中国认可
国际互认
检测
TESTING
CNAS L4062

TEST REPORT

Reference No......	:	WTX25X10273642S
Applicant.....	:	GlobTek, Inc.
Address.....	:	186 Veterans Dr. Northvale, NJ 07647 USA
Manufacturer	:	GlobTek, Inc.
Address.....	:	186 Veterans Dr. Northvale, NJ 07647 USA
Product Name.....	:	ICT/ITE Power Supply
Model No.....	:	GT-41052-WWVV-X.X series (see general product information for model designation)
Test specification.....	:	IEC 61558-2-16:2021 used in conjunction with IEC 61558-1:2017 Include deviations for Australia and New Zealand Safety of power transformers, power supplies, reactors and similar products for supply voltages up to 1100 V Part 2: Particular requirements and tests for switch mode power supply units and transformers for switch mode power supply units
Date of Receipt sample.....	:	2025-10-20
Date of Test.....	:	2025-10-21 to 2025-12-29
Date of Issue.....	:	2026-01-06
Test Report Form No......	:	WTX_IEC61558_2-16_2021A
Test Result.....	:	**Pass**

Remarks:
The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of approver.

Prepared By:
Waltek Testing Group (Shenzhen) Co., Ltd.
Address: 1/F., Room 101, Building 1, Hongwei Industrial Park, Liuxian 2nd Road, Block 70 Bao'an District, Shenzhen, Guangdong, China
Tel :+86-755-33663308 Fax:+86-755-33663309 Email：sem@waltek.com.cn

Tested by:

John Zhong

John Zhong/ Project Engineer

Approved by:

Harvid Wei / Manager

Test item description .....:	ICT/ITE Power Supply
Trademark .....:	GlobTek, Inc.
Model and/or type reference .....:	GT-41052-WWVV-X.X series (see general product information for model designation)
Serial number .....:	/
Rating(s).....:	Input: 100-240V~, 50-60Hz or 50/60Hz, 0.6A, Class II Output: 5-48VDC, Max.2.60A, Max. 15W

Remark:
Whether parts of tests for the product have been subcontracted to other labs:
☐ Yes ☒ No

If Yes, list the related test items and lab information:
Test items:
Lab information:

Summary of testing:

Tests performed (name of test and test clause):	**Testing location:**
- IEC 61558-1:2017 - IEC 61558-2-16:2021 - AS/NZS 61558.1:2018+A1:2020+A2:2020 - AS/NZS 61558.2.16:2022+A1:2023 The submitted samples were found to comply with the requirements of above specification.	Waltek Testing Group (Shenzhen) Co., Ltd. Address: 1/F., Room 101, Building 1, Hongwei Industrial Park, Liuxian 2nd Road, Block 70 Bao'an District, Shenzhen, Guangdong, China

Summary of compliance with National Differences:

List of countries addressed: AU
AU=Australia

The product fulfils the requirements of European, Australia and New Zealand National Differences

Copy of marking plate:

The symbol (IEC 60417-5172) for Class II equipment without functional earth connection and the symbol (IEC 60417-5957) for indoor use only are moulded near marking label:

Remark:
The above markings are the minimum requirements required by the safety standard. For the final production samples, the additional markings which do not give rise to misunderstanding may be added.

Other models are with similar label as corresponding above models except different model name and output ratings.

Test item particulars.....:

Protection against electric shock..... : Class II

Supply Connection..... : Direct plug-in

.....:

Possible test case verdicts:

- test case does not apply to the test object.....: N/A (not applicable)
- test object does meet the requirement..... : P (Pass)
- test object does not meet the requirement.....: F (Fail)

Name and address of factory (ies)..... :

1. GlobTek, Inc.
186 Veterans Dr. Northvale, NJ 07647 USA
2. GlobTek (Suzhou) Co., Ltd
Building 4, No. 76 JinLing East Road, Suzhou Industrial Park, Suzhou, 215021, JiangSu, China

General remarks:

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 testing laboratory.
"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.
Throughout this report a comma (point) is used as the decimal separator.

General product information:

The equipment under tests is a Class II direct plug-in ITE Power Supply, there electronic components mounted on PWB, and housed in a thermoplastic enclosure by ultrasonic welding.

External enclosure is made of min. V-0 plastic material. Two pieces of enclosure are enclosed with ultrasonic welding without screw.

Model Differences –

GT-41052-WWVV-X.X series

WW is the standard output wattage, with a maximum value of "15".
VV is the standard rated output voltage designation, with a maximum value of "48", which can be 05, 06, 07, 09, 12, 15, 18, 20, 24, 48.

- X.X denote the output voltage differentiator, subtracting X.X volts from standard output voltage VV in 0.01V increments, the actual output voltage range is 5-48Vdc, blank is to indicate the no voltage different.

All models are same except output rating, winding turns of transformer (T1), D3 or D4 alternative, see below.

Models	Output Voltage (Vdc)	Max. Output Current (A)	Max. Output Wattage (W)	Transformer
GT-41052-WW05	5	2.60	13	XF00167
GT-41052-WW06-X.X	5.1-6	2.60	15	
GT-41052-WW07-X.X	6.1-7	2.49	15	
GT-41052-WW09-X.X	7.1-9	2.13	15	XF00168
GT-41052-WW12-X.X	9.1 -12	1.66	15	
GT-41052-WW15-X.X	12.1-15	1.24	15	
GT-41052-WW18-X.X	15.1-18	0.99	15	XF00169
GT-41052-WW20-X.X	18.1-20	0.83	15	
GT-41052-WW24-X.X	20.1-24	0.74	15	
GT-41052-WW48-X.X	24.1-48	0.62	15	XF00299
All transformers have same construction except winding turns for different voltage output.				

If not specified, Tests were performed on models GT-41052-1305, GT-41052-1512, GT-41052-1524 and GT-41052-1548 as representative.

—Additional requirements
Exposure to extreme temperatures, excessive dust, moisture or vibration; to flammable gases; to corrosive or explosive atmospheres:
This equipment is intended to operate in a “normal” environment (Offices and homes).

Electromedical equipment connected to the patient:
This equipment is not an electromedical equipment intended to be physically connected to a patient.

The products are not intended to be used in maximum ambient temperature exceed of 40 °C

The products are not intended to use in environment which altitude exceed 2000m.

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
8	**MARKING AND OTHER INFORMATION**		
8.1	Transformers shall be marked with the following (for symbols see Table 1):		P
	a) rated supply voltage(s) or the rated supply voltage range(s) (V) .....:	100-240V ~	P
	b) rated output voltage(s) (V or kV) ..... :	See marking label	P
	c) rated output (VA, kVA, or W) …….:		N/A
	d) rated output current(s) (A or mA) ……....:	See marking label	P
	e) rated supply frequency(ies) (Hz) ……..:	50-60Hz or 50/60Hz	P
	f) rated power factor (if not 1) ……....:		N/A
	g) symbol AC for alternating current, or DC for direct current-output	The symbol ⎓ for DC The symbol ~ for AC	P
	h) relevant graphical symbols shown in Table 101 that indicate the kind of transformer in addition with the symbol for SMPS. (IEC 61558-2-16: 2021)	For example:	P
	i) name or trademark of the manufacturer or responsible vendor	See marking label	P
	j) model or type reference	See marking label	P
	k) vector group in accordance with IEC 60076-1 for three phase transformer	Not a 3-phase transformer.	N/A
	l) symbol for class II construction		N/A
	symbol for class III construction	III	N/A
	m) indication of the protection index IP	IPX0	P
	n) rated maximum ambient temperature ta, if other than 25 °C ……..:	40°C	P
	o) rated minimum ambient temperature tamin, if lower than +10 °C and if a temperature sensitive device is used	0°C	P
	p) duty cycle, if any, unless the operating time is limited by the construction of the transformer or corresponds to the operating conditions specified in the relevant part of IEC 61558-2.		N/A
	q) symbol for overvoltage category, if other than OVC II		N/A
	r) transformers used with forced air cooling shall be marked with “AF” in m/s		N/A
	s) Information from the manufacturer to the purchaser (data sheet)	See below.	P
	- short-circuit voltage (% rated supply voltage) for stationary transformers > 1000 VA		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	- electrical function of the transformer	The electrical input/output rating is shown.	P
	- All markings except those under i) and j) may be illustrated as QR Code according ISO/IEC 18004.		P
	t) symbol indicating the maximum altitude of installation, if higher than 2 000 m		N/A
8.2	Marking for transformers IP00 or for associated transformers: type and trademark, instruction sheets		N/A
8.3	Adjusted voltage easily and clearly discernible	No adjustable voltage.	N/A
8.4	For each tapping or winding: rated output voltage and rated output	Single output.	N/A
	necessary connections clearly indicated		N/A
8.5	For non-short-circuit proof transformers or non-inherently short-circuit proof transformers designed to be protected by fuses shall be marked:	Symbol provided on marking plate.	P
	Rated current (A or mA) and symbol for time current characteristics of the fuses for non-inherently short-circuit proof transformer with incorporated fuses and non-short-circuit proof transformer .....:		N/A
	For non-short-circuit proof transformers or non-inherently short-circuit proof transformers designed to be protected with protective devices other than fuses shall be marked:		N/A
	Manufacturer's models or type reference of the protective device, and/or the ratings of the protective device		N/A
	Instruction sheet for transformers with replaceable protective device (other than fuses) information with information about the replacement.		N/A
8.6	Terminals for neutral: "N"		N/A
	Terminal for protective earth marked with earthing symbol		N/A
	Identification of input terminals:		N/A
	Identification of output terminals:		N/A
	Symbol for any point/terminal in connection with frame or core		N/A
8.7	Indication for correct connection		P
8.8	Instruction sheet for type X, Y, Z attachments		N/A
8.9	Transformer for indoor use shall be marked with the relevant symbol.		P
8.10	Symbol for Class II construction not confused with manufacturer's name or any other identification		P

