

CERTIFICATE OF CONFORMITY

Certificate No.: KEYS2022404002EM-02

Applicant : Shenzhen iTeaQ Power Co., Ltd.
Address : Floor 2, Building 1, EVOC Valley, No. 11 Gaoxin Avenue, Guangming District, Shenzhen, China.
Manufacturer : Shenzhen iTeaQ Power Co., Ltd.
Address : Floor 2, Building 1, EVOC Valley, No. 11 Gaoxin Avenue, Guangming District, Shenzhen, China.
Trade Mark : N/A
Product : UPS (Uninterruptible Power Supply)
Model No. : TM1110H, OL400, OL500, OL600, OL800, OL1000, OL1200, OL1500, OL2000, OL3000, TM1101S, TM1101H, TM1102S, TM1102H, TM1103S, TM1103H, TM1106S, TM1106H, TM1110S, TM3110H, TM3115H, TM3120H, RM1101S, RM1101H, RM1102S, RM1102H, RM1103S, RM1103H, RM1106S, RM1106H, RM1110S, RM1110H, RM3110H, RM3115H, RM3120H

The submitted sample of the above equipment has been tested and found to comply with the following European Directive:

EMC Directive - 2014/30/EU

The standard(s) used for showing compliance with the essential requirements in the specified directive(s):

Applicable Standard(s) **EN 62040-2:2018**
 EN 61000-3-2:2014
 EN 61000-3-3:2013

This certificate is part of the full test report(s) and should be read in conjunction with it. This certificate is based on an evaluation of one sample of above mentioned product. It does not imply assessment of the production of the product. Without the written approval of Dongguan KEYS Testing Technology Co., Ltd., this certificate is not permitted to be reproduced, except in full. It is not permitted to use the test lab's logo. The CE marking may only be used if all the relevant and effective European Directives are applicable.



Date: March 16, 2022

Dongguan KEYS Testing Technology Co., Ltd.

6 / f, Building B, Chuangyigu Industrial Park, No.5 Hehe Street, Songxi Road, Hengkeng, Liaobu, Dongguan City
Tel: +86-0769-89798319

<http://www.keys-lab.com> E-mail: info@keys-lab.com

CE EMC TEST REPORT

for

Product: UPS (Uninterruptible Power Supply)

**Model: TM1110H, OL400,OL500,OL600,OL800,OL1000,OL1200,
OL1500,OL2000,OL3000,TM1101S,TM1101H,TM1102S,TM1102H,TM1103S,
TM1103H,TM1106S,TM1106H,TM1110S,TM3110H,TM3115H,TM3120H,
RM1101S,RM1101H,RM1102S,RM1102H,RM1103S,RM1103H,RM1106S,RM1106H,
RM1110S,RM1110H,RM3110H,RM3115H,RM3120H**

Report No.: KEYS22022404002EM-02

Issued for

Shenzhen iTeaQ Power Co., Ltd.

**Floor 2, Building 1, EVOC Valley, No. 11 Gaoxin Avenue, Guangming District,
Shenzhen, China.**

Issued by

Dongguan KEYS Testing Technology Co., Ltd.

**6 / f, Building B, Chuangyigu Industrial Park, No.5 Hehe Street, Songxi Road,
Hengkeng, Liaobu, Dongguan City**

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Photos of EUT

1.TEST CERTIFICATION

Product:	UPS (Uninterruptible Power Supply)
Model:	TM1110H, OL400,OL500,OL600,OL800,OL1000,OL1200, OL1500,OL2000,OL3000,TM1101S,TM1101H,TM1102S,TM1102H, TM1103S,TM1103H,TM1106S,TM1106H,TM1110S,TM3110H, TM3115H,TM3120H,RM1101S,RM1101H,RM1102S, RM1102H,RM1103S,RM1103H,RM1106S,RM1106H,RM1110S, RM1110H,RM3110H,RM3115H,RM3120H
Applicant :	Shenzhen iTeaQ Power Co., Ltd.
Address:	Floor 2, Building 1, EVOC Valley, No. 11 Gaoxin Avenue, Guangming District, Shenzhen, China.
Manufacturer:	Shenzhen iTeaQ Power Co., Ltd.
Address:	Floor 2, Building 1, EVOC Valley, No. 11 Gaoxin Avenue, Guangming District, Shenzhen, China.
Test Date:	March 08, 2022 to March 16, 2022
Issued Date:	March 16, 2022
Power supply:	208/220/230/240Vac, 50/60Hz,192Vdc,10kVA/0.9kW
Applicable Standards:	EN 62040-2:2018 EN 61000-3-2:2014 EN 61000-3-3:2013

The above equipment has been tested by Dongguan KEYS Testing Technology Co., Ltd. and found compliance with the requirements in the technical standards mentioned above. The test results presented in this report only relate to the product/system tested. The Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Test Engineer:

Sunny Li Engineer



Technical Manager:

Jason Zhan /Manager

1.2. Test Standards

Test Standards	
EN 62040-2:2018	Uninterruptible power systems (UPS) Part 2: Electromagnetic compatibility (EMC) requirements
EN 61000-3-2:2014	Electromagnetic compatibility(EMC)-Part 3-2:Limits-Limits for harmonic current emissions(equipment input current 0 16A per phase)
EN 61000-3-3:2013	Electromagnetic compatibility(EMC)-Part 3-3:Limits-Limitation of voltage changes,Voltage fluctuations and flicker in public low-voltage supply systems. For equipment with Rated current 0 16A per phase and not subject to conditional connection

1.3. Test Summary

- √ Indicates that the test is applicable
x Indicates that the test is not applicable

Standard	Test Items	Status
EN 62040-2:2018	Disturbance Voltage at The Mains Terminals (150KHz To 30MHz)	√
	Radiated Disturbances (30MHz To 1000MHz)	√
EN 61000-3-2:2014	Harmonic Current	√
EN 61000-3-3:2013	Voltage Fluctuations	√
EN 61000-4-2:2009	Electrostatic discharge Immunity	√
EN IEC 61000-4-3:2020	Radiated Susceptibility (80MHz to 1GHz)	√
EN 1000-4-4:2012	Electrostatic Fast Transient/Burst Immunity	√
EN 61000-4-5:2014 +A1:2017	Surge Immunity	√
EN 1000-4-6:2014	Conducted Susceptibility (150KHz to 80MHz)	√
EN 1000-4-8:2010	Power Frequency Magnetic Field Immunity (50/60Hz)	√

1.4. Test Methodology

All measurements contained in this report were conducted with CISPR 16-1, radio disturbance and immunity measuring apparatus, and CISPR16-2, Method of measurement of disturbances and immunity.

1.5. Test Facility

Dongguan KEYS Testing Technology Co., Ltd.

Address: 6 / f, Building B, Chuangyigu Industrial Park, No.5 Hehe Street, Songxi Road, Hengkeng, Liaobu, Dongguan City

2. MEASURING DEVICE AND TEST EQUIPMENT

2.1. For Power Line Conducted Emission

Name of Equipment	Manufacturer	Model	Serial No.	Calibration Due
Magnetic Field Tester	HTEC	HPFMF	142104	Sep. 19, 2022

2.2. For Radiated Emission Measurement

Name of Equipment	Manufacturer	Model	Serial No.	Calibration Due
EMI Test Receiver	Rohde&Schwarz	ESCI	101417	Sep. 19, 2022
Bilog Antenna	SCHWARZBECK	VULB 9168	9168-572	Sep. 21, 2022
Preamplifier (low frequency)	SCHWARZBECK	BBV 9475	9745-0013	Sep. 19, 2022
EMI Test Receiver	Rohde&Schwarz	ESCI	101417	Sep. 19, 2022
Spectrum Analyzer	Agilent	E4407B	MY45109572	Oct. 12, 2022
Horn Antenna	SCHWARZBECK	9120D	9120D-1246	Sep. 26, 2022
LOW NOISE AMPLIFIER	ZHINAN	ZN3380C	15002	Sep. 19, 2022

2.3. For Harmonic Current / Flicker Measurement

Name of Equipment	Manufacturer	Model	Serial No.	Calibration Due
Harmonics / Flicker Test System	California Instruments	CTS/PACS-1-115	1534A00401	Sep. 19, 2022
AC Power Source	California Instruments	3001IX-208-CTS	1534A00401	Sep. 19, 2022

2.4. For Electrostatic Discharge Immunity Test

Name of Equipment	Manufacturer	Model	Serial No.	Calibration Due
ESD Generator	SCHLODER	SESD216	606137	Dec. 14, 2022

2.5. For RF Strength Susceptibility Test

Name of Equipment	Manufacturer	Model	Serial No.	Calibration Due
Signal Generator	Agilent	N517113-50B	MY53050160	Sep. 19, 2022
Amplifier	A&R	150W1000M3	313157	Sep. 19, 2022
Amplifier	A&R	50SIG6M2	0342835	Sep. 19, 2022
Antenna	SCHWARZBECK	STLP9149	9149.222	Sep. 19, 2022
Isotropic Field Probe	A&R	FL7006	0342652	Sep. 19, 2022
Log-periodic Antenna	SCHWARZBECK	STLP 9128E	9128E-012	Sep. 19, 2022

2.6. For Electrical Fast Transient /Burst Immunity Test

Name of Equipment	Manufacturer	Model	Serial No.	Calibration Due
EFT Tester	HTEC	HEFT 51	1416010	Sep. 19, 2022
EFT Coupling Clamp	HTEC	HEFT 51-C	1416011	Sep. 19, 2022

2.7. For Surge Immunity Test

Name of Equipment	Manufacturer	Model	Serial No.	Calibration Due
Surge Tester	HTEC	HCWG 71	174302	Sep. 19, 2022
Surge Tester	HTEC	TCOMB 4	142103	Sep. 19, 2022
Surge Tester	HTEC	HTSG 70	175002	Sep. 19, 2022

2.8. For Injected Current Susceptibility Test

Name of Equipment	Manufacturer	Model	Serial No.	Calibration Due
C/S Test System	SCHLODER	CDG-6000-25	126A1279/2014	Sep. 19, 2022
Coupling Decoupling Network	SCHLODER	CDN-M2+3	A2210251/2013	Sep. 19, 2022
Electromagnetic Injection Clamp	Luthi	EM101	36041	Sep. 19, 2022

2.9. For Magnetic Field Immunity Test

Name of Equipment	Manufacturer	Model	Serial No.	Calibration Due
Surge Tester	HTEC	HCWG 71	174302	Sep. 19, 2022
Surge Tester	HTEC	TCOMB 4	142103	Sep. 19, 2022
Surge Tester	HTEC	HTSG 70	175002	Sep. 19, 2022

2.10. For Voltage Dips and Interruptions Test

Name of Equipment	Manufacturer	Model	Serial No.	Calibration Due
Dips Tester	HTEC	HPFS	1416009	Sep. 19, 2022

3. POWER LINE CONDUCTED EMISSION MEASUREMENT

3.1. Block Diagram of Test Setup

AC Mains

Test
Receiver

EUT

(EUT: Uninterruptible power supply(UPS))

3.2. Measuring Standard

EN 62040-2:2018

Power Line Conducted Emission Limits (Category C1)

Frequency (MHz)	Limit (dB μ V)	
	Quasi-Peak Level	Average Level
0.15 ~ 0.50	56	46
0.50 ~ 5.00	56	46
5.00 ~ 30.00	60	50

3.3. EUT Configuration on Measurement

The following equipments are installed on Conducted Emission Measurement to meet EN55032 requirements and operating in a manner which tends to maximize its emission characteristics in a normal application.

3.4. Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and connected to the AC mains through Line Impedance Stability Network (L.I.S.N). This provided a 50ohm coupling impedance for the tested equipments. Both sides of AC line are investigated to find out the maximum conducted emission according to the EN 55022 regulations during conducted emission measurement.

The bandwidth of the field strength meter (R&S Test Receiver ESCS30) is set at 9KHz in 150KHz~30MHz and 200Hz in 9KHz~150KHz.

The frequency range from 150kHz to 30MHz is investigated .

