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TEST REPORT EN IEC 61557-1 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 1: General requirements	
Report Reference No.	231211155GZU-002
Date of issue	23 Mar 2024
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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 61557-1:2021
Test procedure	LVD
Non-standard test method	N/A
Test Report Form No.	EN IEC61557_1D
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):		
<input checked="" type="checkbox"/>	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, Guangdong, China
Tested by (name, function, signature)		Bin Zhong /Engineer 
Approved by (name, function, signature) ..		Justin He/ Manager 
<input type="checkbox"/>	Testing procedure: CTF Stage 1:	
Testing location/ address		
Tested by (name, function, signature)		
Approved by (name, function, signature) ..		
<input type="checkbox"/>	Testing procedure: CTF Stage 2:	
Testing location/ address		
Tested by (name + signature)		
Witnessed by (name, function, signature) ..		
Approved by (name, function, signature) ..		
<input type="checkbox"/>	Testing procedure: CTF Stage 3:	
<input type="checkbox"/>	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) :		

<p>List of Attachments (including a total number of pages in each attachment):</p> <p>None</p>	
<p>Summary of testing:</p>	
<p>Tests performed (name of test and test clause): All applicable tests were performed.</p>	<p>Testing location: 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</p>
<p>Summary of compliance with National Differences (List of countries addressed):</p> <p>None</p> <p><input checked="" type="checkbox"/> The product fulfils the requirements of EN IEC 61557-1:2021</p>	

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 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
Equipment mobility	Portable
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 IEC60060-2:

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 61557-1			
Clause	Requirement — Test	Result — Remark	Verdict

4	REQUIREMENTS		P
4.1	General requirement		P
	Measuring equipment, when used for a designated purpose, shall not endanger persons, livestock or property.		P
	Measuring equipment with additional functions not forming part of the application of the IEC 61557 series of standards, shall also not endanger persons, livestock or property.		P
4.2	Influence quantities - Operating uncertainty (B), percentage operating uncertainty (B [%])		P
	The operating error shall be calculated by means of equation 1: $B = \pm (A + 1,15 \times \sqrt{E_i^2})$, where:		—
	A is the intrinsic uncertainty; E _i is the variation; i is the consecutive number of the variations.		—
	The percentage operating uncertainty shall be calculated by means of equation 2: $B [\%] = \pm (B / \text{fiducial value}) \times 100 \%$		—
	The influencing variations used for calculating the operating uncertainty are denoted as follows:		—
	– variation due to changing the position E ₁		P
	– variation due to changing the supply voltage E ₂		P
	– variation due to changing the temperature E ₃		P
	– variation due to interference voltages E ₄		N/A
	– variation due to earth electrode resistance E ₅		N/A
	– variation due to changing the phase angle of impedance of circuit under test E ₆		N/A
	– variation due to changing the system frequency E ₇		N/A
	– variation due to changing the system voltage E ₈		N/A
	– variation due to system harmonics E ₉		N/A
	– variation due to system d.c. quantities E ₁₀		N/A
	– variation due to external low-frequency magnetic fields E ₁₁		N/A
	– variation due to load current E ₁₂		N/A
	– variation due to touch current caused by common mode voltage E ₁₃		N/A
	– variation due to frequency E ₁₄		N/A
	– variation due to repeatability E ₁₅		N/A
	The permissible percentage operation uncertainties are stated in other parts of IEC 61557		P