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	Class II transformer with parts to be mounted – delivered with all parts for class II after mounting.	No such parts.	N/A
	Symbol for class II transformer placed on the part which provides class II.		P
8.11	Correct symbols:		P
	Volts	V	P
	Amperes	A (mA)	P
	Volt amperes (or volt-amperes reactive for reactors)	VA or (VAR)	N/A
	Watts	W	P
	Hertz	Hz	P
	Input	PRI	N/A
	Output	SEC	N/A
	Direct current	d.c. (DC) or ⎓	P
	Neutral	N	P
	Single-phase a.c.	~	P
	Three-phase a.c.	3 ~	N/A
	Three-phase and neutral a.c.	3N ~	N/A
	Power factor	cos φ	N/A
	Class II construction	⧈	P
	Class III construction	III	N/A
	Equipment of overvoltage category I	I	N/A
	Equipment of overvoltage category II	II	P
	Equipment of overvoltage category III	III	N/A
	Equipment of overvoltage category IV	IV	N/A
	Fuse		P
	Rated max. ambient temperature	t_a	P
	Rated minimum ambient temperature	t_{amin}	N/A
	Rated minimum temperature	t_{min}	N/A
	Frame or chassis (or core terminal)	⏚	N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	Protective earth (ground)		N/A
	IP number	IPX0	P
	Earth (ground or functional earth)		N/A
	For indoor use only		P
	To indicate that the appliance is intended to be usable up to the maximum altitude 5 000 m.		N/A
	To indicate that the power supply unit shall not be used, if pins of the plug part are damaged.		P
	Additional Symbols (IEC 61558-2-16:2021)		P
	SMPS (Switch mode power supply unit)		P
	SMPS incorporating a Fail-safe separating transformer		N/A
	SMPS incorporating a Non-short-circuit-proof separating transformer		N/A
	SMPS incorporating a Short-circuit-proof separating transformer (inherently or non-inherently)		N/A
	SMPS incorporating a Fail-safe isolating transformer		N/A
	SMPS incorporating a Non-short-circuit-proof isolating transformer		N/A
	SMPS incorporating a Short-circuit-proof isolating transformer (inherently or non-inherently)		N/A
	SMPS incorporating a Fail-safe safety isolating transformer		N/A
	SMPS incorporating a Non-short-circuit-proof safety isolating transformer		N/A
	SMPS incorporating a Short-circuit-proof safety isolating transformer (inherently or non-inherently)		P
	SMPS incorporating a Fail-safe auto-transformer		N/A
	SMPS incorporating a Non-short-circuit proof auto-transformer		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	SMPS incorporating a Short-circuit proof auto-transformer (inherently or non-inherently)		N/A
8.12	Number, letters or other visual means for different positions of regulating devices and switches		N/A
	OFF position indicated by number 0		N/A
	Greater output, input etc. indicated by higher number		N/A
8.13	Marking not on screws or other easily removable parts		P
	Marking clearly discernible (transformer ready for use)		P
	Marking for terminals clearly discernible if necessary after removal of the cover		N/A
	Marking for terminals: no confusion between input and output		N/A
	Marking for interchangeable protective devices positioned adjacent to the base		N/A
	Marking for interchangeable protective devices clearly discernible after removal of cover and protective device		N/A
8.14	Visible information (symbols) shall be provided, when it is necessary to take special precautions for installation, transportation or use (in the catalogue, data sheet, instruction sheet or packaging):		P
	For non-inherently short-circuit proof transformers with non-self-resetting or non-replaceable devices and non-replaceable intentional weak parts: The device cannot be reset or replaced after a short-circuit or an overload		N/A
	For transformers generating a protective earth conductor current greater than 10 mA and are intended for permanent connection The installation shall be made according to the wiring rules.		N/A
	For stationary transformers exceeding 1000 VA: The short circuit voltage expressed as a percentage of the rated supply voltage		N/A
	The electrical function of the transformer		P
	the limiting temperature of the winding under abnormal conditions which shall be respected when the transformer is built into an appliance as information for appliance design;		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	For transformers not designed for series and/or parallel connection with more than one output winding, not for series or parallel connection		N/A
	For IP00-transformers the test of 27.2 is not performed. The result may be affected by the enclosure in the final application.		N/A
8.15	Marking durable and easily legible		P
8.16	Portable transformers with integrated plugs complying with EN 50075 (IEC plug type C), shall use the symbol IEC 60417-6352:2015-10. The instruction sheet of the plug in transformer shall contain the following information, or equivalent: if the pins of the plug parts are damaged, the plug-in power supply shall be scrapped.		P
9	**PROTECTION AGAINST ELECTRIC SHOCK**		P
9.1	General		P
	Transformers shall be enclosed and provided with adequate protection against contact with hazardous-live-parts and shall have no risk of an electric shock from stored charge on capacitors.		P
9.2	Protection against contact with hazardous-live-parts		P
9.2.1	Determination of hazardous-live-parts		P
9.2.1.1	A live part is not a hazardous-live-part if it is separated from the supply by double or reinforced insulation and the requirements of 9.2.1.2 or 9.2.1.3 are met when the transformer is supplied at rated supply voltage		P
9.2.1.2	The voltage shall not exceed 35 V AC peak or 60 V ripple free DC.	Measured maximum output voltage: Max.48.32Vd.c.	P
9.2.1.3	Where the voltage exceeds 35 V (peak) AC or 60 V ripple free DC, the touch current shall not exceed:	L/N and accessible output terminal / enclosure: max.118Vac.	P
	- for AC. 0,7 mA (peak)	Max. 0.13 mA	P
	- for DC. 2,0 mA		N/A
	In addition, when a capacitor is connected to live parts:		P
9.2.1.3.1	The discharge shall not exceed 45 µC for stored voltages between 60 V and 15 kV, or		N/A
9.2.1.3.2	The energy of discharge shall not exceed 350 mJ for stored voltages exceeding 15 kV.		N/A
9.2.2	Accessibility to hazardous-live-parts		P

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	Transformers shall be constructed to provide adequate protection against accessibility to hazardous-live-parts.		P
	Class I and II transformers shall be so constructed and enclosed that there is adequate protection against accidental contact with hazardous-live-parts.	The plastic enclosure considered as electrical and mechanical enclosure.	P
	For class I transformers, accessible parts shall be separated from hazardous-live-parts by at least basic insulation.		P
	Class II transformers shall be so constructed and enclosed that there is adequate protection against accessibility to basic insulation and to conductive parts separated from hazardous-live-parts by basic insulation only.		P
	Only parts separated from hazardous-live parts by double or reinforced insulation may be accessible		N/A
	Hazardous-live-parts shall not be accessible after removal of detachable parts except for	No detachable parts.	N/A
	- lamps having caps larger B9 and E10		N/A
	- type D fuse holder		N/A
	IP00 transformers shall comply with the end product standard after incorporation in the end product.		P
	The insulating properties of lacquer, enamel, paper, cotton, oxide film on conductive parts and sealing compound shall not be considered as giving the required protection against accidental contact with hazardous-live-parts with the exception of fully insulated winding wire (FIW).		P
	Shafts, handles, operating levers, knobs and the like shall not be hazardous-live-parts.		N/A
	Compliance is checked by inspection and by the relevant tests of IEC 60529.		P
	Class II transformers and Class II parts of Class I construction are tested with the test pin (fig. 3)		P
	Hazardous live parts shall not be touchable by test finger (fig. 4) with the exception of fully insulated winding wire (FIW).	No live parts were touched.	P
	for Class II transformers: conductive parts separated by basic insulation from hazardous live parts not touchable by test finger		P
	hazardous live parts shall not be touchable with the test pin	No live parts were touched.	P
9.2.3	Accessibility of non-hazardous live parts		P

