TEST REPORT

Product Name : Hybrid inverter
Model Number : LXP-3K Hybrid , LXP-3.6K Hybrid, LXP-4K Hybrid, LXP-4.6K Hybrid, LXP-5K Hybrid, LXP-6K Hybrid

Prepared for	:	Shenzhen Lux Power Technology Co., Ltd
Address	:	5th Floor, Building 11, Phase III, Yangbei Industrial Zone, Huangtian Community, Huangtian Community, Hangcheng Street, Baoan District, Shenzhen
Prepared by	:	EMTEK (SHENZHEN) CO., LTD.
Address	:	Building 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China Tel: (0755) 26954280 Fax: (0755) 26954282
Report Number	:	ENS2304270141E00101R
Date of Test	:	January 01, 2022 to January 14, 2022
Date of issue	:	May 04, 2023

TABLE OF CONTENT

TEST REPORT DESCRIPTION

Applicant	:	Shenzhen Lux Power Technology Co., Ltd
Manufacturer	:	Shenzhen Lux Power Technology Co., Ltd
Trade Mark	:	N/A
EUT	:	Hybrid inverter
Model Number	:	LXP-3K Hybrid , LXP-3.6K Hybrid, LXP-4K Hybrid, LXP-4.6K Hybrid, LXP-5K Hybrid, LXP-6K Hybrid
Rating	:	230V~, 50/60Hz

Measurement Procedure Used:
EN 62920:2017+A11:2020
CISPR 11:2015+A1:2016
EN IEC 61000-3-2: 2019, EN 61000-3-12:2011
EN 61000-3-3: 2013+A1: 2019, EN IEC 61000-3-11:2019
(IEC 61000-4-2:2008, IEC 61000-4-3:2006+A1:2007+A2:2010, IEC 61000-4-4:2012,
IEC 61000-4-5:2014, IEC 61000-4-6:2013, IEC 61000-4-34:2005+A1:2009)

The device described above is tested by EMTEK (SHENZHEN) CO., LTD. to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and EMTEK (SHENZHEN) CO., LTD. is assumed full of responsibility for the accuracy and completeness of these measurements.
This report applies to above tested sample only and shall not be reproduced in part without written approval of EMTEK (SHENZHEN) CO., LTD.

Date of Test	:	January 01, 2022 to January 14, 2022
Prepared by	:	Kangtao Zhang/Editor
Reviewer	:	Kaimin Guo/Supervisor
Approved & Authorized Signer	:	Lisa Wang/Manager

Modified Information

Version	Report No.	Revision Date	Summary
Ver.1.0	ENS2304270141E00101R	/	Original Report

1. DESCRIPTION OF STANDARDS AND RESULTS (EUT)

EMISSION			
Description of Test Item	Standard	Limits	Results
Disturbance Voltage at the AC Power Port	EN 62920:2017+A11:2020	Class B	Pass
Disturbance Voltage at the DC Power Port	EN 62920:2017+A11:2020	Class B	N/A
Disturbance Voltage at the Wired Network Port and the Signal and Control Port	EN 62920:2017+A11:2020	Class B	N/A
Radiated emissions	EN 62920:2017+A11:2020	Class B	Pass
Harmonic Current Emissions	EN 61000-3-12:2011	Table 2	Pass
	EN IEC 61000-3-2: 2019	Class A	Pass
Voltage Fluctuation and Flicker	EN IEC 61000-3-11:2019	--	Pass
	EN 61000-3-3: 2013+A1: 2019	Section 5	Pass

IMMUNITY				
Description of Test Item		Basic Standard	Performance Criteria	Results
Electrostatic Discharge	Enclosure ports	IEC 61000-4-2:2008	B	Pass
Continuous RF electromagnetic field disturbances	Enclosure ports	IEC 61000-4-3:2006+ A1:2007+A2:2010	A	Pass
Electrical fast transients/burst	AC mains power ports	IEC61000-4-4:2012	B	Pass
	Wired Network Port and the Signal and Control Port		B	N/A
	DC network power ports		B	Pass
Surges	AC mains power ports	IEC 61000-4-5:2014	B	Pass
	Wired Network Port and the Signal and Control Port		B	N/A
	DC network power ports		B	Pass
Continuous induced RF disturbances	AC mains power ports	IEC 61000-4-6:2013	A	Pass
	Wired Network Port and the Signal and Control Port		A	N/A
	DC network power ports		A	Pass
Voltage dips and interruptions	AC mains power ports	IEC 61000-4-34:2005+A1:2009	B,C	Pass
Note: N/A is an abbreviation for Not Applicable.				

2. GENERAL INFORMATION

2.1. Description of Device (EUT)

EUT	:	Hybrid inverter
Model Number	:	LXP-3K Hybrid, LXP-6K Hybrid (Note: These models are identical in circuitry and electrical, mechanical and physical construction; the only differences are the rating. for trading purpose, We prepare LXP-3K Hybrid for Harmonic Current Emissions and Voltage Fluctuation and Flicker test; LXP-6K Hybrid for all the EMC test.)
Applicant	:	Shenzhen Lux Power Technology Co., Ltd
Address	:	5th Floor, Building 11, Phase III, Yangbei Industrial Zone, Huangtian Community, Huangtian Community, Hangcheng Street, Baoan District, Shenzhen
Manufacturer	:	Shenzhen Lux Power Technology Co., Ltd
Address	:	5th Floor, Building 11, Phase III, Yangbei Industrial Zone, Huangtian Community, Huangtian Community, Hangcheng Street, Baoan District, Shenzhen
Factory	:	Shenzhen Sea Star Industry Co.,Ltd
Address	:	Bao Long 6th Avenue Sea Star Science Park.6thFloor .Long Gang Street.Bao Long Industrial City,LongGang District, Shenzhen
Date of Received	:	January 01, 2022
Date of Test	:	January 01, 2022 to January 14, 2022

Note: This report is based on ENS2112310001E00201R to add model, change factory and address. This change does not affect test results. Please refer to ENS2112310001E00201R report for raw data and records.

2.2. Operating modes

A. On
   1. AC in & Charging
   2. Discharging & AC connected grid
   3. PV in & AC connected grid

2.3. Test Manner

Test Items	Test Voltage	Operation Modes	Worst case
Disturbance Voltage at the AC Power Port	AC 230V/50Hz & DC 360V, AC 230V/50Hz & DC 48V	Mode A	Mode A.3 (AC 230V/50Hz & DC 360V)
Radiated emissions	AC 230V/50Hz & DC 360V, AC 230V/50Hz & DC 48V	Mode A	Mode A.2 (AC 230V/50Hz & DC 48V)
Harmonic Current Emissions	AC 230V/50Hz & DC 360V	Mode A.3	\
Voltage Fluctuation and Flicker	AC 230V/50Hz & DC 360V	Mode A.3	\
EMS	AC 230V/50Hz & DC 360V, AC 230V/50Hz & DC 48V	Mode A	\

2.4. Description of Support Device

N/A

2.5. Description of Test Facility

Site Description

EMC Lab. : **Accredited by CNAS**
The Certificate Registration Number is L2291.
The Laboratory has been assessed and proved to be in compliance with CNAS-CL01 (identical to ISO/IEC 17025:2017)

Accredited by FCC
Designation Number: CN1204
Test Firm Registration Number: 882943

Accredited by A2LA
The Certificate Number is 4321.01.

Accredited by Industry Canada
The Conformity Assessment Body Identifier is CN0008

Name of Firm : EMTEK (SHENZHEN) CO., LTD.

Site Location : Building 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China

2.6. Measurement Uncertainty

Test Item		Uncertainty
Conducted Emission Uncertainty	:	3.16dB(9k~150kHz Conduction 2#) 2.90dB(150k-30MHz Conduction 2#)
Radiated Emission Uncertainty (10m Chamber)	:	4.58dB (30M~1GHz Polarize: H) 4.54dB (30M~1GHz Polarize: V)
Uncertainty for Flicker test	:	0.07%
Uncertainty for Harmonic test	:	1.8%
Uncertainty for C/S Test	:	1.45dB(Using CDN Test) 2.37dB(Using EM Clamp Test)
Uncertainty for R/S Test	:	2.10dB(80MHz-200MHz) 1.76dB(200MHz-1000MHz)
Uncertainty for test site temperature and humidity	:	0.6℃ 4%

3. MEASURING DEVICE AND TEST EQUIPMENT

3.1. For Disturbance Voltage at the AC Power Port

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
☑	EMI Test Receiver	Rohde & Schwarz	ESCI	101045	May 15, 2021	1 Year
☑	PULSE LIMTER	Rohde & Schwarz	ESH3-Z2	100107	May 15, 2021	1 Year
☑	AMN	Schwarzbeck	NNLK 8129	8129203	May 15, 2021	1 Year

3.2. For Radiated Emission Measurement (10m)

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
☑	Bilog Antenna	Schwarzbeck	VULB9163	661	June 12, 2021	2 Year
☑	Bilog Antenna	Schwarzbeck	VULB9163	660	June 12, 2021	2 Year
☑	EMI Test Receiver	Rohde & Schwarz	ESR3	101707	May 15, 2021	1 Year
☑	EMI Test Receiver	Rohde & Schwarz	ESR3	101706	May 15, 2021	1 Year
☑	Pre-Amplifier	Lunar EM	LNA10M1G-40	J10111311260 01	May 15, 2021	1 Year
☑	Pre-Amplifier	Lunar EM	LNA10M1G-40	J10111311260 02	May 15, 2021	1 Year

3.3. For Harmonic Current / Flicker Measurement

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
☑	45KVA AC Power source	Teseq	NSG 1007-45/45KV A	1305A02873	May 16, 2021	1 Year
☑	Signal conditioning Unit	Teseq	CCN 1000-3	1305A02873	June 10, 2021	1 Year
☑	Impedance network	Teseq	INA2197/37A	1305A02873	June 10, 2021	1 Year
☑	Impedance network	Teseq	INA 2196/75A	1305A02874	June 10, 2021	1 Year
☐	Profline 2100 AC Switching Unit	Teseq	NSG 2200-3	A22714	June 10, 2021	1 Year

3.4. For Electrostatic Discharge Immunity

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
☑	ESD Tester	TESEQ AG	NSG 438A	130	July 07, 2021	1 Year

3.5. For Continuous RF Electromagnetic Field Disturbances Immunity

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
☑	Power Amplifier	MILMEGA	AS0102-55	1018770	May 15, 2021	1 Year
☑	50ohm Diode Power Sensor	BOONTON	51011EMC	34236	May 16, 2021	1 Year
☑	RF Power Meter. Dual Channel	BOONTON	4232A	10539	May 15, 2021	1 Year
☑	Log.-Per. Antenna	SCHWARZBECK	VULP 9118E	811	N/A	N/A
☑	Signal Generator	Agilent	N5181A	MY50145187	May 15, 2021	1 Year
☑	50ohm Diode Power Sensor	BOONTON	51011EMC	36164	May 15, 2021	1 Year
☑	Broad-Band Horn Antenna	SCHWARZBECK	STLP 9149	9149-227	N/A	N/A
☑	Field Strength Meter	DARE	RSS1006A	10I00037SNO22	May 16, 2021	1 Year
☑	Multi-function interface system	DARE	CTR1009B	12I00250SNO72	N/A	N/A
☑	Automatic switch group	DARE	RSW1004A	N/A	N/A	N/A
☑	Power Amplifier	MILMEGA	AS1860-50	1059346	May 15, 2021	1 Year
☑	Power Amplifier	MILMEGA	80RF1000-175	1059345	May 15, 2021	1 Year

3.6. For Electrical Fast Transient / Burst Immunity

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
☑	Burst Tester	HAEFELY	PEFT4010	080981-16	May 16, 2021	1 Year
☑	Coupling Clamp	HAEFELY	IP-4A	147147	May 16, 2021	1 Year

3.7. For Surges Immunity

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
☑	Controller	HAEFELY	Psurge 8000	174031	May 16, 2021	1 Year
☑	Impulse Module	HAEFELY	PIM 100	174124	May 16, 2021	1 Year
☑	Coupling Decoupling	HAEFELY	PCD 130	172181	May 16, 2021	1 Year
☑	Coupling Module	HAEFELY	PCD122	174354	May 16, 2021	1 Year
☑	Impulse Module	HAEFELY	PIM 120	174435	May 16, 2021	1 Year
☑	Coupling Module	HAEFELY	PCD 126A	174387	May 16, 2021	1 Year
☑	Impulse Module	HAEFELY	PIM 110	174391	May 16, 2021	1 Year
☑	Impulse Module	HAEFELY	PIM 150	178707	May 16, 2021	1 Year

3.8. For Continuous Induced RF Disturbances Immunity

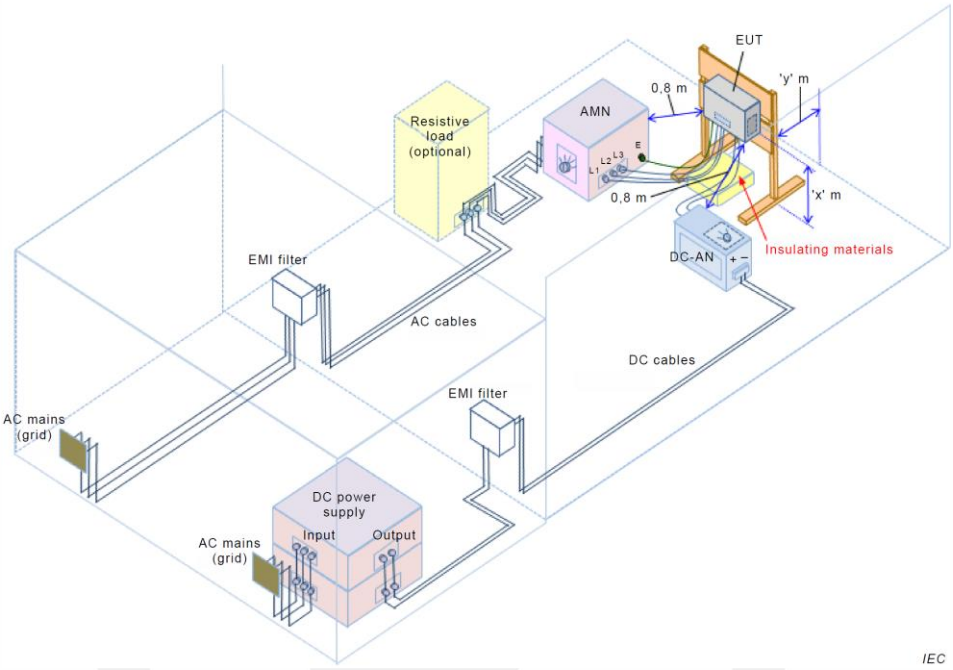
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
☑	Continuous Wave Simulator	EMTEST	CWS500C	0900-12	May 15, 2021	1 Year
☐	CDN	EMTEST	CDN-M2	510010010010	May 16, 2021	1 Year
☑	CDN	EMTEST	CDN-M3	0900-11	May 15, 2021	1 Year
☐	EM Injection Clamp	EMTEST	F-2031-23MM	368	May 15, 2021	1 Year
☑	Attenuator	EMTEST	100W 6dB DC-3G	/	May 15, 2021	1 Year
☑	Signal Generator	R&S	SMB100A	103041	May 15, 2021	1 Year
☑	CDN	LUTHI	CDN L-801 M2/M3	2606	May 15, 2021	1 Year

3.9. For Voltage Dips and Interruptions Immunity

Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
☑	45KVA AC Power source	Teseq	NSG 1007-45/45KVA	1305A02873	May 16, 2021	1 Year
☐	Signal conditioning Unit	Teseq	CCN 1000-3	1305A02873	June 10, 2021	1 Year
☐	Impedance network	Teseq	INA2197/37A	1305A02873	June 10, 2021	1 Year
☐	Impedance network	Teseq	INA 2196/75A	1305A02874	June 10, 2021	1 Year
☑	Profline 2100 AC Switching Unit	Teseq	NSG 2200-3	A22714	June 10, 2021	1 Year

4. DISTURBANCE VOLTAGE AT THE AC POWER PORT

4.1. Block Diagram of Test Setup



4.2. Limits

EN 62920:2017+A11:2020
CISPR 11:2015+A1:2016
Class B

Frequency range MHz	Quasi-peak dB(μV)	Aversge dB(μV)
0.15 to 0.50	66 Decreasing linearly with logarithm of frequency to 56	56 Decreasing linearly with logarithm of frequency to 56
0.50 to 5	56	46
5 to 30	60	50
At the transition frequency, the more stringent limit shall apply.		

