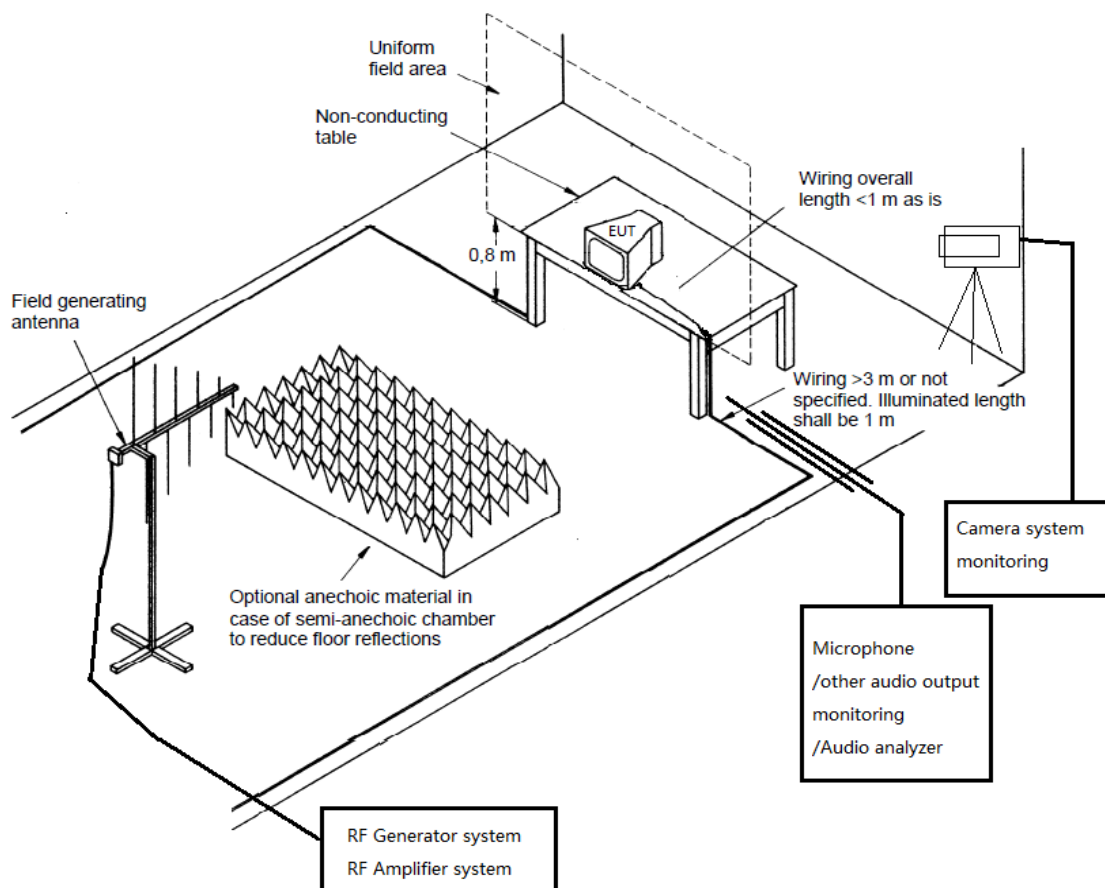
- a. The testing was performed in a fully-anechoic chamber.
- b. The frequency range is swept from 80 MHz to 6000 MHz with the signal 80% amplitude modulated with a 1kHz sinewave.
- c. The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised and respond it, but no case be less than 0.5s.
- d. The field strength level was 3V/m.
- e. The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.
- f. EN 55035 For Broadcast reception function:
 - * Group1: Equipment in which the desired RF broadcast signal enters the equipment through a coaxial broadcast receiver tuner port. These coaxial ports are intended to be connected via a coaxial cable to an antenna or a cable distribution system.
 - * Group 2: Broadcast reception equipment which is not included in Group 1.
 - * AM/FM/DAB equipment with a coaxial broadcast receiver tuner port is classified as Group 2 equipment if the manufacturer declares that the equipment is not intended to be connected to a CATV or other cable distribution network.
 - * The broadcast reception function shall be tested in each reception mode for which the receiver is designed, for example analogue reception, DVB-T, DVB-T2, DVB-C, DVB-C2, DVB-S, DVB-S2. The receiver shall be tuned to one channel and provided with an appropriate wanted signal on that channel or other input typical of normal use.

8.4.4 Deviation from test standard

No deviation.

8.4.5 Test setup

For Picture monitoring/Electrical mode /Acoustic mode:



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

Note:

Tabletop equipment

The EUT installed in a representative system as described in section 7 of EN 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

8.4.6 Test results

EN 61000-6-1; EN 61000-6-2:

Test Mode	See section 2.2
-----------	-----------------

Field Strength (V/m)	Test Frequency (MHz)	Polarization of antenna (Horizontal / Vertical)	EUT direction to Antenna	Test Distance (m)	Test Result	Remark
10	80-1000 1400-6000	H&V	Front Back Left Right	3	A	Pass

Note:

1. Tested Israel SII Frequencies 89,100,107,144,163,196,244,315,434,460,600,825,845,880 MHz
2. The test result of **A**: that was no change compared with initial operation during the test.

8.5 Electrical Fast Transient/Burst Immunity Test**8.5.1 Test Specification**

Basic Standard:	IEC 61000-4-4, EN 61000-4-4
Test Voltage:	Power Line: 2kV; 1kV
Polarity:	Positive&Negative
Impulse Frequency:	5 kHz
Impulse Wave-shape:	5/50 ns
Burst Duration:	15 ms
Burst Period:	300 ms
Test Duration:	1 min.

8.5.2 Test Instruments

Equipment Name	Model	Manufacturer	Serial No.	Cal. date	Interval
Immunity test system EFT	CCS 600	3ctest	ES014002222008	2022/12/23	1 Year
Capacitive coupling clamp EFT	CCC 100	3ctest	CCC22090017	2022/12/23	1 Year
EFT generator	SKS-0404GB	SANKI	040414002E321	2022/12/7	1 Year

- Note:** 1. The calibration interval of the above test instruments is 12 months.
2. The test was performed in Shielded Room (Worldtest (GuangDong)Co., Ltd.)