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	Non-hazardous live parts of the output circuit isolated from the input circuit by double or reinforced insulation may be accessible under the following conditions:		P
	- for no-load output voltages not exceeding 35 V peak AC or 60 V ripple-free DC, both poles may be accessible;	The no load output voltage is 48.32Vdc	P
	- for no-load output voltages exceeding 35 V peak AC or 60 V ripple-free DC and not exceeding 250 V AC, only one of the poles may be accessible.		N/A
9.3	Protection against hazardous electrical discharge		P
	Transformers with primary supply plug: 1 s after the interruption of the supply the voltage between the pins do not exceed 35 V (peak) AC or 60 V ripple free DC	After 1s: Max. 24Vac CX1=0.15uF RA=RB=2MΩ	P
	Transformers without a primary supply plug: 5 s after the interruption of the supply the voltage between the input terminals do not exceed 35 V (peak) AC. or 60 V ripple free DC.		N/A
	If the nominal capacitance is ≤ 0,1 µF – no test is conducted.		N/A
	- 10 times switch the supply source on and off, or use a special equipment for to switch off at the most unfavourable electrical angle		P
	If the measured voltage is > 60 V ripple free DC, the discharge must be ≤ 45 µC.		N/A
10	**CHANGE OF INPUT VOLTAGE SETTING**		P
	Transformers with more than one rated supply voltage shall be so constructed that the voltage setting cannot be changed without the aid of a tool.	No such devices.	N/A
	Transformers which can be set to different rated supply voltages:		N/A
	- The indication of voltage for which the transformer is set is discernible on the transformer.		N/A
10.101	A wide range (e.g. 100 V AC to 240 V AC) of supply voltage is allowed (IEC 61558-2-16: 2021)		P
	- if the output voltage does not exceed the rated output voltage		P
	- if the no-load output voltage does not exceed the limits of the output voltage deviation		P
11	**OUTPUT VOLTAGE AND OUTPUT CURRENT UNDER LOAD**		P
11.1	Difference from rated value (without rectifier; with rectifier):	With rectifier. (see appended table)	P

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	a) inherently short-circuit proof transformers with one rated output voltage for the output voltage: AC≤ 10%; DC≤ 15%		N/A
	b) inherently short-circuit proof transformers with more than one rated output voltage for the highest output voltage: AC≤10%; DC≤15%		N/A
	c) inherently short-circuit proof transformers with more than one rated output voltage for the other output voltages: AC≤15%; DC≤20%		N/A
	d) other transformers for the output voltages: AC≤5%; DC≤10%	(see appended table)	P
11.2	If a transformer is marked with the rated output, the rated output voltage, the rated output current, and the rated power factor, these values shall be substantially in agreement with each other.		P
	If no rated output current is assigned to the transformer, the rated output current for the purpose of this specification can be calculated from the rated output and the rated output voltage.		N/A
12	**NO-LOAD OUTPUT VOLTAGE (IEC 61558-2-16:2021)**		P
	Remark: with rectifier measuring on both sides of the rectifier if they are accessible to the user	Input terminals of the rectifier are not accessible to user.	P
12.101	The no load output voltage shall not exceed :		P
	- For SMPS incorporating separating or auto-transformers: 1000V AC. or 1415 V ripple free DC		N/A
	- For SMPS including isolating transformers: 500 V AC. or 708 V ripple-free DC		N/A
	- For SMPS including safety isolating transformers: 50 V AC. or 120 V ripple-free DC		P
	For independent SMPS incorporating separating transformers, isolating transformers or auto-transformers: 50 V AC. or 120 V ripple-free DC		N/A
	For independent SMPS, this output voltage limitation applies even when output windings, not for interconnection, are connected in series		N/A
	The requirement for series connection does not apply to associated or IP 00 SMPS		N/A
12.202	The difference between no-load output voltage and the output voltage measured in clause 11 does not exceed the values of table 102		P

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
12.103	Unless otherwise specified by the manufacturer, SMPS shall be tested with 20 cm to 200 cm length of wire connected to the output terminals under the most unfavourable conditions. Twisted wires or cables rated in accordance with IEC 60227-5:2011 (type 60227 IEC 53) may be used. The cross sectional area of the conductors shall be determined in accordance with the rated output current of the SMPS, and the current density shall not exceed 5 A/mm^2 in normal use.		P
13	**SHORT-CIRCUIT VOLTAGE**		N/A
	The short-circuit voltage measured shall not deviate by more than 20 % from the value marked.	No marked.	N/A
14	**HEATING**		P
14.1	General requirements		P
14.1.1	Temperature-rise test		P
	No excessive temperature in normal use		P
	The manufacturer may choose the simulated load methods according to 14.1.2.1 or 14.1.2.2 instead of the direct load method that may be applied.		P
	Room temperature: rated ambient temperature ta ± 5 °C		P
	Type X, Y, Z attachments: 1 pull (5 N) to the connection windings		N/A
	Upri (V): 1,1 times rated supply voltage loaded with rated impedance – for independent transformers	264V (240 x 1.1)	P
	Upri (V): 1,1 times rated supply voltage: with I sec (A), measured with rated impedance and 1,0 times of the rated supply voltage for others than independent transformers		N/A
	Max. temperature windings ……:	(see appended table)	N/A
	- Class A: 100 °C		N/A
	- Class E: 115 °C		N/A
	- Class B: 120 °C		P
	- Class F: 140 °C		N/A
	- Class H: 165 °C		N/A
	- other classes		N/A
	Temperature of external enclosures of stationary transformers:		N/A
	- bare metal: 65 °C		N/A
	- metal covered by lac or varnish: 70 °C		N/A
	- other material: 80 °C		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	Temperature of external enclosure of stationary transformer 85 °C (not touchable with the IEC test finger)		N/A
	Temperature of external enclosures, handles, etc. of portable transformers:		P
	- continuously held parts of metal: 48 °C		N/A
	- continuously held parts of other material: 48 °C		N/A
	- not continuously held parts of metal: 60 °C		N/A
	- not continuously held parts of other material: 80 °C	Plastic enclosure.	P
	Temperature of terminals for external conductors and terminals of switches 70 °C	No switch.	N/A
	Temperature of internal and external wiring:		P
	- rubber: 65 °C	No rubber.	N/A
	- PVC: 70 °C	Output wiring	P
	Temperature of parts where safety can be affected:		N/A
	- rubber: 75 °C		N/A
	- phenol-formaldehyde: 105 °C		N/A
	- urea-formaldehyde: 85 °C		N/A
	- impregnated paper and fabric: 85 °C		N/A
	- impregnated wood: 85 °C		N/A
	- PVC, polystyrene and similar thermoplastic material: 65 °C		N/A
	- varnished cambric: 75 °C		N/A
	Temperature rise of supports 85 °C		P
	Temperature of printed boards:	UL approved PCB used, the limit is 130 °C	P
	- bonded with phenol-formaldehyde: 105 °C		N/A
	- melamine-formaldehyde: 105 °C		N/A
	- phenol-furfural: 105 °C		N/A
	- polyester: 105 °C		N/A
	- bonded with epoxy: 140 °C	PCB rating: 130°C	P
	Electric strength between input and output windings (18.3, 1 min); test voltage (V) ……:		P
14.101	Winding temperature measured by thermocouples at the surface of the winding (IEC 61558-2-16: 2021)		P
	- if the internal frequencies is > 500Hz		P

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	- the values of Table 2 for windings temperatures are reduced by 10°C	Class: 120-10=110° C	P
14.102	SMPS shall be tested at 0,9 times and 1,1 times the rated supply voltage		P
14.2	Application of 14.1 or 14.3 according to the insulation system		P
14.2.1	Class of insulation system (classified materials according to IEC 60 085 and IEC 60 216)	Class B	P
14.2.2	No classified material, or system but the measured temperature does not exceed the value of Class A		N/A
14.2.3	No classified material or system but the measured temperature exceeds the value for Class A, the live parts of the transformers are submitted to the test of 14.3		N/A
14.3	Accelerated ageing test for undeclared class of insulation system		N/A
14.3.1	General Cycling test (10 cycles):	Measured transformer winding within the specified limit on normal heating test.	N/A
14.3.2	Heat run (temperature in table 4)		N/A
14.3.3	Vibration test: 30 min; amplitude 0,35 mm; frequency range: 10 Hz, 55 Hz, 10 Hz		N/A
14.3.4	Moisture treatment (48 h, 17.2)		N/A
14.3.5	Measurements and tests at the beginning and after each test:		N/A
	- deviation of the no-load input current, measured at the beginning of the test less than 30%		N/A
	- insulation resistance acc. cl.18.1 and 18.2		N/A
	- electric strength, no breakdown (18.3 and 18.4); 2 min; test voltage 35% of specified value		N/A
	- Transformers (50 or 60 Hz version) are tested after the dielectric strength test as follows: under no load; duration: 5 min; Upri(V):1,2 times rated supply voltage; frequency (Hz): 2 times rated frequency		N/A
15	**SHORT-CIRCUIT AND OVERLOAD PROTECTION**		P
15.1	General requirements		P
15.1.1	Short circuit and overload test method		P
	Tests direct after 14.1 at the same ta and without changing position.	(see appended table)	P
	Supply voltage between 0,9 times and 1,1 times of the rated supply voltage	264V (240 x 1.1) 90V (100 x 0.9)	P