4.3. Test Procedure

The EUT was placed on an insulating support 0.8 m height from the metal ground plane and 0.4 m from the conducting wall of the shielding room and it was kept at least 0.8 m from any other grounded conducting surface.

The rear of the arrangement shall be flush with the back of the supporting tabletop unless that would not be possible or typical of normal use.

All units of equipment forming the system under test (includes the EUT as well as connected peripherals and associated equipment or devices) shall be arranged such that a nominal 0.1 m separation is achieved between the neighboring units.

Connect EUT to the power mains through a artificial mains network (AMN). Where the mains cable supplied by the manufacturer is longer than 1 m, the excess should be folded at the centre into a bundle no longer than 0.4 m, so that its length is shortened to 1 m.

The AMN provides 50 ohm coupling impedance for the measuring instrument.

The CISPR states that the AMN with 50 ohm and 50 microhenry should be used.

Both sides of AC line were checked for maximum conducted interference.

The frequency range from 150 kHz to 30 MHz was sweep.

Set the test-receiver system to quasi peak detect function and average detect function, and to measure the conducted emissions values.

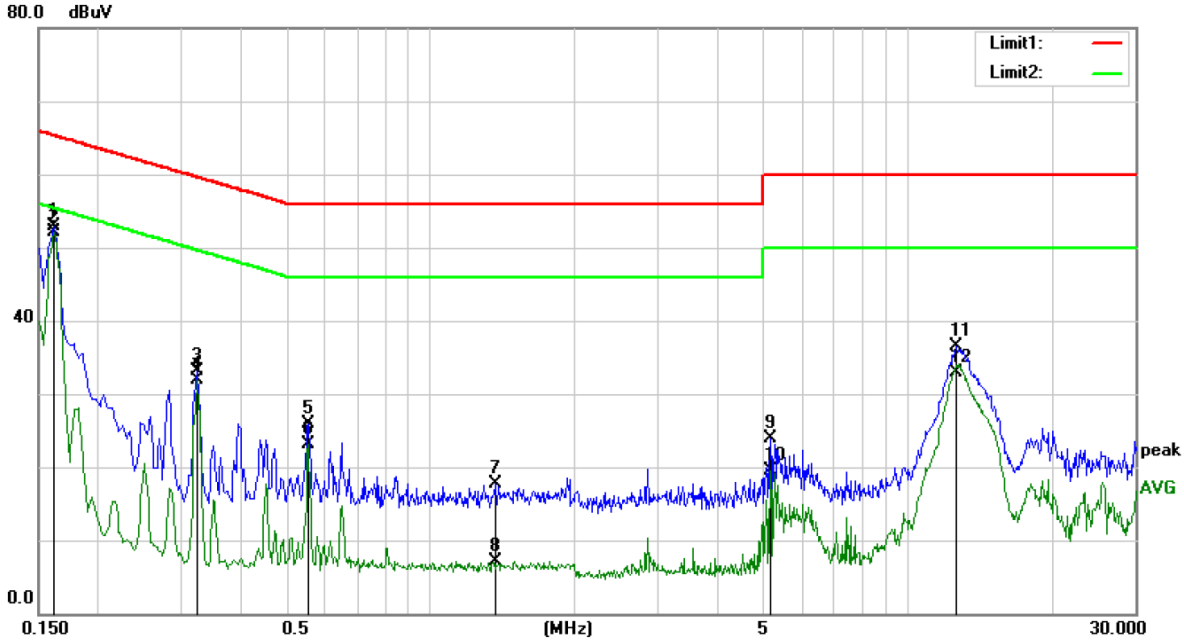
Test results were obtained from the following equation:
Emission Level (dBμV) = AMN Factor (dB) + Cable Loss (dB) + Reading (dBμV)
Margin (dB) = Emission Level (dBμV) - Limit (dBμV)

4.4. Measuring Results

PASS.

Please see the attached page.

Temperature	:	26.4°C
Humidity	:	45%
Atmospheric Pressure	:	101kpa
Test Engineer	:	LZW
Test Date	:	2022-01-05



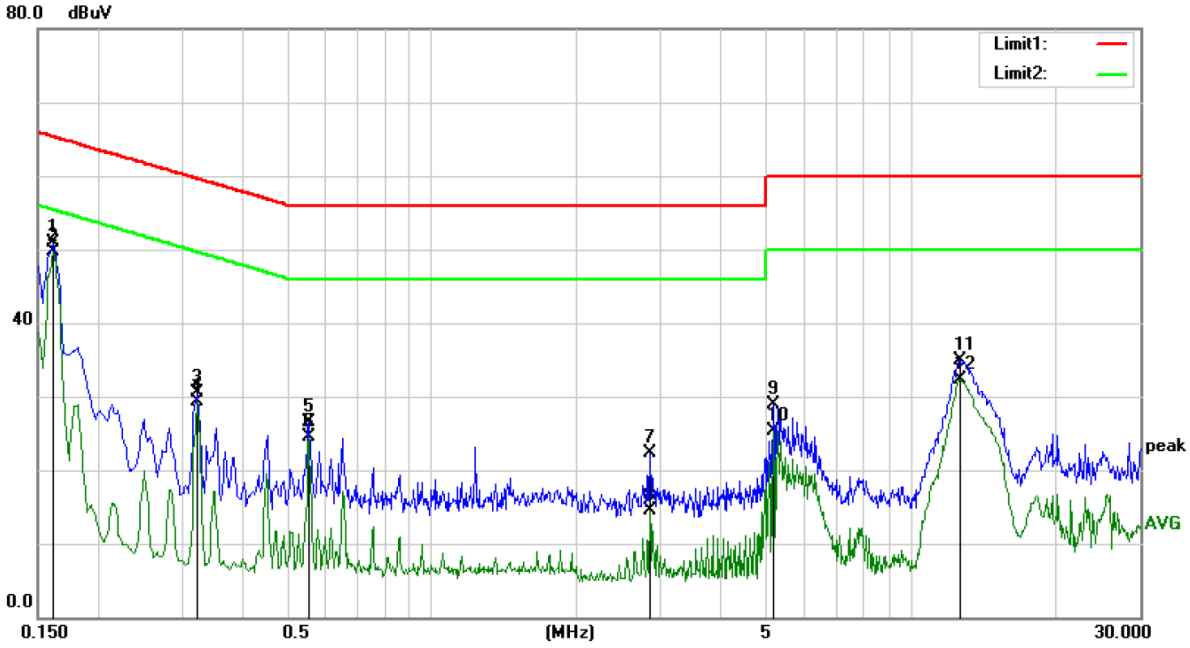
Site Conduction #2 Phase: *L1* Temperature: 26.4

Limit: (CE)EN62920 class B_QP Power: AC 230V/50Hz & DC 360V Humidity: 45 %

Mode: PV in & AC connected grid

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1620	42.32	10.60	52.92	65.28	-12.36	QP	
2	*	0.1620	41.55	10.60	52.15	55.36	-3.21	AVG	
3		0.3220	22.67	10.40	33.07	59.62	-26.55	QP	
4		0.3220	21.42	10.40	31.82	49.66	-17.84	AVG	
5		0.5540	15.44	10.45	25.89	56.00	-30.11	QP	
6		0.5540	12.73	10.45	23.18	46.00	-22.82	AVG	
7		1.3700	7.50	10.23	17.73	56.00	-38.27	QP	
8		1.3700	-3.14	10.23	7.09	46.00	-38.91	AVG	
9		5.1540	13.54	10.31	23.85	60.00	-36.15	QP	
10		5.1540	9.19	10.31	19.50	50.00	-30.50	AVG	
11		12.6780	26.26	10.29	36.55	60.00	-23.45	QP	
12		12.6780	22.61	10.29	32.90	50.00	-17.10	AVG	



Site Conduction #2 Phase: N Temperature: 26.4

Limit: (CE)EN62920 class B_QP Power: AC 230V/50Hz & DC 360V Humidity: 45 %

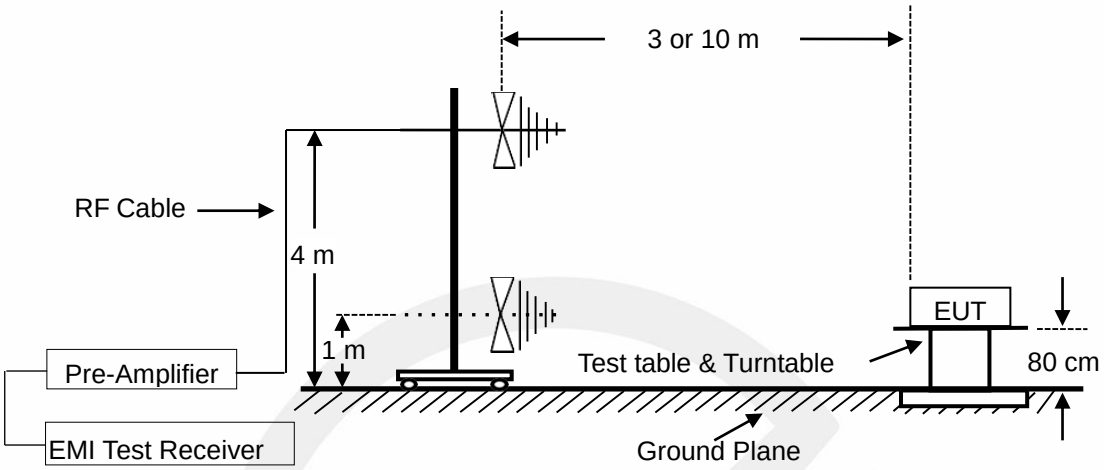
Mode: PV in & AC connected grid

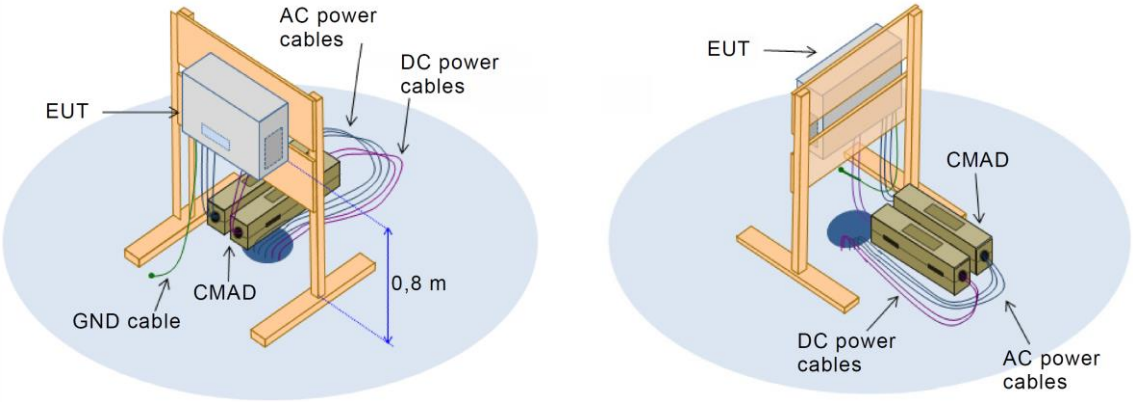
Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1620	40.21	10.60	50.81	65.28	-14.47	QP	
2	*	0.1620	39.16	10.60	49.76	55.36	-5.60	AVG	
3		0.3220	20.14	10.40	30.54	59.62	-29.08	QP	
4		0.3220	18.92	10.40	29.32	49.66	-20.34	AVG	
5		0.5540	16.02	10.45	26.47	56.00	-29.53	QP	
6		0.5540	13.99	10.45	24.44	46.00	-21.56	AVG	
7		2.8500	11.96	10.25	22.21	56.00	-33.79	QP	
8		2.8500	4.18	10.25	14.43	46.00	-31.57	AVG	
9		5.1540	18.64	10.31	28.95	60.00	-31.05	QP	
10		5.1540	15.08	10.31	25.39	50.00	-24.61	AVG	
11		12.7140	24.65	10.29	34.94	60.00	-25.06	QP	
12		12.7140	22.08	10.29	32.37	50.00	-17.63	AVG	

5. RADIATED EMISSION MEASUREMENT

5.1. Block Diagram of Test Setup





5.2. Radiated Limit

EN 62920:2017+A11:2020
CISPR 11:2015+A1:2016
Class B

Frequency range MHz	10 m measuring distance	3 m measuring distance [a]
	Quasi-peak dB(μV/m)	Quasi-peak dB(μV/m)
30 to 230 230 to 1000	30 37	40 47
On a test site, class B equipment can be measuring at a nominal distance of 3 m or 10 m. At the transition frequency, the more stringent limit shall apply.		
[a] The 3 m separation distance applies only to small equipment meeting the size criterion defined in 3.16.		

5.3. Test Procedure

The EUT was placed on an insulating support whose total height equaled 80cm. All units of equipment forming the system under test (includes the EUT as well as connected peripherals and associated equipment or devices) shall be arranged such that a nominal 0.1 m separation is achieved between the neighboring units. Where the mains cable supplied by the manufacturer is longer than 1 m, the excess should be folded at the centre into a bundle no longer than 0.4 m, so that its length is shortened to 1 m.

The EUT was set 3 meters (or 10 meters) away from the receiving antenna that was mounted on a non-conductive mast. The antenna can move up and down between 1 to 4 meters to find out the maximum emission level.

The turntable can rotate 360 degree to determine the position of the maximum emission level.

The initial testing identified the frequency that has the highest disturbance relative to the limit while operating the EUT in typical modes of operation and cable positions in a test setup representative of typical system configuration.

The identification of the frequency of highest emission with respect to the limit was found by investigating emissions at a number of significant frequencies. The probable frequency of maximum emission had been found and that the associated cable and EUT configuration and mode of operation had been identified.

The bandwidth of the Receiver is set at 120 kHz.