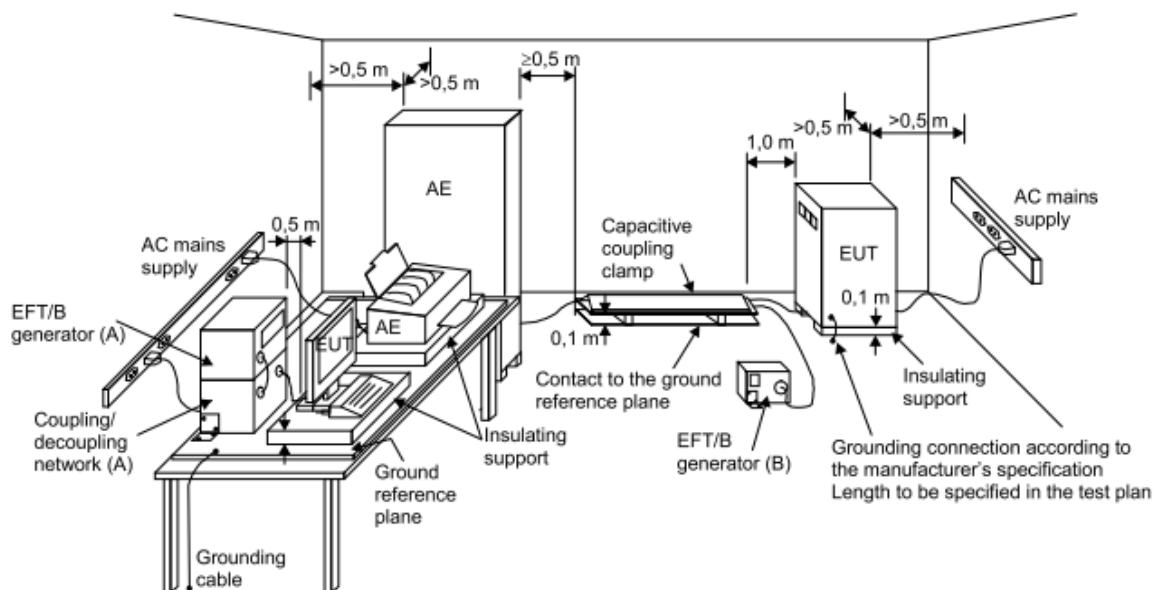
8.5.3 Test Procedure

- a Both positive and negative polarity discharges were applied.
- b The distance between any coupling devices and the EUT should be (0.5 – 0/+0.1) m for table-top equipment testing, and (1.0 ± 0.1) m for floor standing equipment.
- c The duration time of each test sequential was 1 minute.
- d The transient/burst waveform was in accordance with IEC 61000-4-4, 5/50ns.

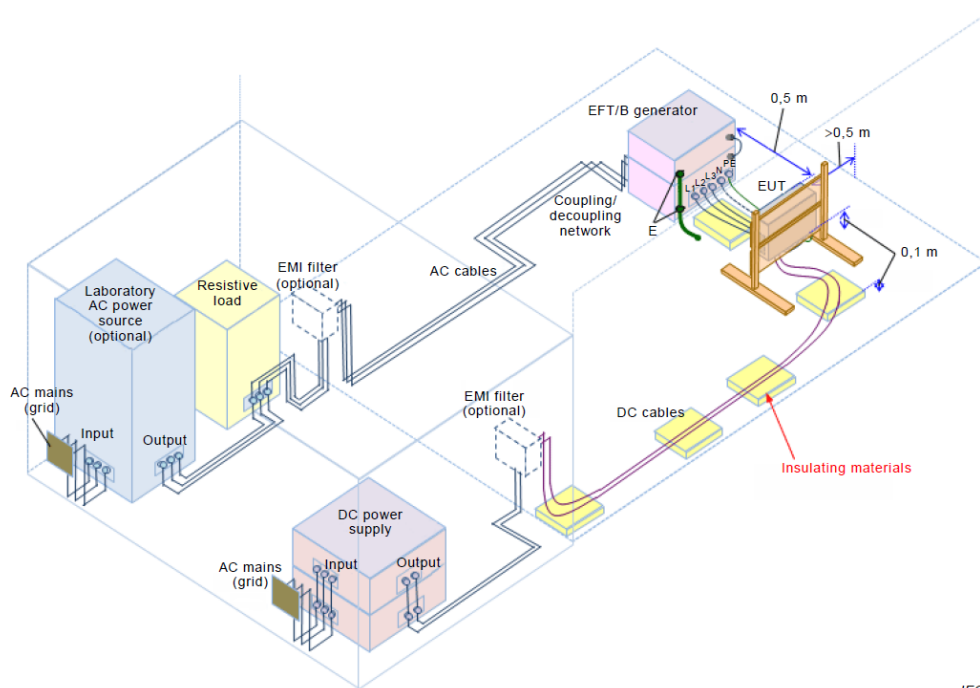
8.5.4 Deviation from test standard

No Deviation.

8.5.5 Test Setup



IEC 645/12



IEC

Figure A.4 – Example of a test setup for direct coupling of the test voltage to AC mains power ports

- (A) Location for supply line coupling
- (B) Location for signal lines coupling

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

8.5.6 Test Results

Test Mode	See section 2.2
-----------	-----------------

Pulse Voltage	1 kV		2 kV		kV		kV	
Pulse Polarity	+	-	+	-	+	-	+	-
L1	/	/	A	A	/	/	/	/
L2	/	/	A	A				
L3	/	/	A	A				
N	/	/	A	A	/	/	/	/
PE	/	/	A	A	/	/	/	/
L1- N	/	/	A	A	/	/	/	/
L1-PE	/	/	A	A	/	/	/	/
N-PE	/	/	A	A	/	/	/	/
L1-N-PE	/	/	A	A	/	/	/	/
L2- N	/	/	A	A	/	/	/	/
L2-PE	/	/	A	A	/	/	/	/
L2-N-PE	/	/	A	A	/	/	/	/
L3- N	/	/	A	A	/	/	/	/
L3-PE	/	/	A	A	/	/	/	/
L3-N-PE	/	/	A	A	/	/	/	/
DC Port	A	A	/	/	/	/	/	/

The **Performance Criterion A**: There was no change compared with initial operation during the test.

8.6 Surge Immunity Test

8.6.1 Test Specification

Basic Standard:	IEC 61000-4-5, EN 61000-4-5
Wave-Shape:	1.2/50 us Open Circuit Voltage 8/20 us Short Circuit Current
Test Voltage:	AC Power line: line to line 1 kV, line to earth 2Kv DC Power line:
Surge Input/Output:	line to line line to earth
Polarity:	Positive/Negative
Phase Angle:	0°/90°/180°/270°
Pulse Repetition Rate:	1 time / 60 sec.
Number of Tests:	5 @positive and 5 @negative at selected points

8.6.2 Test Instruments

Equipment Name	Model	Manufacturer	Serial No.	Cal. date	Interval
Immunity test system Surge	CCS 600	3ctest	ES014002222008	2022/12/23	1 Year
Surge Generator	SKS-05010I	SANKI	100413002E321	2022/11/24	1 Year
Surge-CDN	CDN-5413F	SANKI	321	2022/11/24	1 Year
Surge-CDN	CDN-5413G	SANKI	321	2022/11/24	1 Year

- Note:** 1. The calibration interval of the above test instruments is 12 months.
2. The test was performed in Shielded Room (Worldtest (GuangDong)Co., Ltd.)