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	Transformer with rectifier tests of 15.2 and 15.3 at the input and the output terminals of the rectifier.		P
	Transformers with more than one output winding or tapping, all windings tested with normal load, the winding with the highest temperature is short circuited.		N/A
	Wining protected inherently (15.2)		N/A
	- Max. temperature of winding protected inherently (insulation class): 150°C (A); 165°C (E); 175°C (B); 190°C (F); 210°C (H)		N/A
	Winding protected by protective device:		P
	- Test according 15.3.2 - 15.3.3 – 15.3.4: max. temperature of winding during the time required or the time T given in table 6 (insulation class): 200 °C (A); 215 °C ;(E); 225 °C (B); 240 °C (F); 260 °C (H)		N/A
	- Test according 15.3.1: max. temperature of winding during the first hour, peak value (insulation class): 200 °C (A); 215 °C (E); 225 °C (B); 240 °C (F); 260 °C (H)	Protected, no high temperature	P
	- Test according 15.3.1: max. temperature of winding after first hour, peak value (insulation class): 175 °C (A); 190 °C (E); 200 °C (B); 215 °C (F); 235 °C (H)		P
	- Test according 15.3.1: max. temperature of winding after first hour, arithmetic mean value (insulation class):150 °C (A); 165 °C (E); 175 °C (B); 190 °C (F); 210 °C (H)		P
	- Test according 15.3.5: max. temperature of winding (insulation class): 175 °C (A); 190 °C (E); 200 °C (B); 215 °C (F); 235 °C (H)		P
	Max. temperature of external enclosures (accessible by test finger) 105 °C		P
	Max. temperature of insulation of wiring (rubber and PVC) 85 °C		P
	Temperature rise of supports 105 °C		P
15.1.2	Alternative short circuit and overload test method		P
	The manufacturer may choose to apply any of the following methods described in 14.1.2.1 and 14.1.2.2. These test procedures are according to IEC 60076-11:2004, 23.2.1 and 23.2.2		P
15.2	Inherently short-circuit proof transformers		N/A
	Inherently short-circuit proof transformers are tested by short-circuiting the output windings until steady-state conditions are reached		N/A
15.3	Non-inherently short-circuit proof transformers		P

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	Non-inherently short-circuit proof transformers are tested as follows		P
15.3.1	Output terminals short-circuited: protection device operates, test at 0,9 … 1,1 of the rated supply voltage		P
15.3.2	If protected by a fuse accordance with either IEC 60 269-2 or IEC 60 269-3, or a technical equivalent fuse, the transformer is loaded as in table 6.		N/A
15.3.3	If protected by a fuse accordance with either IEC 60 127(all parts) or ISO 8820(all parts), or a technical equivalent fuse, the transformer is loaded with the current as specified for the longest pre arcing time. If protected by miniature fuses in accordance to IEC 60127(all parts), 1,5 times of the rated fuse, until steady state condition (in addition)		N/A
15.3.4	If protected by a circuit-breaker according to IEC 60 898(all parts) the transformer is loaded with a current equal to 1,45 times the value of the circuit-breaker rated current		N/A
15.3.5	If other overload protection than a fuse (IEC 60 127) or a circuit-breaker (IEC 60 269) test with 0,95 times of operating current	Protected by electronic circuit	P
	If an internal week point is used, the test must be repeated with two new samples. The two additional samples works similar to the first sample. Temperatures in the limit of table 5		N/A
15.4	For non-short-circuit proof transformers: temperature rises values in table 5, tests as indicated in 15.3		N/A
15.5	For fail-safe transformers:		N/A
15.5.1	Three additional new specimens are used		—
	- Upri (V): 1,1 times rated supply voltage ……..:		—
	- Isec (A): 1,5 times rated output current ……..:		—
	- time until steady-state conditions t1 (h) ……:		—
	- time until failure t2 (h): t1; 5 h ……..:		—
15.5.2	During the test:		N/A
	- no flames, molten material, etc.		N/A
	- temperature of enclosure 175 °C		N/A
	- temperature of plywood support 125 °C		N/A
	After the test:		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	- electric strength (Cl. 18, 1 min, test voltage: 35% of specified value); no flashover or break-down for primary-to-secondary only for safety isolating, isolating and separating transformer and for primary-to-body for all kinds of transformer		N/A
	- bare hazardous live parts not accessible by test finger through holes of enclosure		N/A
15.101	Electronic circuits shall be so designed and applied that a fault condition within the SMPS will not cause electric shock, or fire hazard, and unintentional operation of the appliance will not impair safety.	(Details see Annex H)	P
16	**MECHANICAL STRENGTH**		P
16.1	General		P
	After tests of 16.2, 16.3 and 16.4		P
	- no damage		P
	- hazardous live parts not accessible by test pin according to 9.2.2		P
	- no damage for insulating barriers		P
	- handles, levers, etc. have not moved on shafts		N/A
16.2	Stationary transformers		N/A
	3 blows, impact energy 0,5 ±0,05 J		N/A
16.3	Portable transformers (except of direct plug in transformers)		P
	For portable transformers: 100 falls, 25 mm		P
16.4	Portable transformers provided with integral pins for introduction in socket outlets of the fixed wiring		N/A
16.4.1	General requirements		N/A
	Portable transformers with integral pins for introduction into fixed socket-outlets shall have adequate mechanical strength.		N/A
	Plug in power supply units with integral main plug complying with IEC TR 60083, without plugs complying with EN 50075 (IEC plug type C) shall be tested:	AU plug, complying with AS/NZS 3112:2017+A1:2021	P
	a) plug-in transformers: tumbling barrel test: 50 times, x ≤ 250 g; 25 times, x > 250 g	169g, 50 times	P
	b) torque test of the plug pins with 0,4 Nm		P
	c) pull force according to table 7 for each pin		P
16.4.2	Portable transformers provided with integral pins according to EN 50075 (IEC plug type C) for introduction in socket-outlets of the fixed wiring		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	a) The test is carried in a tumbling barrel as described in IEC 60068-2-31.		N/A
	- 1000 times: x ≤ 100 g; 500 times: 100 g< x ≤ 200 g; 200 times: g< 100 x		N/A
	- pull force according to IEC 60884-1:2002, 24.10 for each pin		N/A
	b) torque test of the plug pins with 0,4 Nm		N/A
16.5	Additional requirements for transformers to be used in vehicles and railway applications		N/A
16.5.1	Transformers to be used in vehicles and railway applications		N/A
	An test according IEC 61373 shall be performed with conditions of Table 8 and Table 9 and the frequency values depending on the weight of the specimen are defined in Table 10		N/A
16.5.2	Test requirements for the transportation of transformers		N/A
	Shock and vibration testing requirements for transformers subjected to while being transported per IEC 60721-3-2 with conditions according to Table 11 and Figure 8.		N/A
17	**PROTECTION AGAINST HARMFUL INGRESS OF WATER AND MOISTURE**		P
17.1	Degree of protection (IP code marked on the transformer)		P
17.1.1	General requirements	IPX0	P
	Test according to 17.1.2 and for other IP ratings test according to IEC 60 529:		P
	- stable operating temperature before starting the test for < IPX8		N/A
	- the water for the test shall be at a temperature of 15±10℃		N/A
	- transformer mounted and wired as in normal use		N/A
	- fixed transformer mounted as in normal use by the tests according to 17.1.2 A to J		N/A
	- portable transformers placed in the most unfavourable position and wired as in normal use		N/A
	- glands tightened with a torque equal to two-thirds of 25.6		N/A
	After the tests:		N/A
	- dielectric strength test according to 18.3		N/A
	Inspection:		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	a) no access with hazardous-live-parts or hazardous moving parts with the relevant test probe according to the test described in 17.1.2, items A 1), B 1) and C 1). The test finger may penetrate but the stop face (ø 50 x 20 mm) shall not pass through the openings for the number 2 of the first characteristic numeral		N/A
	b) no entry into the transformer enclosure by the relevant test probe for solid-object-proof transformers according to test described in 17.1.2, items A 2) and B 2). The protection is satisfactory if the full diameter of the probe does not pass through any openings;		N/A
	c) no deposit of talcum powder in dust-proof transformers		N/A
	d) no deposit of talcum powder inside dust-tight transformers		N/A
	e) no trace of water on live parts except SELV parts below 15 V AC or 25 V DC or insulation if hazard for the user or surroundings no reduction of creepage distances		N/A
	f) no accumulation of water inside the enclosures of drip-proof, spray-proof, splash-proof and jet-proof transformers, which may impair safety		N/A
	g) no trace of water entered in any part of water-tight transformer		N/A
17.1.2	Tests on transformers with enclosure:		P
	A) Solid-object-proof transformers:		P
	- 2 IP2X test finger (IEC 60 529) and test pin (fig. 3)		P
	- rigid sphere		P
	B) Solid-object-proof transformers:		N/A
	- IP3X, wire 2,5 mm; force 3 N		N/A
	- IP4X, wire 1 mm; force 1 N		N/A
	C) Dust-proof transformers, IP5X;		N/A
	1) At every possible point with a probe according to test probe D of B 1).		N/A
	2) dust chamber according to IEC 60 529, fig. 2:		N/A
	a) transformer has operating temperature		N/A
	b) transformer, still operating, is placed in the dust chamber		N/A
	c) the door of the dust chamber is closed		N/A
	d) fan/blower is switched on		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	e) after 1 min transformer is switched off for cooling time of 3 h		N/A
	D) Dust-tight transformers (IP6X) test according with C)		N/A
	E) Drip-proof transformers (IPX1) test according to fig. 3 of IEC 60 529 for 10 min		N/A
	F) Rain-proof transformers (IPX2) test according to fig. 3 of IEC 60 529 for 10 min in operation, any angle up to 15°		N/A
	G) Spray proofed transformers (IPX3) test according to fig. 4 of IEC 60 529 for 10 min in operation and 10 min switched off , time for complete oscillation (2 x 120°) is 4 sec.		N/A
	H) Splash-proof transformers (IPX4) test according to fig. 4 of IEC 60 529 (see F) for 10 min in operation and 10 min switched off (the tube shall oscillate ≈360)		N/A
	I) Jet-proof transformer (IPX5) test according to fig. 6 of IEC 60 529 (nozzle 6,3mm)		N/A
	J) Powerful Jet-proof transformer (IPX6) test according to fig. 6 of IEC 60 529 (nozzle 12 mm)		N/A
	K) Watertight transformers (IPX7)		N/A
	L) Pressure watertight transformers (IPX8)		N/A
17.2	After moisture test (48 h for IP20, 168 h for other transformers):	IP20, 48h; 93%R.H.; 40℃	P
	- insulation resistance and electric strength (Cl. 18)		P
18	**INSULATION RESISTANCE AND ELECTRIC STRENGTH**		P
18.2	Insulation resistance between:		P
	- live parts and body for basic insulation ≥ 2 MΩ		N/A
	- live parts and body for reinforced insulation ≥ 7 MΩ	>100MΩ	P
	- input circuits and output circuits for basic insulation ≥ 2 MΩ		N/A
	- input circuits and output circuits for double or reinforced insulation ≥ 5 MΩ	>100MΩ	P
	- each input circuit and all other input circuits connected together ≥ 2 MΩ		N/A
	- each output circuit and all other output circuits connected together ≥ 2 MΩ		N/A
	- hazardous live parts and metal parts with basic insulation (Class II transformers) ≥ 2 MΩ		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	- conductive parts of class II transformers which are separated from hazardous-live parts by basic insulation only, and the body ≥ 5 MΩ		N/A
	- metal foil in contact with inner and outer surfaces of insulating enclosures ≥ 7 MΩ	>100MΩ	P
18.3	Electric strength test (1 min): no flashover or breakdown:		P
	Overvoltage category ……:	II	P
	1) functional insulation; working voltage (V); test voltage (V) ……:		N/A
	2) basic insulation; working voltage (V); test voltage (V) ……..:	(see table 18.3)	P
	3) supplementary insulation; working voltage (V); test voltage (V) ……:		N/A
	4) double or reinforced insulation……:	(see table 18.3)	P
	5) Functional insulation for windings intended to be connected in series or parallel (test voltage = working voltage + 500 V)		N/A
18.3.1	A partial discharge test according to IEC 60664-1, (see test description below) shall be performed, if FIW wires or TIW wires are used and if the recurring peak working voltage Ut across the insulation is greater than 750 V. The relevant recurring peak voltage is the maximum measured voltage between the input and the output circuit, if the secondary side is earthed. The measuring shall be done at 1,0 of the maximum rated input voltage.		N/A
18.3.1.101	For transformers incorporated in an SMPS in accordance with Annex BB, a partial discharge type test in accordance with Annex AA shall be performed		N/A
18.4	Does not apply (IEC 61558-2-16:2021)		-
18.101	SMPS shall fulfil the impulse dielectric test in accordance with Annex R of IEC 61558-1:2017		P
	After the test of 18.3, the SMPS shall be connected to the impulse test equipment. The impulse dielectric test shall be carried out in accordance with Annex R of IEC 61558-1:2017 between the input and output terminals of the SMPS. The interval between the impulses shall be at least 1 s if the impulses are produced inside the SMPS.		P
	During the test, there shall be no breakdown of the insulation between turns of a winding, between input and output circuits, between adjacent input or output circuits, or between the windings and any conductive core		P
18.5	**Touch current and protective earthing conductor current**		P