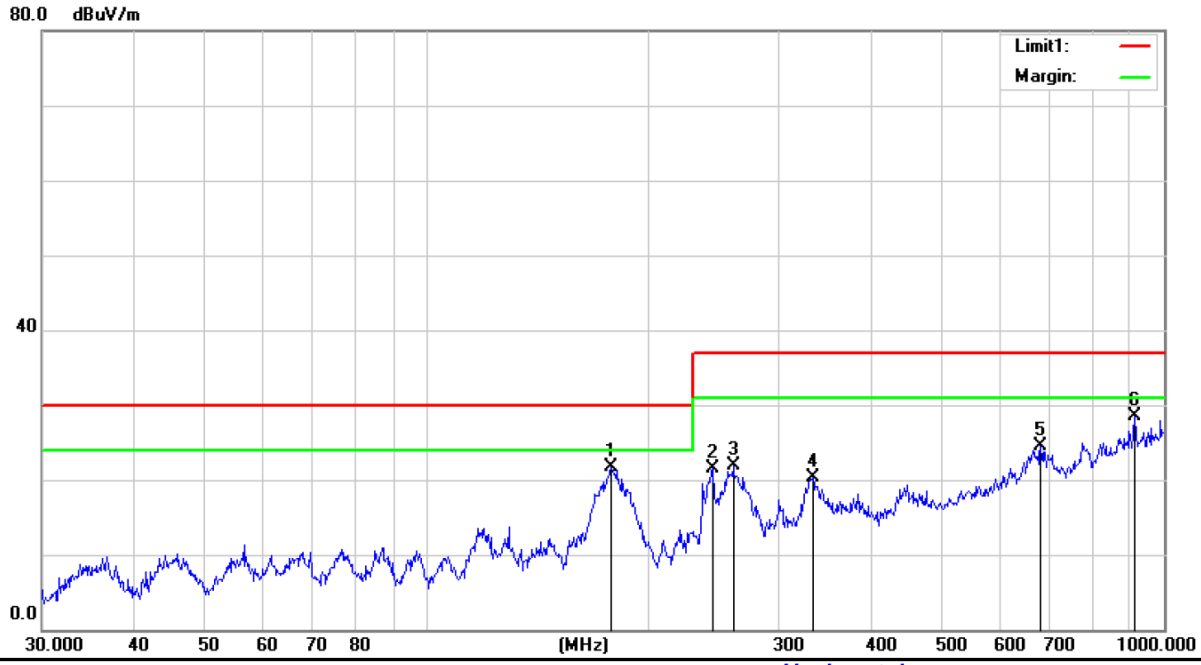
Test results were obtained from the following equation:
Emission level (dBμV/m) = Antenna Factor -Amp Factor +Cable Loss + Reading
Margin (dB) = Emission Level (dBμV/m) - Limit (dBμV/m)

5.4. Measuring Results

PASS.

Please see the attached page.

Temperature	:	26°C
Humidity	:	60%
Atmospheric Pressure	:	101kpa
Test Engineer	:	CCWS
Test Date	:	2022-01-04



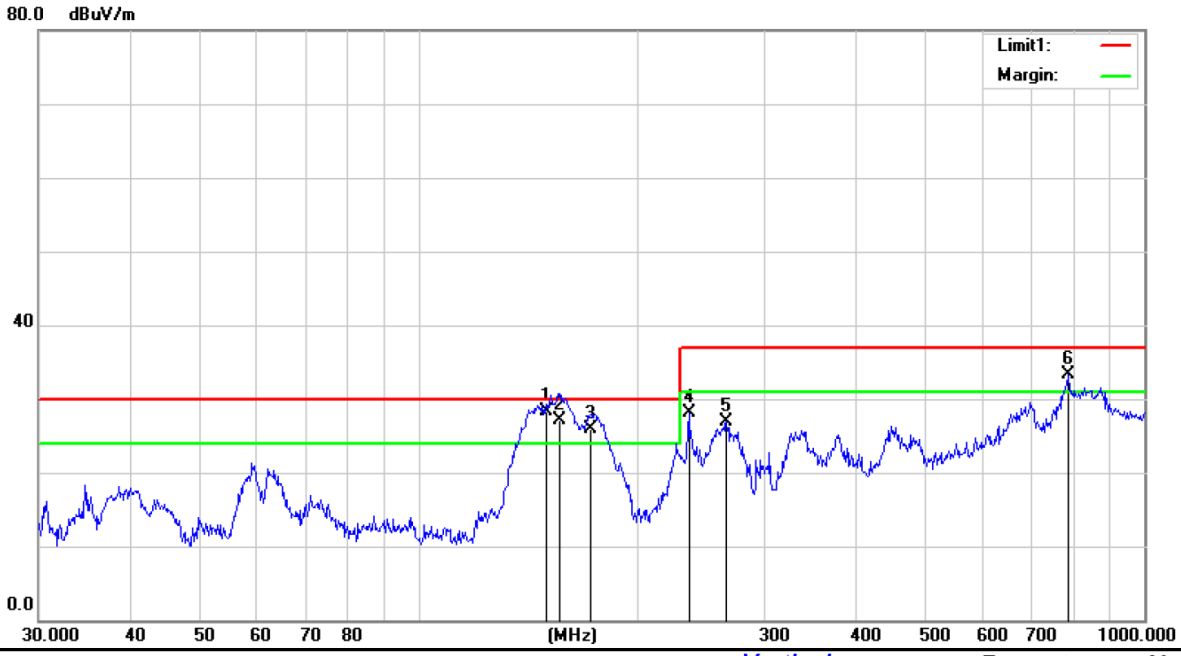
Site 10m Chamber 1# Polarization: *Horizontal* Temperature: 26

Limit: (RE10M)EN62920 ClassB Power: AC 230V/50Hz & DC 48V Humidity: 60 %

Mode: Discharging & AC connected grid

Note:

No.	Mk.	Freq.	Reading Level	Ant. Factor	Pre Amp Gain	Cable loss	Measure-ment	Limit	Over		HI	Degree	
		MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	Detector	cm	deg.	Comment
1	*	177.5091	53.23	10.14	43.93	2.19	21.63	30.00	-8.37	QP	400	153	
2		244.2321	49.66	12.55	43.38	2.7	21.53	37.00	-15.47	QP	400	241	
3		260.1444	49.42	12.84	43.16	2.82	21.92	37.00	-15.08	QP	191	78	
4		333.6865	45.19	14.07	42.29	3.33	20.30	37.00	-16.70	QP	191	34	
5		679.9600	41.91	18.94	41.71	5.4	24.54	37.00	-12.46	QP	400	202	
6		912.8620	39.81	22.45	40.36	6.57	28.47	37.00	-8.53	QP	191	81	



Site 10m Chamber 1# Polarization: *Vertical* Temperature: 26

Limit: (RE10M)EN62920 ClassB Power: AC 230V/50Hz & DC 48V Humidity: 60 %

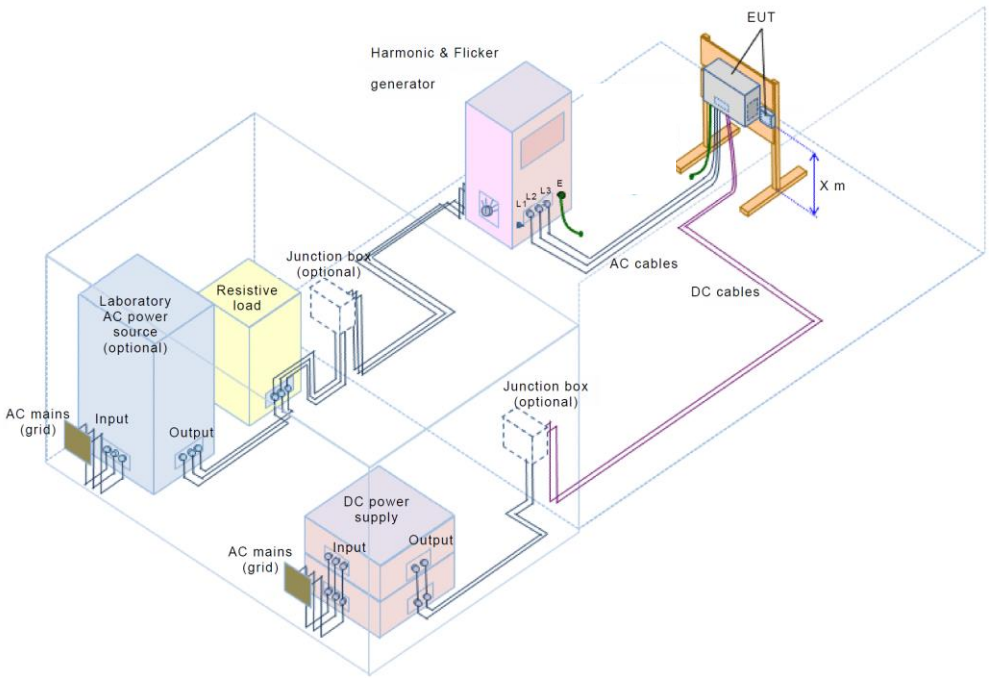
Mode: Discharging & AC connected grid

Note:

No.	Mk.	Freq.	Reading Level	Ant. Factor	Pre Amp Gain	Cable loss	Measure-ment	Limit	Over		HI	Degree	
		MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	Detector	cm	deg.	Comment
1	*	150.0108	59.13	9.8	43.48	2.84	28.29	30.00	-1.71	QP	100	306	
2	!	156.4578	57.89	9.77	43.49	2.93	27.10	30.00	-2.90	QP	100	98	
3	!	172.5988	56.66	9.71	43.5	3.09	25.96	30.00	-4.04	QP	100	16	
4		235.8164	56.85	10.96	43.32	3.62	28.11	37.00	-8.89	QP	199	153	
5		265.6757	54.04	12.1	43.14	3.82	26.82	37.00	-10.18	QP	100	351	
6	!	785.0935	42.63	24.09	40.87	7.39	33.24	37.00	-3.76	QP	199	0	

6. HARMONIC CURRENT EMISSION MEASUREMENT

6.1. Block Diagram of Test Setup



6.2. Standard Limits

EN 61000-3-12
Harmonic current emissions evaluate the potential for the EUT to cause distortion on the AC power lines. It is applicable to electrical and electronic equipment having an input current >16 A and ≤75 A per phase, and intended to be connected to public low-voltage distribution systems.

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, CLASS A
Harmonic current emissions evaluate the potential for the EUT to cause distortion on the AC power lines. It is applicable to electrical and electronic equipment having an input current≤16 A per phase, and intended to be connected to public low-voltage distribution systems

Table 1 – Limits for Class A equipment

Harmonic order n	Maximum permissible harmonic current (A)
Odd harmonics	
3	2.30
5	1.14
7	0.77
9	0.40
11	0.33
13	0.21
$15 \le n \le 39$	$0.15 \frac{0.15}{n}$
Even harmonics	
2	1.08
4	0.43
6	0.30
$8 \le n \le 40$	$0.23 \frac{8}{n}$

6.3. Test Results

PASS.

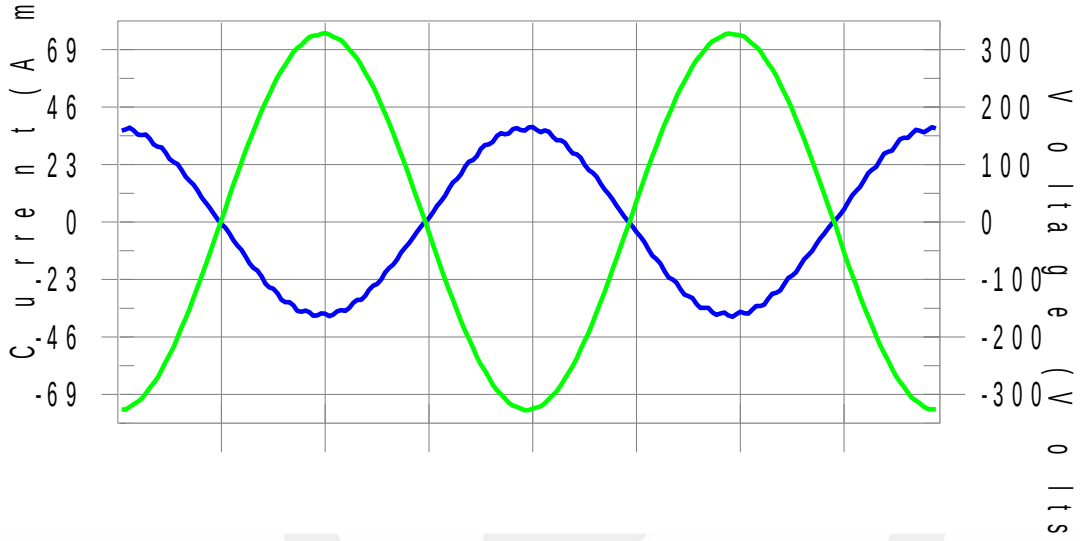
Please see the attached page.

Temperature	:	25.1 °C
Humidity	:	50%
Atmospheric Pressure	:	101kpa
Test Engineer	:	ZHT
Test Date	:	2022-01-12
Test Mode	:	PV in & AC connected grid

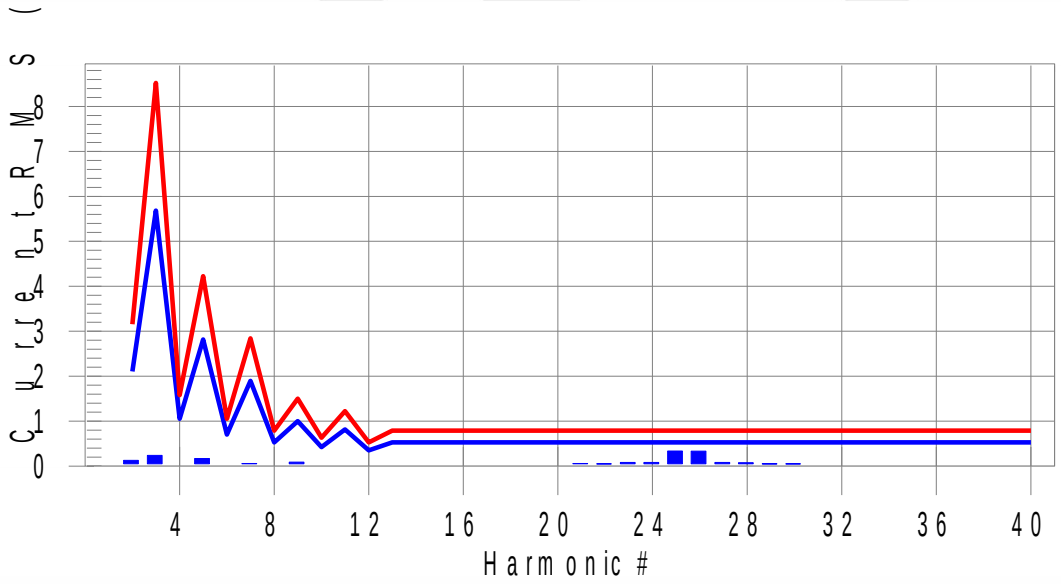
Harmonics – Per EN/IEC61000-3-12, Ed. 2.0(Run time)

EUT: Hybrid inverter(LXP-6K Hybrid) **Tested by:ZHT**
Test category: Table:2, Rsce=33, Inter-Harm, **Test Margin: 100**
Test date: 2022/1/12 **Start time: 15:30:32** **End time: 15:33:15**
Test duration (min): 2.5 **Data file name: WIN2106_H-000130.cts_data**
Comment: PV in & AC connected grid
Customer: Shenzhen Lux Power Technology Co., Ltd
Test Result: Pass **Source qualification: Normal**

Current & voltage waveforms



Harmonics and Class 2 limit line **European Limits**



Test result: Pass Worst harmonics H9-6.0% of 150% limit, H9-8.8% of 100% limit.