8.6.3 Test Procedure

a. For EUT power supply:

The surge is to be applied to the EUT power supply terminals via the capacitive coupling network. Decoupling networks are required to avoid possible adverse effects on equipment not under test that may be powered by the same lines, and provide to sufficient the decoupling impedance to the surge wave. The power cord between the EUT and the coupling/decoupling networks shall be 2 meters in length (or shorter).

b. For test applied to unshielded un-symmetrically operated interconnection lines of EUT:

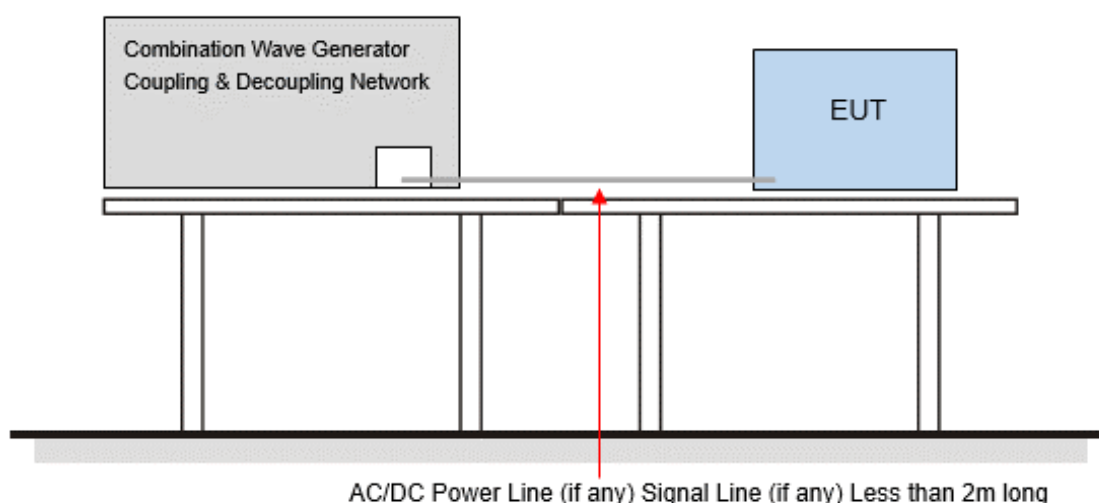
The surge is applied to the lines via the capacitive coupling. The coupling / decoupling networks shall not influence the specified functional conditions of the EUT. The interconnection line between the EUT and the coupling/decoupling networks shall be 2 meters in length (or shorter).

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

8.6.4 Deviation from test standard

No deviation.

8.6.5 Test Setup



8.6.6 Test Results

Test Mode	See section 2.2
-----------	-----------------

Voltage (kV)	Test point	Polarity	Test result of Phase angle			
			0°	90°	180°	270°
1.0	Line to Line	+	A	A	A	A
		-	A	A	A	A
2.0	Line to earth	+	A	A	A	A
		-	A	A	A	A

Voltage (kV)	Test point	Polarity	Test result of Phase angle
1.0	DC Line	+	A
		-	A

Note:

The **Performance Criterion A**: that was no change compared with initial operation during the test

8.7 Immunity to Conducted Disturbances Induced by RF Fields

8.7.1 Test Specification

Basic Standard:	EN 61000-4-6; IEC 61000-4-6
Frequency Range: & Field Strength:	0.15 MHz - 80 MHz, 3V _{r.m.s} , 0.15 MHz - 80 MHz, 10V _{r.m.s}
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of fundamental
Coupled Cable:	Power Mains, Unshielded
Coupling Device:	CDN-M2(2wires)

8.7.2 Test Instruments

Equipment Name	Model	Manufacturer	Serial No.	Cal. date	Interval
Signal Generator	SML	R&S	101709	2022/12/7	1 Year
Power meter	E4419B	Agilent	MY45108826	2022/12/7	1 Year
Power sensor	E9304	Agilent	MY51110016	2022/12/7	1 Year
Power sensor	E9304	Agilent	MY52270014	2022/12/7	1 Year
power amplifier	MPA-0.15-230-110	Maiketuo	9332	2022/12/7	1 Year
Single phase CDN	CDN_M3PE_16A	Schwarzbeck	00124	2022/12/7	1 Year
Electromagnetic injection clamp	KEMZ 801AS	TEQ	64524	2023/3/6	1 Year
CS test system	EM6	Emtrace	N/A	N/A	N/A

- Note:** 1. The calibration interval of the above test instruments is 12 months.
2. The test was performed in Shielded Room (Worldtest (GuangDong)Co., Ltd.)

8.7.3 Test Procedure

- a. The EUT shall be tested within its intended operating and climatic conditions.
- b. An artificial hand was placed on the hand-held accessory and connected to the ground reference plane.
- c. 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 50-ohm load resistor.
- d. The frequency range is swept from 0.15 MHz - 10 MHz, 10 MHz – 30 MHz and 30 MHz – 80MHz, using the signal level established during the setting process and with a disturbance signal of 80 % amplitude. The signal is modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or the switch coupling devices as necessary. Where the frequency is swept incrementally, the step size shall not exceed 1 % of the preceding frequency value.
- e. The dwell time of the amplitude modulated carrier at each frequency shall not be less than the time necessary for the EUT to be exercised and to respond, but shall in no case be less than 0,5 s. The sensitive frequencies (e.g. clock frequencies) shall be analyzed separately.
- f. Attempts should be made to fully exercise the EUT during testing, and to fully interrogate all exercise modes selected for susceptibility.

For Broadcast reception function:

- g. **Group1:** Equipment in which the desired RF broadcast signal enters the equipment through a coaxial broadcast receiver tuner port. These coaxial ports are intended to be connected via a coaxial cable to an antenna or a cable distribution system.
- h. **Group 2:** Broadcast reception equipment which is not included in Group 1.
- i. AM/FM/DAB equipment with a coaxial broadcast receiver tuner port is classified as Group 2 equipment if the manufacturer declares that the equipment is not intended to be connected to a CATV or other cable distribution network.

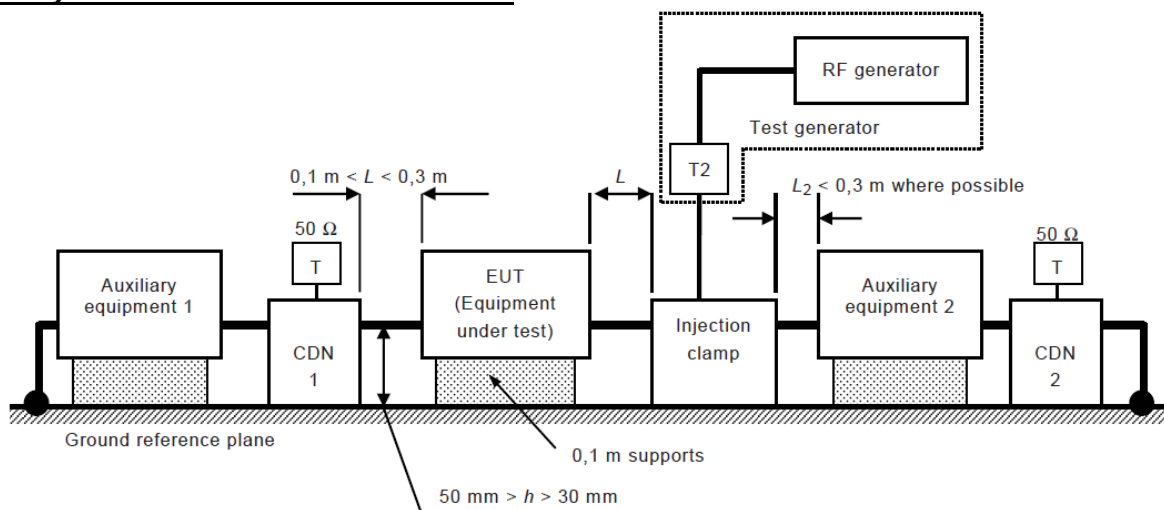
The broadcast reception function shall be tested in each reception mode for which the receiver is designed, for example analogue reception, DVB-T, DVB-T2, DVB-C, DVB-C2, DVB-S, DVB-S2. The receiver shall be tuned to one channel and provided with an appropriate wanted signal on that channel or other input typical of normal use.