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
18.5.1	General		P
18.5.2	Touch current		P
	Touch current measured after the clause 14 test (hot) for class I and class II transformers (class II transformers with metal foil at the plastic surface). The test circuit according figure 10. Measuring network according Figure J.1 (Annex J). If the frequency is >30kHz, measuring across the 500 ohm resistor of J.1 (burn effects).		P
	Measurement of the touch current with switch p in both positions and in combination with switches e and n. The measured values are less than the required values of table 15.	Under normal condition: Max. 0.14mA (to output terminals) Max. 0.06 (to accessible enclosure)	P
	switches n and e in on position		P
	switch n: off and switch e: on		P
	switch n: on and switch e: off		P
18.5.3	Protective earthing conductor current		N/A
	The transformer is connected as in clause 14 Impedance of the ammeter < 0,5 ohm, connected between earthing terminal of the transformer and protective earthing conductor		N/A
	The measured values are less than the required values of table 15.		N/A
19	**CONSTRUCTION**		P
19.1	General construction		P
19.1.1	General		P
19.1.2	Auto-transformers	No auto-transformers	N/A
19.1.2.1	Plug connected auto-transformers where the rated input voltage is higher than the rated output voltage, shall not have any potential to protective earthing at the output socket higher than the rated output voltage.	No polarised input	N/A
19.1.2.2	Polarised input and output plug and socket-outlet system: an instruction shall be given for not using such a transformer with a nonpolarized plug and socket-outlet system.		N/A
19.1.2.3	A polarity detecting device only energises the output in the case: output potential to earth ≤ rated output voltage, also with reversed input plug.		N/A
	- The contact separation of the device is ≥ 3mm		N/A
	- A current to earth does not exceed 0,75 mA.		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	- All tests are repeated under fault conditions of H.3.3. The potential to earth does not exceed 1,1 times the max output voltage for more than 5 s.		N/A
	- for class I transformers, the insulation between the input / output winding and the body shall consist of at least basic insulation (rated for the working voltage)		N/A
	- for class II transformers, the insulation between the input / output winding and the body shall consist of double or reinforced insulation (rated for the working voltage).		N/A
19.1.3	Separating transformers		P
19.1.3.1	Input and output circuits electrically separated.		P
19.1.3.2	The insulation between input and output winding(s) consist of basic insulation		P
	Class I transformer		--
	- Insulation between input windings and body consist of basic insulation		N/A
	- Insulation between output windings and body consist of basic insulation		N/A
	Class II transformer		P
	- Insulation between input windings and body consist of double or reinforced insulation		P
	- Insulation between output windings and body consist of double or reinforced insulation		P
19.1.3.3	The insulation between input windings and intermediate conductive parts and the output windings and intermediate part consist of basic insulation		N/A
	For class I transformer the insulation between input and output windings via the intermediate conductive parts consist of basic insulation		N/A
	For class II transformer the insulation between input winding and the body and between the output windings and the body via the intermediate conductive parts consist of double or reinforced insulation.		P
19.1.3.4	Parts of output circuits may be connected to protective earthing		N/A
19.1.3.5	No direct contact between output circuits and the body, unless:		N/A
	- Allowed for associated transformers by the relevant equipment standard		N/A
19.1.4	Isolating transformers and safety isolating transformers		P

