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TEST REPORT
EN IEC 61557-2
Electrical safety in low voltage distribution systems up to 1000 V a.c. and 1500 V d.c. – Equipment for testing, measuring or monitoring of protective measures Part 2: Insulation Resistance

Report Reference No. ..... :	231211155GZU-003
Date of issue..... :	23 Mar 2024
Total number of pages ..... :	16
Name of Testing Laboratory preparing the Report ..... :	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch
Applicant's name ..... :	Uni-Trend Technology (China) Co., Ltd
Address..... :	No. 6, Gong Ye Bei 1st Road, Songshan Lake National High-Tech Industrial Development Zone, DONGGUAN Guangdong Province 523808 CHINA
Test specification:	
Standard ..... :	EN IEC 61557-2:2021
Test procedure..... :	LVD
Non-standard test method……..:	N/A
Test Report Form No. ..... :	EN IEC61557_2D
TRF Originator..... :	Copyright © 2023 Intertek
Master TRF ..... :	2023-03

General disclaimer:

Determination of the test conclusion is based on IEC Guide 115 in consideration of measurement uncertainty.

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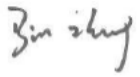
Test item description..... :	PV Insulation Tester
Trade Mark..... :	UNI-T
Manufacturer ..... :	Same as applicant
Model/Type reference..... :	UT503PV
Ratings..... :	Powered: 6 x 1.5V LR6 AA Measurement: CAT III 600V, CAT II 1000Vdc

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):			
☒	**CB Testing Laboratory:**	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch	
Testing location/ address .....:		Room 101/301/401/102/202/302/402/502/602/702/802, No. 7-2, Caipin Road, Huangpu District, Guangzhou, Guang-dong, China	
Tested by (name, function, signature).....:		Bin Zhong /Engineer	
Approved by (name, function, signature) ..:		Justin He/ Manager	
☐	**Testing procedure: CTF Stage 1:**		
Testing location/ address .....:			
Tested by (name, function, signature).....:			
Approved by (name, function, signature) ..:			
☐	**Testing procedure: CTF Stage 2:**		
Testing location/ address .....:			
Tested by (name + signature).....:			
Witnessed by (name, function, signature) .:			
Approved by (name, function, signature) ..:			
☐	**Testing procedure: CTF Stage 3:**		
☐	**Testing procedure: CTF Stage 4:**		
Testing location/ address .....:			
Tested by (name, function, signature).....:			
Witnessed by (name, function, signature) .:			
Approved by (name, function, signature) ..:			
Supervised by (name, function, signature) :			

List of Attachments (including a total number of pages in each attachment):
None

Summary of testing:

Tests performed (name of test and test clause):	**Testing location:**
All applicable tests.	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch Room 101/301/401/102/202/302/402/502/602/702/802, No. 7-2, Caipin Road, Huangpu District, Guangzhou, Guangdong, China

Summary of compliance with National Differences (List of countries addressed):

None.

☒ **The product fulfils the requirements of** EN IEC 61557-2:2021

Copy of marking plate:

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

Refer to test report 231211155GZU-001

Test item particulars ..... :	
Classification of installation and use ..... :	Portable
Supply Connection..... :	Battery operated
Type of item tested ..... :	Measurement
Description of equipment function..... :	See general product information
Measurement (Installation) category..... :	CAT II, CAT III
Pollution degree..... :	2
Protection class..... :	Class II
Environmental rating..... :	0°C ~ 40°C: <80%RH (No condensation) 40°C ~ 50°C: <70%RH
Connection to mains supply ..... :	Battery operated
Operating conditions..... :	Continuous
Overall size of the equipment (W x D x H)..... :	161mm x 117.3mm x 63mm
Mass of the equipment (kg)..... :	0.5kg (including battery)
Marked degree of protection to IEC 60529..... :	IP54
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 ..... :	12 Dec 2023
Date (s) of performance of tests..... :	12 Dec 2023 – 14 Mar 2024

General remarks:

"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.
Determination of the test conclusion is based on IEC Guide 115 in consideration of measurement uncertainty

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Throughout this report a ☐ comma / ☒ point is used as the decimal separator.

Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:

The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided .....:	☐ **Yes** ☒ **Not applicable**

When differences exist; they shall be identified in the General product information section.

Name and address of factory (ies) ..... : Same as applicant

General product information and other remarks:

This tester can be used to measure photovoltaic energized (maximum: 1000V DC) insulation resistance and conventional insulation resistance (de-energized) and automatically identify AC/DC voltage. It has multiple functions including: photovoltaic insulation resistance measurement without solar panel in power outage/short circuit condition or at night, voltage stepping, Bluetooth transmission, automatic discharge, high voltage warning, remote-controlled test lead operation, and more. UT503PV is commonly applied to test insulation resistance for various equipment such as photovoltaic panel, battery energy storage system, new energy vehicles, etc.

EN IEC 61557-2			
Clause	Requirement — Test	Result — Remark	Verdict

	TABLE: 1 - Test Report Index Page	N/A
Document No.	Documents included / attached to this report (description)	Page Numbers
None		

EN IEC 61557-2			
Clause	Requirement — Test	Result — Remark	Verdict
4	**REQUIREMENTS**		P
4.1	General requirement		P
	In addition to the requirement of IEC 61557-1:2019, clause 4, the requirements of clause 4 of this document shall apply		P
	Insulation measurement equipment shall fulfil the safety requirement of IEC 61010-2-034	Refer to test report 231211155GZU-001	P
	Test leads and test probe used with insulation measuring equipment shall fulfil the requirements of IEC 61010-031		P
	Equipment intended for making measurement on distribution systems shall be rated at least for measurement category III		P
	Equipment intended for making measurement on electrical systems shall be rated at least for measurement category II		P
4.2	output Voltage		P
	The output voltage shall be a d.c. voltage		P
	The open-circuit voltage shall not exceed 1.25 times the rated output voltage		P
4.3	Rated current		P
	The rated current shall be at least 1 mA.		P
4.4	Measuring current		P
	The measuring current shall not exceed 15 mA peak. Any a.c. component present shall not exceed 1,5 mA peak.		P
4.5	Influence of external capacitors		P
	The indication of a measured resistance of 1(± 1%)MΩ shall not differ by more than 10% as result of AC voltage components possibly present in the output voltage, when a capacitor of 2(±10%)uF is connected in parallel with the measured resistance.		P
	If the manufacturer specifies a higher capacitance for the object under test, the 2uF capacitor shall be replaced to adhere to the manufacturer's specified capacitance value.	Less than 2uF	N/A
4.6	Overvoltage		P
	The user shall not be subjected to danger, when extraneous d.c. or a.c. voltages up to120 % of the highest rated ouput voltage are accidentally applied for a duration of 10 s to the measurement terminals of the measuring equipment.		P
	When the measuring equipment bears one of the following markings, the applied extraneous a.c. overvoltage can be reduced to a voltage of 1,1	1.2 times of output voltage was applied	N/A

EN IEC 61557-2			
Clause	Requirement — Test	Result — Remark	Verdict
	times the line-to-line voltage:		
	a) DO NOT USE IN DISTRIBUTION SYSTEMS WITH VOLTAGES HIGHER THAN ... V.		N/A
	or		N/A
	b) Example of pictogram for a 500 V a.c. system		N/A
	After applying this reduced AC overvoltage, the equipment shall meet the specifications of 4.6.		N/A
5	**MARKING AND OPERATING INSTRUCTIONS**		P
5.1	Marking		P
	In addition to the marking in accordance with IEC 61557-1:2019, 5.1 and 5.2 and IEC 61010-2-3034:2-17, clause 5, the following information shall be provided on the measuring equipment.		P
	- Rated output voltage		P
	- Rated current		P
	- Measurement range		P
	- Rated voltage to earth and measuring category		P
5.2	Operating instructions		P
	The operating instructions shall state the following information in addition to the statements specified in IEC 61557-1:2019, 5.3 and in IEC 61010-2-3034:2-17, clause 5		P
	- A warning stating that measurements shall be carried out only on parts of an installation or equipment that is de-energized.		P
	- A statement on the correct operation when power is supplied by a hand-driven generator.	Not a hand-driven generator	N/A
	- The number of possible measurements shall be stated for measuring equipment with power supplied by batteries/ accumulators.		P
	- A statement about the maximum capacitance value of the test object if higher than 2uF		P
	- A statement about intended applications of the equipment		P
	- A statement about discharge time and relevant capacity of the test object		P
6	**TESTS**		P
6.1	General		P
	In addition to IEC 61557-1:2019, clause 6 and IEC 61010-2-034:2017, clause 6, the following tests shall be performed.		P