Conduction Uncertainty: $U_c = f \quad 2.72 \text{ dB}$

Conducted Emission Test Data

EUT	: Uninterruptible power supply(UPS)	Temperature:	20
Model	TM1110H	Humidity :	50Á
Test Voltage	: AC 230V/50Hz	Test Mode :	Normal Working
Test Engineer	Brian	Phase :	L-Line



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.4820	49.05	-0.03	49.02	56.30	-7.28	QP	
2	*	0.4820	43.02	-0.03	42.99	46.30	-3.31	AVG	
3		0.8460	50.00	-0.08	49.92	56.00	-6.08	QP	
4		0.8980	41.75	-0.10	41.65	46.00	-4.35	AVG	
5		1.4380	40.71	-0.18	40.53	46.00	-5.47	AVG	
6		1.4420	50.47	-0.18	50.29	56.00	-5.71	QP	
7		2.4020	50.53	-0.24	50.29	56.00	-5.71	QP	
8		2.4020	41.75	-0.24	41.51	46.00	-4.49	AVG	
9		4.6819	50.22	-0.21	50.01	56.00	-5.99	QP	
10		4.6819	40.36	-0.21	40.15	46.00	-5.85	AVG	
11		12.6019	54.63	-0.14	54.49	60.00	-5.51	QP	
12		12.7219	43.14	-0.15	42.99	50.00	-7.01	AVG	

Conducted Emission Test Data

EUT	: Uninterruptible power supply(UPS)	Temperature:	20
Model	TM1110H	Humidity	: 50Á
Test Voltage	: AC 230V/50Hz	Test Mode	: Normal Working
Test Engineer	Brian	Phase	: N-Line

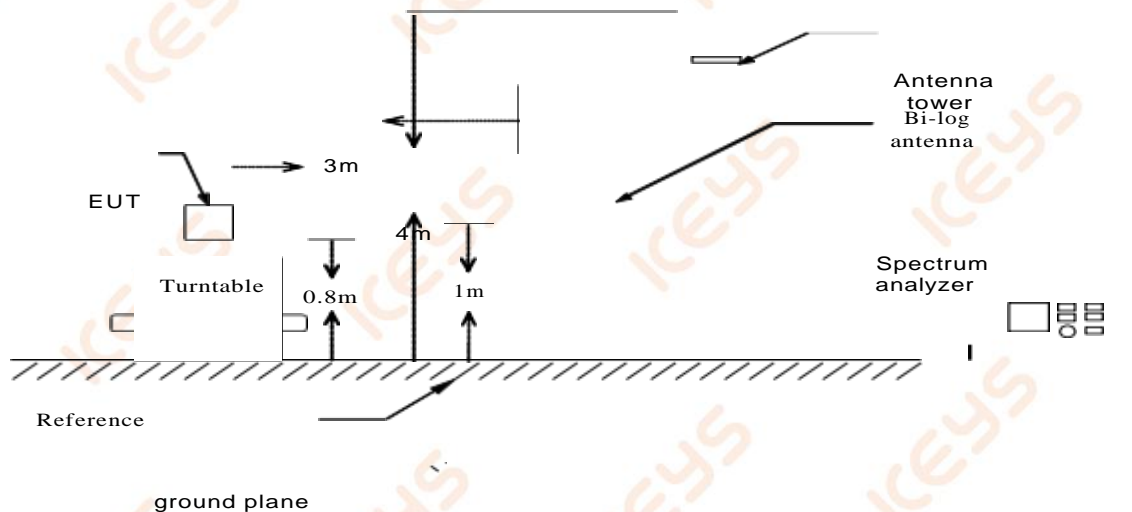


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.5980	49.31	-0.04	49.27	56.00	-6.73	QP	
2	*	0.5980	41.57	-0.04	41.53	46.00	-4.47	AVG	
3		1.0820	49.39	-0.13	49.26	56.00	-6.74	QP	
4		1.0820	40.88	-0.13	40.75	46.00	-5.25	AVG	
5		1.8020	48.69	-0.21	48.48	56.00	-7.52	QP	
6		1.8020	38.65	-0.21	38.44	46.00	-7.56	AVG	
7		2.2740	49.08	-0.25	48.83	56.00	-7.17	QP	
8		2.2740	40.65	-0.25	40.40	46.00	-5.60	AVG	
9		6.1179	44.16	-0.25	43.91	50.00	-6.09	AVG	
10		6.1379	54.71	-0.25	54.46	60.00	-5.54	QP	
11		13.6859	51.71	-0.17	51.54	60.00	-8.46	QP	
12		13.9259	41.74	-0.19	41.55	50.00	-8.45	AVG	

4. RADIATED EMISSION MEASUREMENT

4.1. Block Diagram of Test

4.1.1. Block diagram of test setup (In chamber)



4.2. Measuring Standard

EN 62040-2:2018

4.3. Radiated Emission Limits

All emanations from a Category C1 device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified below:

FREQUENCY (MHz)	DISTANCE (Meters)	FIELD STRENGTHS LIMIT (dB μ V/m)
30 ~ 230	3	40
230 ~ 1000	3	47

Note: (1) The smaller limit shall apply at the combination point between two frequency bands.

(2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the EUT.

4.4. EUT Configuration on Test

The EN55032 regulations test method must be used to find the maximum emission during radiated emission measurement.

4.5. Operating Condition of EUT

4.5.1. Turn on the power.

4.5.2. After that, let the EUT work in test mode (Normal) and measure it.

4.6. Test Procedure

The EUT is placed on a turn table which is 0.8 meter high above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on an antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Bilog antenna (calibrated by Dipole Antenna) is used as a receiving antenna. Both horizontal and vertical polarization of the antenna are set on test.

The bandwidth of the Receiver (ESCI 3) is set at 120KHz below 1 GHz.
Above 1 GHz (1MHz resolution bandwidth)

Radiated Emission Test Data

EUT	: Uninterruptible power supply(UPS)	Temperature:	20
Model	TM1110H	Humidity	50Á
Test Voltage	: AC 230V/50Hz	Test Mode	Normal Working
Test Engineer	Brian	Polarization	: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		73.3593	48.20	-18.41	29.79	40.00	-10.21	QP		
2	*	117.3602	47.53	-12.82	34.71	40.00	-5.29	QP		
3		128.1129	43.28	-12.58	30.70	40.00	-9.30	QP		
4		158.6676	42.09	-13.02	29.07	40.00	-10.93	QP		
5		208.5801	46.27	-14.37	31.90	40.00	-8.10	QP		
6		219.8448	43.04	-14.24	28.80	40.00	-11.20	QP		

Radiated Emission Test Data

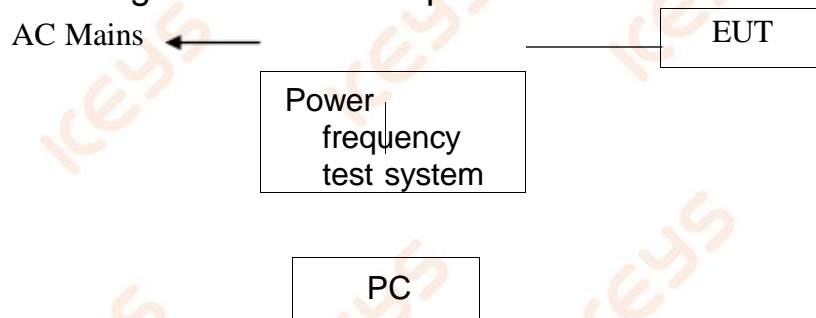
EUT	: Uninterruptible power supply(UPS)	Temperature:	20
Model	TM1110H	Humidity	50Á
Test Voltage	: AC 230V/50Hz	Test Mode	Normal Working
Test Engineer	Brian	Polarization	: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	cm	degree	Comment
1	!	30.5304	40.19	-5.34	34.85	40.00	-5.15	QP		
2	*	46.3402	52.74	-16.85	35.89	40.00	-4.11	QP		
3	!	73.3593	54.49	-18.94	35.55	40.00	-4.45	QP		
4	!	118.6012	47.04	-12.62	34.42	40.00	-5.58	QP		
5		159.7844	40.04	-12.91	27.13	40.00	-12.87	QP		
6		210.7860	43.87	-14.49	29.38	40.00	-10.62	QP		

5. HARMONIC CURRENT EMISSION MEASUREMENT

5.1 Block Diagram of Test Setup



(EUT: Uninterruptible power supply(UPS))

5.2 Measuring Standard

EN 61000-3-2: 2014

5.3 Description of test Equipment

Note:

.

Current Test Result Summary (Run time)

EUT: Uninterruptible power supply(UPS)

Tested by: Brian

M/N: TM1110H

Test category: Class-A per A- 14 (European limits)

End time: 17:17:46

Test date: 2022-03-14

Start time: 16:15:25

Test duration (min): 2.5

Data file name: H-03114.cts_data

Comment: On

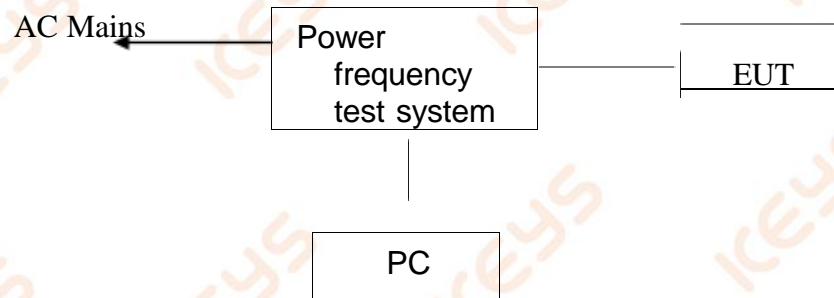
Humi:54%

Temp:25.3'C

Harmonic #	Harm(avg)	100%Limits	% ofLimit	Harm (max)	150%Limit	% ofLimit	Status
2	0.11	1.07	11.10	0.133	1.61	8.14	pass
3	1.67	2.32	73.05	1.71	33.46	49.37	pass
4	0.08	0.44	18.60	0.10	10.65	15.66	pass
5	0.31	1.14	27.19	0.35	11.71	20.53	pass
6	0.03	0.31	10.00	0.04	20.45	9.33	pass
7	0.21	0.76	27.27	0.223	1.16	19.31	pass
8	0.03	0.25	13.04	0.044	0.35	12.75	pass
9	0.11	0.42	27.50	0.135	0.60	22.50	pass
10	0.04	0.20	21.74	0.049	0.28	17.75	pass
11	0.1	0.37	30.30	0.122	0.50	24.65	pass
12	0.03	0.10	19.57	0.048	0.23	20.87	pass
13	0.08	0.22	38.10	0.102	0.32	32.38	pass
14	0.03	0.14	22.83	0.0403	0.20	20.44	pass
15	0.02	0.15	13.33	0.031	0.23	13.78	pass
16	0.02	0.12	17.39	0.03	10.17	17.97	pass
17	0.02	0.13	15.11	0.032	0.20	16.12	pass
18	0.01	0.10	9.78	0.015	0.15	9.78	pass
19	0.01	0.12	8.44	0.013	0.18	7.32	pass
20	0.01	0.09	10.87	0.017	0.14	12.32	pass
21	0.01	0.11	9.33	0.01 8	0.16	11.20	pass
22	0.01	0.08	11.96	0.012	0.13	9.57	pass
23	0.01	0.10	10.22	0.015	0.15	10.22	pass
24	0.01	0.08	13.04	0.012	0.12	10.43	pass
25	0.01	0.09	11.11	0.014	0.14	10.37	pass
26	0.01	0.07	14.13	0.015	0.11	14.13	pass
27	0.01	0.08	12.00	0.015	0.13	12.00	pass
28	0.01	0.07	15.22	0.017	0.10	17.25	pass
29	0.01	0.08	12.89	0.012	0.12	10.31	pass
30	0.01	0.06	16.30	0.013	0.09	14.13	pass
31	0.01	0.07	13.78	0.012	0.11	11.02	pass
32	0.01	0.06	17.39	0.013	0.09	15.07	pass
33	0.01	0.07	14.67	0.013	0.10	12.71	pass
34	0.01	0.06	18.48	0.015	0.08	18.48	pass
35	0.01	0.07	15.56	0.016	0.10	16.59	pass
36	0.01	0.04	19.57	0.014	0.08	18.26	pass
37	0.01	0.04	16.44	0.016	0.09	17.54	pass
38	0.01	0.05	20.65	0.018	0.07	24.78	pass
39	0.01	0.05	17.33	0.014	0.09	16.18	pass
40	0.01	0.04	21.74	0.016	0.07	23.19	pass