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
19.1.4.1	Input and output circuits electrically separated		P
	No possibility of any connection between these circuits		P
19.1.4.2	The insulation between input and output winding(s) consist of double or reinforced insulation (exception see 19.1.4.4)		P
	Class I transformers not intended for connection to the mains by a plug:		N/A
	- Insulation between input windings and body connected to earth consist of basic insulation (rated for the input voltage)		N/A
	- Insulation between output windings and body, connected to earth consist of basic insulation rated (rated for the output voltage)		N/A
	Class I transformers intended for connection to the mains by a plug:		N/A
	- Insulation between input windings and body connected to earth consist of basic insulation (rated to the working voltage)		N/A
	- Insulation between output windings and body, connected to earth consist of supplementary insulation (rated for the working voltage)		N/A
	Class II transformers		P
	- Insulation between input windings and body consist of double or reinforced insulation (rated for the input voltage)		P
	- Insulation between output windings and body consist of double or reinforced insulation (rated for the output voltage)		P
19.1.4.3	For transformers with intermediate conductive parts not connected to the body (between input/output):	Iron core was considered as primary circuit	N/A
19.1.4.3.1	For class I and class II transformers the insulation between input and output windings, via intermediate conductive parts, consist of double or reinforced insulation (rated for the working voltage)		N/A
	- For class II transformers the insulation between input winding and the body and between the output windings and the body via the intermediate conductive parts consist of double or reinforced insulation. (rated for the input voltage and output voltage), for SELV circuits only basic insulation is required.		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	- For transformers, different from independent, the insulation between input and output windings, via intermediate conductive parts, consist of double or reinforced insulation (rated for the working voltage)		N/A
19.1.4.3.2	Class I transformers with earthed core, and not allowed for class II equipment		N/A
	- Insulation between the input winding and the earthed core: basic insulation rated for the input voltage		N/A
	- Insulation between the output winding and the earthed core: basic insulation rated for the output voltage		N/A
19.1.4.3.3	Insulation between: input and intermediate conductive parts, and output and intermediate parts consist of at least basic insulation		P
	- If the insulation from input or output to the intermediate metal part is less than basic insulation, the part is considered to be connected to input or output.	Iron core was considered as primary circuit	P
19.1.4.4	For class I transformers, with protective screen, not connected to the mains by a plug the following conditions comply:		N/A
	- The insulation between input winding and protective screen consist of basic insulation (rated for the input voltage)		N/A
	- The insulation between output winding and protective screen consist of basic insulation (rated for the output voltage)		N/A
	- The protective screen consist of metal foil or a wire wound screen extending the full width of the windings and has no gaps or holes		N/A
	- Where the protective screen does not cover the entire width of the input winding, additional insulation to ensure double insulation in this area, is used.		N/A
	- If the protective screen is made by a foil, the turns are isolated, overlap at least 3 mm		N/A
	- The cross-section of the screen and the lead out wire is at least corresponding to the rated current of the overload protective device		N/A
	- The lead out wire is soldered or fixed to the protective screen.		N/A
	For transformers for connection to the mains by the means of a plug of any type (incorporating or not), the alternative with basic insulation plus protective screening is not allowed.		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
19.1.4.5	No connection between output circuit and protective earth, except of associated transformers (allowed by equipment standard) or 19.8 is fulfilled.		N/A
19.1.4.6	No connection between output circuit and body, except of associated transformers (allowed by equipment standard) or when 19.8 is fulfilled.		N/A
19.1.4.7	The distance between input and output terminals for the connection of external wiring is ≥ 25 mm		P
19.1.4.8	Portable transformers having an rated output ≤ 630 VA shall be class II.		P
19.1.4.9	No connection between output circuit and body except of associated transformers (allowed by equipment standard)		P
19.1.4.10	Protective screening is not allowed for transformers with plug connection to the mains		N/A
19.2	Flammability of materials		P
	Materials known to be highly flammable, such as celluloid, shall not be used in the construction of transformers.		P
	Cotton, silk, paper and similar fibrous material shall not be used as insulation, unless impregnated.		P
	Wax and similar impregnators shall not be used, unless suitably restrained from migration		P
	Wood, even if impregnated, shall not be used as supplementary or reinforced insulation		N/A
19.3	Short-circuit characteristics of portable transformers		P
	Portable transformer: short-circuit proof or fail-safe		P
19.4	Class II transformer contact prevention of accessible conductive parts		P
	There shall be provisions to prevent contact between accessible conductive parts and conduits or metal sheaths of supply wiring for class II transformers.		P
19.5	Class II transformer insulation reassembling after service		N/A
	Parts of class II transformers serving as supplementary insulation or reinforced insulation which might be omitted during reassembly after servicing, shall either:		N/A
	- be fixed in such a way that they cannot be removed without being seriously damaged; or		N/A
	- be so designed that they cannot be replaced in an incorrect position and that, if they are omitted, the **transformer** is rendered inoperable or is manifestly incomplete		N/A
	Sleeving may, however, be used as **supplementary insulation** on internal wiring, if it is retained in position by positive means.		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
19.6	Loosening of wires, screws or similar parts		P
	Class I and II transformers: creepage distances and clearances over supplementary or reinforced insulation if wire, screw, nut, etc. become loose or fall out of position not less than 50% specified values (Cl. 26)		P
19.7	Resistor or capacitor connection with accessible conductive parts		N/A
	Conductive parts connected to accessible metal parts by resistors or capacitors shall be separated from hazardous live parts by double or reinforced insulation	No such parts	N/A
19.8	Bridging of separated conductive parts by resistors or capacitors		P
	Resistors or capacitors connected between hazardous live parts and the body (accessible metal parts) consist of:		P
	- components according to IEC 60 065, 14.2 or capacitor Y2 according to IEC 60 384-14		N/A
	- at least two separate components	Certified Y-capacitor according to IEC 60384-14	P
	- if one component is short-circuited or opened, values specified in Cl. 9 shall not be exceeded		N/A
	- if the working voltage is ≤ 250 V, one Y1 capacitor according 60384-14 is allowed		N/A
	- For a working voltage above 250 V AC and not exceeding 500 V AC and an overvoltage category III, two Y1 capacitors are required.		N/A
19.9	Insulating material separating input and output windings		N/A
	Insulation material input/output and supplementary insulation of rubber resistant to ageing		N/A
	Creepage distances (if cracks) > specified values (Cl. 26)		N/A
19.10	Accidental contact protection against hazardous-live-parts provided by isolating coating		N/A
	Protection against accidental contact by insulating coating:		N/A
	a) ageing test (IEC 60068-2-14), test Na: 168 h; 70± 2℃		N/A
	b) impact test (spring-operated impact hammer according to IEC 60 068-2-75; 0,5 ± 0,05 J)		N/A
	c) scratch test (hardened steel pin) electric strength test according to Cl. 18.3		N/A
19.11	Insulating material of handles, operating levers, knobs and similar parts		N/A
	Handles, levers, knobs, etc.:		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	- insulating material		N/A
	- supplementary insulation covering		N/A
	- separated from shafts or fixing by supplementary insulation		N/A
19.12	Winding construction		P
19.12.1	Undue displacement in all types of transformers not allowed:		P
	- of input or output windings or turns thereof		P
	- of internal wiring or wires for external connection		P
	- of parts of windings or of internal wiring in case of rupture or loosening		P
19.12.2	Serrated tape:		N/A
	- distance through insulation according to table 22		N/A
	- one additional layer of serrated tape, and		N/A
	- one additional layer without serration		N/A
	- in case of cheekless bobbins the end turns of each layer shall be prevented from being displaced		N/A
19.12.3	Insulated winding wires, in an insulation system providing basic, supplementary or reinforced insulation, shall meet the following requirements.	Approved TIW used	P
	• Multi-layer extruded or spirally wrapped insulation, passed the tests of annex K		P
	• Basic insulation: two wrapped or one extruded wire		N/A
	• Supplementary insulation: two layers, wrapped or extruded		N/A
	• Reinforced insulation: three layers wrapped or extruded		P
	Spirally wrapped insulation:		N/A
	• creepage distances between wrapped layers > cl. 26 _ P1 values		N/A
	• path between wrapped layers sealed, the test voltage of K2 is multiplied with 1,35		N/A
	• test 26.2.4 – Test A, passed for wrapped layers		N/A
	• the finished component pass routine test for the electric strength test according to cl. 18.3		N/A
a)	Insulated winding wire used for basic or supplementary insulation in a wound part:		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	• comply with annex K		N/A
	• two layers for supplementary insulation		N/A
	• one layer for basic insulation		N/A
	• one layer for mechanical separation between the insulated wires of primary and secondary. This layer fulfils the requirement of basic insulation.		N/A
b)	Insulated winding wire used for reinforced insulation in a wound part:	Approved TIW used	P
	• comply with annex K		P
	• three layers		P
	• relevant dielectric strength test of 18.3		P
	Where the insulated winding wire is wound:		P
	• upon metal or ferrite cores		P
	• upon enamelled wire		P
	• under enamelled wire		P
	• one layer for mechanical separation between the insulated wires and the core or the enamelled wires is required. This layer fulfils the requirement of basic insulation.		P