8.7.4 Deviation from test standard

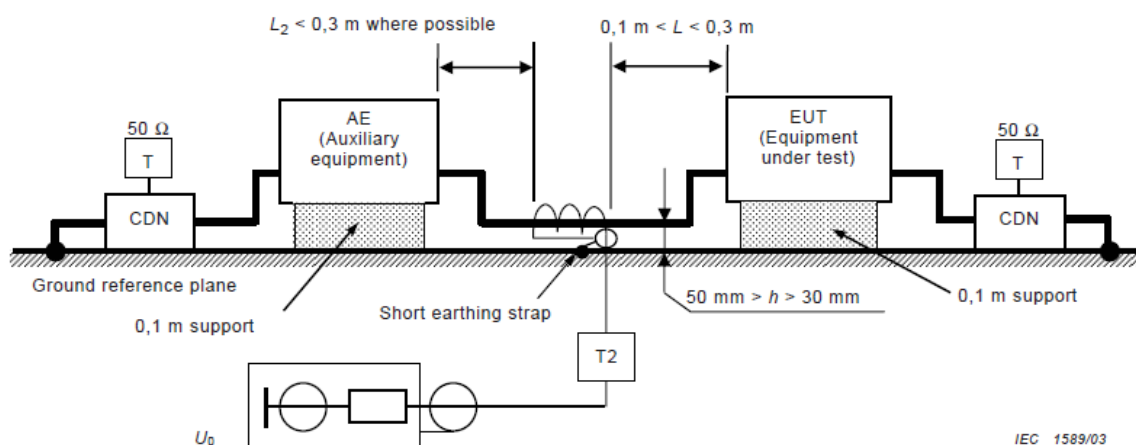
No deviation.

8.7.5 Test Setup

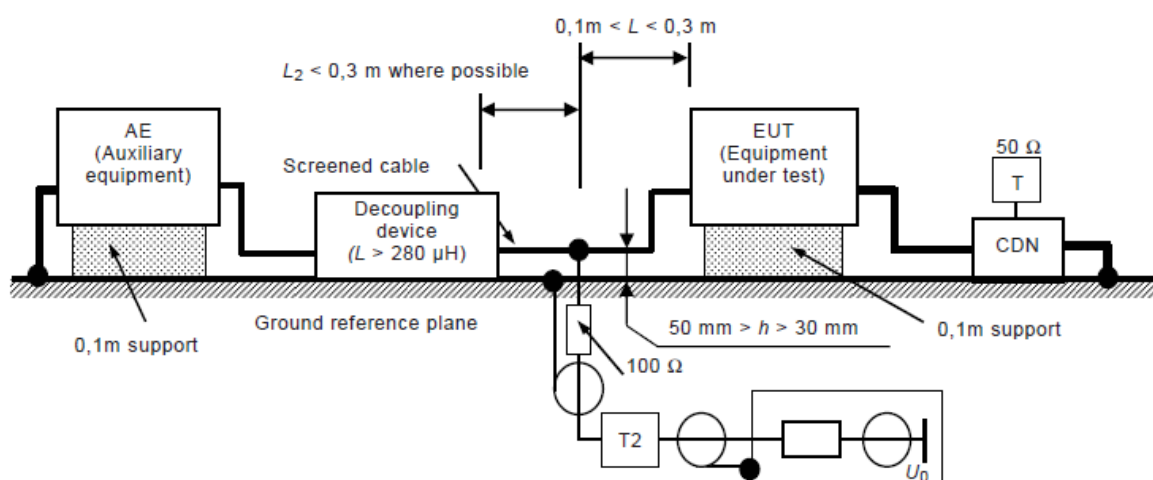
Immunity test to RF conducted disturbances



Coupling and decoupling according to the clamp injection



Direct injection to screened cables



Note: 1. The EUT clearance from any metallic obstacles shall be at least 0.5m.

2. All non-excited input ports of the CDNs shall be terminated by 50Ω loads.

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E-Mail: customerservice.dg@hwa-hsing.com

Release

Ver. 1.5

8.7.6 Test Results

Test Mode	See section 2.2
-----------	-----------------

Voltage (V)	Test Frequency Note#1 (MHz)	Tested Line	Injection Method.	Test Result
3	0.15 –80 MHz	AC Line	CDN-M3	A
10	0.15 –80 MHz	DC Line	CDN-M3	A
*Tested Israel SII Frequencies 0.2,0.53,1,1.5,7.1,13.56,21,27.12,40.68,65,68 MHz				

The **Performance Criterion A**: There was no change compared with initial operation during the test.

8.8 Power frequency magnetic field immunity test

8.8.1 Test Specification

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

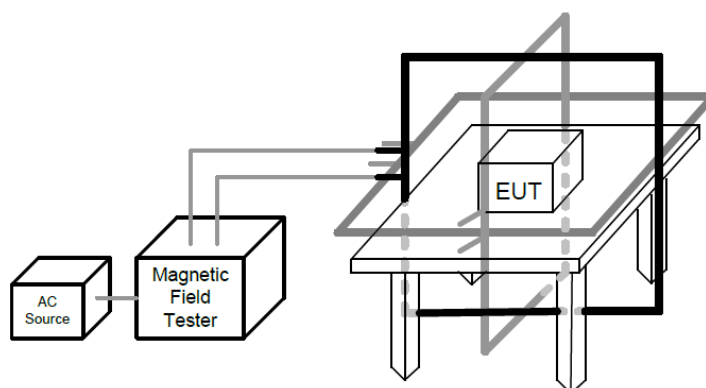
8.8.2 Test Instruments

Equipment Name	Model	Manufacturer	Serial No.	Cal. date	Interval
Immunity test system	CCS 600	3ctest	ES014002222008	2022/12/23	1 Year
magnetic field coil PFMF	TCXS113	3ctest	TCXS22045959	2022/12/23	1 Year

- Note:** 1. The calibration interval of the above test instruments is 12 months.
2. The test was performed in Shielded Room (Worldtest (GuangDong)Co., Ltd.)

8.8.3 Test Procedure

- The equipment is configured and connected to satisfy its functional requirements.
- The power supply, input and output circuits shall be connected to the sources of power supply, control and signal.
- The cables supplied or recommended by the equipment manufacturer shall be used. 1 meter of all cables used shall be exposed to the magnetic field.