6.VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT

6.1Block Diagram of Test Setup



(EUT: Uninterruptible power supply(UPS))

6.2Measuring Standard

EN 61000-3-3:2013

Flicker Test Result Summary (Run time)

EN 61000-3-3 TEST REPORT 2022-03-14 15:39

E. U. T.: Uninterruptible power supply(UPS) Model: TM1110H

Test mode: Normal Working

Operator: Brian

TEST SETUP

Test Freq.: 50.00 Hz. Test Voltage: 220.2vac
Waveform : SINE
Test Time: 120.0 min. Tshort: 10.0 min.
Prog. Zo Enabled: YES Prog. Zo: 0.000
Voltage Change less than once per Hour: NO
Impedance selected: IEC-725 STD. REF.
Synthetic R+L Enabled: NO
Resistance: 0.380 Ohms Inductance: 460.000 uH

TEST DATA

Result: PASS

	EUT Data	Limit	Result	Test Enabled
Pst max	0.255	1.00	PASS	true
Plt max	0.186	0.65	PASS	true
dc %	0.002	3.30	PASS	true
dmax %	1.440	4.00	PASS	true
d(t) sec.	0.000	0.50	PASS	true

7. ELECTROSTATIC DISCHARGE IMMUNITY TEST

7.1 Block Diagram of Test Setup

7.1.1 Block Diagram of the EUT and the simulators

Auxiliary



(EUT: Uninterruptible power supply(UPS))

7.1.2 Block diagram of ESD test setup



0.8 m

(EUT: Uninterruptible power supply(UPS))

7.2 Test Standard

(IEC 61000-4-2: 2009)

Severity Level: 3 / Air Discharge: f 8KV Level: 2 / Contact Discharge: f 4KV)

7.3 Severity Levels and Performance Criterion

7.3.1 Severity level

Level	Test Voltage Contact Discharge (KV)	Test Voltage Air Discharge (KV)
1.	f 2	f 2
2.	f 4	f 4
3.	f 6	f 8
4.	f 8	f 15
X	Special	Special

7.3.2 Performance criterion: **B**

7.4 Test Procedure

7.4.1 Air Discharge:

This test is done on a non-conductive surface. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT. After each discharge, the discharge electrode shall be removed from the EUT. The generator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

7.4.2 Contact Discharge:

All the procedure shall be same as Section 7.4.1. except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

7.4.3 Indirect discharge for horizontal coupling plane

At least 10 single discharges (in the most sensitive polarity) shall be applied at the front edge of each HCP opposite the center point of each unit (if applicable) of the EUT and 0.1m from the front of the EUT. The long axis of the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge.

7.4.4 Indirect discharge for vertical coupling plane

At least 10 single discharge (in the most sensitive polarity) shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

Electrostatic Discharge Test Result

EUT	Uninterruptible power supply(UPS)	Temperature:	20
Model	TM1110H	Humidity	: 50Á
Test Voltage	AC 230V/50Hz	Test Mode	: Normal Working
Test Engineer	Brian	Test Date	2022-03-14

Air Discharge: f 8KV # For each point positive 10 times and negative 10 times discharge.
Contact Discharge: f 4KV # For each point positive 10 times and negative 10 times discharge.

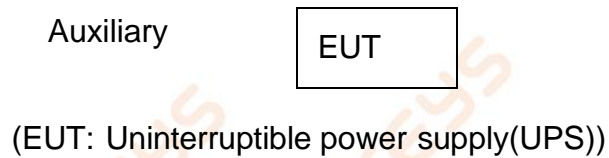
Location	Discharge Points	Kind A-Air Discharge C-Contact Discharge	Result
HCP	4 Points	C	PASS
VCP	4 Points	C	PASS
Metal	40 Points	C	PASS
Screw	10 Points	C	PASS
Slot	4 Points	A	PASS
Button	4 Points	A	PASS
/	/	/	/
/	/	/	/
/	/	/	/
/	/	/	/
/	/	/	/
/	/	/	/
/	/	/	/
/	/	/	/
/	/	/	/

Note: (The Criterion) A:Normal performance within the specification limits; B:Temporary degradation or less of function or performance which is self-recoverable; C:Temporary degradation or loss of function or performance which requires operator intervention or system reset;	Test Equipment :ESD Tester Model: ESD61002A
---	--

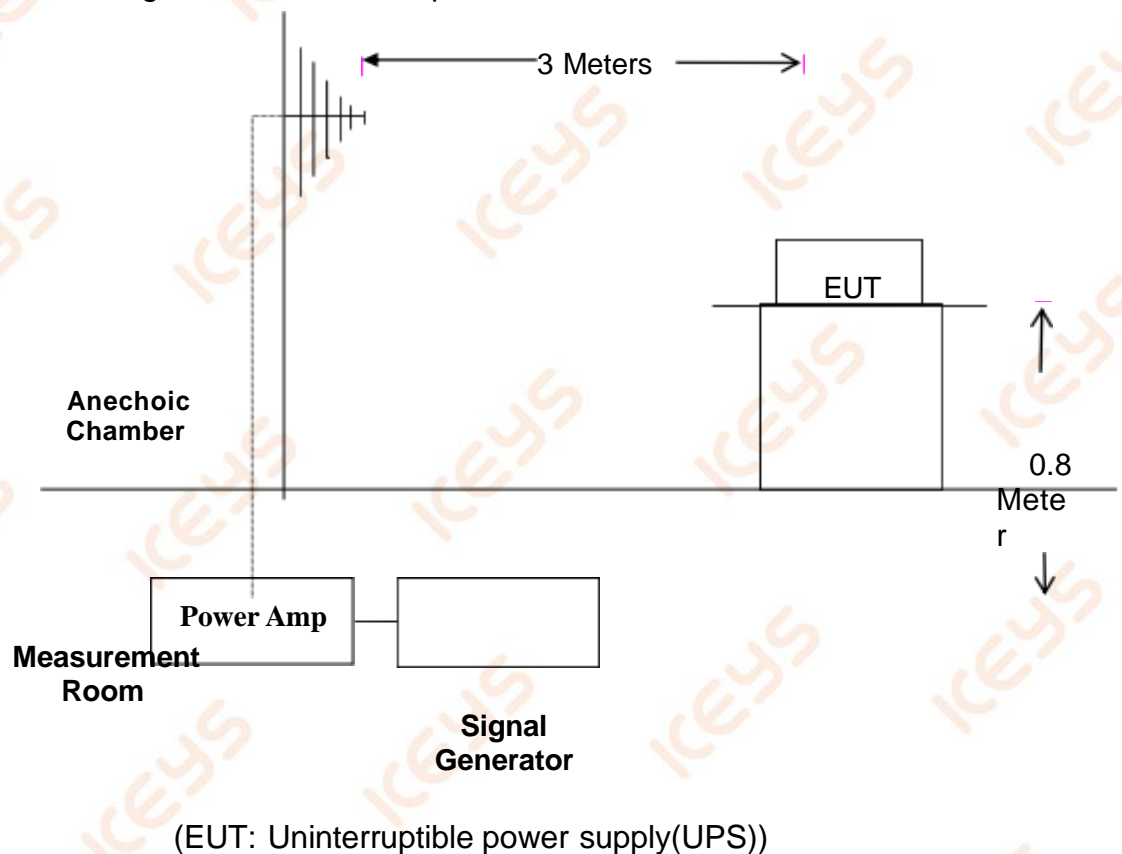
8. RF FIELD STRENGTH SUSCEPTIBILITY TEST

8.1 Block Diagram of Test

8.1.1 Block diagram of connection between the EUT and Load



8.1.2 Block diagram of RS test setup



8.2 Test Standard

(EN 61000-4-3: 2006 (Severity Level: 2, 3V / m))

8.3 Severity Levels and Performance Criterion

8.3.1 Severity Levels

Level	Field Strength V/m
1.	1
2.	3
3.	10
X	Special

8.3.2 Performance Criterion : A

8.4 Test Procedure

The EUT are placed on a table which is 0.8 meter high above the ground. The EUT is set 3 meters away from the transmitting antenna which is mounted on an antenna tower. Both horizontal and vertical polarization of the antenna are set on test. Each of the four sides of the EUT must be faced this transmitting antenna and measured individually. In order to judge the EUT performance, a CCD camera is used to monitor its screen. All the scanning conditions are as following:

Condition of Test	Remark
1. Fielded Strength	3V/m (Severity Level 2)
2. Radiated Signal	Modulated
3. Scanning Frequency	80- 1000MHz, 1000-2500MHz
4. Sweep time of radiated	0.0015 Decade/s
2. Dwell Time	3 Sec.

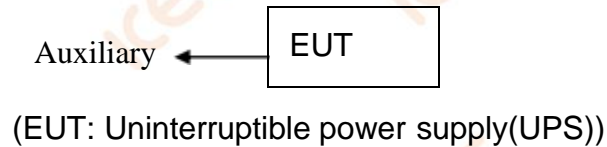
RF Field Strength Susceptibility Test Results

EUT	Uninterruptible power supply(UPS)			Temperature	22		
Model	TM1110H			Humidity	50 Å		
Test Voltage	AC 230V/50Hz			Test Mode	Normal Working		
Field Strength	3 V/m			Test Date	2022-03-14		
Test Engineer:	Brian			Frequency Range:	80 MHz to1000 MHz		
Modulation:				<input type="checkbox"/> None	<input type="checkbox"/> Pulse	<input checked="" type="checkbox"/> AM 1KHz 80%	
		Frequency Rang 1: 80~ 1000MHz			Frequency Rang 2: 1000MHz~2500MH Z		
Steps	1	/	%	#	/	%	
	Horizontal		Vertical	Horizontal		Vertical	
Front	PASS		PASS	PASS		PASS	
Right	PASS		PASS	PASS		PASS	
Rear	PASS		PASS	PASS		PASS	
Left	PASS		PASS	PASS		PASS	
Test Equipment : 1. Signal Generator : 2031 (MARCONI) 2. Power Amplifier : 500A100 & 100W/1000M1 (A&R) 3. Power Antenna : 3108 (EMCO) & AT1080 (A&R) 4. Field Monitor : FM2000 (A&R)							
Note: Note: (The Criterion) A:Normal performance within the specification limits; B:Temporary degradation or less of function or performance which is self-recoverable; C:Temporary degradation or loss of function or performance which requires operator intervention or system reset;							

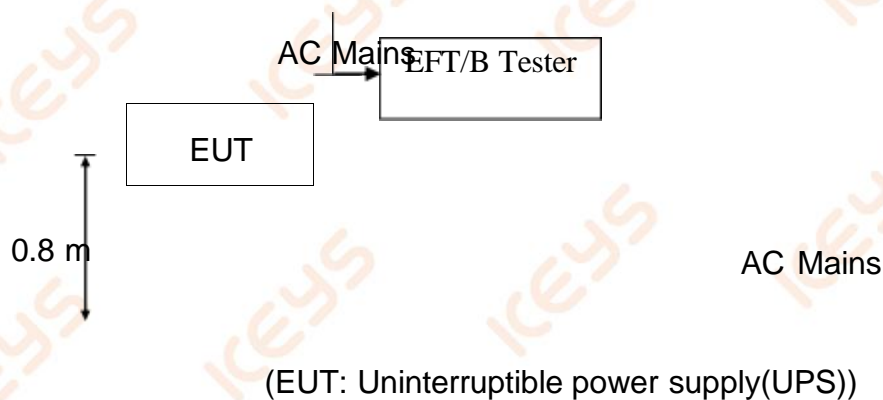
9. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

9.1 Block Diagram of Test Setup

9.1.1. Block Diagram of the EUT



9.1.2. EFT Test Setup



9.2 Test Standard

(EN 61000-4-4:2012, Severity Level, Level 2: 1KV)

9.3 Severity Levels and Performance Criterion

9.3.1 Severity level

Open Circuit Output Test Voltage $f = 10\text{A}$		
Level	On Power Supply Lines	On I/O (Input/Output) Signal data and control lines
1.	0.5 KV	0.25 KV
2.	1 KV	0.5 KV
3.	2 KV	1 KV
4.	4 KV	2 KV
X	Special	Special

9.3.2 Performance criterion : **B**

9.4 Test Procedure

The EUT is put on the table which is 0.8 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.