EN IEC 61557-1			
Clause	Requirement — Test	Result — Remark	Verdict
	Only one of the influence quantities is varied when calculating the operating uncertainty, whilst the remaining influence quantities are kept under reference conditions		P
	The larger of the respective values of the variation(positive and negative variation) is inserted into the equation for the calculation of the operating uncertainty		P
4.3	Rated operating conditions		P
	The stated operating uncertainty shall apply under the following rated operating conditions:		P
	– temperature range from 0 °C to 35 °C;		P
	– a position of ±90° from the reference position for portable measuring equipment;		P
	– 85 % to 110 % of the nominal supply voltage for supply from the distribution systems (if applicable);		P
	– the charge condition in accordance with 4.4 shall apply to the battery or batteries / accumulators for measuring equipment with a supply from batteries/accumulators;	No charge function	N/A
	– the range of revolutions per minute stated by the manufacturer for measuring equipment with a supply from a hand-driven generator;		N/A
	– frequency of the supply voltage ±5 % (if applicable).	Battery operated	N/A
4.4	Battery check facility		P
	Measuring equipment with power supplied from dry or rechargeable cells shall test and indicate that the state of charge of these batteries will permit measurement with specification. This may be done :		P
	automatically as part of the measurement cycle or		P
	as a separate function		N/A
	The test load shall be of the same level as the one appearing during a measurement.		N/A
4.5	Safety		P
	Measuring and monitoring equipment shall be in accordance with IEC 61010-1, IEC 61010-2-030, IEC 61010-2-034 and, if applicable, IEC 61010-2-032, and with the following additional requirement.	Refer to test report 231211155GZU-001	P
	Overvoltage categories and/or measurement categories are specified in the relevant parrs of IEC 61557.		P
	Handheld measuring equipment shall fulfil the requirement for double or reinforced insulation.		P

EN IEC 61557-1			
Clause	Requirement — Test	Result — Remark	Verdict
	The conductive parts of the terminals shall not be accessible and hazardous in connected, partially connected or unconnected conditions.		P
	The protective conductor if used for measuring purposes shall be treated as live parts, except where a different requirement is specified in other parts of IEC 61557.	No protective conductor	N/A
	The terminals shall be designed so that the probe assembly can be connected to the measuring equipment reliably.		P
4.6	Electromagnetic compatibility	Refer to EMC test report	N/A
4.6.1	Immunity		N/A
	For immunity requirements, IEC 61326-1:2012, table 2 shall apply. For testing see 6.5.		N/A
4.6.2	Emission		N/A
	For emission, either class A or class B limits in accordance with IEC 61326-1:2012, 7.2 shall apply		N/A
4.7	Mechanical strength against vibration		P
	In additional to the mechanical resistance tests in accordance with IEC 61010-1, measuring equipment shall successfully passed the following vibration conditions (<i>type test</i>)		P
	direction: three mutually perpendicular axes;		—
	amplitude: 1 mm;		—
	frequency: 25 Hz;		—
	duration: 20 min.		—
5	MARKING AND OPERATING INSTRUCTIONS		P
5.1	General		P
	Marking and operating instructions shall comply with IEC 61010-1, IEC 61010-2-032, IEC 61010-2-030 and, in addition, there instructions shall comply with the requirements specified relevant parts of IEC 61557.		P
5.1	Marking		P
	The measuring equipment shall carry the following marking:		P
	- Type of equipment.		P
	- Type and current rating of the fuse in the case of exchangeable fuse	No fuse	N/A
	- Type of battery/accumulator and polarity of connection in the battery compartment		P
	- Nominal system voltage and if applicable, the symbol for double insulation in accordance with IEC 61010-1:2010, table 1, symbol 11		P

EN IEC 61557-1			
Clause	Requirement — Test	Result — Remark	Verdict
	- Manufacturer's name or registered trade mark		P
	- Model number, name or other means to identify the equipment (inside or outside)		P
	- Reference to operating instructions in accordance with IEC 61010-1:2010, table 1, symbol 14.		P
	Units of measuring quantities and ranges of measurement shall be stated on enclosure or on the display.		P
5.3	Operating instructions		P
5.3.1	Performance requirements		P
	The operating uncertainty, the intrinsic uncertainty and variations E ₁ to E ₁₅ shall be provided in the operating instructions (with the exception of measuring devices covered by IEC 61557-8 and IEC 61557-9)		P
5.3.2	Other information		P
	The operating instructions shall contain the following details:		P
	- Connection diagrams		P
	- Brief description of the principle of measurement		P
	- Diagrams or tables showing the maximum permissible indicated values taking into consider the tolerances stated by the manufacturer (if necessary)		P
	- Type of battery/ rechargeable cells		P
	- Information on the charging current, charging voltage and duration of charging for rechargeable cells	No charging function	N/A
	- Operational lifetime/runtime of the batter/ rechargeable cells or the possible number of measurements		P
	- Type of IP protection according to IEC 60529	IP54	P
	- Any necessary special guidance notes		P
6	TESTS		P
6.1	General		P
	Measuring equipment shall be tested in accordance with safety standards IEC 1010-1, IEC 61010-2-030 , IEC 6101-031, IEC 61010-2-034 and if applicable , IEC 61010-2-032, and the EMC standards of IEC 61326(all relevant parts).		P
	All tests shall be carried out under reference conditions unless otherwise specified. The reference conditions are stated in the various parts of IEC 61557.		P