Note:

Tabletop Equipment

The equipment shall be subjected to the test magnetic field by using the induction coil of standard dimension (1 m x 1 m). The induction coil shall then be rotated by 90 degrees in order to expose the EUT to the test field with different orientations.

8.8.4 Deviation from test standard

No deviation.

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Release

[Ver. 1.5](#)

8.8.5 Test Results

Test Mode	See section 2.2
-----------	-----------------

Magnetic field direction	Magnetic field level	Testing result of Criterion	Verdict
X - Axis	30A/m	A	Pass
Y - Axis	30A/m	A	Pass
Z - Axis	30A/m	A	Pass

The **Performance Criterion A**: There was no change compared with initial operation during the test.

8.9 Voltage Dip/Short Interruptions/Voltage Variations Immunity Test

8.9.1 Test Specification

Basic Standard:	IEC 61000-4-11, EN 61000-4-11
Test Duration Time:	Minimum three test events in sequence
Interval between Event:	Minimum ten seconds
Phase Angle:	0° & 180°
Test Cycle:	3 times

8.9.2 Test Instruments

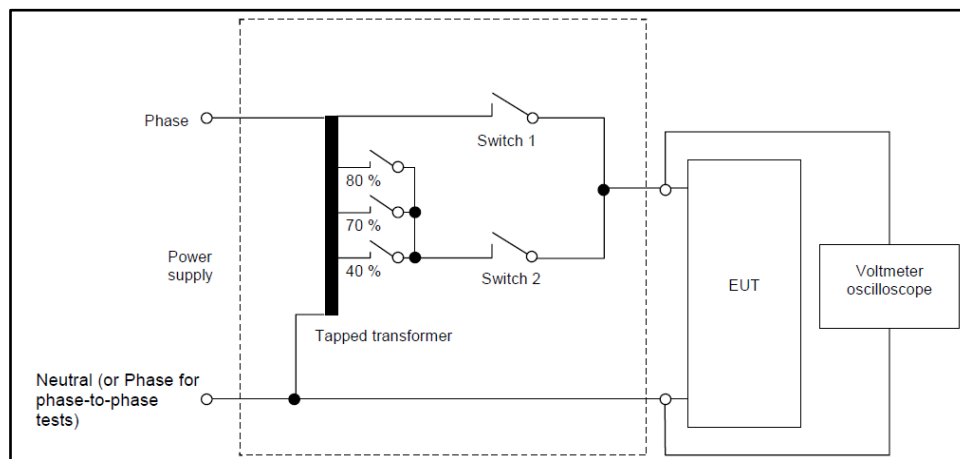
Equipment Name	Model	Manufacturer	Serial No.	Cal. date	Interval
Immunity test system	CCS 600	3ctest	ES014002222008	2022/12/23	1 Year
Immunity test system DIPS Module	VMT 2216SV	3ctest	ES047000221015	2022/12/23	1 Year

- Note:** 1. The calibration interval of the above test instruments is 12 months.
2. The test was performed in Shielded Room (Worldtest (GuangDong)Co., Ltd.)

8.9.3 Test Procedure

The EUT shall be tested for each selected combination of test levels and duration with a sequence of three dips/interruptions with intervals of 10 s minimum (between each test event). Each representative mode of operation shall be tested. Abrupt changes in supply voltage shall occur at zero crossings of the voltage waveform.

8.9.4 Test Setup



8.9.5 Deviation from test standard

No deviation.

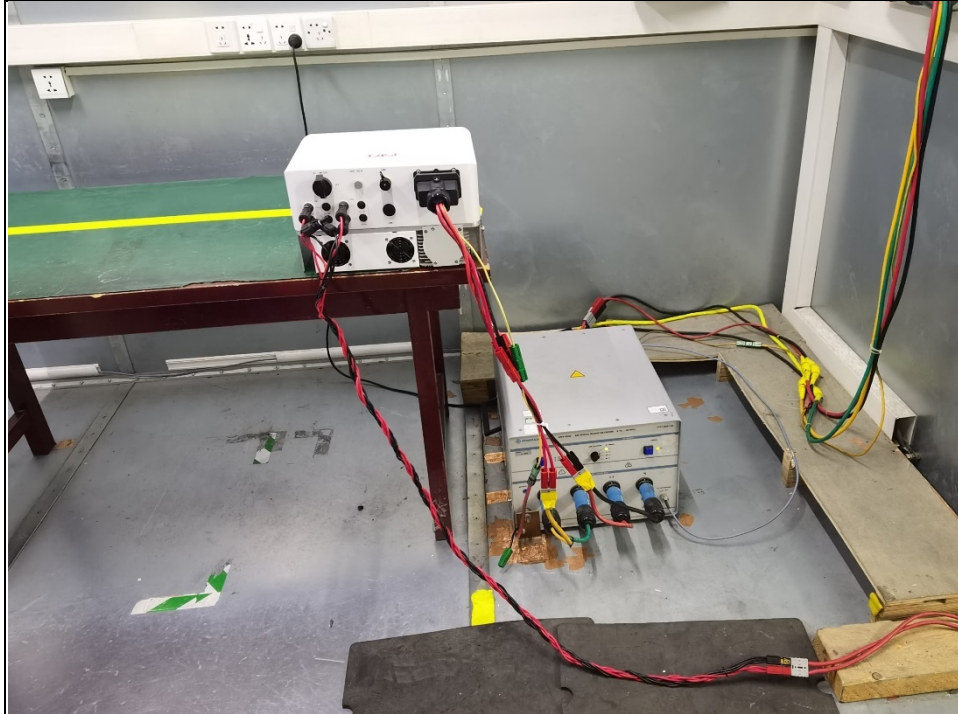
8.9.6 Test Results

The AC port of the product is an output port. This item does not need to be evaluated.