Current Test Result Summary (Run time)

EUT: Hybrid inverter(LXP-6K Hybrid) **Tested by: ZHT**
Test category: Table:2, Rsce=33, Inter-Harm, **Test Margin: 100**
Test date: 2022/1/12 **Start time: 15:30:32** **End time: 15:33:15**
Test duration (min): 2.5 **Data file name: WIN2106_H-000130.cts_data**
Comment: PV in & AC connected grid
Customer: Shenzhen Lux Power Technology Co., Ltd
Test Result: Pass **Measured Iref: 26.310(Amps)** **Source: Normal**
THC/Iref (%): 1.8 **Limit (%): 23.0** **PWHC/Iref (%): 9.1** **PWHC Limit (%): 23.0**

Highest parameter values during test:

V_RMS (Volts):	231.43	Frequency (Hz):	50.00
I_Peak (Amps):	38.570	I_RMS (Amps):	26.317
I_Fund (Amps):	26.302(avg)	Crest Factor:	1.466
Power (Watts):	-6081	Power Factor:	-0.998

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.127	2.105	6.1	0.132	3.157	4.2	Pass
3	0.237	5.683	4.2	0.246	8.524	2.9	Pass
4	0.045	1.052	4.2	0.047	1.579	3.0	Pass
5	0.168	2.815	6.0	0.170	4.223	4.0	Pass
6	0.022	0.702	3.2	0.023	1.052	2.2	Pass
7	0.055	1.894	2.9	0.057	2.841	2.0	Pass
8	0.023	0.526	4.4	0.024	0.789	3.1	Pass
9	0.088	1.000	8.8	0.091	1.500	6.0	Pass
10	0.014	0.421	3.4	0.015	0.631	2.4	Pass
11	0.045	0.816	5.6	0.047	1.223	3.8	Pass
12	0.012	0.351	3.3	0.013	0.526	2.5	Pass
13	0.039	0.526	7.4	0.041	0.789	5.2	Pass
14	0.012	N/A	N/A	0.013	N/A	N/A	N/A
15	0.035	N/A	N/A	0.037	N/A	N/A	N/A
16	0.008	N/A	N/A	0.009	N/A	N/A	N/A
17	0.028	N/A	N/A	0.029	N/A	N/A	N/A
18	0.010	N/A	N/A	0.011	N/A	N/A	N/A
19	0.028	N/A	N/A	0.029	N/A	N/A	N/A
20	0.016	N/A	N/A	0.018	N/A	N/A	N/A
21	0.055	N/A	N/A	0.056	N/A	N/A	N/A
22	0.051	N/A	N/A	0.052	N/A	N/A	N/A
23	0.080	N/A	N/A	0.081	N/A	N/A	N/A
24	0.082	N/A	N/A	0.082	N/A	N/A	N/A
25	0.335	N/A	N/A	0.336	N/A	N/A	N/A
26	0.333	N/A	N/A	0.333	N/A	N/A	N/A
27	0.081	N/A	N/A	0.082	N/A	N/A	N/A
28	0.076	N/A	N/A	0.077	N/A	N/A	N/A
29	0.050	N/A	N/A	0.050	N/A	N/A	N/A
30	0.049	N/A	N/A	0.050	N/A	N/A	N/A
31	0.013	N/A	N/A	0.014	N/A	N/A	N/A
32	0.011	N/A	N/A	0.012	N/A	N/A	N/A
33	0.009	N/A	N/A	0.011	N/A	N/A	N/A
34	0.008	N/A	N/A	0.009	N/A	N/A	N/A
35	0.008	N/A	N/A	0.008	N/A	N/A	N/A
36	0.006	N/A	N/A	0.007	N/A	N/A	N/A
37	0.007	N/A	N/A	0.007	N/A	N/A	N/A
38	0.005	N/A	N/A	0.005	N/A	N/A	N/A
39	0.004	N/A	N/A	0.005	N/A	N/A	N/A
40	0.003	N/A	N/A	0.004	N/A	N/A	N/A

Note: Measured I-ref was applied for this test.

Voltage Source Verification Data (Run time)

EUT: Hybrid inverter(LXP-6K Hybrid) **Tested by: ZHT**
Test category: Table:2, Rsce=33, Inter-Harm, **Test Margin: 100**
Test date: 2022/1/12 **Start time: 15:30:32** **End time: 15:33:15**
Test duration (min): 2.5 **Data file name: WIN2106_H-000130.cts_data**
Comment: PV in & AC connected grid
Customer: Shenzhen Lux Power Technology Co., Ltd
Test Result: Pass **Source qualification: Normal**
Measured source distortion is within the requirements of the standards
Measurements are compliant with IEC/EN61000-3-12 Ed. 2.0 & IEC/EN61000-4-7 Ed. 2.1

Highest parameter values during test:

Voltage (Vrms):	231.43	Frequency (Hz):	50.00
I_Peak (Amps):	38.570	I_RMS (Amps):	26.317
I_Fund (Amps):	26.302(avg)	Crest Factor:	1.466
Power (Watts):	-6081	Power Factor:	-0.998

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.093	0.926	10.10	OK
3	0.190	2.892	6.57	OK
4	0.028	0.926	3.08	OK
5	0.129	3.471	3.71	OK
6	0.019	0.926	2.05	OK
7	0.138	2.892	4.76	OK
8	0.027	0.926	2.87	OK
9	0.163	1.388	11.71	OK
10	0.025	0.926	2.67	OK
11	0.145	1.620	8.93	OK
12	0.016	0.694	2.24	OK
13	0.126	1.388	9.05	OK
14	0.018	0.694	2.63	OK
15	0.122	0.694	17.51	OK
16	0.015	0.694	2.20	OK
17	0.110	0.694	15.89	OK
18	0.015	0.694	2.10	OK
19	0.102	0.694	14.73	OK
20	0.023	0.694	3.30	OK
21	0.086	0.694	12.42	OK
22	0.018	0.694	2.59	OK
23	0.075	0.694	10.87	OK
24	0.022	0.694	3.14	OK
25	0.085	0.694	12.28	OK
26	0.030	0.694	4.26	OK
27	0.072	0.694	10.42	OK
28	0.021	0.694	3.06	OK
29	0.055	0.694	7.88	OK
30	0.013	0.694	1.87	OK
31	0.049	0.694	7.01	OK
32	0.012	0.694	1.76	OK
33	0.042	0.694	6.02	OK
34	0.012	0.694	1.80	OK
35	0.041	0.694	5.93	OK
36	0.012	0.694	1.68	OK
37	0.035	0.694	5.01	OK
38	0.010	0.694	1.51	OK
39	0.028	0.694	4.01	OK
40	0.014	0.694	1.99	OK

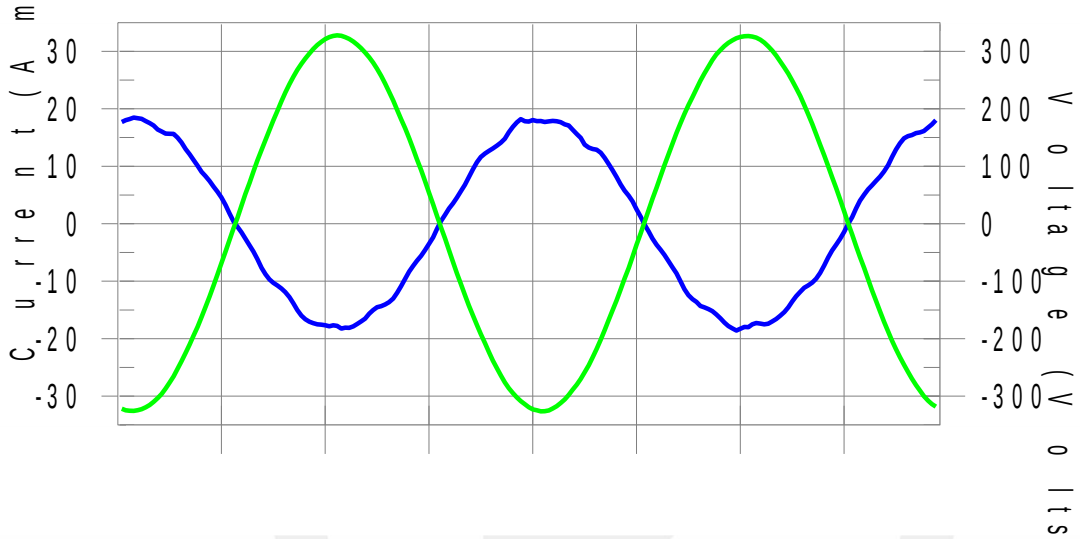
Minimum Rsce required: Rsce = 13.010
Phase A = 39.4% of tested Rsce = 33.000, Rsce = 13.010

Harmonics – Class-A (Run time) incl. inter-harmonics

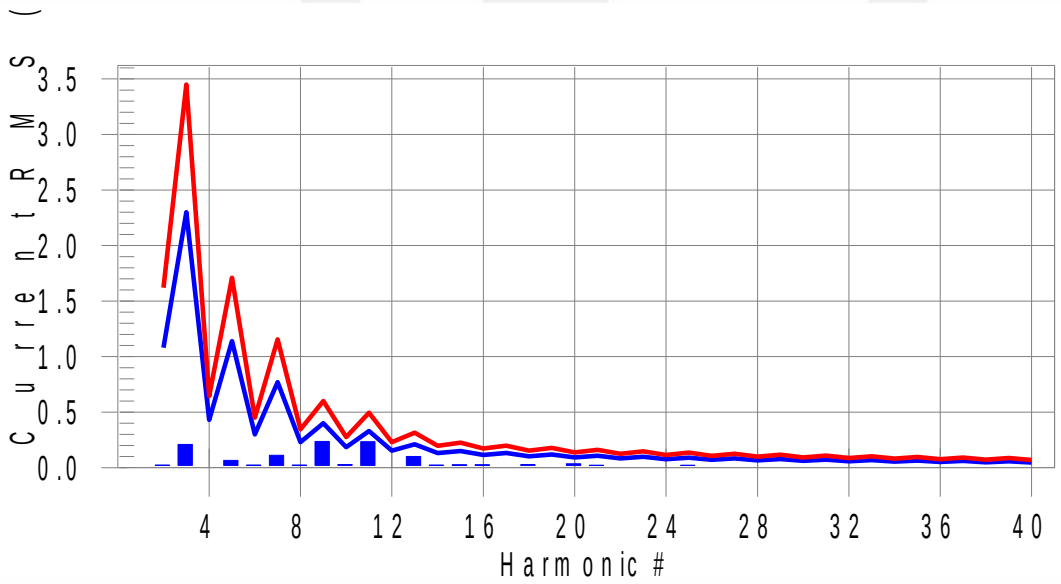
EUT: Hybrid inverter(LXP-3K Hybrid) **Tested by: ZHT**
Test category: Class-A (European limits) **Test Margin: 100**
Test date: 2022/1/12 **Start time: 9:51:42** **End time: 9:54:35**
Test duration (min): 2.5 **Data file name: WIN2105_H-000434.cts_data**
Comment: PV in & AC connected grid
Customer: Shenzhen Lux Power Technology Co., Ltd

Test Result: Pass **Source qualification: Normal**

Current & voltage waveforms



Harmonics and Class A limit line **European Limits**



Test result: Pass **Worst harmonic was #11 with 71.0% of the limit.**

Current Test Result Summary (Run time)

EUT: Hybrid inverter(LXP-3K Hybrid) **Tested by: ZHT**
Test category: Class-A (European limits) **Test Margin: 100**
Test date: 2022/1/12 **Start time: 9:51:42** **End time: 9:54:35**
Test duration (min): 2.5 **Data file name: WIN2105_H-000434.cts_data**
Comment: PV in & AC connected grid
Customer: Shenzhen Lux Power Technology Co., Ltd

Test Result: Pass **Source qualification: Normal**
THC: 0.439 A **I-THD: 3.4 %** **POHC(A): 0.044 A** **POHC Limit(A): 0.251 A**
Highest parameter values during test:

V_RMS (Volts):	231.013	Frequency(Hz):	50.00
I_Peak (Amps):	18.900	I_RMS (Amps):	12.976
I_Fund (Amps):	12.968	Crest Factor:	1.458
Power (Watts):	-2993.3	Power Factor:	-0.999

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.023	1.080	2.1	0.030	1.620	1.9	Pass
3	0.209	2.300	9.1	0.218	3.450	6.3	Pass
4	0.020	0.430	4.5	0.025	0.645	3.9	Pass
5	0.066	1.140	5.8	0.069	1.710	4.0	Pass
6	0.022	0.300	7.5	0.026	0.450	5.7	Pass
7	0.113	0.770	14.7	0.115	1.155	10.0	Pass
8	0.023	0.230	9.9	0.026	0.345	7.6	Pass
9	0.236	0.400	59.1	0.239	0.600	39.9	Pass
10	0.029	0.184	15.7	0.036	0.276	13.0	Pass
11	0.234	0.330	71.0	0.242	0.495	49.0	Pass
12	0.019	0.153	12.2	0.021	0.230	9.0	Pass
13	0.101	0.210	48.1	0.107	0.315	34.0	Pass
14	0.022	0.131	17.0	0.024	0.197	12.5	Pass
15	0.027	0.150	17.9	0.034	0.225	15.3	Pass
16	0.027	0.115	23.2	0.030	0.173	17.3	Pass
17	0.016	0.132	12.4	0.018	0.198	9.2	Pass
18	0.029	0.102	28.5	0.036	0.153	23.3	Pass
19	0.014	0.118	12.0	0.017	0.178	9.6	Pass
20	0.034	0.092	37.3	0.044	0.138	31.7	Pass
21	0.021	0.107	20.0	0.024	0.161	14.9	Pass
22	0.018	0.084	21.6	0.021	0.125	17.1	Pass
23	0.012	0.098	12.0	0.015	0.147	10.3	Pass
24	0.018	0.077	23.6	0.020	0.115	17.7	Pass
25	0.021	0.090	23.6	0.030	0.135	22.4	Pass
26	0.016	0.071	22.6	0.020	0.107	18.7	Pass
27	0.014	0.083	16.7	0.018	0.125	14.6	Pass
28	0.009	0.066	13.1	0.010	0.099	10.6	Pass
29	0.011	0.078	13.9	0.012	0.116	10.3	Pass
30	0.009	0.061	14.7	0.010	0.092	11.3	Pass
31	0.014	0.073	18.6	0.018	0.109	16.3	Pass
32	0.010	0.058	17.1	0.012	0.086	13.7	Pass
33	0.009	0.068	13.0	0.011	0.102	11.0	Pass
34	0.010	0.054	18.3	0.011	0.081	13.5	Pass
35	0.017	0.064	25.9	0.020	0.096	20.7	Pass
36	0.011	0.051	21.2	0.014	0.077	18.3	Pass
37	0.008	0.061	13.6	0.009	0.091	10.2	Pass
38	0.008	0.048	N/A	0.010	0.073	N/A	Pass
39	0.006	0.058	N/A	0.007	0.087	N/A	Pass
40	0.008	0.046	17.8	0.012	0.069	17.6	Pass

Voltage Source Verification Data (Run time)