EN IEC 61557-1			
Clause	Requirement — Test	Result — Remark	Verdict
	Tolerances are added in the relevant parts of IEC 61557		P
6.2	Operating uncertainty		P
6.2.1	General		P
	The operating uncertainty shall be determined according to 6.2.2 to 6.2.4		P
6.2.2	Influence of changing position		P
	The variation E_1 due to changing the position in accordance with 4.2 and 4.3, if applicable, shall be determined for positions $+90^\circ$ or -90° from the reference position stated by the manufacturer (routine test).	See Form A	P
6.2.3	Influence of temperature		P
	The variation E_3 shall be determined from the reference at 0°C and 35°C after the device has reached a state of equilibrium (type test)	See Form A	P
6.2.4	Influence of the supply voltage		P
	The variation E_2 due to changing the supply voltage shall be determined under the following rated operating conditions (routine test):	See Form A	P
	– limits in accordance with 4.3 for measuring equipment supplied from distribution systems;		P
	– limits in accordance with 4.4 and 6.3 for measuring equipment supplied from a battery/accumulator;		P
	– limits in accordance with 4.3 for measuring equipment supplied by a hand-driven generator.		N/A
6.3	Battery check facility		P
	The lower and upper limits for the battery voltage to which the battery test facility in accordance with 4.4 is set, shall be determined by means of an external voltage source. These values shall be used during the test in accordance with 6.2.4 as limits for variation E_2 by changing the supply voltage (routine test).	See Form B	P
6.4	Safety tests	Refer to test report 231211155GZU-001	P
	Compliance with 4.5 shall be test (type test)		P
6.5	EMC tests	Refer to EMC test report	N/A
	For the electromagnetic radio frequency field (RF) and conducted RF the following requirements apply		N/A
	- the auxiliary circuits of the measuring equipment shall be energised with the rated voltage		N/A
	- the measuring equipment shall be tested in its operation conditions		N/A
6.6	Mechanical requirements		P

EN IEC 61557-1			
Clause	Requirement — Test	Result — Remark	Verdict
	The test shall be performed in accordance with 4.7 (type test).		P
	The tests are deemed to have been passed successfully when no parts have become loose or bent and the connecting leads are not damaged. After the process, the measuring equipment shall comply with the requirements for intrinsic uncertainty of the equipment (type test), if applicable		P
6.7	Marking and operating instructions		P
	The marking and the operating instructions shall be confirmed by visual inspection (type test).		P
	The marking shall be inspected during type test and routine test.		P
6.8	Records		P
	Compliance with the tests in clause 6 shall be recorded		P

EN IEC 61557-1

Clause	Requirement — Test	Result — Remark	Verdict
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6.2	TABLE: Operating uncertainty											Form A	P
	Intrinsic Error			Influence of									Percentage
	true	displayed		Position (E1)			Supply voltage (E2)			Temperature (E3)			Operating Error
Range	value	value	A %	-90°	+90°	E1 %			E2 %	0°C	35°C	E3 %	[B] %

Refer to test report 231211155GZU-003

Notes:

Intrinsic error 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 1, 6.1	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	$B = \pm (A + 1,15 \times \sqrt{E_1^2 + E_2^2 + E_3^2})$	B	Part 1 4.1	
A = intrinsic uncertainty	E _n = variations	R = routine test	T = type test	$B [\%] = \pm (B / fiducial \text{ value}) \times 100\%$

Supplementary information:

6.3	TABLE: Battery check facility			Form B	P
	Lower voltage Limit [V]	Upper voltage Limit [V]	Remark	Verdict	
	7.67Vdc	9.0Vdc	-	P	

Supplementary information:

6.4	TABLE: Terminals			Form C	P
	Location Terminal	Hazardous Parts not accessible	Remark	Verdict	
	"Line" and "earth" terminal	Yes	Refer to test report 231211155GZU-001	P	

Supplementary information:

****END OF REPORT****