9.4.1 For input and output AC power ports:

The EUT is connected to the power mains by using a coupling device which couples the EFT interference signal to AC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 2 mins.

9.4.2 For signal lines and control lines ports: No I/O ports. ,W unnecessary to test.

9.4.3 For DC output line ports: ,W unnecessary to test.

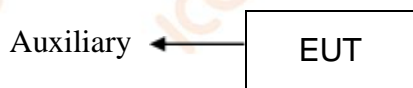
Electrical Fast Transient/Burst Test Results

EUT	Uninterruptible power supply(UPS)	Temperature:	20
Model	TM1110H	Humidity :	50Á
Test Voltage	AC 230V/50Hz	Test Mode :	Normal Working
Test Engineer	Brian	Test Date :	2022-03-14
Line: <input checked="" type="checkbox"/> AC Mains <input type="checkbox"/> Signal line <input type="checkbox"/> DC line		Coupling : <input checked="" type="checkbox"/> Direct <input type="checkbox"/> Capacitive	
Test Time : 120s			
Line	Test Voltage	Result	
L	f 1KV	Pass	
N	f 1KV	Pass	
L Ñ N	f 1KV	Pass	
PE	f 1KV	Pass	
L Ñ PE	f 1KV	Pass	
N Ñ PE	f 1KV	Pass	
L Ñ PE Ñ N	f 1KV	Pass	
/	/	/	
/	/	/	
/	/	/	
/	/	/	
/	/	/	
/	/	/	
<div>Test Equipment:Burst Tester Model : HEFT 51</div> <div>Note: (The Criterion)</div> <div>A:Normal performance within the specification limits;</div> <div>B:Temporary degradation or less of function or performance which is self-recoverable;</div> <div>C:Temporary degradation or loss of function or performance which requires operator intervention or system reset;</div>			

10. SURGE IMMUNITY TEST

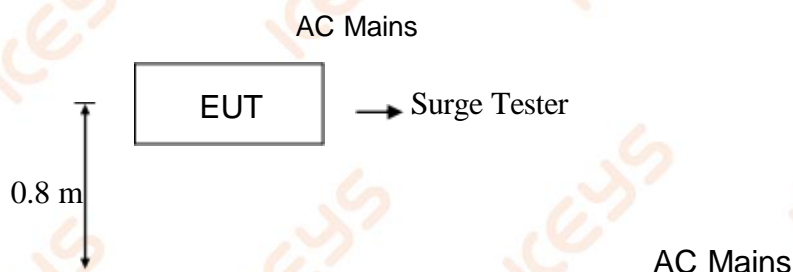
10.1 Block Diagram of Test Setup

10.1.1 Block Diagram of the EUT



(EUT: Uninterruptible power supply(UPS))

10.1.2. Surge Test Setup



(EUT: Uninterruptible power supply(UPS))

10.2 Test Standard

(EN 61000-4-5: 2014)Severity Level: Line to Line: Level 2, 1.0KV, Line to Earth:
Level 3, 2.0KV

10.3 Severity Levels and Performance Criterion

10.3.1. Severity level

Severity Level	Open-Circuit Test Voltage KV
1	0.5
2	1.0
3	2.0
4	4.0
*	Special

10.3.2 Performance criterion : **B**

10.3 Test Procedure

- 1) Set up the EUT and test generator as shown on Section 10.1.2.
- 2) For line to line coupling mode, provide a 1.0 KV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points.
- 3) At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.
- 4) Different phase angles are done individually.
- 5) Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

Surge Immunity Test Result

EUT	Uninterruptible power supply(UPS)			Temperature:	20
Model	TM1110H			Humidity	: 50%
Test Voltage	AC 230V/50Hz			Test Mode	: Normal Working
Test Engineer	Brian			Test Date	2022-03-14
Location	Voltage (KV)	1kV		2kV	
	Phase	+	-	+	-
L Ñ N	0°	Pass	Pass	/	/
	90°	Pass	Pass	/	/
	180°	Pass	Pass	/	/
	270°	Pass	Pass	/	/
L Ñ PE	0°	/	/	Pass	Pass
	90°	/	/	Pass	Pass
	180°	/	/	Pass	Pass
	270°	/	/	Pass	Pass
N Ñ PE	0°	/	/	Pass	Pass
	90°	/	/	Pass	Pass
	180°	/	/	Pass	Pass
	270°	/	/	Pass	Pass
	/	/	/	/	/

Test Equipment :Surge Tester Model: HCWG

Note: (The Criterion)

A:Normal performance within the specification limits;

B:Temporary degradation or less of function or performance which is self-recoverable;

C:Temporary degradation or loss of function or performance which requires operator intervention or system reset;

11. INJECTED CURRENTS SUSCEPTIBILITY TEST

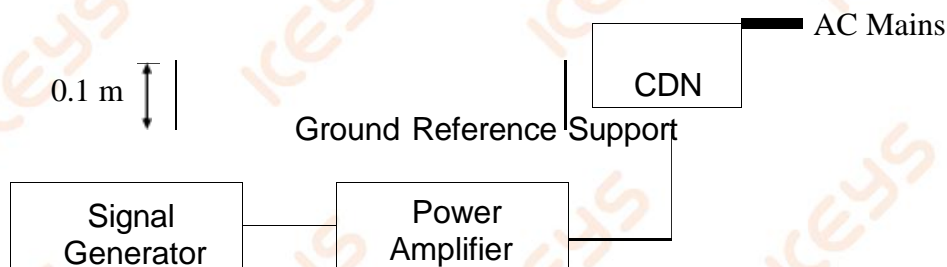
11.1 Block Diagram of Test Setup

11.1.1 Block Diagram of the EUT



(EUT: Uninterruptible power supply(UPS))

11.1.2 Block Diagram of Test Setup



(EUT: Uninterruptible power supply(UPS))

11.2 Test Standard

(EN 61000-4-6: 2014, Severity Level: Level 2, 3V (rms), (0.15MHz ~ 80MHz))

11.3 Severity Levels and Performance Criterion

11.3.1 Severity level

Level	Field Strength V
1	1
2	3
3	10
X	Special

11.3.2 Performance criterion: **A**

11.4 Test Procedure

- 1) Set up the EUT, CDN and test generators as shown on Section 11.1.2.
- 2) Let the EUT work in test mode and measure it.
- 3) The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).
- 4) The disturbance signal described below is injected to EUT through CDN.
- 5) The EUT operates within its operational mode(s) under intended climatic conditions after power on.
- 6) The frequency range is swept from 150KHz to 80MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1KHz sine wave.
- 7) The rate of sweep shall not exceed 1.5×10^{-3} decades/s. Where the frequency is swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.
- 8) Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

Injected Currents Susceptibility Test Results

EUT	Uninterruptible power supply(UPS)	Temperature:	20
Model	TM1110H	Humidity :	50Á
Test Voltage	AC 230V/50Hz	Test Mode :	Normal Working
Test Engineer	Brian	Test Date :	2022-03-14
Frequency Range (MHz)	Injected Position	Strength (Unmodulated)	Result
0.15~80	AC Mains	3V	Pass
/	/	/	/
/	/	/	/
/	/	/	/
Frequency Range (MHz)	Injected Position	Strength (Unmodulated)	Result
/	/	/	/
/	/	/	/
/	/	/	/
Test Equipment :Injected Currents Tester Model: CWS500C Injection Clamp Model: F-2031-23MM CDN Model: CDN-M2, CDN-M3 Note: (The Criterion) A:Normal performance within the specification limits; B:Temporary degradation or less of function or performance which is self-recoverable; C:Temporary degradation or loss of function or performance which requires operator intervention or system reset;			

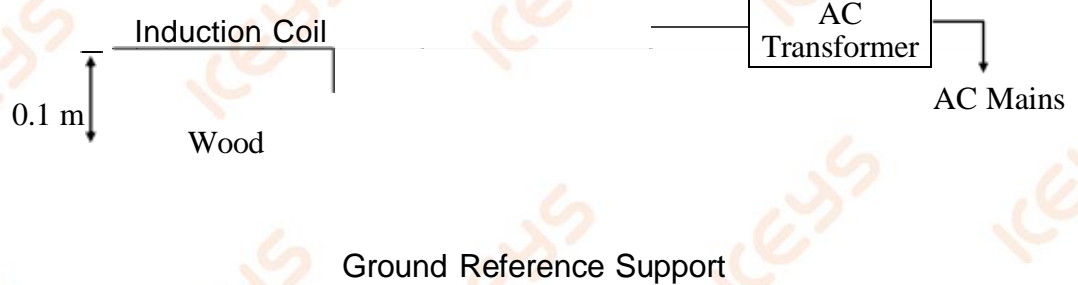
12. MAGNETIC FIELD SUSCEPTIBILITY TEST

12.1 Block Diagram of Test

12.1.1 Block diagram of test setup Auxiliary

(EUT: Uninterruptible power supply(UPS))

12.1.2 Magnetic field test setup



12.2 Test Standard

(EN 61000-4-8: 2010, Severity Level: Level 2, 3A / m)

12.3 Severity Levels and Performance Criterion

12.3.1 Severity Levels

Level	Field Strength A/m
1	1
2	3
3	10
4	30
5	100
X	Special

12.3.2 Performance Criterion : A

12.4 Test Procedure

The EUT is placed in the middle of a induction coil (1*1m), under which is a 1*1*0.1m (high) table, this small table is also placed on a larger table, 0.8 m above the ground. Both horizontal and vertical polarization of the induction coil are set on test, so that each side of the EUT is affected by the magnetic field. Also can reach the same aim by change the position of the EUT.

Magnetic Field Immunity Test Result

EUT	Uninterruptible power supply(UPS)	Temperature:	20
Model	TM1110H	Humidity :	50Á
Test Voltage	AC 230V/50Hz	Test Mode :	Normal Working
Test Engineer	Brian	Test Date :	2022-03-14
Test Level (A/M)	Testing Duration	Coil Orientation	Result
3	1 mins	X	Pass
3	1 mins	Y	Pass
3	1 mins	Z	Pass
Test Level (A/M)	Testing Duration	Coil Orientation	Result
/	/	/	/
/	/	/	/
/	/	/	/
Test Equipment :Magnetic Field Tester Model: HPFM T Note: (The Criterion) A:Normal performance within the specification limits; B:Temporary degradation or less of function or performance which is self-recoverable; C:Temporary degradation or loss of function or performance which requires operator intervention or system reset;			

13. PHOTOGRAPH

N/A

14. PHOTOGRAPHS OF EUT







*****THE END OF REPORT*****

CERTIFICATE OF CONFORMITY

Certificate No.: KEYS22022404002LD-01

Applicant : Shenzhen iTeaQ Power Co., Ltd.
Address : Floor 2, Building 1, EVOC Valley, No. 11 Gaoxin Avenue, Guangming District, Shenzhen, China.
Manufacturer : Shenzhen iTeaQ Power Co., Ltd.
Address : Floor 2, Building 1, EVOC Valley, No. 11 Gaoxin Avenue, Guangming District, Shenzhen, China.
Trade mark : N/A
Product : UPS (Uninterruptible Power Supply)
Power Rating : 208/220/230/240Vac, 50/60Hz, 192Vdc, 10kVA/0.9kW
Model No. : TM1110H, OL400, OL500, OL600, OL800, OL1000, OL1200, OL1500, OL2000, OL3000, TM1101S, TM1101H, TM1102S, TM1102H, TM1103S, TM1103H, TM1106S, TM1106H, TM1110S, TM3110H, TM3115H, TM3120H, RM1101S, RM1101H, RM1102S, RM1102H, RM1103S, RM1103H, RM1106S, RM1106H, RM1110S, RM1110H, RM3110H, RM3115H, RM3120H

Low Voltage Directive - 2014/35/EU

The standard(s) used for showing compliance with the essential requirements:

Applicable Standard(s) EN 62040-1-1-2003

This certificate is part of the full test report(s) and should be read in conjunction with it. This certificate is based on an evaluation of one sample of above mentioned product. It does not imply assessment of the production of the product. Without the written approval of Dongguan KEYS Testing Technology Co., Ltd., this certificate is not permitted to be reproduced, except in full. It is not permitted to use the test lab's logo. The CE marking may only be used if all the relevant and effective European Directives are applicable.