EUT: Hybrid inverter(LXP-3K Hybrid) **Tested by: ZHT**
Test category: Class-A (European limits) **Test Margin: 100**
Test date: 2022/1/12 **Start time: 9:51:42** **End time: 9:54:35**
Test duration (min): 2.5 **Data file name: WIN2105_H-000434.cts_data**
Comment: PV in & AC connected grid
Customer: Shenzhen Lux Power Technology Co., Ltd
Test Result: Pass **Source qualification: Normal**

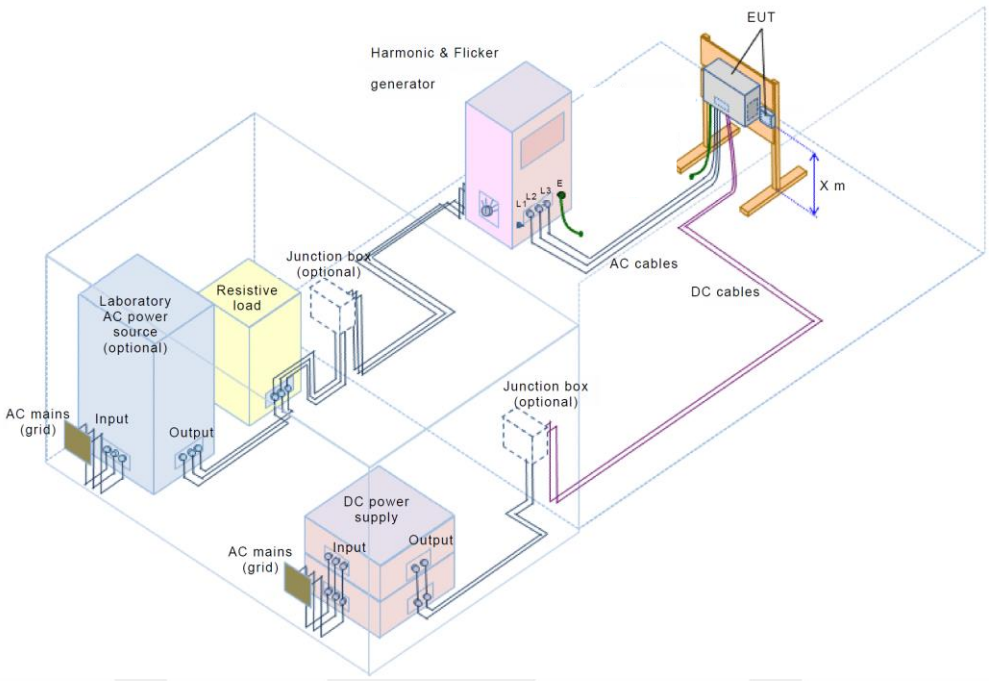
Highest parameter values during test:

Voltage (Vrms):	231.013	Frequency(Hz):	50.00
I_Peak (Amps):	18.900	I_RMS (Amps):	12.976
I_Fund (Amps):	12.968	Crest Factor:	1.458
Power (Watts):	-2993.3	Power Factor:	-0.999

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.093	0.462	20.11	OK
3	0.143	2.078	6.89	OK
4	0.033	0.462	7.23	OK
5	0.060	0.924	6.44	OK
6	0.023	0.462	4.89	OK
7	0.055	0.693	7.92	OK
8	0.018	0.462	3.89	OK
9	0.039	0.462	8.52	OK
10	0.024	0.462	5.22	OK
11	0.041	0.231	17.61	OK
12	0.020	0.231	8.79	OK
13	0.030	0.231	13.05	OK
14	0.026	0.231	11.17	OK
15	0.031	0.231	13.51	OK
16	0.032	0.231	14.02	OK
17	0.027	0.231	11.79	OK
18	0.026	0.231	11.21	OK
19	0.035	0.231	15.37	OK
20	0.035	0.231	15.21	OK
21	0.039	0.231	16.74	OK
22	0.021	0.231	9.30	OK
23	0.032	0.231	13.88	OK
24	0.023	0.231	9.86	OK
25	0.037	0.231	16.07	OK
26	0.031	0.231	13.39	OK
27	0.033	0.231	14.33	OK
28	0.015	0.231	6.55	OK
29	0.031	0.231	13.49	OK
30	0.019	0.231	8.16	OK
31	0.040	0.231	17.28	OK
32	0.017	0.231	7.53	OK
33	0.028	0.231	12.01	OK
34	0.018	0.231	7.85	OK
35	0.042	0.231	18.34	OK
36	0.023	0.231	9.79	OK
37	0.022	0.231	9.49	OK
38	0.022	0.231	9.48	OK
39	0.023	0.231	9.85	OK
40	0.037	0.231	16.13	OK

7. VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT

7.1. Block Diagram of Test Setup



7.2. Standard Limits

EN IEC 61000-3-11 Limits
The limits shall be applicable to voltage fluctuations and flicker at the supply terminals of the equipment under test, measured or calculated according to clause 4 under test conditions described in clause 6. Tests made to prove the compliance with the limits are considered to be type tests.
The following limits apply:
– the value of the short-term flicker indicator, P_{st} shall not be greater than 1,0;
– the value of the long-term flicker indicator, P_{lt} shall not be greater than 0,65;
– the value of d(t) during a voltage change shall not exceed 3,3 % for more than 500 ms;
– the relative steady-state voltage change, d_c, shall not exceed 3,3 %;
– the maximum relative voltage change d_{max}, shall not exceed:

EN 61000-3-3 Limits
The objective of voltage changes, voltage fluctuations and flicker in public low voltage supply systems during equipment with rated current≤16 A per phase, ensures that home appliances and certain other electrical equipment do not adversely affect lighting equipment when connected to the same power system.
Voltage Fluctuation and Flicker Limits:
— the value of Pst shall not be greater than 1.0;
— the value of Plt shall not be greater than 0.65;
— the value of d(t) during a voltage change shall not exceed 3.3 % for more than 500 ms;
— the relative steady-state voltage change, dc, shall not exceed 3.3 %;
— the maximum relative voltage change, dmax, shall not exceed 4.0 %;

7.3. Test Procedure

The total impedance of the test circuit, excluding the appliance under test, but including the internal impedance of the supply source, shall be equal to the reference impedance. The stability and tolerance of the reference impedance shall be adequate to ensure that the overall accuracy of 8% is achieved during the whole assessment procedure.

7.4. Test Results

PASS.

Please see the attached page.

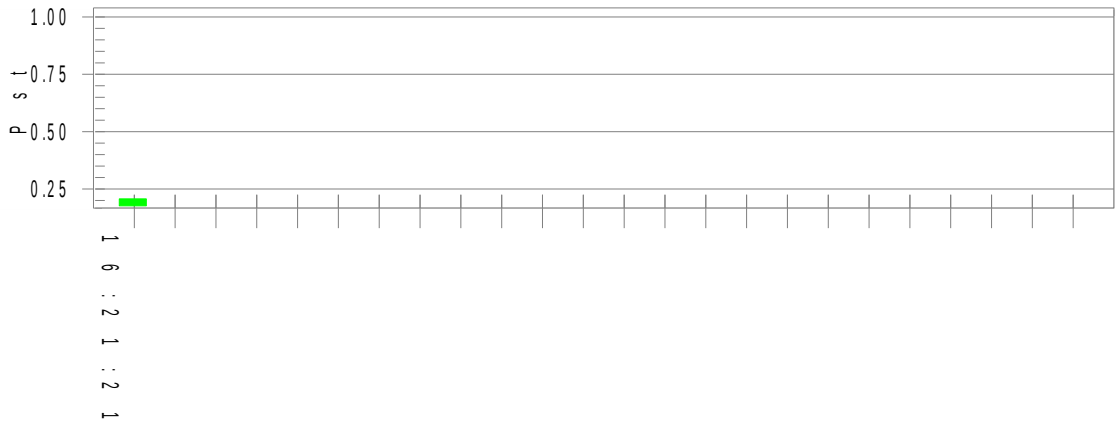
Temperature	:	25.1 °C
Humidity	:	50%
Atmospheric Pressure	:	101kpa
Test Engineer	:	ZHT
Test Date	:	2022-01-12
Test Mode	:	PV in & AC connected grid

Flicker Test Summary Per EN/IEC61000-3-11, Ed. 1.0(Run time) per EN/IEC61000-3-11IEC61000-3-11 Ed. 1.0 (2000)

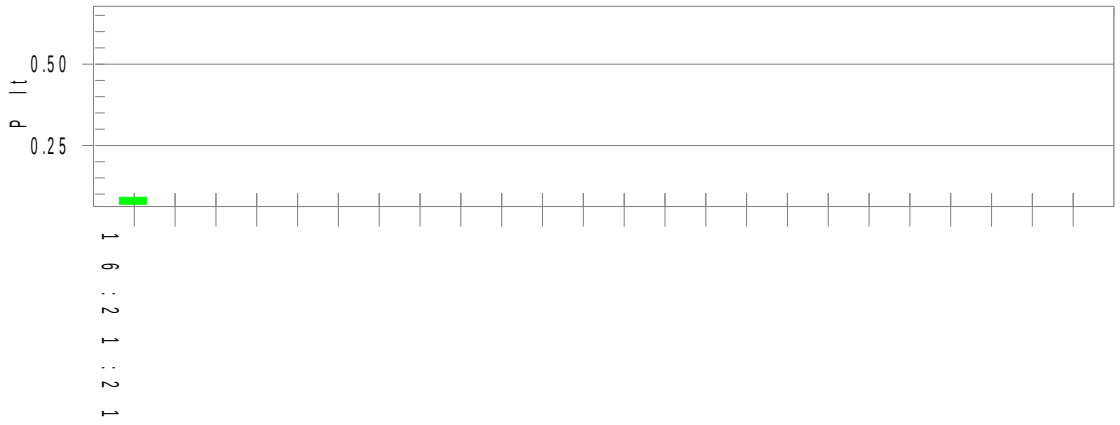
EUT: Hybrid inverter(LXP-6K Hybrid) **Tested by: ZHT**
Test category: All parameters **Test Margin: 100**
Test date: 2022/1/12 **Start time: 16:11:00** **End time: 16:21:27**
Test duration (min): 10 **Data file name: WIN2106_F-000134.cts_data**
Comment: PV in & AC connected grid
Customer: Shenzhen Lux Power Technology Co., Ltd
Z-test = (0.400 + j 0.250 Ohm)

Test Result: Pass
Status: Test Completed

Pst_i and limit line



Plt and limit line



Parameter values recorded during the test:

Vrms at the end of test (Volt): 235.47

T-max (mS):	**0.0**	**Test limit (mS):**	**500.0**	**Pass**
Highest dc (%):	**-1.01**	**Test limit (%):**	**3.30**	**Pass**
Highest dmax (%):	**-1.07**	**Test limit (%):**	**4.00**	**Pass**

Highest Pst (10 min. period):	**0.207**	**Test limit:**	**1.000**	**Pass**
Highest Plt (2 hr. period):	**0.090**	**Test limit:**	**0.650**	**Pass**

Calculated dmax(%): 0.000
Calculated dc(%): -1.009
Calculated Pst : 0.207
Calculated Plt : 0.090

The maximum permissible system impedance Zsys:

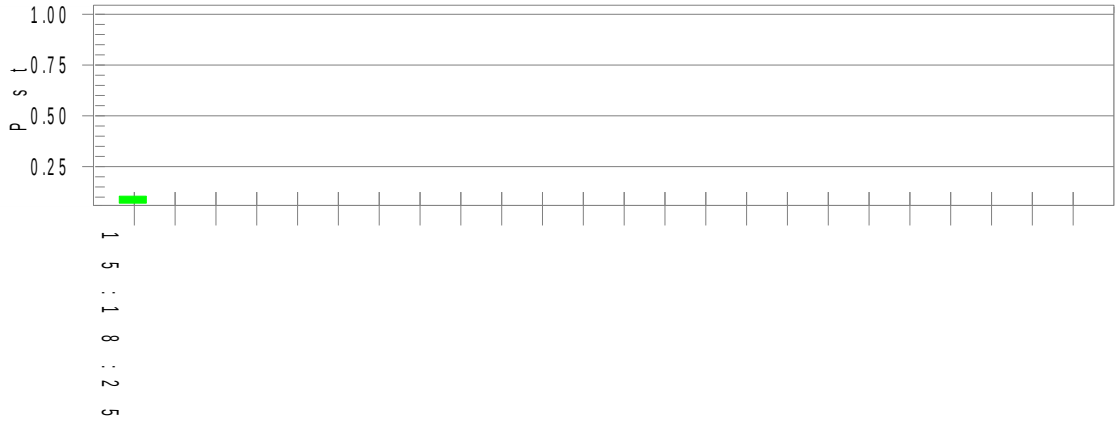
Z = 1.309 Ohm + j 0.818 Ohm (1.309 Ohm + 2604 μH)

Flicker Test Summary per EN/IEC61000-3-3 (Run time)

EUT: Hybrid inverter(LXP-3K Hybrid) **Tested by: ZHT**
Test category: All parameters (European limits) **Test Margin: 100**
Test date: 2022/1/12 **Start time: 15:08:04** **End time: 15:18:32**
Test duration (min): 10 **Data file name: WIN2105_F-000328.cts_data**
Comment: PV in & AC connected grid
Customer: Shenzhen Lux Power Technology Co., Ltd

Test Result: Pass **Status: Test Completed**

Pst_i and limit line **European Limits**



Plt and limit line

Parameter values recorded during the test:

Vrms at the end of test (Volt):	**231.05**			
T-max (mS):	**0.0**	**Test limit (mS):**	**500.0**	**Pass**
Highest dc (%):	**0.00**	**Test limit (%):**	**3.30**	**Pass**
Highest dmax (%):	**0.38**	**Test limit (%):**	**4.00**	**Pass**
Highest Pst (10 min. period):	**0.104**	**Test limit:**	**1.000**	**Pass**
Highest Plt (2 hr. period):	**0.045**	**Test limit:**	**0.650**	**Pass**

8. IMMUNITY GENERAL PERFORMANCE CRITERIA DESCRIPTION

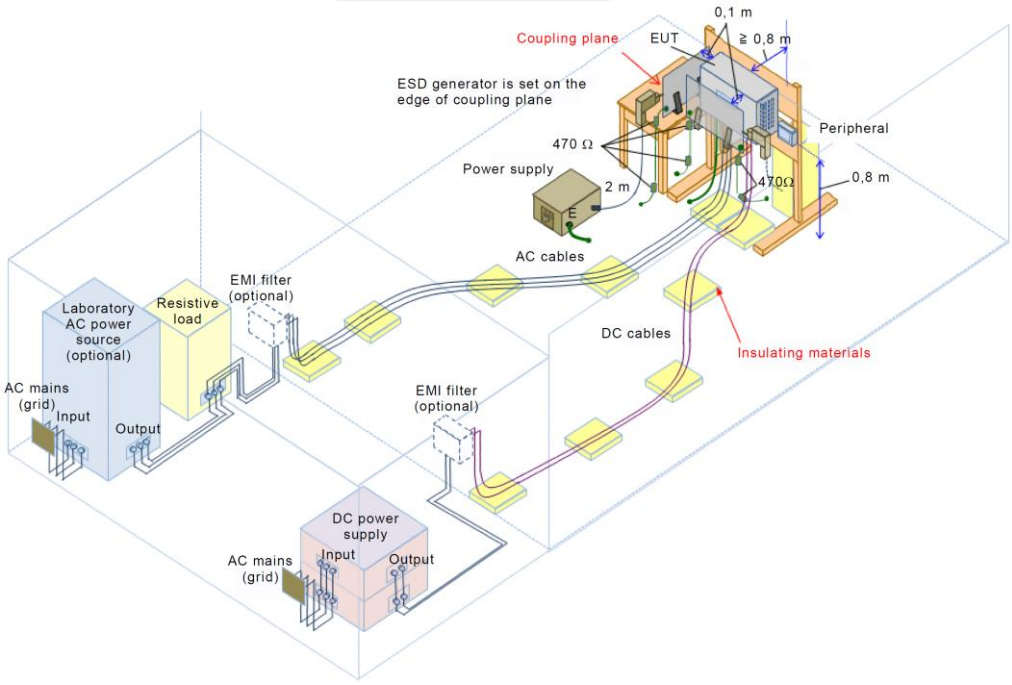
Item	Criterion A	Criterion B	Criterion C
Operating status	No noticeable change of the operating atatus. Operating as intended.	Noticeable changes of the operating characteristic. Self-recoverable	Shutdown, changes in operating status. Triggering of protective devices. Not self-recoverable
Power output	Power output permitted to vary only within ±25%.	Power output permitted to temporarily vary outside ±25% Self-recoverable	Loss of power output. Not self-recoverable
External and internal Indications and metering	No noticeable change of the operating atatus.	Changes only during test	Shutdown, triggering of protective devices. Not self-recoverable
Control signal to external devices	Undisturbed Communication and data exchange to external devices	Temporarily disturbed communication, but no error reports of the internal or external devices which could cause shut-down	Errors in communication, loss of data and information. No loss of stored program, no loss of user program. Not self-recoverable