EN IEC 61557-2			
Clause	Requirement — Test	Result — Remark	Verdict
6.2	Operation uncertainty		P
	Operation uncertainty shall be determined in accordance with Table 1		P
	The operating uncertainty shall under the rated operating conditions in accordance with IEC 61557-1:	see Form A	P
	– nominal value of the supply voltage;		P
	– nominal r/min when power is supplied by a hand-driven generator;		P
	– reference temperature 23 °C ± 2 °C;		P
	– reference position in accordance with the manufacturer's statement.		P
6.3	Open circuit voltage		P
	The open-circuit voltage shall be checked with a test circuit with a loading resistance of a minimum of Un x100k Ω/V for compliance with the specification in 4.2(routine test).	see Form B	P
6.4	Rated current		P
	The rated current shall be tested through a test resistor of a value of Un x 1000 Ω/V.	see Form B	P
	Compliance with the requirements in 4.3 shall be checked (routine test).		P
6.5	Measurement current		P
	The measuring current shall be test and compliance with the requirement in 4.4 shall be checked (routine test).	see Form B	P
	When an AC voltage is superimposed on the DC voltage, the measuring equipment for measuring the peak value of the current shall be applied		P
6.6	Overvoltage Tests		P
6.6.1	Overvoltage test with a.c. voltage	see Form C	P
	The permissible overload in accordance with 4.6 shall be tested for a duration of at least 10 seconds		P
	After the test:		P
	– defects, shall be clearly indicated, indications and displayed values shall not lead to unsafe interpretations		P
	– equipment shall stay within the specification.		P
6.6.2	Overvoltage test with d.c. voltage	see Form C	P
	In addition a .d.c. voltage of 1.2 times the magnitude of the highest rated output voltage stored on a capacitor of 2 µF shall be applied in both polarities whilst the equipment is switched on and off.		P
	After the test:		P

EN IEC 61557-2			
Clause	Requirement — Test	Result — Remark	Verdict
	– shall stay within the specification, without activation of protective devices.		P
6.7	Battery life in battery operated instruments		P
	The number of measurements that it is possible to make, until the limit of the voltage range determined by the battery check facility is reached, shall be determined.	see Form D	P
6.8	Stability test		P
	Tests shall verify that the indication of measured resistance of 1(±1%)MΩ is stable and does not change by more than 10% when a capacitor of 2(±10%)uF (or higher capacitance value if specified) is connected in parallel, resistance and inductance of the test capacitor shall be negligible.	see Form C	P

EN IEC 61557-2			
Clause	Requirement — Test	Result — Remark	Verdict

6.2	**TABLE: Operating uncertainty Insulation Resistance**									**Form A**			P
	Intrinsic uncertainty			Influence of									Percentage Operating uncer-tainty
	true	displayed		Position (E1)			Supply voltage (E2)			Temperature (E3)			
Range	value MΩ	value MΩ	A MΩ	-90° MΩ	+90° MΩ	E1 MΩ	6.16Vdc MΩ	9Vdc MΩ	E2 MΩ	0°C MΩ	35°C MΩ	E3 MΩ	[B] %
125V	1.50	1.54	0.04	1.54	1.54	0	1.52	1.54	0.02	1.53	1.54	0.01	3.17
250V	1.50	1.53	0.03	1.53	1.53	0	1.52	1.53	0.01	1.52	1.53	0.01	2.28
500V	1.50	1.50	0	1.50	1.50	0	1.49	1.50	0.01	1.49	1.50	0.01	1.08
1000V	1.50	1.50	0	1.50	1.50	0	1.49	1.50	0.01	1.50	1.51	0.01	1.08
1000V	1.00	1.03	0.03	1.03	1.03	0	1.03	1.03	0	1.01	1.04	0.01	3.79