Date: March 16, 2022

Dongguan KEYS Testing Technology Co., Ltd.

6 / f, Building B, Chuangyigu Industrial Park, No.5 Hehe Street, Songxi Road, Hengkeng, Liaobu, Dongguan City
Tel: +86-0769-89798319

<http://www.keys-lab.com> E-mail: info@keys-lab.com

TEST REPORT

EN 62040-1

Uninterruptible power systems (UPS) -- Part 1-1: General and safety requirements for UPS used in operator access areas

Report Number..... : KEYS22022404002LD-01

Tested by (name + signature)..... : Sunny Li

Approved by (name + signature).. : Jason Zhan

Date of issue : March 16, 2022

Total number of pages : 32 pages



Testing Laboratory : Dongguan KEYS Testing Technology Co., Ltd.

Address..... : 6 / f, Building B, Chuangyigu Industrial Park, No.5 Hehe Street, Songxi Road, Hengkeng, Liaobu, Dongguan City

Applicant's name : Shenzhen iTeaQ Power Co., Ltd.

Address..... : Floor 2, Building 1, EVOC Valley, No. 11 Gaoxin Avenue, Guangming District, Shenzhen, China.

Test specification:

Standard : EN 62040-1-1-2003

Test procedure : CE-LVD

Non-standard test method..... : N/A

General disclaimer:

The test results presented in this report relate only to the object tested.

This report shall not be reproduced, except in full, without the written approval of the Issuing KEYS Testing Laboratory.

Test item description..... : UPS (Uninterruptible Power Supply)

Trade Mark..... : N/A

Manufacturer : Shenzhen iTeaQ Power Co., Ltd.

Address..... : Floor 2, Building 1, EVOC Valley, No. 11 Gaoxin Avenue, Guangming District, Shenzhen, China.

Model/Type reference : TM1110H, OL400,OL500,OL600,OL800,OL1000,OL1200, OL1500,OL2000,OL3000,TM1101S,TM1101H,TM1102S, TM1102H,TM1103S,TM1103H,TM1106S,TM1106H, TM1110S,TM3110H,TM3115H,TM3120H,RM1101S, RM1101H,RM1102S,RM1102H,RM1103S, RM1103H,RM1106S,RM1106H,RM1110S,RM1110H, RM3110H,RM3115H,RM3120H

Ratings..... : 208/220/230/240Vac, 50/60Hz,192Vdc,10kVA/0.9kW

List of Attachments (including a total number of pages in each attachment):

Attachment : 3 pages of photos.

Summary of testing:

N/A

Copy of marking plate

UPS (Uninterruptible Power Supply)
Model No.: TM1110H
208/220/230/240Vac, 50/60Hz, 192Vdc, 10kVA/0.9kW



Shenzhen iTeaQ Power Co., Ltd.
Made in China

Importer: xxx

Address: yyy

Remarks:

1. The height dimension of CE symbol should not less than 5mm, the height dimension of WEEE symbol should not less than 7mm.
2. All models rating label are in the same design except for type designation. Above label was shown for representing the others models.
3. xxx means importer company name; yyy means importer company address information.

TEST ITEM PARTICULARS:	
Construction	Fixed installation
Operating condition.....	Continuous operation
Power factor	>0.9
Supply connection	Terminal block
Class of equipment	<input checked="" type="checkbox"/> Class I <input type="checkbox"/> Class II <input type="checkbox"/> Class III
IP protection class	<input type="checkbox"/> IPX0 <input checked="" type="checkbox"/> IP_20__
POSSIBLE TEST CASE VERDICTS:	
- test case does not apply to the test object.....	N/A
- test object does meet the requirement.....	P (Pass)
- test object does not meet the requirement	F (Fail)
TESTING:	
Date of receipt of test item.....	March 08, 2022
Date (s) of performance of tests	March 08, 2022 ~ March 16, 2022
GENERAL PRODUCT INFORMATION:	
<p>The unit has following features:</p> <p>The equipment under test (EUT) is a UPS (Uninterruptible Power Supply) from AC mains .</p> <p>All series models are identical, except for model name difference for trading purpose.</p> <p>All test(s) were performed on model "TM1110H" to represent other models also.</p>	


EN 62040-1			
Clause	Requirement – Test	Result – Remark	Verdict
4	General conditions for tests		P
4.1	Introduction		P
	The provisions of 1.4.1/RD, 1.4.3/RD, 1.4.6/RD, 1.4.7/RD, 1.4.8/RD, 1.4.10/RD, 1.4.11/RD, 1.4.12/RD, 1.4.13/RD, 1.4.14/RD apply together with the following.		P
	Only the leakage current and heating tests shall be performed at input voltage tolerances (see 1.4.5/RD). All tests shall be run at nominal input voltages, unless specifically prescribed otherwise.		P
4.2	Type test		P
	The provisions of 1.4.2/RD apply together with the following addition.		P
	Where in this standard compliance of materials, components or subassemblies is checked by inspection or by testing of properties, it is permitted to confirm compliance by reviewing any relevant data or previous test results that are available instead of carrying out the specified type tests.		P
	NOTE For physically large units and/or power ratings, adequate test facilities to demonstrate some of the type tests may not exist		P
	This situation also applies to some electrical tests for which no commercial test simulation equipment is available or requires specialized test facilities beyond the scope of the manufacturer's premises		P
4.3	Operating parameters for tests		P
	Except where specific test conditions are stated elsewhere in the standard, and where it is clear that there is a significant impact on the results of the test, the tests shall be carried out at rated voltage and under the most unfavorable combination of the following parameters, within the manufacturer's operating specifications:		P
	– absence of supply voltage;	208/220/230/240VAC	P
	– supply frequency;	50/60Hz	P
	– charge condition of the battery;	192VDC	P
	– physical location of UPS and position of movable parts;		N/A
	– operating mode.		P

EN 62040-1			
Clause	Requirement – Test	Result – Remark	Verdict
	The following does not apply to UPS installed in restricted access locations:		N/A
	– adjustments of thermostats, regulating devices or similar controls in operator access areas, which are		N/A
	a) adjustable without the use of a tool, or		N/A
	b) adjustable using a means, such as a key or a tool, deliberately provided for the operator.		N/A
4.4	UPS loading during tests		P
	Where test results could reasonably be expected to vary upon UPS loading, adjustments shall be made to provide the most unfavorable results. This is achieved by considering loading		P
	– that could be connected to any standard supply outlet or terminal on the equipment, up to the value indicated in the marking required by 4.7.2;		P
	– due to recharge of the stored energy source (batteries or similar);		P
	– due to optional features, offered or provided for by the manufacturer for inclusion in or with the equipment under test;		P
	– due to other units of equipment intended by the manufacturer to draw power from the equipment under test.		P
	NOTE 1 Artificial loads may be used to simulate such loading while testing.		P
	NOTE 2 See also 4.6.		P
4.5	Components		P
	Where safety is involved, components shall comply either with the requirements of this standard or with the safety aspects of the relevant IEC component standards.		P
	NOTE 1 An IEC component standard is considered relevant only if the component in question clearly falls within its scope.		P
	Further, the provisions of 1.5.2/RD, 1.5.3/RD, 1.5.4/RD, 1.5.5/RD, 1.5.6/RD, 1.5.7/RD and 1.5.8/RD apply.		P
	NOTE 2 The requirements of this standard include abnormal tests to ensure safe failure mode of components; see 8.3.		P
4.6	Power Interfaces		P
	The provisions of 1.6.1/RD, 1.6.2/RD, 1.6.4/RD apply together with the following.		P
	NOTE While supplying rated output under each of the conditions described in a) to d) below, the relevant a.c. or d.c. steady state input current should not exceed 110 % of the rated current.		P

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Clause	Requirement – Test	Result – Remark	Verdict
	a) Recharging mode – Applicable to the primary power received by the UPS while also charging the battery.		P
	b) Stored energy mode – Applicable to the d.c. current from, for example, a remote battery while simulating primary power outage. The inverter portion of the UPS should receive power from either a fully charged battery bank or an external d.c. source of supply.		P
	c) Bypass mode – The transfer switch should be positioned to allow the primary power for the output load to bypass the rectifier/charger and inverter sections of the UPS and be delivered directly to the load.		N/A
	d) Normal mode – With a fully charged battery, the UPS should receive power from the primary power source.		P
	The neutral conductors, if any, shall be insulated from earth and the body throughout the equipment, as if they were phase conductors. Components connected between neutral and earth shall be rated for a working voltage equal to the phase-to-neutral voltage. In the case of the output neutral conductor being isolated from the input neutral conductor, the service person responsible for the installation shall connect this output neutral conductor as required by local wiring rules and as detailed in the installation instructions.		P
	Compliance is checked by inspection.		P
4.7	Markings and instructions		P
4.7.1	General		P
	Where a marking is required as detailed below, provision shall be allowed for equivalent wording. The marking shall be readily visible either in an operator access area or shall be located on an outside surface of the equipment. If located on an outside surface of fixed equipment, the marking shall be visible after the equipment has been installed as in normal use.		P
	For equipment intended to be installed by a service person or located in a restricted access location, the marking may be located behind a door or cover that it is not operator accessible. In this case, a readily visible marker shall be attached to the equipment to clearly indicate the location of such marking. It is allowed to use a temporary marker.		P
4.7.2	Power rating		P
	Equipment shall be provided with adequate markings in order to specify	See marking	P
	– input supply requirements;		P

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Clause	Requirement – Test	Result – Remark	Verdict
	– output supply ratings.		P
	For equipment with multiple rated voltages, the corresponding rated currents shall be marked such that the different current ratings are separated by a solidus (/) and the relation between rated voltage and associated rated current appears distinctly.		N/A
	Equipment with a rated voltage range shall be marked with either the maximum rated Current or with the current range		P
	The markings of input and output shall include those in the RD, in addition to the following:		P
	– output rated voltage;		P
	– output rated power factor, if less than unity, or active power and rated current;		P
	– number of output phases and neutral (refer to 1.7.1/RD);		P
	– output rated active power, in watts or kilowatts according to Annex L/RD;		P
	– output rated apparent power in volt-amperes or kilovoltamperes according to Annex L/RD;		P
	– ambient operating temperature range (if other than 0 °C to 40 °C).		P
	For units designed with additional separate automatic bypass/maintenance bypass, additional input a.c. supply, or external batteries, it shall be allowed for relevant supply ratings to be specified in the accompanying installation instructions. Where this is done, the following instruction shall appear on or near the point of connection: SEE INSTALLATION INSTRUCTIONS BEFORE CONNECTING TO THE SUPPLY		P
4.7.3	Safety instructions		P
4.7.3.1	General		P
	The manufacturer shall make safety instructions available as required to avoid introduction of hazards when operating, installing, maintaining, transporting or storing the UPS.		P
	For example, special precaution for the protective earth conductor may be required when installing a pluggable UPS comprising separate enclosures. The protective conductor should remain interconnected between enclosures also when the mains plug of the UPS is disconnected. Such enclosures may house power electronics, battery strings, bypass switch, terminals and/or outlets.		P
	Installation		P