9. ELECTROSTATIC DISCHARGE

9.1. Test Specification

Test standard	:	EN 62920
Basic standard	:	IEC 61000-4-2
Performance criterion	:	B
Test level	:	±8.0kV (Air discharge) ±4.0kV (Contact discharge)

9.2. Block Diagram of Test Setup



9.3. Test Procedure

a. In the case of air discharge testing, the climatic conditions shall be within the following ranges:
- ambient temperature: 15°C to 35°C;
- relative humidity : 30% to 60%;
- atmospheric pressure : 86 kPa (860 mbar) to 106 kPa (1060 mbar)

b. Test programs and software shall be chosen so as to exercise all normal modes of operation of the EUT. The use of special exercising software is encouraged, but permitted only where it can be shown that the EUT is being comprehensively exercised.

c. In the case of contact discharges, the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

d. In the case of painted surface covering a conducting substrate, the following procedure shall be adopted : - If the coating is not declared to be an insulating coating by the equipment manufacturer, then the pointed tip of the generator shall penetrate the coating so as to make contact with the conducting substrate. - Coating declared as insulating by the manufacturer shall only be submitted to the air discharge. - The contact discharge test shall not be applied to such surfaces.

e. In the case of air discharges, the round discharge tip of the discharge electrode shall be approached as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator (discharge electrode) shall be removed from the EUT. The generator is then retriggered for a new single discharge. This procedure shall be repeated until the discharges are completed. In the case of an air discharge test, the discharge switch, which is used for contact discharge, shall be closed.
f. The test voltage shall be increased from the minimum to the selected test severity level, in order to determine any threshold of failure. The final test level should not exceed the product specification value in order to avoid damage to the equipment.
g. The test shall be performed with both air discharge and contact discharge. The test shall be performed with single discharges. On each pre-selected point at least 10 single discharges (in the most sensitive polarity) shall be applied. For the time interval between successive single discharges an initial value of 1 s is recommended. Longer intervals may be necessary to determine whether a system failure has occurred.
h. Ensure that the applied charge on the EUT has been dis-charged before next ESD pulse.

9.4. Test Results

PASS

Temperature	:	24.5°C
Humidity	:	45%
Atmospheric Pressure	:	101kpa
Test Engineer	:	ZHT
Test Date	:	2022-1-5
Test Mode	:	

Air Discharge:

Test Voltage	Location	Actual criterion	Required performance criterion	Result (Pass/Fail)
± 8 kV	LED/SLOT/SCREEN	A	B	Pass

Contact Discharge

Test Voltage	Location	Actual criterion	Required performance criterion	Result (Pass/Fail)
± 4kV	METAL/SCREW	A	B	Pass

Indirect Discharge

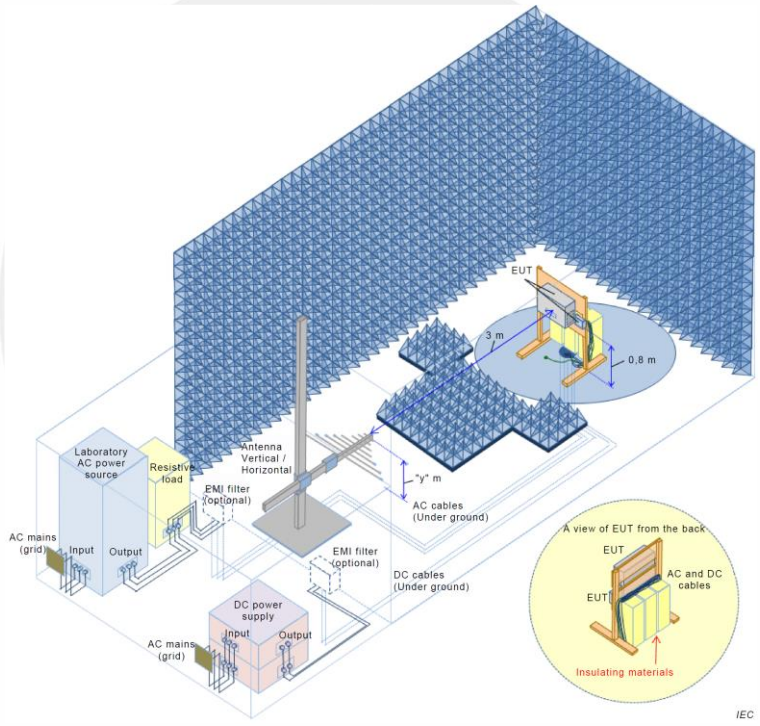
Test Voltage	Location	Actual criterion	Required performance criterion	Result (Pass/Fail)
± 4kV	VCP	A	B	Pass

10. CONTINUOUS RF ELECTROMAGNETIC FIELD DISTURBANCES

10.1. Test Specification

Test standard	:	EN 62920	
Basic standard	:	IEC 61000-4-3	
Performance criterion	:	A	
Frequency range & Test level	:	☒80M-1000MHz, 1400M-6000MHz	3V/m
Modulation	:	AM, 80%, 1kHz sine-wave	

10.2. Block Diagram of Test Setup



10.3. Test procedure

The procedure defined in this part requires the generation of electromagnetic fields within which the test sample is placed and its operation observed. To generate fields that are useful for simulation of actual (field) conditions may require significant antenna drive power and the resultant high field strength levels. To comply with local regulations and to prevent biological hazards to the testing personnel, it is recommended that these tests be carried out in a shielded enclosure or semi-anechoic chamber.

a. The antenna which is enabling the complete frequency range of 80-6000 MHz is placed 3m (or 1m) away from the equipment. The required field strength is determined by placing the field strength meter(s) on top of or directly alongside the equipment under test and monitoring the field strength meter via a remote field strength indicator outside the enclosure while adjusting the continuous-wave to the antenna.
b. The test is performed with the antenna facing the front and back sides of the EUT with. Both vertical and horizontal polarizations from antenna are tested.

10.4.Test results

PASS

Temperature	:	23.1°C
Humidity	:	49%
Atmospheric Pressure	:	101kpa
Test Engineer	:	ZHT
Test Date	:	2022-1-5
Test Mode	:	

☒ 80M-1000MHz:

Freq. Range (MHz)	Field	Modulation	Polarity	Position (°)	Actual criterion	Required performance criterion	Result
80-1000	3V/m	AM, 80%	H / V	0, 90,180, 270	A	A	Pass
1400-6000	3V/m	AM, 80%	H / V	0, 90,180, 270	A	A	Pass

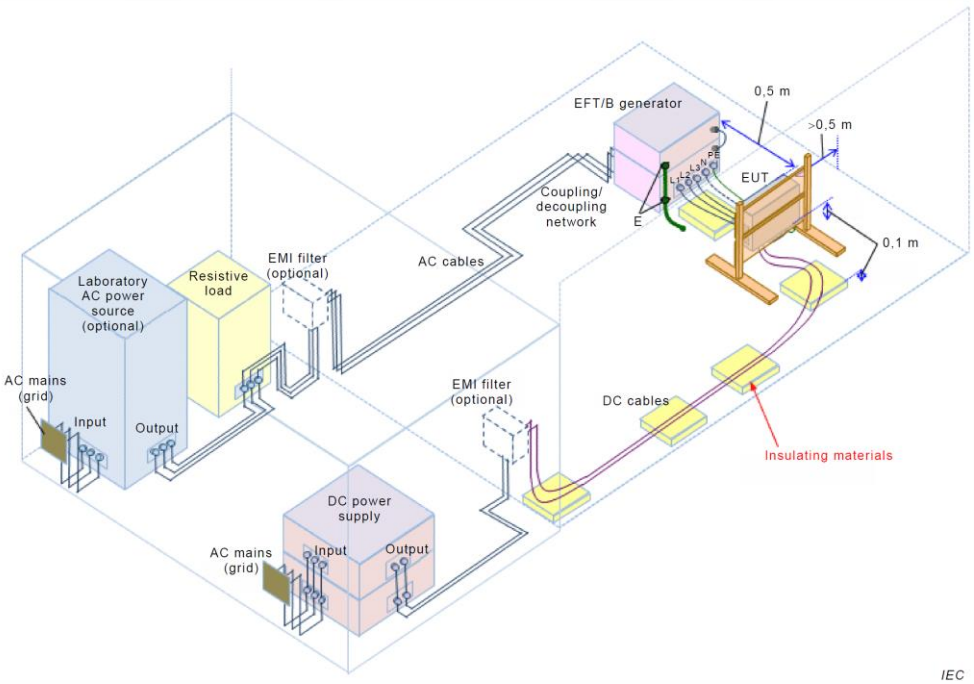
11. ELECTRICAL FAST TRANSIENTS/BURST

11.1. Test Specification

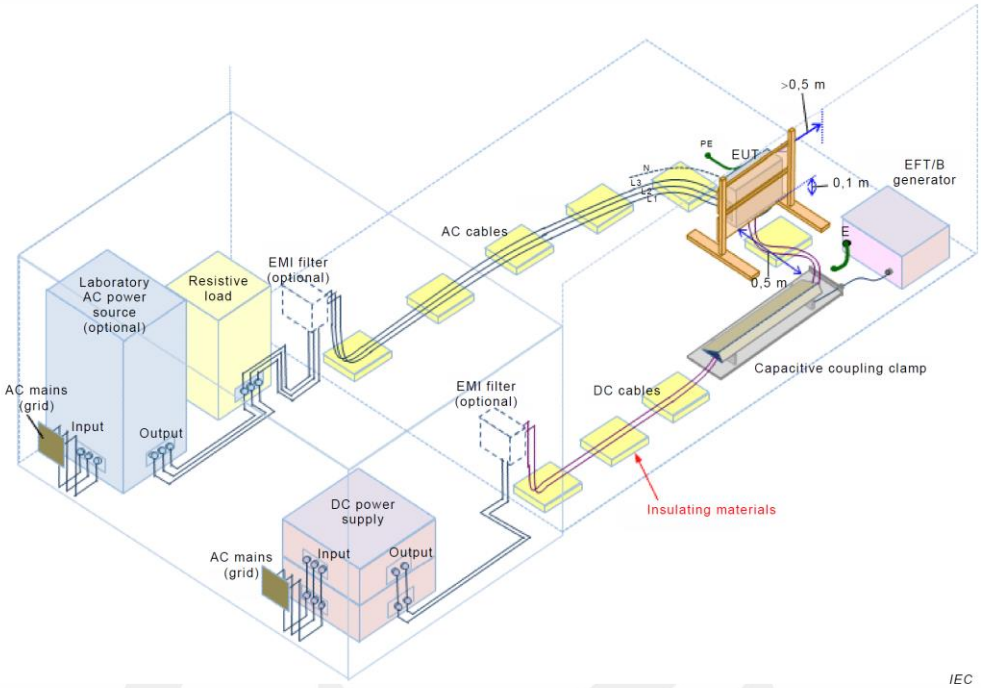
Test standard	:	EN 62920
Basic standard	:	IEC 61000-4-4
Performance criterion	:	B
Test level	:	☒1kV, AC mains power ports
		☒0.5kV, DC network power ports
		☐0.5kV, Signal and control (wired network) ports
Repetition frequency	:	☒5kHz, ☒100kHz
Tr/Th:	:	5/50ns
Burst period	:	300ms
Test time :	:	120s

11.2. Block Diagram of Test Setup

AC Lines:



DC lines:



11.3.Test Procedure

The EUT is put on the insulating support that is 0.1 meter high above the ground. This reference ground plane shall project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane beneath the EUT, shall be more than 0.5m.

11.4.Test Results

PASS

Temperature	:	25.1°C
Humidity	:	50%
Atmospheric Pressure	:	101kpa
Test Engineer	:	ZHT
Test Date	:	2022-1-5
Test Mode	:	

Injection Line	Voltage (kV)	Injected Method	Actual criterion	Required performance criterion	Result (Pass/Fail)
☒ AC mains power ports	± 1	☒ CDN ☐ Direct injection ☐ Capacitive coupling clamp	A	B	Pass
☒ DC network power ports	± 0.5	☐ CDN ☐ Direct injection ☒ Capacitive coupling clamp	A	B	Pass
☐ Signal and control (wired network) ports	± 0.5	☐ CDN ☐ Direct injection ☒ Capacitive coupling clamp	N/A	N/A	N/A