	• both windings shall not touch each other and also not the core.		P
	100 % routine test of Annex K3 is fulfilled		N/A
	no creepage distances and clearances for insulated winding wires		P
c)	Toroidal cores used with TIW wires for double or reinforced insulation between the primary and secondary circuits shall comply with the following:		N/A
	1) a coating which fulfils the requirements of basic insulation between a winding and the core		N/A
	2) The primary winding consists of TIW wire with 3 layers (reinforced insulation) and the secondary winding consists of enamelled wire. These independent windings shall not be able to contact each other either by mechanical separation or a gap which fulfil the dielectric strength tests for basic insulation.		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	3) For polyfilar windings (primary and secondary windings in contact with each other), the primary winding consists of TIW wire with 3 layers and the secondary winding consists of a TIW wire with 1 layer (requirements for primary and secondary windings can be changed). This construction also is allowed for use with EE-cores or similar.		N/A
d)	Toroidal cores used with FIW wires for double or reinforced insulation between the primary and secondary circuits shall comply with the following:		N/A
	1) a coating, which fulfil the requirements of basic insulation.		N/A
	2) The primary winding consists of FIW wire for reinforced insulation and the secondary winding consist of FIW wire – of basic insulation. These independent windings shall not be able to contact each other either by mechanical separation or a gap which fulfil the dielectric strength test for basic insulation.		N/A
	3) For polyfilar windings (primary and secondary windings in contact with each other), the primary winding and the secondary winding consist of FIW wire for reinforced insulation. This construction also is allowed to use for EE-core or similar.		N/A
e)	Toroidal cores used with TIW in combination with FIW wire, for double or reinforced insulation between the primary and secondary circuits shall comply with the following:		N/A
	1) a coating, which fulfils the requirements of basic insulation.		N/A
	2) The primary winding consists of FIW wire for reinforced insulation, and the secondary winding consists of TIW wire for basic insulation (1 layer). These independent windings shall not be able to contact each other either by mechanical separation or a gap which fulfil the dielectric strength tests for basic insulation.		N/A
	3) For polyfilar windings (primary and secondary windings in contact with each other), the primary winding consists of TIW wire for reinforced insulation (3 layer) and the secondary winding consists of FIW wire for reinforced insulation. This construction also is allowed for use with EE-cores or similar.		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
f)	Toroidal cores used with TIW in combination with FIW wire, for basic insulation between the primary and secondary circuits shall comply with the following:		N/A
	1) a coating, which fulfils the requirements of basic insulation		N/A
	2) The primary winding consists of FIW wire for basic insulation, and the secondary winding consists of TIW wire for basic insulation (1 layer). These independent windings shall not be able to contact each other either by mechanical separation or a gap which fulfils the dielectric strength tests for basic insulation.		N/A
	3) For polyfilar windings (primary and secondary windings in contact with each other), the primary winding consists of TIW wire for supplementary insulation (2 layers) and the secondary winding consists of FIW wire for basic insulation. This construction also is allowed for use with EE-cores or similar.		N/A
	4) Further polyfilar constructions with FIW and TIW wires in combination with enamelled wires for basic insulation only: 4.1) Primary winding consists of enamelled wire, secondary winding consists of FIW wire for reinforced insulation 4.2) Primary winding consists of enamelled wire, secondary winding consists of TIW wire for reinforced insulation		N/A
19.12.3.1	Max. Class F for transformers which use FIW-wire		N/A
19.12.3.2	FIW wires comply with IEC 60851-5:2008, IEC 60317-0-7 and IEC 60317-56.		N/A
	• other nominal diameter as mentioned in table 24 can be calculated with the Formula (6) in 26.3.5:		N/A
	FIW wire used for basic or supplementary insulation for transformers according 19.1.3:		--
	• the test voltage of table 14, based on the working voltage of basic or supplementary insulation, comply with the min. voltage strength of table 24		N/A
	• one layer for mechanical separation is located between the insulated wires of primary and secondary. This layer fulfil the requirement of basic insulation		N/A
	• between FIW and enamelled wire, no requirements of creepage distances and clearances		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	• no touch of FIW and enamelled wires		N/A
	FIW wire used for double or reinforced insulation for transformers according 19.1.4:		--
	• the test voltage of table 14, based on the working voltage of basic or supplementary insulation, comply with the min. voltage strength of table 24		N/A
	• for primary and secondary winding FIW-wire for basic insulation is used		N/A
	• one layer for mechanical separation is located between the insulated wires of primary and secondary. This layer fulfil the requirement of basic insulation		N/A
	• no touch between the basic insulated PRI and SEC FIW-wires		N/A
	• between PRI- and SEC-FIW wires, no requirements of creepage distances and clearances		N/A
	Alternative construction used for reinforced insulation (reinforced insulated FIW wire and enamelled wire)		N/A
	• the test voltage of table 14, based on the working voltage reinforced insulation, comply with the min. voltage strength of table 24		N/A
	• one layer for mechanical separation is located between the reinforced insulated FIW wire and the enamelled wire. This layer fulfil the requirement of basic insulation		N/A
	• no touch between the FIW wire and the enamelled wire		N/A
	• between the reinforced FIW wire and any other parts, no requirements of creepage distances and clearances exist		N/A
	Alternative construction with FIW wires, basic or supplementary insulated for transformers with double or reinforced insulation:		N/A
	• the test voltage of table 14, based on the working voltage of basic or supplementary insulation, comply with the min. voltage strength of table 24		N/A
	• PRI or SEC basic insulated FIW wire and to the other winding (enamelled wire) requirements of supplementary insulation		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	• creepage distances and clearances between the basic insulated FIW wire and the enamelled wire for basic or supplementary insulation are required.		N/A
	Where the FIW wire is wound		N/A
	• upon metal or ferrite cores		N/A
	• one layer for mechanical separation between the insulated wires and the core or the enamelled wires is required. This layer fulfils the requirement of basic insulation.		N/A
	• both windings shall not touch each other and also not the core.		N/A
19.13	Fixing of handles, operating levers and similar parts		N/A
	Handles, operating levers and similar parts shall be fixed in a reliable manner so that they will not become loose as a result of heating, vibration, etc. which may occur in normal use.		N/A
19.14	Fixing of covers providing protection against electric shock		P
	Protection against electric shock: covers securely fixed, 2 independent fixing means, one with tool	Enclosure secured by ultrasonic welding	P
19.15	Strain on fixed socket-outlets caused by pin-transformers connection		N/A
	Transformer with pins for fixed socket-outlets: no strain on socket-outlet		N/A
	Additional torque ≤ 0,25 Nm		N/A
19.16	Portable transformers for use in irregular or harsh conditions		P
	Portable transformers for use in irregular or harsh conditions		P
	Portable transformers having a weight not exceeding 18 kg shall have a protection index IPX4 or higher.	Indoor use only.	P
19.17	Drain hole of transformers protected against ingress of water		N/A
	Transformers having a protection index from IPX1 up to and including IPX6 shall have an effective drain hole at least 5 mm in diameter or 20 mm^2 in area, with a width of at least 3 mm.		N/A
	The drain hole is not required if the transformer, including its windings and core and all uninsulated live parts, are completely embedded in a potting material.		N/A
19.18	Plug connected transformers protected against ingress of water		N/A
	Transformers classified for a protection index higher than IPX1 and having a cord provided with a plug; it shall be a moulded-on plug.		N/A
19.19	Flexible cable or flexible cord connection for class I portable transformers		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	Class I transformers with a non-detachable flexible cable or cord with earth conductor and a plug with earth contact		N/A
19.20	SELV- and PELV-circuit separation of live parts		P
	Live parts of SELV- and PELV-circuits shall be electrically separated from each other and from other circuits		P
	- SELV output circuits separated by double or reinforced insulation from all other than SELV or PELV circuits		P
	- SELV output circuits separated by basic insulation from other SELV or PELV circuits		N/A
19.20.1	SELV circuits and parts not connected to protective earth, to live parts, or protective conductors forming part of other circuits		P
	Nominal voltage (V) > 25 V a.c. or 60 V d.c., the required insulation fulfils the high voltage test according to table 14		P
19.20.2	PELV-circuits double or reinforced insulation is necessary		N/A
19.21	Protection against contact for FELV-circuit		N/A
	FELV-circuits: protection against contact fulfils the min. test voltage required for the primary circuit		N/A
19.22	Protective earthing regarding class II transformers		P
	Class II transformers shall not be provided with means for protective earth		P
	A class II transformer intended for looping-in may have an internal terminal for maintaining the electrical continuity of a protective earthing conductor not terminating in the transformer, provided that the terminal is insulated from the accessible conductive parts by class II insulation.		N/A
19.23	Protective earthing regarding class III transformers		N/A
	Class III transformers shall not be provided with means for protective earth		N/A
20	**COMPONENTS**		P
20.1	Components such as switches, plugs, fuses, lamp holders, capacitor and flexible cables and cords, comply with relevant IEC standard	See appended Critical Component list.	P
	Components inside the transformer pass all tests of this standard together with the transformer tests		P
	Testing of components separately to the transformer according the relevant standard:		P