Notes:7.83

Intrinsic uncertainty or influence quantity	Reference conditions or specified operating range	Designation code	Requirements or tests in accordance with relevant parts of IEC 61557	Type of test
Intrinsic uncertainty	Reference conditions	A	Part 2, 6.2	R
Position	Reference position ± 90°	E_1	Part 1, 4.2	R
Supply voltage	At the limits stated by the manufacturer	E_2	Part 1, 4.2, 4.3	R
Temperature	0 °C and 35 °C	E_3	Part 1, 4.2	T
Operating uncertainty	$B = \pm\sqrt{A^2 + \frac{4}{3}\sum_i E_i^2}$	B	Part 2, 6.2	

A = intrinsic uncertainty E_n = variations R = routine test T = type test F = fiducial value B [%] = ± (B / F) x 100%

Supplementary information:

EN IEC 61557-2			
Clause	Requirement – Test	Result - Remark	Verdict

6.3	**TABLE: Open circuit voltage**		**Form B**	P
Rated output voltage [V]		Measured output voltage [V]	Remark	Verdict
125V		141V	-	P
250V		265V	-	P
500V		526V	-	P
1000V		1050V	-	P
Supplementary information:				

6.4	**TABLE: Rated current**		P
Range	Output current [mA]	Remark	Verdict
125V	1.265mA	-	P
250V	1.234mA	-	P
500V	1.002mA	-	P
1000V	1.034mA	-	P
Supplementary information:			

6.5	**TABLE: Measuring current**		P
DC current [mA]	AC current [mA]	Remark	Verdict
1.26 mApk	0	Range:125V	P
1.40 mApk	0	Range: 250V	P
1.30 mApk	0	Range: 500V	P
1.10 mApk	0	Range: 1000V	P
Supplementary information:			

EN IEC 61557-2			
Clause	Requirement — Test	Result — Remark	Verdict

6.6	**TABLE: Overvoltage tests**												**Form C**	P

Condition	Value test voltage (NOTE 1)	Voltage measured			Transient (NOTE 2)		Current measured				Ca-paci-tance µF	Protective means operating Y/N	Verdict	Comments (NOTE 3)
		V r.m.s	V peak	V d.c.	V	s	Test circuit A1/A2/A3	mA r.m.s.	mA peak	mA d.c.				
Instrument switched ON														
120 % U_N dc (+)	1200V	-	-	-	-	-	A1	0.04	0.05	-	2	N	P	
120 % U_N dc (reverse polarity)	1200V	-	-	-	-	-	A1	0.04	0.05	-	2	N	P	
120 % U_N ac	1200V	-	-	-	-	-	A1	0.04	0.05	-	-	N	P	
Instrument switched OFF														
120 % U_N dc (+)	1200V	-	-	-	-	-	A1	0.04	0.05	-	2	N	P	
120 % U_N dc (reverse polarity)	1200V	-	-	-	-	-	A1	0.04	0.05	-	2	N	P	
120 % U_N ac	1200V	-	-	-	-	-	A1	0.04	0.05	-	-	N	P	

NOTE 1 - Value of test voltage is based on U_N 120 % (Subcl. 4.6)
NOTE 2 - Transient voltages must be below the limits given from Figure 1 of IEC 61010-1
NOTE 3 - Other results noted under comments

Supplementary information:

EN IEC 61557-2			
Clause	Requirement – Test	Result - Remark	Verdict

6.7	**TABLE: Battery life in battery operated instruments**	**Form D**	P
Condition	Number of measurements	Remark	Verdict
Output voltage 1000V, load 1 MΩ	793	-	P
Supplementary information:			

6.8	**TABLE: Stability test**	**Form E**	P
Measured Value [Ω]	Measured Value (2µF) [Ω]	Remark	Verdict
1.00 MΩ	1.04 MΩ	Test voltage: 1000V	P
Supplementary information:			

END OF REPORT