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Clause	Requirement – Test	Result – Remark	Verdict
	The manufacturer shall provide guidance on the level of competence necessary for installation. Where appropriate, installation instructions should include reference to national wiring rules. Distinct instructions apply for:		P
	– UPS designed for location in a restricted access location only		P
	The installation instructions shall clearly state that the UPS may only be installed in accordance with the requirements of IEC 60364-4-42. Such UPS may not meet the requirements for a fire enclosure as specified in 1.2.6.2/RD.		P
	– UPS designed for permanent connection by fixed wiring to the a.c. supply or to the load or to a separate energy storage device, e.g. batteries that are not installed when delivered to the user. The installation instructions shall clearly state that only a qualified professional (e.g. service person) may install the UPS and that, when the disconnect device for isolation of mains power is not incorporated in the equipment (see 3.4.2/RD), an appropriate and readily accessible disconnect device shall be incorporated in the fixed wiring.		N/A
	– Pluggable type A or pluggable type B UPS with energy storage device, e.g. a battery, already installed by the supplier. The installation instructions for UPS intended for user installation shall be made available to the user, e.g. in the user manual. When the disconnect device for isolation of mains power is not incorporated in the equipment (see 3.4.2/RD) or when the plug on the power supply cord is intended to serve as the disconnect device, the installation instructions shall state that the mains socket outlet that supplies the UPS shall be installed near the UPS and shall be easily accessible. When the UPS power cord must be connected to an earthed mains socket outlet for safety reasons, the UPS marking or installation instructions shall so state. The same requirement for marking applies to any special equipotential earth bonding to other connected UPS equipment or to Class I loads.	Supplied by terminal block	N/A
	NOTE Pluggable power cords are normally 2 m in length or less		N/A
4.7.3.3	Operation		P
	The manufacturer shall, except when the UPS is intended for operation by a layperson, provide guidance on the level of competence necessary to operate the equipment. This may include reference for operators to undergo training or to be qualified and authorized to enter restricted access locations.		P

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Clause	Requirement – Test	Result – Remark	Verdict
4.7.3.4	Maintenance		P
	Except for minor routine maintenance that may be performed by the operator, safety instructions to be used during maintenance of the UPS are normally made available only to service persons.		P
4.7.3.5	Distribution related backfeed		P
	For the purpose of warning the electrical service person against backfeed situations not caused by the UPS but that may arise when a particular load fault is present while the UPS operates in stored energy mode or while unbalanced loads are supplied through a particular power distribution system, e.g. an impedance grounded IT system, the installation instructions for permanently connected UPS shall require the fitting of a warning label		P
	by the UPS supplier, at the UPS input terminals and		P
	– by the user, on all primary power isolators installed remote from the UPS area and on external access points, if any, between such isolators and the UPS when		P
	a) the automatic backfeed isolation (see 5.1.4) is provided external to the equipment or		P
	b) the UPS input is connected through external isolators that, when opened, isolate the neutral or		P
	c) the UPS is connected to an IT power distribution system (see 1.6.1/RD). The warning label shall carry the following wording or equivalent.		P
	<div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>Before working on this circuit</p> <p>- Isolate Uninterruptible Power System (UPS)</p> <p>- Then check for Hazardous Voltage between all terminals including the protective earth</p>  <p>Risk of Voltage Backfeed</p> </div>		P
4.7.4	Main voltage adjustment		P
4.7.5	Power outlets		P
4.7.6	Fuses		P
4.7.7	Wiring terminals		P
4.7.8	Battery terminals		P
	Terminals intended for connection to batteries shall indicate the polarity according to IEC 60417 or be so constructed as to reduce the likelihood of improper connection.		P
4.7.9	Controls and indicators		P

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Clause	Requirement – Test	Result – Remark	Verdict
4.7.10	Isolation of multiple power sources		N/A
4.7.11	IT power systems		P
4.7.12	Protection in building installation		N/A
	If pluggable equipment type B or permanently connected equipment relies on the building installation for the protection of internal wiring of the equipment, the equipment installation instructions shall so state and shall also specify the necessary requirements for short-circuit protection or overcurrent protection or, where necessary, for both (see 5.5.2).		N/A
	If the protection against electric shock of the UPS (see 5.1) relies on residual current devices in the building installation circuit and the design of the UPS is such that in any normal or abnormal operating condition a fault current to earth with d.c. component is possible, the installation instructions shall define the building residual current devices as type B (see IEC 60755) for three-phase UPS and as type A (IEC 61008-1 or IEC 61009-1) for singlephase UPS.		N/A
4.7.13	High leakage current		P
	The provisions of 5.1/RD apply in addition with the following.		P
	For UPS systems intended for use as pluggable equipment type B or fixed installations, where the earth leakage currents of the UPS and connected loads sum in the primary UPS protective earth conductor exceeds or is likely to exceed the limits of 5.1/RD under any mode of operation, the unit shall carry a warning label as required by 5.1/RD, and the installation manual shall define the connection method to the primary power source.		
4.7.14	Thermostats and other regulating devices		P
4.7.15	Language	Chinese	P
	Instructions and equipment marking related to safety shall be in a language which is acceptable in the country in which the equipment is to be installed.		P
4.7.16	Durability of markings		P
4.7.17	Removable parts		P
4.7.18	Replaceable batteries		N/A
4.7.19	Operator access with a tool		P
4.7.20	Battery		P

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Clause	Requirement – Test	Result – Remark	Verdict
	External battery cabinets or battery compartments within the UPS shall be provided with the following, clearly legible information in such a position as to be immediately seen by a service person when servicing the UPS, in accordance with the requirements of 1.7.1/RD:		P
	a) battery type (lead-acid, NiCd, etc.) and number of blocks or cells; b) nominal voltage of total battery; c) nominal capacity of total battery (optional); d) warning label denoting an energy or electrical shock and chemical hazard and reference to the maintenance, handling and disposal requirements detailed in the following instructions.	See battery specification	P
	All other information shall be given in the user's instructions		P
	Instructions:		P
	a) Internally mounted battery: – instructions shall carry sufficient information to enable the replacement of the battery with a suitable recommended type; – safety instructions to allow access by a service person shall be stated in the installation/service handbook; – if batteries are to be installed by a service person, instructions for interconnections including terminal torques shall be provided. The operator manual shall include the following instructions: – Servicing of batteries should be performed or supervised by personnel knowledgeable about batteries and required precautions. – When replacing batteries, replace with the same type and number of batteries or battery packs. CAUTION: Do not dispose of batteries in a fire. The batteries may explode. CAUTION: Do not open or mutilate batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	<p>b) Externally mounted batteries:</p> <ul style="list-style-type: none"> – installation instructions shall state voltage, ampere-hour rating, charging regime and method of protection required on installation to coordinate with UPS protective devices, where the battery is not provided by the UPS manufacturer; – instructions for the battery cells shall be provided by the battery manufacturer. <p>b) Externally mounted batteries:</p> <ul style="list-style-type: none"> – installation instructions shall state voltage, ampere-hour rating, charging regime and method of protection required on installation to coordinate with UPS protective devices, where the battery is not provided by the UPS manufacturer; – instructions for the battery cells shall be provided by the battery manufacturer. 		P
	<p>c) External battery cabinets:</p> <p>External battery cabinet supplied with the UPS shall have adequate installation instructions to define cable sizes for connection to the UPS if the cabling is not supplied by the UPS manufacturer. Where the battery cells or blocks are not supplied pre-installed and wired, installation instructions for the battery cells or blocks shall be provided by the battery manufacturer, if not detailed in the UPS manufacturer's installation instructions.</p>		N/A
4.7.21	Installation instructions		P
	Adequate information shall be provided in the installation instructions as to the purpose and connection of any signaling circuits, relay contacts, emergency power off (EPO) circuits, etc. Attention should be drawn as to the necessity of maintaining characteristics of any TNV, SELV or ELV circuits when connected to other equipment.		P
	Installation instructions shall carry sufficient information, including the basic internal circuit configuration of the UPS, to emphasize its compatibility to power distribution systems.		P
	Special attention shall be given to the compatibility with the relevant wiring rules and to bypass circuits.		P
	Where a UPS output neutral relies on the input supply/supplies neutral reference, adequate installation instructions shall be provided to prevent loss of this neutral reference, if a hazard should result due to external isolation/changeover of supply sources, etc.		P
	Only UPS complying with the marking instruction of 1.7.2.4/RD are suitable for use on IT power systems, as defined in Annex V/RD. Where additional external components are required to meet this requirement, these shall be referenced in the installation instructions.		P

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Clause	Requirement – Test	Result – Remark	Verdict
5	Fundamental design requirements		P
5.1	Protection against electric shock and energy hazards		P
5.1.1	Protection for UPS intended to be used in operator access areas		P
	The requirements and restrictions of 2.1.1/RD apply.		P
	The requirements for protection against electric shock from energized parts are based on the principle that the operator is permitted to have access to: – bare parts of SELV circuits; and – bare parts of limited current circuits; and – TNV circuits under specified conditions.		P
	The requirements for protection against energy hazards are based on the principle that there shall be no risk of injury where a hazardous energy level exists.		P
	UPS intended for building-in and/or rack mounting or for incorporation in larger equipment is tested with access to UPS limited according to the method of mounting detailed by the manufacturer.		P
	Protection for UPS intended to be used in service access areas		P
	In a service access area, the following requirements apply.		P
	Bare parts at hazardous voltage shall be located or guarded so that unintentional contact with such parts is unlikely during service operations involving other parts of the equipment. Bare parts at hazardous voltage shall be located or guarded so that accidental shorting to SELV circuits or to TNV circuits (for example, by tools or test probes used by a service person) is unlikely.		P
	No requirement is specified regarding access to ELV circuits or to TNV circuits. However, bare parts that present a hazardous energy level shall be located or guarded so that unintentional bridging by conductive materials that might be present is unlikely during service operations involving other parts of the equipment.		P
	Any guards required for compliance with 5.1.2 shall be easily removable and replaceable if removal is necessary for servicing. Compliance is checked by inspection and measurement. In deciding whether or not unintentional contact is likely, account is taken of the way a service person needs to gain access past, or near to, the bare parts in order to service other parts. For determination of a hazardous energy level, see 2.1.1.5 c) /RD.		P
5.1.3	Protection for UPS intended to be used in restricted access areas		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	For equipment to be installed in a restricted access location, the requirements for operator access areas apply, except as permitted in the following three paragraphs.		N/A
	Contact with bare parts of a secondary circuit at hazardous voltage with the test finger, Figure 2A/RD (see 2.1.1.1/RD) is permitted. However, such parts shall be so located or guarded that unintentional contact is unlikely		N/A
	Bare parts that present a hazardous energy level shall be located or guarded so that unintentional bridging by conductive materials that might be present is unlikely.		N/A
	Compliance is checked by inspection and measurement.		N/A
	In deciding whether or not unintentional contact is likely, account is taken of the need to gain access past, or near to, the bare parts. For determination of a hazardous energy level, see 2.1.1.5 c) /RD.		N/A
5.1.4	Backfeed protection		P
	A UPS shall prevent hazardous voltage or hazardous energy from being present on the UPS input a.c. terminals after interruption of the input a.c. power.		P
	No shock hazard shall exist at a.c. input terminals when measured 1 s after de-energization of a.c. input for pluggable UPS, or 15 s for permanently connected UPS.		P
	For permanently connected UPS, the requirement may be implemented with the use of an a.c. input line isolation device external to the UPS, in which case:		N/A
	<ul style="list-style-type: none"> – the requirement applies to the input terminals of the isolation device, – the UPS supplier shall provide or specify a suitable isolating device, – additional labeling applies (4.7.3). 		N/A
	Compliance is checked by inspection of the equipment and relevant circuit diagram, and by simulating fault conditions in accordance with Annex I of this standard.		P
	When an air gap is employed for backfeed protection, the provision of 2.10.3.3/RD for creepage and clearance distances applies in addition to the following		P
	<p>a) Subject to confirmation from the manufacturer, the UPS output, in stored energy mode, may be considered a transient free secondary circuit of overvoltage category I (for this purpose identify the overvoltage category I value in Table 2J/RD by using the appropriate UPS r.m.s. output voltage).</p> <p>b) The creepage and clearance distances shall meet the basic insulation requirements for pollution degree 2 (see Tables 2M/RD and 2N/RD).</p>		P