9 Pictures of Test Procedures

EA17KTL-P1

Conducted Emission for AC Power port

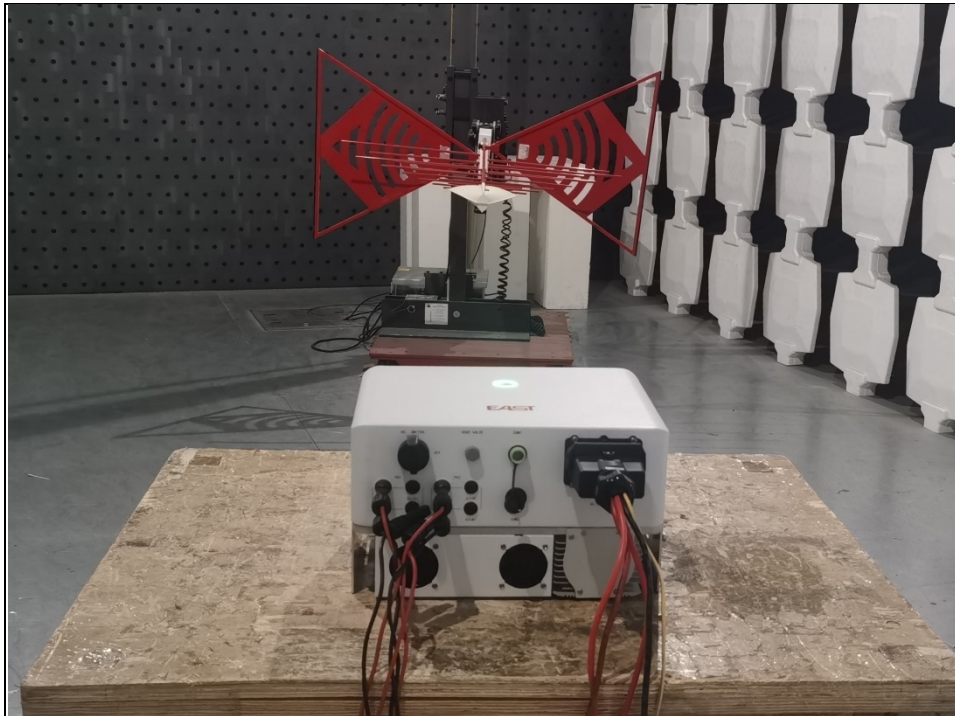


Conducted Emission for DC Power port



Test Report No.: 230530JH06-RE-EU-01

Radiated Emissions up to 1GHz



Harmonic current & Voltage fluctuations & flicker



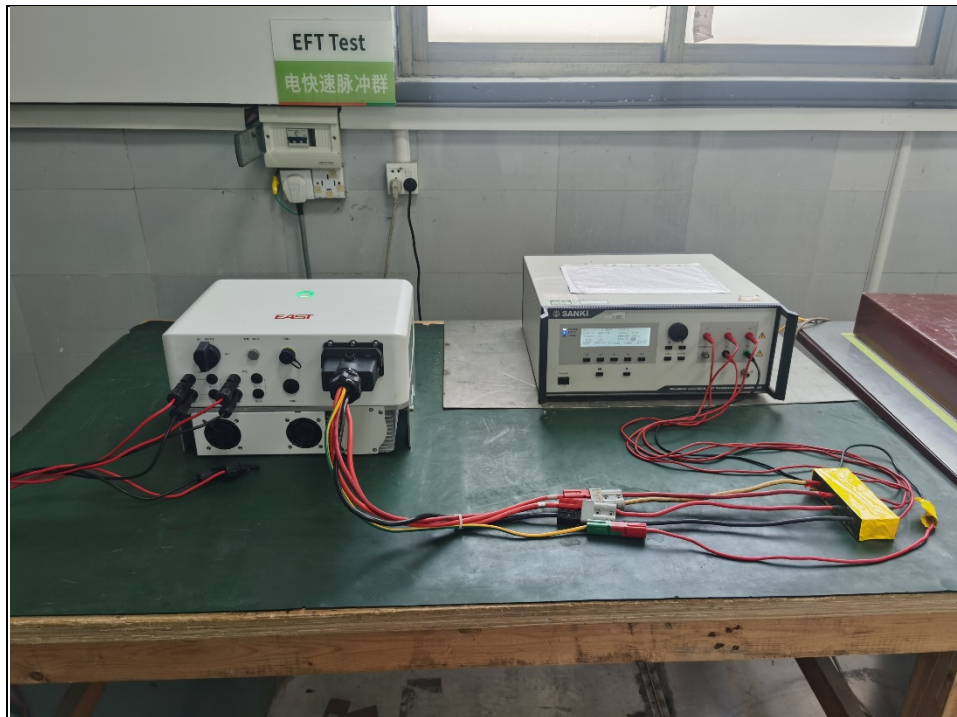
Electrostatic discharge immunity test –ESD