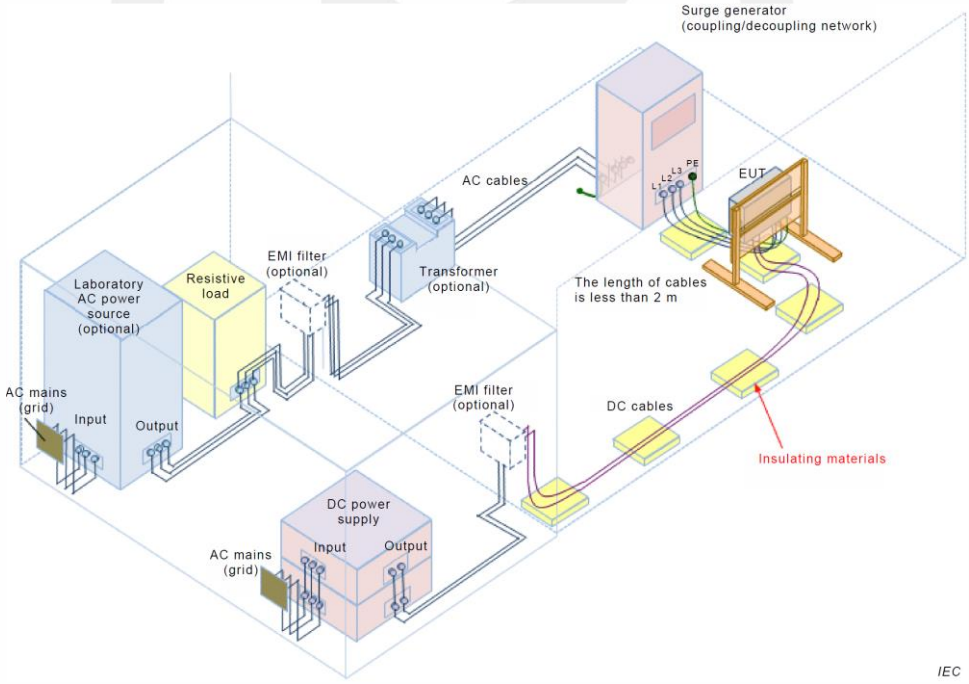
12. SURGES

12.1. Test Specification

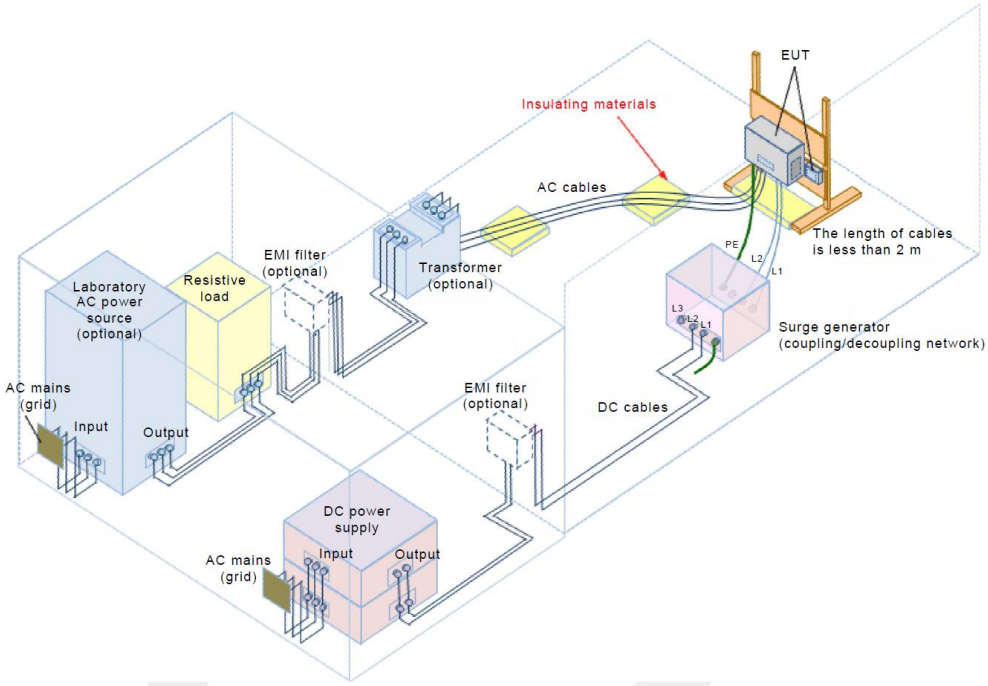
Test standard	:	EN 62920
Basic standard	:	IEC 61000-4-5
Test level	:	☒1kV, Line to Line, AC mains power ports, Criterion B ☒2kV, Line to Earth, AC mains power ports, Criterion B ☒0.5kV, Line to Reference Line, DC network power ports, Criterion B ☒1kV, Line to Reference ground, DC network power ports, Criterion B ☐0.5kV, Lines to Ground, Signal and control (wired network) ports, Criterion B
Number of surges	:	5 (for each combination of parameters)
Repetition rate	:	1 minute / time
Polarity:	:	Positive / Negative
Phase angle:	:	0º, 90º, 180º, 270º (Only AC mains power ports)

12.2. Block Diagram of Test Setup

AC Lines:



DC Lines:



12.3.Test Procedure

This test simulates a lightning event by inducing transients onto the AC/DC power supply lines in common mode (Line to Ground) and differential mode (Line to Line). Each device was tested in a total of two surge configurations: Line to Ground (L-G): Combination Wave, Line to Protective Earth with 9uF and 10Ohm and Neutral to Protective Earth with 9uF and 10Ohm, common mode, generator earthed.
Line to Line (L-L): Combination Wave,
Line to Neutral with 18uF, differential mode, generator floated.
2 ohm : the source impedance of the low-voltage power supply network.
12 ohm : the source impedance of the low-voltage power supply network and ground.

a. If not otherwise specified the surges have to be applied synchronized to the voltage phase at the zero-crossing and the peak value of the a.c. voltage wave (positive and negative).
b. The surges have to be applied line to line and line to earth. When testing line to earth, the test voltage has to be applied successively between each of the lines and earth, if there is no other specification.
c. The test procedure shall also consider the non-linear current-voltage characteristics of the equipment under test. Therefore the test voltage has to be increased by steps up to the test level specified in the product standard or test plan. All lower levels including the selected test level shall be satisfied.
d. For testing the secondary protection, the output voltage of the generator shall be increased up to the worst-case voltage breakdown level (let-through level) of the primary protection.
e. Testing shall be performed according to a Test Plan, which shall be included in the test report.
f. To find all critical points of the duty cycle of the equipment, a sufficient number of positive and negative test pulses shall be applied.

12.4.Test results

PASS

Temperature	:	25.1°C
Humidity	:	50%
Atmospheric Pressure	:	101kpa
Test Engineer	:	ZHT
Test Date	:	2022-1-5
Test Mode	:	

☒ AC mains power ports:

Coupling Line	Voltage (kV)	Waveform (μs)	Polarity	Actual criterion	Required performance criterion	Result (Pass/Fail)
☒ Line to line	1	1.2/50 (8/20)	Pos./ Neg.	A	B	Pass
☒ Line to earth	2	1.2/50 (8/20)	Pos./ Neg.	A	B	Pass

☒ DC network power ports:

Coupling Line	Voltage (kV)	Waveform (μs)	Polarity	Actual criterion	Required performance criterion	Result (Pass/Fail)
☒ Line to Reference line	0.5	1.2/50 (8/20)	Pos./ Neg.	A	B	Pass
☒ Line to Reference ground	1	1.2/50 (8/20)	Pos./ Neg.	A	B	Pass

☐ Signal and control (wired network) ports:

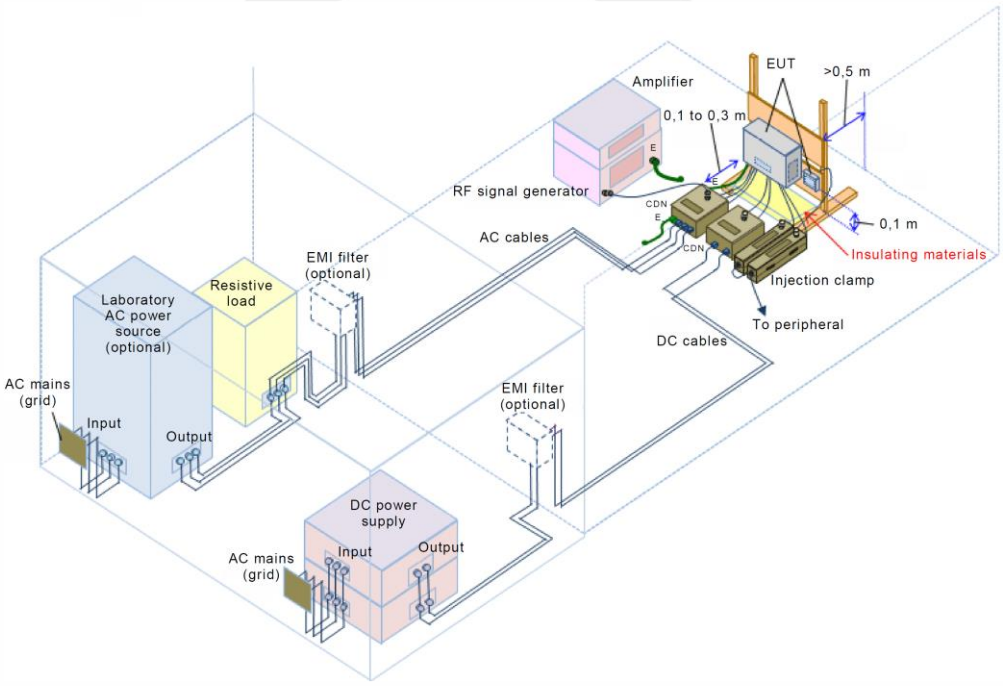
Port type	Coupling Line	Voltage (kV)	Waveform (μs)	Polarity	Actual criterion	Required performance criterion	Result (Pass/Fail)
☐ Signal and control (wired network) ports	Lines to ground	1	10/700 (5/320)	Pos./ Neg.	N/A	B	N/A

13. CONTINUOUS INDUCED RF DISTURBANCES

13.1. Test Specification

Test standard	:	EN 62920
Basic standard	:	IEC 61000-4-6
Performance criterion	:	A
Frequency range & Test level	:	0.15M to 80MHz, 3V
Modulation	:	AM 80%, 1kHz sine-wave
Frequency Step	:	1% of fundamental

13.2. Block Diagram of Test Setup



13.3. Test Procedure

a. The EUT shall be operated within its intended climatic conditions. The temperature and relative humidity should be recorded.
b. The EUT is placed on a 0.1m high insulating support, and a well grounded cable is connected to metallic plane above the test table.
c. All cables/wires must be laid out on test plate (3cm in thickness),and the EUT is set up on test plate (10 cm in thickness) as shown in test setup photo. Ensure that the EUT is properly connected to the accessory equipment. d. 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.
e. The frequency range is swept from 150 kHz to 80 MHz, using the signal levels established during the setting process, and with the disturbance signal 80% amplitude modulated with a 1 kHz sine wave, pausing to adjust the RF-signal level or to switch coupling devices as necessary. The rate of sweep shall

no exceed 1.5 x 10-3 decades/s. Where the frequency is swept incrementally, the step size shall no exceed 1% of the start and thereafter 1% of the preceding frequency value.
f. 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 e.g. clock frequency (ies) and harmonics or frequencies of dominant interest shall be analyzed separately.
g. Attempts should be made to fully exercise the EUT during testing, and to fully interrogate all exercise modes selected for susceptibility
h. Testing shall be performed according to a Test Plan, which shall be included in the test report.

13.4.Test results

PASS

Temperature	:	25.1°C
Humidity	:	50%
Atmospheric Pressure	:	101kpa
Test Engineer	:	ZHT
Test Date	:	2022-1-5
Test Mode	:	

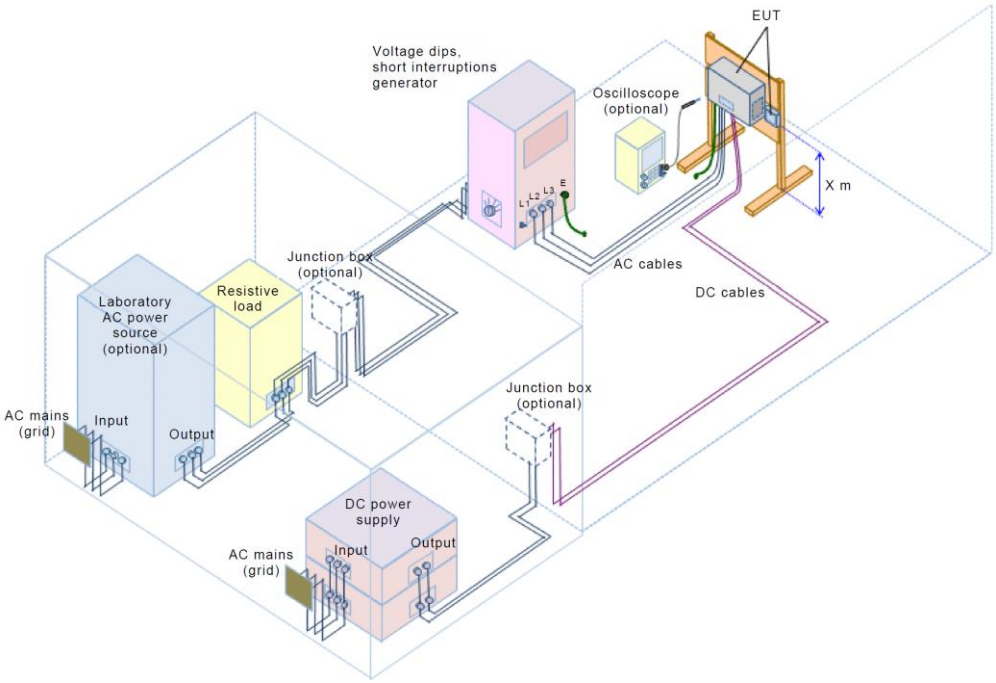
Range (MHz)	Levers (V)	Injection port	Coupling type	Actual criterion	Required performance criterion	Result (Pass/Fail)
0.15-80	3	☒AC mains power ports	☒CDN ☐EM Clamp ☐Current Clamp ☐Direct injection	A	A	Pass
0.15-80	3	☒DC network power ports	☐CDN ☒EM Clamp ☐Current Clamp ☐Direct injection	A	A	Pass
0.15-80	3	☐Signal and control (wired network) ports	☐CDN ☒EM Clamp ☐Current Clamp ☐Direct injection	N/A	N/A	N/A

14. VOLTAGE DIPS AND INTERRUPTIONS

14.1. Test Specification

Test standard	:	EN 62920
Basic standard	:	IEC 61000-4-11
Test level	:	☒0%, 1 period, Criterion B
		☒70%, 25 periods for 50Hz, Criterion C
		☐70%, 30 periods for 60Hz, Criterion C
		☒0%, 250 periods for 50Hz, Criterion C
		☐0%, 300 periods for 60Hz, Criterion C

14.2. Block Diagram of Test Setup



14.3. Test Procedure

a. Where the equipment has a rated voltage the following shall apply - If the voltage range does not exceed 20% of the lower voltage specified for the rated voltage range, a single voltage within that range may be specified as a basis for test level specification.
- In all other cases, the test procedure shall be applied for both the lowest and highest voltages declared in the voltage range.

b. Test Conditions
- Select operated voltage and frequency of EUT - Test of interval : 10 sec.

- Level and duration : Sequence of 3 dips/interrupts.
- Voltage rise (and fall) time : 1.5 μs.

14.4.Test results

PASS

Temperature	:	25.1°C
Humidity	:	50%
Atmospheric Pressure	:	101kpa
Test Engineer	:	ZHT
Test Date	:	2022-1-5
Test Mode	:	

	Test Level (% UT)	Phase angle (°)	Input Voltage (V)	Freq (Hz)	Duration (periods)	Actual criterion	Required performance criterion	Result (Pass /Fail)
☒Voltage dips	0%	0°~315°	AC 230V	50	0.5	A	B	Pass
☒Voltage dips	0%	0°~315°	AC 230V	50	1	A	B	Pass
☒Voltage dips	70%	0°~315°	AC 230V	50	25	A	C	Pass
☐Voltage dips	70%	0°~315°	AC 120V	60	30	N/A	N/A	N/A
☒Voltage interruptions	0%	0°~315°	AC 230V	50	250	B	C	Pass
☐Voltage interruptions	0%	0°~315°	AC 120V	60	300	N/A	N/A	N/A

Note: 1. Dips to 0%, Duration 250P, EUT stopped operation, but can be automatically restored.