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Clause	Requirement – Test	Result – Remark	Verdict
	NOTE Reinforced or equivalent insulation may apply if any output conductor including the neutral does not meet basic insulation to earth while the UPS operates in stored energy mode. In all other cases, basic insulation is acceptable.		P
	Compliance is checked by inspection.		P
5.1.5	Emergency switching (disconnect) device		N/A
	A UPS shall be provided with an integral single emergency switching device (or terminals for the connection of the remote emergency switching device), which prevents further supply to the load by the UPS in any mode of operation. If reliance is placed on additional disconnection of supplies in the building wiring installation, the installation instructions shall so state. The requirement is not mandatory for pluggable UPS if permitted by national wiring rules.		N/A
	NOTE In some countries, an emergency switching device is called EPO ("emergency power off").		N/A
	Compliance is checked by inspection and analysis of relevant circuit diagrams		N/A
5.2	Requirements for auxiliary circuits		P
5.2.1	Safety extra low voltage circuits – SELV	Battery input	P
5.2.2	Telephone network voltage circuits – TNV		N/A
	The provisions of 2.3/RD apply for any incoming TNV circuits supported by the UPS.		N/A
	NOTE Most UPS would not provide TNV circuits themselves, but due consideration should apply to any incoming TNV circuit that may be supported by the UPS, e.g. connection to the PSTN.		N/A
5.2.3	Limited current circuits		P
	The provisions of 2.4/RD apply for any limited current circuits provided by the UPS.		P
5.2.4	External signalling circuits		P
	The provisions of 3.5/RD applies.		P
5.2.5	Limited power source		P
	The provisions of 2.5/RD apply.		P
5.3	Protective earthing and bonding		P
5.3.1	General		P
	The provisions of 2.6/RD apply together with the following.		P
5.3.2	Protective earthing		P

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Clause	Requirement – Test	Result – Remark	Verdict
	Accessible conductive parts of Class I equipment, which might assume a hazardous voltage in the event of a single insulation fault, shall be reliably connected to a protective earthing terminal within the equipment.		P
	NOTE In service access areas, conductive parts such as motor frames, electronic chassis, etc., which might assume a hazardous voltage in the event of a single insulation fault, either should be connected to the protective earthing terminal or, if this is impossible or impracticable, a suitable warning label should indicate to a service person that such parts are not earthed and should be checked for hazardous voltages before being touched.		P
	This requirement does not apply to accessible conductive parts that are separated from parts at hazardous voltage by		P
	– earthed metal parts, or – solid insulation or an air gap, or a combination of the two, meeting the requirements for double insulation or reinforced insulation. In this case, the parts involved shall be so fixed and so rigid that the minimum distances are maintained during the application of force as required by the relevant tests of 2.10/RD and 4.2/RD.		P
	Compliance is checked by inspection and by the applicable requirements of 2.6.1/RD and 5.2/RD.		P
5.3.3	Protective bonding		P
	The UPS output a.c. circuit shall be referenced to the protective earth of the equipment as required by the AC power distribution system in which the UPS is intended to operate.		P
	The bonding of the protective earth and neutral conductors applies to all modes of operation of the unit. The physical bonding point may be external to the UPS.		P
	The output a.c. circuit of a pluggable type A or pluggable type B UPS that is not a separately derived source during the normal mode of operation is not required to be bonded in the stored energy mode of operation. Refer to Annex V/RD for grounding supplied from separately derived a.c. sources.		N/A
	NOTE Annex V/RD classifies a.c. power distribution systems as TNS, TNC, TT or IT depending on: – the bonding condition between the protective earth and the neutral conductor (or, where no neutral conductor applies, a phase conductor), – the separation, if any, between the neutral conductor and the earth, – the earthing of the equipment structure.		P

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Clause	Requirement – Test	Result – Remark	Verdict
	For Class I pluggable equipment type A, the UPS shall provide sufficient terminals, earthed socket-outlets or other means to permit, in the final installed system configuration, equipotential protective bonding to the UPS from other Class I equipments, including external UPS battery cabinets, irrespective of whether the UPS primary protective conductor is disconnected from its source. Any special bonding instructions shall be stated in the user's instructions.		N/A
	Compliance is checked by inspection and earth resistance tests between respective connection points.		P
5.4	AC and d.c. power isolation		P
5.4.1	General		P
	Disconnect devices		P
	Means shall be provided to disconnect the UPS from the a.c. and d.c. supplies for service and testing by qualified personnel.		P
	Means of isolation and disconnect devices for internal and external d.c. supplies, e.g. a battery bank, shall open all ungrounded conductors connected to the d.c. supply.		P
	If operation of a disconnect device causes the reference from the UPS output voltage to the protective earth to differ from requirements of 5.3.3, then operation of that device shall be alarmed. Alternatively, an appropriate warning label shall be located adjacent to that disconnect device or to its command.		P
	If the operating means of the disconnection device is operated vertically rather than rotationally or horizontally, the "UP" position of the operating means shall be the "ON" position.		P
	Where a permanently connected UPS receives power from more than one external source, there shall be a prominent marking at each disconnect device giving adequate instructions for the removal of all power from the unit.		P
5.5	Overcurrent and earth fault protection		P
5.5.1	General		P
5.5.2	Basic requirements		P
	Protection against excess currents, short circuits and earth faults in input and output circuit shall be provided, either as an integral part of the equipment or as part of the building installation.		P

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Clause	Requirement – Test	Result – Remark	Verdict
	Protective devices in the building installations shall provide short-circuit and earth-fault protection for UPS components in series with the mains input. Such components include the supply cord, appliance coupler, RFI filter, bypass and isolation switches. Otherwise, protective devices necessary to comply with the requirements for abnormal operating and fault conditions detailed in 8.3 shall be included as an integral part of the equipment.		P
5.5.3	Battery circuit protection		P
5.5.3.1	Overcurrent and earth fault protection		P
	A battery supply circuit shall be provided with overcurrent and earth fault protection and shall comply with the requirements described in 5.5.3.2 and 5.5.3.3.		P
5.5.3.2	Location of protective devices		P
	Where the batteries are installed inside the UPS, the battery supply circuit shall be provided with a protective device.		P
5.5.3.3	Rating of protective devices		P
	The rating of the overcurrent protective device located internally shall be such as to protect against conditions described in 5.3.1/RD.		P
	For a UPS to be used with a separate battery supply, the rating of the overcurrent-protective device shall be indicated in the instruction manual and shall take into account the current rating of the conductors to be connected between the UPS and battery supply, as determined from the requirements given in 6.2.		P
	NOTE Where the battery bank terminals are not directly grounded, the device should protect both terminals.		P
	Compliance is checked by inspection.		P
5.6	Protection of personnel – Safety interlocks		P
5.6.1	Operator protection		P
5.6.2	Service person protection		P
5.6.2.1	Introduction		P
	In addition to the requirements of 2.8/RD, the following subclauses apply to service persons who find it necessary to reach over, under, across and around an uninsulated electrical part or moving part to make adjustments or measurements while the UPS is energized.		P
5.6.2.2	Covers		P

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Clause	Requirement – Test	Result – Remark	Verdict
	Parts at hazardous voltage or energy level shall be so arranged and covers so located as to reduce the risk of electric shock or high current levels while covers are being removed and replaced.		P
5.6.2.3	Location and guarding of parts		P
	Parts at hazardous voltage or energy level and moving parts that involve a risk of injury to persons shall be located, guarded or enclosed so as to reduce the likelihood of unintentional contact by a service person adjusting or resetting controls, or the like, or performing mechanical functions that may be performed with the UPS energized, such as lubricating a motor, adjusting the setting of a control with or without marked dial settings, resetting a trip mechanism or operating a manual switch.		P
5.6.2.4	Parts on doors		N/A
	Parts at hazardous voltage or energy level located on the rear side of a door shall be guarded or insulated to reduce the likelihood of unintentional contact of the live parts by a service person.		N/A
	Compliance with 5.6.1 to 5.6.2.4 is checked by inspection, measurement and use of the test finger (Figure 2A/RD).		N/A
5.6.2.5	Component access		P
	A component that requires inspection, resetting, adjustment, servicing or maintenance while energized shall be so located and mounted with respect to other components and with respect to grounded metal parts that it is accessible for electrical service functions without subjecting the service person to the risk of electric shock, hazardous energy level, high current or injury to person by adjacent moving parts. Access to a component shall not be impeded by other components or wiring.		P
5.6.2.6	Moving parts		P
	Moving parts that can cause injury to persons during service operations shall be located or protected so that unintentional contact with the moving parts is not likely.		P
5.6.2.7	Capacitor banks		N/A
	Capacitor banks shall be fitted with a means of discharge for protection of service persons. A warning label shall be added if discharge time exceeds 1,0 s, stating the time taken to reduce the hazard to a safe level (not greater than 5 min) (see 1.2.8.5/RD and 1.2.8.8/RD).		N/A
5.6.2.8	Internal batteries		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Internal batteries shall be so arranged as to minimize risk of electric shock from inadvertent contact with terminals and the interconnection method shall be such as to minimize risk of short-circuiting and electric shock during servicing and replacement.		N/A
	The user's or service manual, as applicable, shall include the following instructions or similar warning:		N/A
	"CAUTION: A battery can present a risk of electrical shock and high short circuit current. The following precautions should be observed when working on batteries.		N/A
	a) Remove watches, rings or other metal objects. b) Use tools with insulated handles. c) Wear rubber gloves and boots. d) Do not lay tools or metal parts on top of batteries. e) Disconnect the charging source prior to connecting or disconnecting battery terminals. f) Determine if battery is inadvertently grounded. If inadvertently grounded, remove source from ground. Contact with any part of a grounded battery can result in electrical shock. The likelihood of such shock can be reduced if such grounds are removed during installation and maintenance (applicable to equipment and remote battery supplies not having a grounded supply circuit)."		N/A
5.7	Clearances, creepage distances and distances through insulation		P

6	Wiring, connections and supply		P
6.1	General		P
6.1.1	Introduction		P
	Supply leads to apparatus and measuring instruments in covers or doors shall be so installed that no mechanical damage can occur to conductors as a result of movement of these covers or doors.		P
	Neutral conductors in three-phase UPS shall be rated to take account of harmonic currents summing in this conductor as a result of single-phase loads.		P
	Generally, only one conductor shall be connected to a terminal, the connection of two or more conductors being allowed only in those cases where terminals are designed for this purpose.		P
6.1.2	Dimensions and ratings of busbars and insulated conductors		P

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Clause	Requirement – Test	Result – Remark	Verdict
	The choice of cross-sections of conductors inside the UPS is the responsibility of the manufacturer. In addition to the current which must be carried, the choice is governed by the mechanical stresses to which the UPS is subjected, by the way the conductors are laid, by type of insulation and, if applicable, by the kind of elements connected (for example, electronics).		P
6.2	Connection to power		P
6.2.1	General provisions for connection to power		P
6.2.2	Means of connection		P
	For safe and reliable connection to the primary power supply, UPSs are classified and connected as follows (see 1.2.5.2/RD):		P
	<ul style="list-style-type: none"> – UPS for permanent connection: terminals for permanent connection to the supply; – pluggable UPS type B: non-detachable power supply cord or a type B appliance coupler meeting the requirements of 3.2.5/RD; – pluggable UPS type A: an appliance inlet for connection of a detachable power supply cord or a non-detachable power supply cord meeting the requirements of 3.2.5/RD. 		N/A
	Where equipment is provided with more than one supply connection (for example, with different voltages/frequencies or as a redundant power), the design shall be such that all of the following conditions are met:		N/A
	<ul style="list-style-type: none"> – separate means of connection are provided for different circuits; – supply plug connections, if any, are not interchangeable if a hazard could result from incorrect attachment; – the operator is prevented from touching bare parts at ELV or hazardous voltages, such as plug contacts, when one or more connectors have been disconnected. 		N/A
6.3	Wiring terminals for external power conductors		P
	Provisions shall be made for the securement of external power cable glands and accessories, for example, metal/wire sheaths to prevent movement of the cable in its installed condition.		P
	The manufacturer shall indicate if the terminals are suitable for connection of copper or aluminium conductors or both. The terminals shall be such that the external conductors may be connected by a means (screws, connectors, etc.) which ensures that the necessary contact pressure corresponding to the current rating and the short-circuit strength of the apparatus and the circuit is maintained.		P