Radiated, radio-frequency, electromagnetic field immunity test



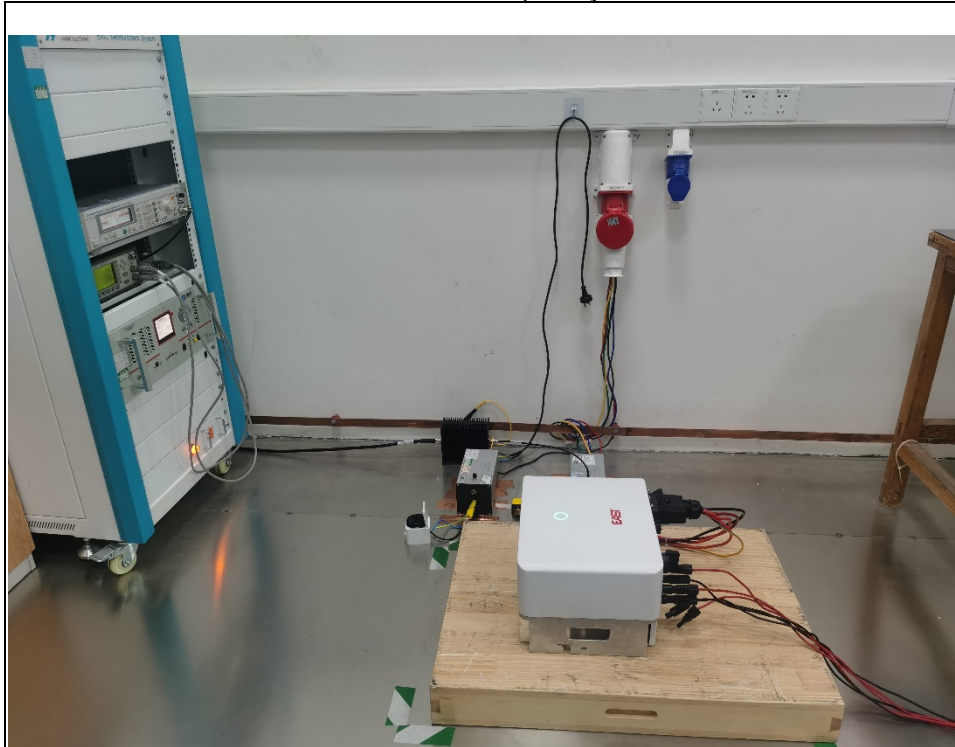
EFT test



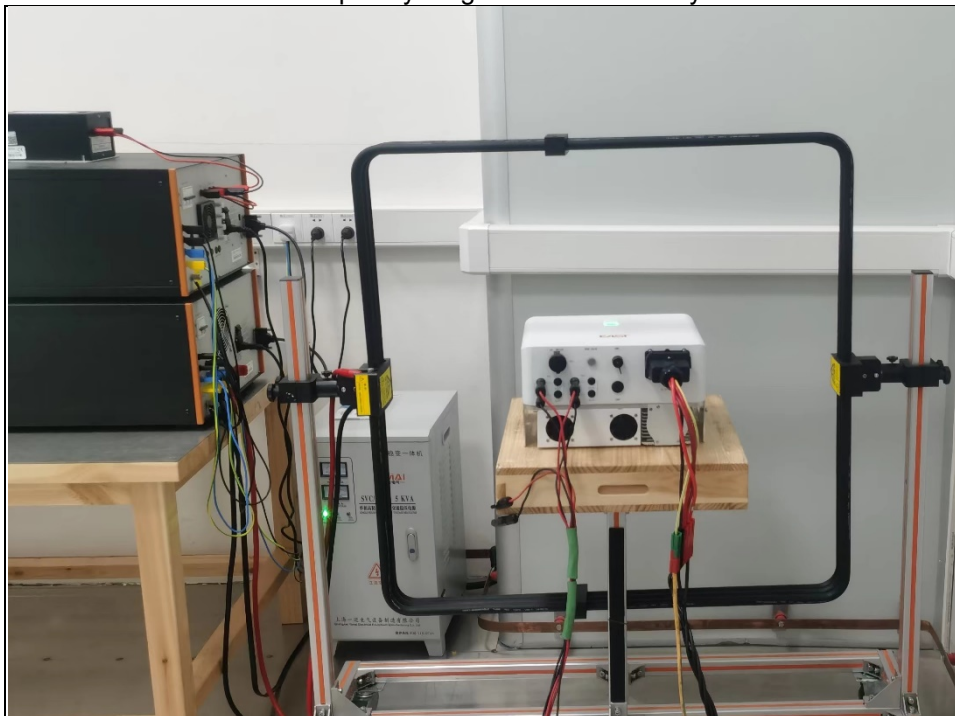
Surge test



Conducted Susceptibility Test

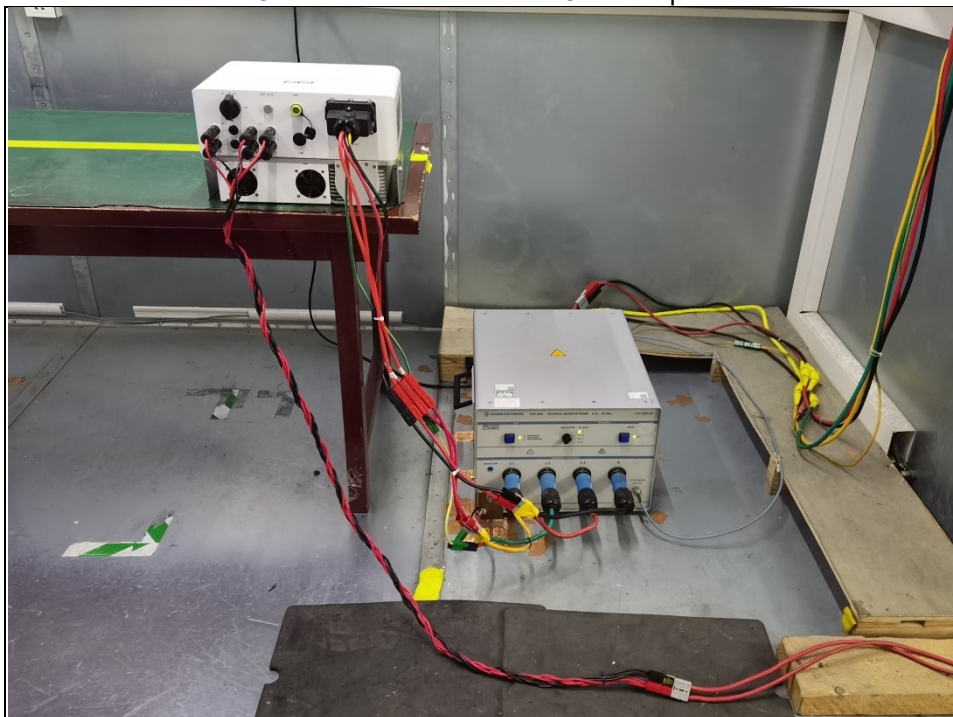


Power frequency magnetic field immunity test

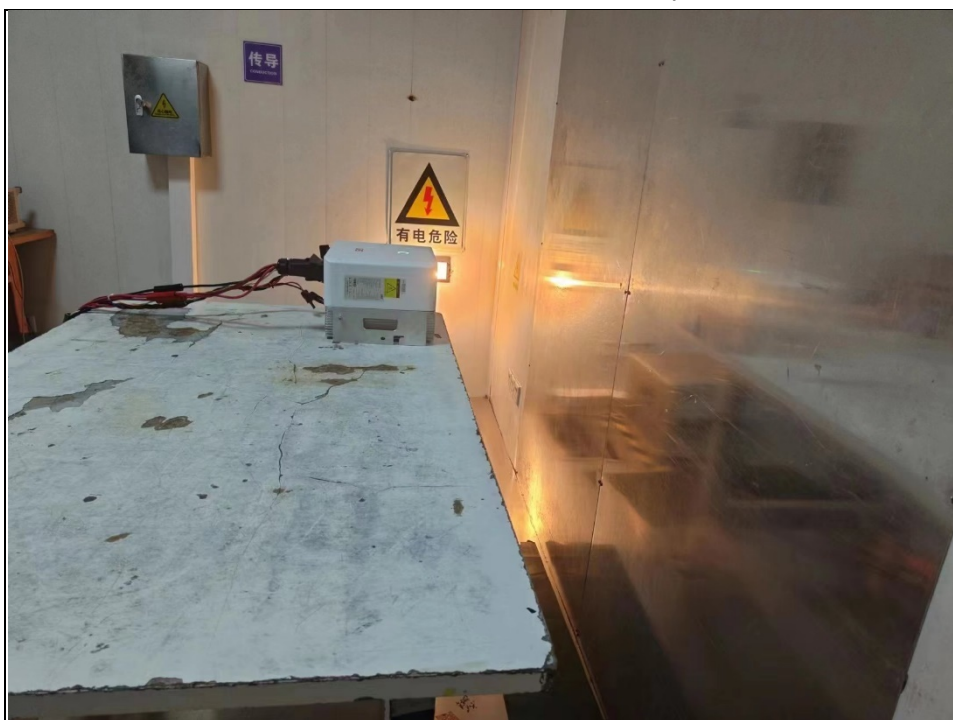


EA17KTL-S1

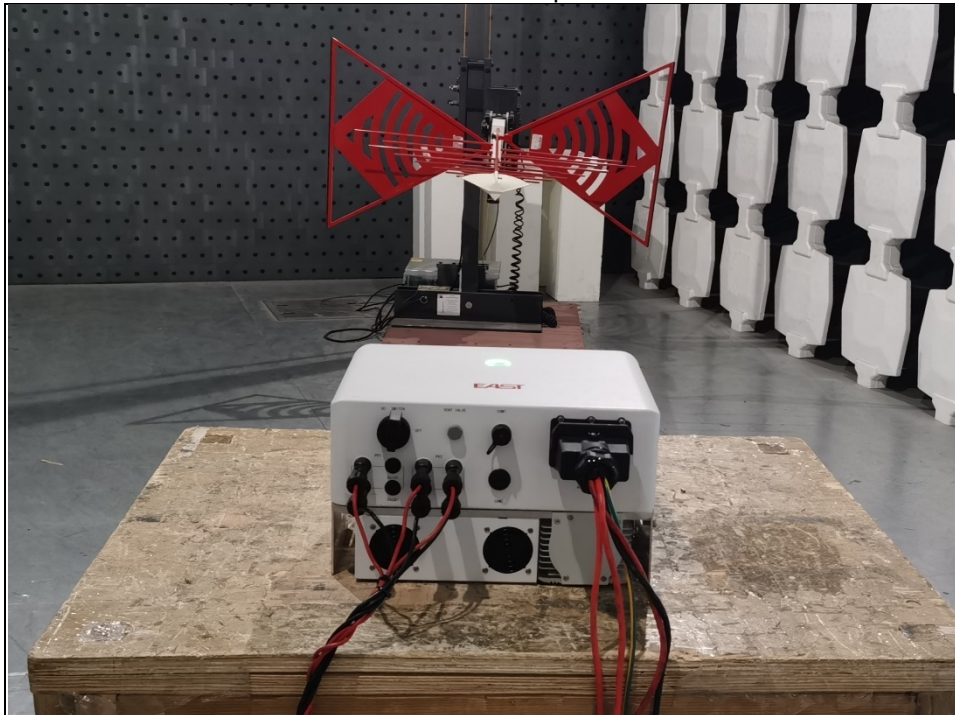
Conducted Emission for AC Power port



Conducted Emission for DC Power port



Radiated Emissions up to 1GHz



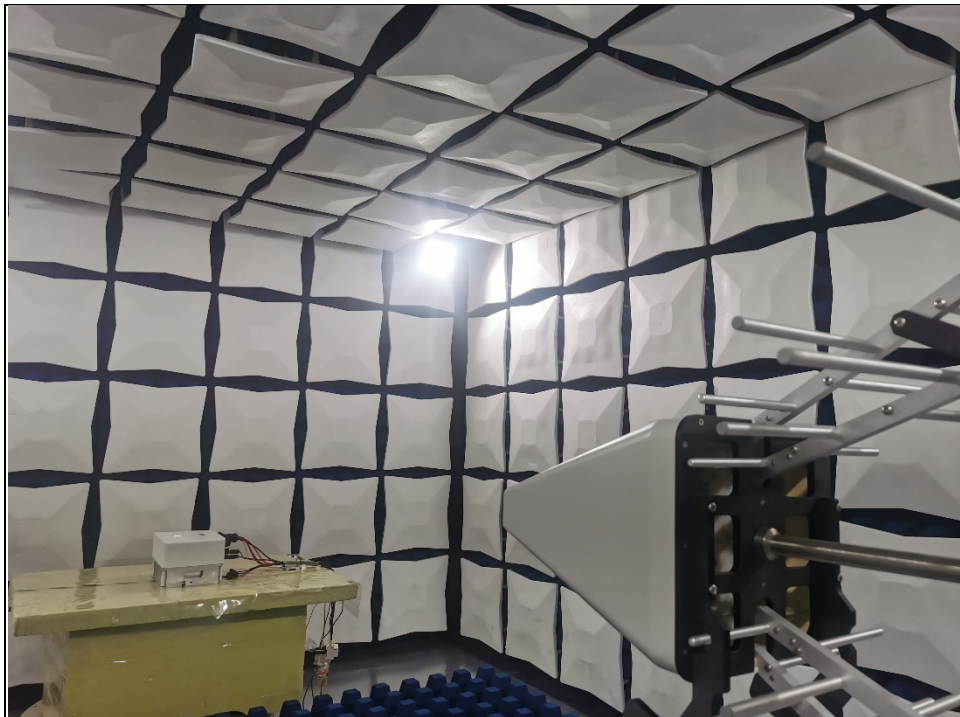
Harmonic current & Voltage fluctuations & flicker



Electrostatic discharge immunity test –ESD



Radiated, radio-frequency, electromagnetic field immunity test



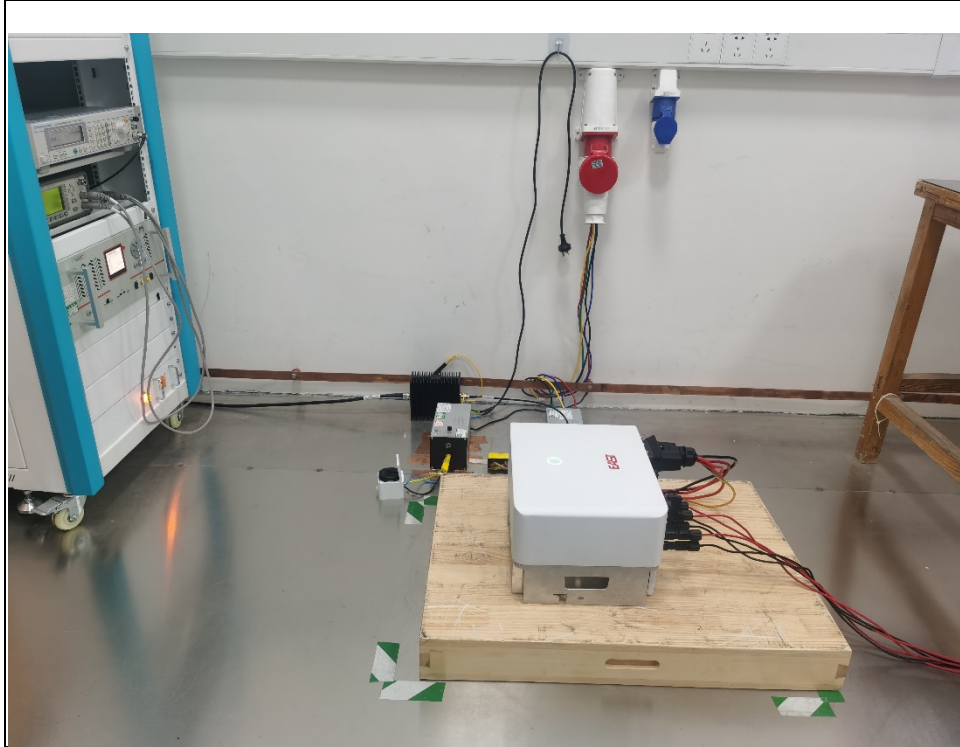
EFT test



Surge test



Conducted Susceptibility Test



Power frequency magnetic field immunity test



Appendix – Information on the Testing Laboratories

We, [Hwa-Hsing \(Dongguan\) Testing Co., Ltd.](#) A global provider of TESTING and CERTIFICATION services for consumer products, electronic products and wireless information technology products. Adhering to the core values “HONEST and TRUSTWORTHY, OBJECTIVE and IMPARTIALITY, RIGOROUS and AFFICIENT”, commitment to provide professional, perfect and efficient comprehensive ONE-STOP solution of TESTING and CERTIFICATION services for Manufacturers, Buyers, Traders, Brands, Retailers. Assist client to better manage risk, protect their brands, reduce costs and cut time to over 150 markets in global. Our laboratories are FCC recognized accredited test firms and accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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The address and road map of all our labs can be found in our web site also.

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