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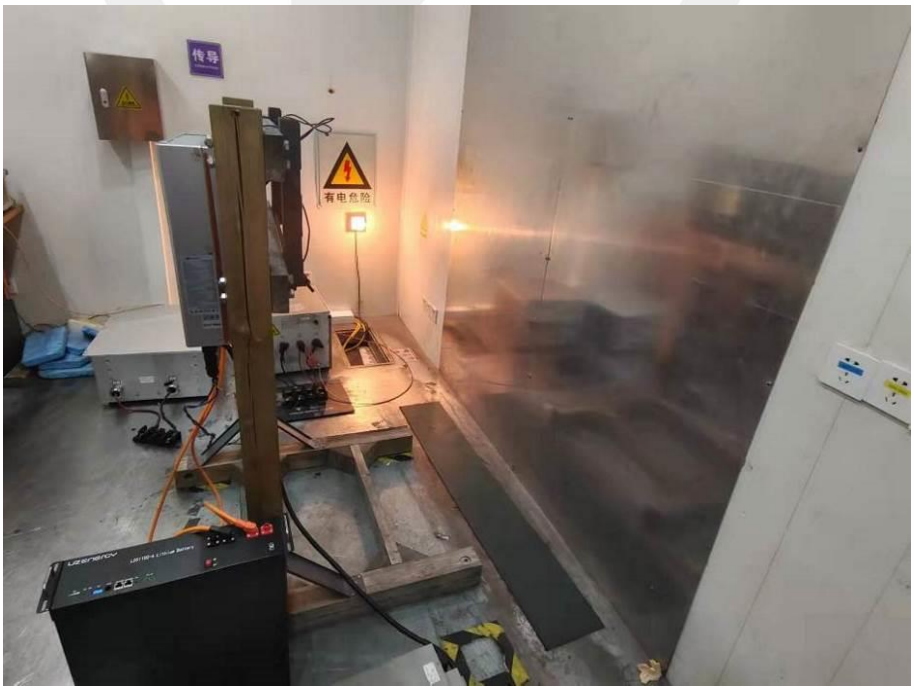
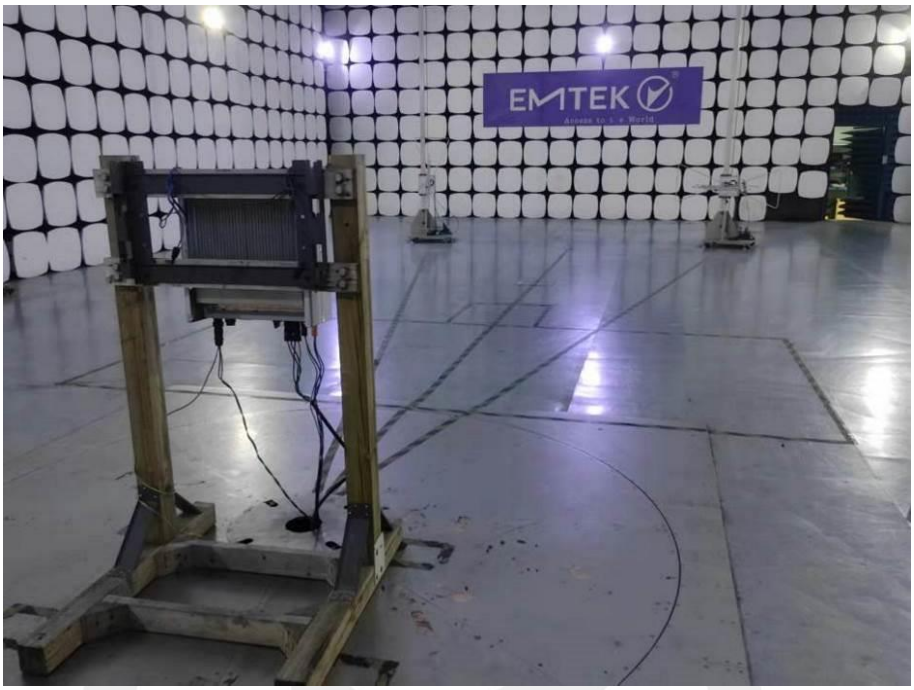
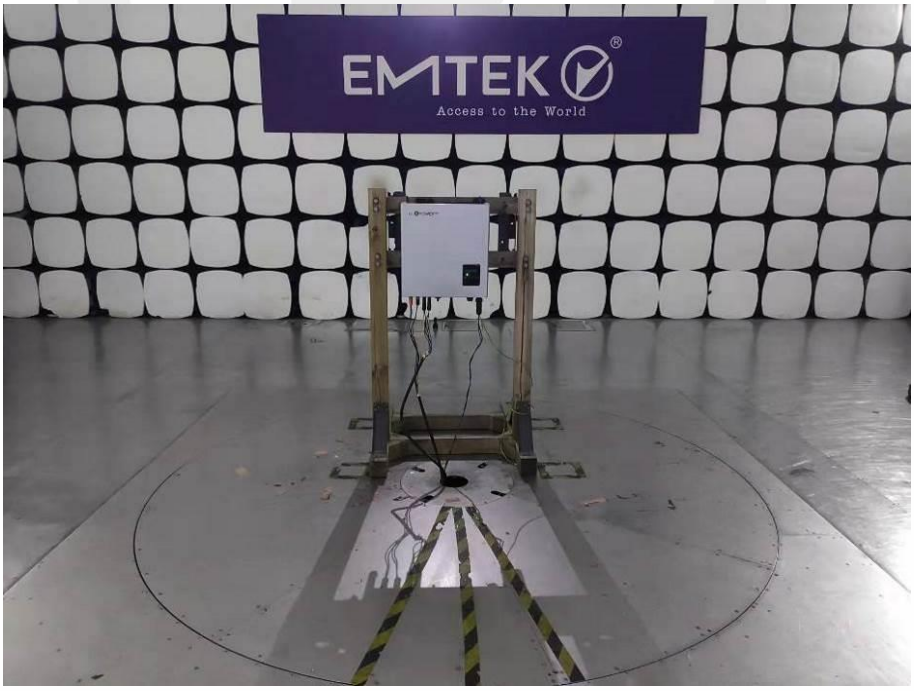
15. PHOTOGRAPHS

15.1. Photos of Disturbance Voltage at the AC Power Port



15.2.Photos of Radiation Emission Measurement

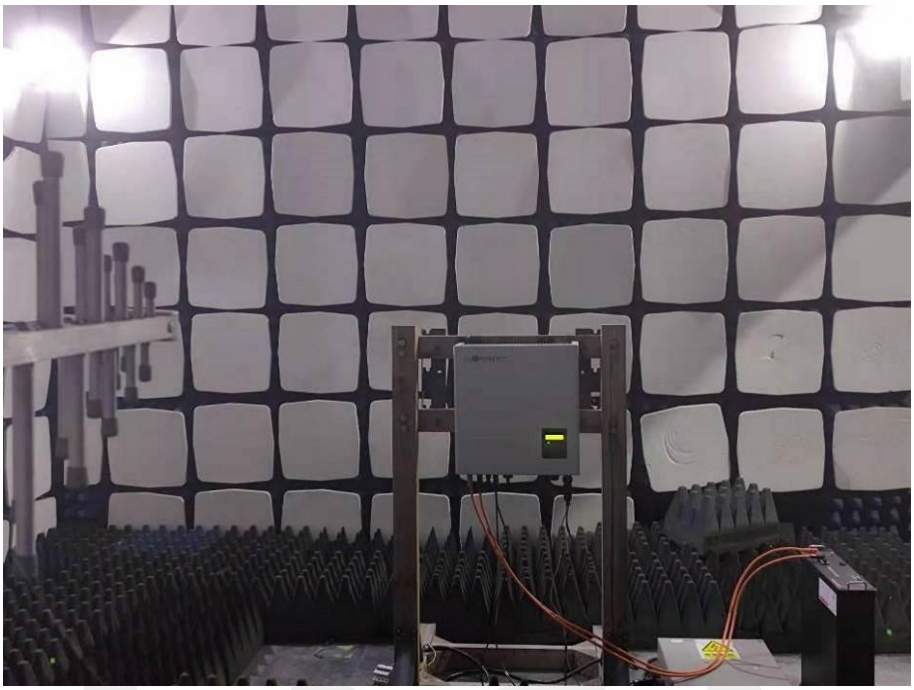


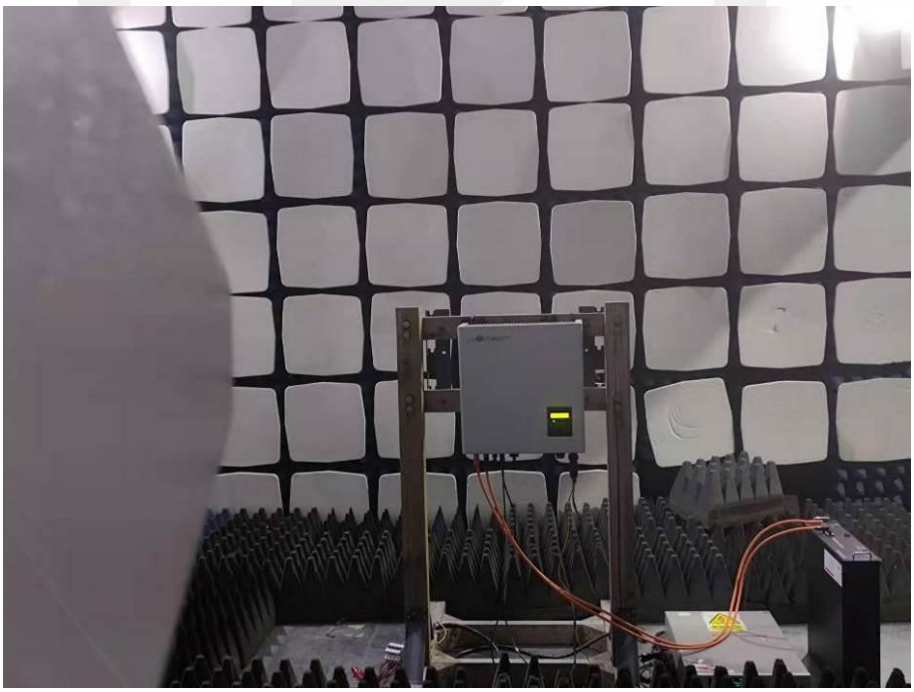


15.3.Photo of Harmonic / Flicker Measurement

15.4.Photo of Electrostatic Discharges

15.5.Photo of Continuous RF Electromagnetic Field Disturbances





15.6.Photos of Electrical Fast Transients/Burst

AC Mains:

DC Line

15.7.Photos of Surges

AC Mains:

DC Line

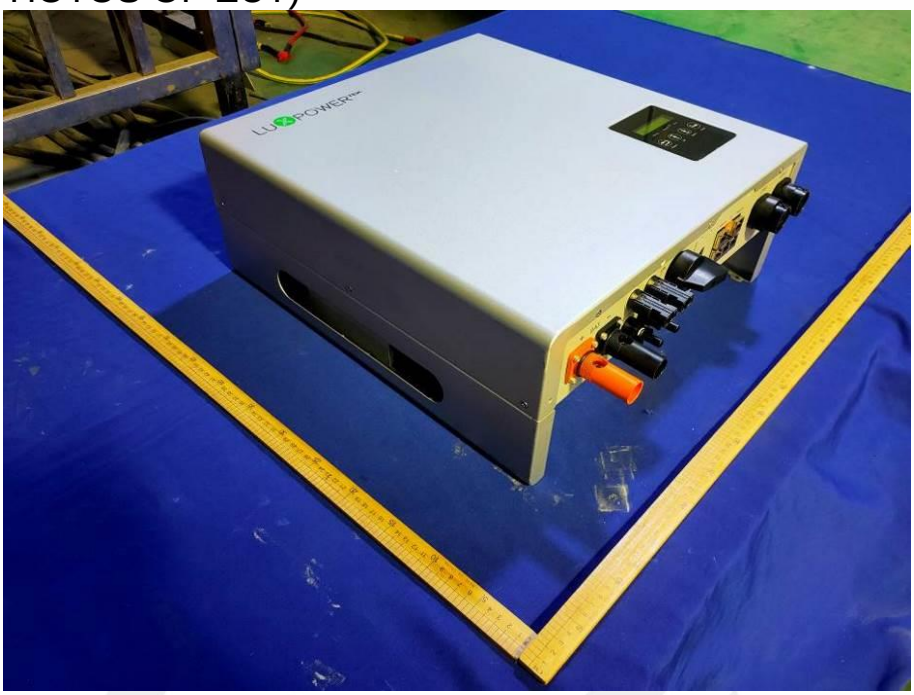
15.8.Photos of Continuous Induced RF Disturbances

AC Mains:

DC Line

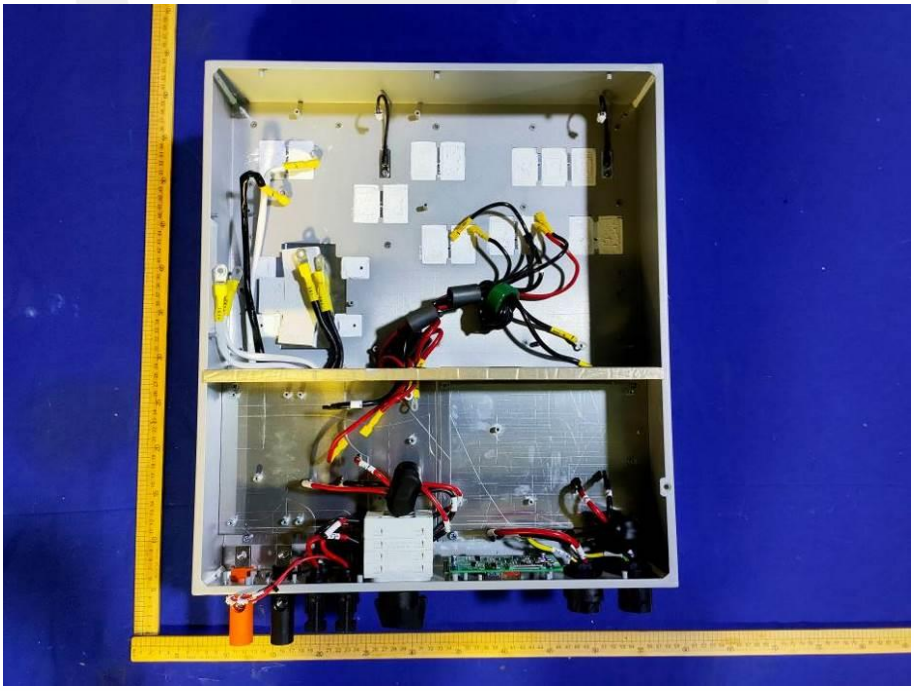
15.9.Photo of Voltage Dips and Interruptions

APPENDIX (PHOTOS OF EUT)




LUXPOWER TEK


+ BAT –
PV1
PV2
ON
OFF
WIRELESS COMMUNICATION
UPS
GRID



*** End of Report ***

Statement

1．This report is invalid without the signature of the authorized approver and "special seal for testing".

2．This report shall not be copied partly without authorization.

3．The test results or observations are applicable only to tested sample. Client shall be responsible for representativeness of the sample and authenticity of the material.

4．The observations or tests with special mark fall outside the scope of accreditation, and are only used for purpose of commission, research, training, internal quality control etc.

5．The test results or observations are provided in accordance with measured value, without taking risks caused by uncertainty into account. Without explicit stipulation in special agreements, standards or regulations, EMTEK shall not assume any responsibility.

6．Objections shall be raised within 20 days from the date receiving the report.