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Clause	Requirement – Test	Result – Remark	Verdict
	In the absence of a special agreement between manufacturer and user , terminals shall be capable of accommodating conductors and cables of copper from the smallest to the largest cross-sectional areas corresponding to the appropriate rated current (see Annex N).		P
7	Physical requirements		P
7.1	Enclosure		P
	The frame or chassis of a unit shall not be used to carry current during intended operation.		P
	A part, such as a dial or nameplate that serves as a functional part of the enclosure shall comply with the enclosure requirements.		P
	Individual modules of a modular unit may be of open construction – either no enclosure or partial enclosure is supplied – provided that when the modules are assembled in the field as intended, the unit enclosure complies with the requirements in 2.1/RD.		P
	The enclosure shall protect the various parts of the unit. The parts of an enclosure that are required to be in place to comply with the requirements for risk of fire, electric shock, injury to persons and hazardous energy level shall comply with the applicable enclosure requirements specified in this standard.		P
7.2	Stability		P
	Under conditions of normal use, units and equipment shall not become physically unstable to the degree that they may become a hazard to operators and service persons .		P
	If a reliable stabilizing means is used to improve stability when drawers, doors, etc., are opened, it shall be automatic in operation when associated with operator use. Where it is not automatic, suitable and conspicuous markings shall be provided to caution service persons .		P
7.3	Mechanical strength		P
7.4	Construction details		P
7.4.1	Introduction		P
	The minimum protection degree IP20 shall be provided for enclosures when installed in accordance with manufacturer's instructions unless a greater level of protection is stated by the manufacturer.		P

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Clause	Requirement – Test	Result – Remark	Verdict
	Compliance is checked by inspection and with the test finger, except where a greater level of protection is declared and the test finger replaced by the appropriate test method in IEC 60529.		P
7.4.2	Openings		P
	Openings vertically above bare parts at hazardous voltages in the top of a fire enclosure or an electrical enclosure shall not exceed 5 mm in any dimension unless the construction prevents vertical access to such parts, for example, by means of a trap or similar restriction (see Figure 4B/RD). This requirement does not apply to equipment having openings in the top of an enclosure with a height exceeding 1,8 m.		P
7.4.3	Gas concentration		N/A
	Equipment that, in normal use, contains batteries shall incorporate adequate safeguards against the risk of explosive gas concentration and internal or external spillage (see also 7.6 and Annex M).		N/A
7.4.4	Equipment movement		N/A
	Equipment provided with castors to temporarily enable easy movement to installed position and intended to have rigid fixed wiring shall have an additional method to ensure the equipment does not move when installed. For a unit having mass of 25 kg or more, a force equal to 20 % of the weight of the unit but not more than 250 N is applied to verify that the unit does not move.		N/A
7.5	Resistance to fire		P
	UPS intended to be used in operator access areas (see 5.1.1) shall meet the minimum requirements of 4.7.2/RD.		P
	Batteries shall have a flammability class HB or better (see 1.2.12/RD).	See battery specification	P
7.6	Battery location		P
7.6.1	Battery location and installation		P
	Batteries for use with UPS shall be installed taking into account the requirements prescribed in 7.6.2 through 7.6.8.		P
	Batteries shall be installed in: – separate battery rooms or buildings; – separate cabinets or compartments, indoor or outdoor; – battery bays or compartments within the UPS		P
7.6.2	Accessibility and maintainability		P

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Clause	Requirement – Test	Result – Remark	Verdict
	When deemed necessary, battery poles and battery connectors shall be accessible so that their fixings can be tightened with the correct tools. Batteries with liquid electrolyte must be so located that the battery cell caps are accessible for electrolyte tests and readjusting of electrolyte levels.		P
7.6.3	Distance		P
	Battery cells shall be mounted with a distance to each other for the purpose of complying with ventilation, battery temperature and insulation requirements.		P
	The batterie shall be so located and mounted that the terminals of cells will be prevented from coming into undesirable contact with terminals of adjacent cells, or with metal parts of the battery compartment, as the result of shifting of the battery.		P
7.6.4	Case insulation		P
	Cells in conductive casings shall have adequate insulation between each other and to cabinets or compartments. Such insulation shall meet the requirements of 5.2/RD.		P
7.6.5	Wirin		P
	Contacts, connections and wiring shall be protected against effects of ambient temperature, moisture, gas, vapor and mechanical stress according to Clause 6.		P
7.6.6	Electrolyte spillage		P
	To prevent electrolyte spillage from the battery, adequate protection such as an electrolyteresistive coating on the battery trays and cabinets shall be provided.		P
	Ventilation		P
	Proper ventilation shall be provided so that any potential explosive mixtures of hydrogen and oxygen are dispersed safely below hazardous levels.		P
	For battery compartments (separate or combined), the determination method of the necessary airflow to ensure adequate dissolution levels is given in Annex M.		P
	In combined apparatus of battery and electrical components, attention shall be given to prevent ignition of local concentrations of hydrogen and oxygen by adjacent operational arcing parts, such as contactors and switches close to battery vents/valves.		P

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Clause	Requirement – Test	Result – Remark	Verdict
	The sufficiency of the distance between battery vents/valves and any open arcing component shall be demonstrated by the manufacturer with technical data for the construction of the equipment under test (see Clause M.2 for guidance).		P
	For battery rooms, proper information on the required flow of air shall be provided in the installation instructions where the battery installation is supplied with the UPS.		P
	Charging voltages		P
	Batteries shall be protected against excessive voltages, including under a single fault condition, for example due to a charger failure, by switching off the charger or interrupting the charging current. The charging voltage limits shall be as declared by the manufacturer		P
7.7	Temperature rise		P
	The provisions of 4.5/RD apply with the following		P

Table 1 – Temperature limits

Insulation class	Maximum temperature °C
Insulation, including winding insulation, of	
– Class A material 105	100
– Class E material 120	115
– Class B material 130	120
– Class F material 155	140
– Class H material 180	165
– Class C material 200	180
– Class N material 220	200
– Class P material 250	225

Table 2 – Permitted temperature limits for magnetic windings at the end of stored energy mode of operation

Insulation class °C	Temperature by average resistance method °C	Temperature by thermocouple method °C
105	127	117
120	142	132
130	152	142
155	171	161
180	195	185
200	209	199
220	216	206
250	234	224

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Clause	Requirement – Test	Result – Remark	Verdict

8	Electrical requirements and simulated abnormal conditions		P
8.1	Electrical requirements and simulated abnormal conditions		P
	The provisions of 5.1.1/RD apply together with the following.		P
	Where the circuit configuration is such that in any mode of operation the UPS protective earth conductor will carry the sum of the UPS and connected load earth leakage currents, the UPS shall meet the following requirements.		P
	Systems of interconnected equipment with individual connections to the a.c. mains supply shall have each piece of equipment tested separately. Systems of interconnected equipment with one common connection to the a.c. mains supply shall be treated as a single piece of equipment. See also 1.4.10/RD regarding the inclusion of optional features.		P
	Equipment which is designed for connection to multiple mains supplies , only one of which is required at a time (for example, for backup) shall be tested with only one mains supply connected. Equipment requiring power simultaneously from two or more mains supplies shall be tested with all mains supplies connected.		
	Where the earth leakage current exceeds 3,5 mA, the requirements of 5.1.7/RD shall apply.		P
	See 6.2.2 for means of connection to the primary power supply .		P
8.2	Electric strength		P
	The provisions of 5.2/RD apply.		P
8.3	Abnormal operating and fault conditions		P
8.3.1	General		P
	The provisions of 5.3.1/RD, 5.3.2/RD, 5.3.3/RD, 5.3.4/RD, 5.3.5/RD, 5.3.9/RD apply together with the following.		P
8.3.2	Simulation of faults		P
	For components and circuits other than those covered by 5.3.2/RD, 5.3.3/RD and 5.3.5/RD, compliance is checked by simulating the following conditions:		P

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Clause	Requirement – Test	Result – Remark	Verdict
	<ul style="list-style-type: none"> – faults in any components in primary circuits; – faults in any components where failure could adversely affect supplementary insulation or reinforced insulation; – additionally, for equipment that does not comply with the requirements of 4.7.1/RD and 4.7.2/RD, faults in all components; – faults arising from connection of the most unfavourable load impedance to terminals and connectors that deliver power or signal outputs from the equipment, other than main power outlets. 		P
	The equipment, circuit diagrams and component specifications shall be examined to determine those fault conditions that might reasonably be expected to occur.		P
8.3.3	Conditions for tests		P
	Equipment shall be tested by applying any condition that may be expected in normal use and foreseeable misuse, with the UPS operating at rated voltage or at the upper limit of the rated voltage range .		P
	In addition, equipment that is provided with a protective covering shall be tested with the covering in place.		P
9	Connection to telecommunication networks		N/A
	The provisions of Clause 6/RD and 3.5/RD apply together with the following: 2.1.3/RD, 2.3.1/RD, 2.3.2/RD, 2.3.3/RD, 2.3.4/RD, 2.3.5/RD, 2.6.5.8/RD, 2.10.3.3/RD, 2.10.3.4/RD, 2.10.4/RD, Annex M/RD.		N/A

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Clause	Requirement – Test	Result – Remark	Verdict

Annex 1	List of critical components and materials				P
Object/part No.	Manufacturer / trademark	Type/model	Technical data	Standard(s)	Mark(s) of conformity
Fuse	Interchangeable	Interchangeable	40A, 250VAC	--	Tested with appliance
Socket	Interchangeable	Interchangeable	40A, 250VAC	--	VDE
Terminal block	Interchangeable	Interchangeable	60A 600VAC	EN 60947-7-1	VDE
Transformer	Interchangeable	Interchangeable	4000W 48V	--	Tested with appliance
Capacitor	Interchangeable	Interchangeable	10uF 350V	EN 60252- 1	VDE
Capacitor	Interchangeable	Interchangeable	3300UF 63V	EN 60384-14	Tested with appliance
Relay	Interchangeable	Interchangeable	DC24V	EN 60950- 1	Tested with appliance
Fan	Interchangeable	Interchangeable	AC220-240, 50/60HZ 0.28/0.24A	--	CE
Breaker	Interchangeable	Interchangeable	400V 450A	IEC 60898-1	CE

Table 8.1	TABLE: Thermal requirements					P
	Supply voltage (V)	Battery charger	Battery discharger	-	-	—
Maximum measured temperature T of part/at:		T (°C)				Allowed T _{max} (°C)
PCB near transformer		68.6	69.6	-	-	130
Transformer coil		96.9	99.0	-	-	110
Transformer core		97.0	99.8	-	-	110
Input terminal		57.7	58.5	-	-	75
Internal wire		68.4	69.3	-	-	105
Battery		49.0	49.8	-	-	Ref.
Enclosure inside near transformer		55.8	54.7	-	-	Ref.
Enclosure outside near transformer		48.5	49.3	-	-	95
Ambient		40	40	-	-	--
Temperature T of winding:	t ₁ (°C)	R ₁ (Ω)	t ₂ (°C)	R ₂ (Ω)	T (°C)	Allowed T _{max} (°C)
—	—	—	—	—	—	Insulation class
Supplementary information:						B

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Clause	Requirement – Test	Result – Remark	Verdict

Table 8.2 Electric strength			P
Test points		Test voltage	Results
Between	To		
Line & Neutral	Enclosure	1500Vac	No breakdown
Line & Neutral	Battery input	3750Vac	No breakdown

Photos Documents



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===End of the report===