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	- Ratings of the component in line with the transformer ratings, including inrush current. Component test according the component standard, based on the component marking (rating).		N/A
	- Components without markings tested under transformer conditions including inrush current.		P
	- If no IEC standard exists, the component is tested under transformer conditions.	Components complied with IEC or UL. Components which comply with UL standard only are tested additionally under transformer conditions.	P
20.2	Appliance couplers for main supply shall comply with:		N/A
	- IEC 60 320 for IPX0		N/A
	- IEC 60320-2-3 or IEC 60309 for other		N/A
20.3	Automatic controls shall comply with IEC 60730-1		N/A
20.4	Thermal-links comply with IEC 60691		N/A
20.5	Switches shall comply with annex F	No switch	N/A
	Disconnection from the supply:		N/A
	- by a switch, disconnecting all poles of the supply (full disconnection under the relevant overvoltage category)		N/A
	- or a flexible supply cable and cord with plug		N/A
	- or an instruction sheet: disconnection by all-poles switches incorporated in fixed wiring		N/A
20.6	Socket-outlets of the output circuit shall be such that there is no unsafe compatibility to plugs complying with input circuit.		N/A
	SELV plug and socket-outlets shall comply with IEC 60 884-2-4 and IEC 60 906-3		N/A
	Plugs and socket-outlets for SELV systems with both a rated current ≤3A and a rated voltage ≤ 24 VAC or 60VDC with a power not exceeding 72W are allowed to comply only with following:		N/A
	- It is not possible for plugs to enter socket-outlets of other standardised voltage system		N/A
	- Socket outlets do not accommodate plugs of other standardised voltage systems		N/A
	- Socket outlets do not have a protective earth contact		N/A
	PELV plug and socket-outlets shall comply with following:		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	- It is not possible for plugs to enter socket-outlets of other standardised voltage system		N/A
	- Socket outlets do not accommodate plugs of other standardised voltage systems		N/A
	- Socket outlets do not have a protective earth contact		N/A
	FELV plug and socket-outlets shall comply with following:		N/A
	- It is not possible for plugs to enter socket-outlets of other standardised voltage system		N/A
	- Socket outlets do not accommodate plugs of other standardised voltage systems		N/A
20.7	Thermal cut-outs, thermal links, overload relays, fuses and other overload protective devices shall have adequate breaking capacity		P
	- Thermal cut outs fulfil the relevant requirements of 20.8 and 20.9		N/A
	- Thermal links fulfil the relevant requirements of 20.9		N/A
	- The breaking capacity is in accordance with the relevant fuse standard		P
	For fuses according IEC 60127 and IEC 60269, the fuse current does not exceed 1,1 times of the rated value		P
20.8	Thermal cut outs shall meet the requirements of 20.8.1.1 and 20.8.2, or 20.8.1.2 and 20.8.2.		N/A
20.8.1	Requirements according to IEC 60730-1		N/A
20.8.1.1	Thermal cut-out tested as component shall comply with IEC 60 730-1		N/A
	a) Thermal cut outs type 1 or type 2 (see 6.4 of IEC 60730-1:2013)		N/A
	b) Thermal cut outs fulfil the requirements of micro-interruption (type 1.C or 2.C) or micro-disconnection, (type 1.B or 2.B) (see IEC 60730-1:2013)		N/A
	c) Thermal cut outs with manual rest have a trip free mechanism (type 1.E and 2.E) (see IEC 60730-1:2013)		N/A
	d) The number of cycles of automatic action shall be:		N/A
	- 3000 cycles for self-resetting thermal cut-outs		N/A
	- 300 cycles for non-self-resetting thermal cut-outs resetting by hand		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	- 300 cycles for non-self-resetting thermal cut-outs resetting disconnecting		N/A
	- 30 cycles for non-self-resetting thermal cut-outs which are only resettable by a tool		N/A
	e) Thermal cut outs fulfil the electrical stress according 6.14.2 of IEC 60730-1:2013		N/A
	f) Characteristic of thermal cut-outs:		N/A
	- ratings according IEC 60730-1:2013, cl. 5		N/A
	- classification according to:		N/A
	1) nature of supply to IEC 60730-1:2013, cl. 6.1		N/A
	2) type of load controlled to IEC 60730-1:2013, cl. 6.2		N/A
	3) degree of protection IPX0 to IEC 60730-1:2013, cl. 6.5.1		N/A
	4) degree of protection IP0X to IEC 60730-1:2013, cl. 6.5.2		N/A
	5) pollution degree to IEC 60730-1:2013, cl. 6.5.3		N/A
	6) comparative tracking index to IEC 60730-1:2013, cl. 6.13		N/A
	7) max. ambient temperature to IEC 60730-1:2013, cl. 6.7		N/A
20.8.1.2	Thermal cut-out tested as a part of the transformer, test with 3 samples:		N/A
	- at least micro-interruption or micro-disconnection (IEC 60730-1:2013)		N/A
	- 300 h aged at ta (transformer) + 10°C		N/A
	- subjected to a number of cycles for automatic operating according 20.8.1.1		N/A
	During the test no sustaining arcing shall occur, during and after the test no damage at the thermal cut out and the transformer in the sense of this standard		N/A
20.8.2	Thermal cut-outs shall have adequate breaking capacity		N/A
20.8.2.1	The output of the transformer with a non-self-resetting thermal cut out is short circuited at a supply voltage 1, 1 of rated supply voltage. After opening of the cut off, the supply voltage is switched of, until the transformer is cooling down.		N/A
	- 3 cycles at 25° C for transformers without t_{amin}		N/A
	- 3 cycles at t_{amin} for transformers with t_{amin}		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	- after the 3 cycles short circuit of the output at 1,1 of rated supply voltage for 48 h.		N/A
	During the tests no sustaining arcing shall occur After the test: withstand the test of clause 18, show no damage in sense of this standard, and be operational.		N/A
20.8.2.2	The output of the transformer with a self-resetting thermal cut out is short circuited at a supply voltage 1, 1 of rated supply voltage.		N/A
	- 48 h at 25° C for transformers without t_{amin}		N/A
	- 24 h at ta and 24 h at t_{amin} for transformers with t_{amin}		N/A
	During the tests no sustaining arcing shall occur After the test: withstand the test of clause 18, show no damage in sense of this standard, and be operational.		N/A
20.8.3	Test of a PTC resistor:		N/A
	5 cycles: transformer short-circuited for 48 h by 1,1 times of the input voltage and max. ta		N/A
	5 cycles: transformer short-circuited for 48 h by 0,9 times of the input voltage and min. ta (if declared)		N/A
	After the test: withstand the test of clause 18, show no damage in sense of this standard, and be operational.		N/A
20.9	Thermal links shall be tested in one of the following two ways.		N/A
20.9.1	Thermal-links shall comply with IEC 60 691 as a separate component.		N/A
	- electrical conditions to IEC 60691, cl. 6.1		N/A
	- thermal conditions to IEC 60691, cl. 6.2		N/A
	- ratings to 8 b) of IEC 60691:2015		N/A
	- suitability of sealing components, impregnating fluids or cleaning solvents 8 c) of IEC 60691:2015		N/A
20.9.2	Thermal-links tested as a part of the transformer:		N/A
	- ageing test 300 h by 35 °C or ta + 10 °C		N/A
	- After transformer fault condition the thermal link operate without sustaining arcing		N/A
	- after opening the thermal-link shall have an insulation resistance of at least 0,2 MΩ		N/A
	- 3 cycles for replaceable thermal-links		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	- 3 new specimens for not replaceable thermal-links		N/A
20.10	Self-resetting devices not used if mechanical, electrical, etc. hazards		N/A
20.11	Thermal cut-outs intended to be reset by soldering operation shall not be used for overload protection.		N/A
20.12	Overload protection devices do not operate during test (20 times switched on and off, at no load); Upri (V): 1,1 times rated supply voltage.		P
21	**INTERNAL WIRING**		P
21.1	Internal wiring and electrical connections protected or enclosed		P
	Wire-ways smooth and free from sharp edges	No sharp edges.	P
21.2	Openings in sheet metal: edges rounded (radius ≥ 1,5 mm) or bushings of insulating material		N/A
21.3	Uninsulated conductors: distances adequately maintained		P
21.4	When external wires are connected to terminal, internal wiring shall not loosen up		P
21.5	Insulation of heat-resistant and non-hygroscopic material for insulated conductors subject to temperature rise > limiting values given in 14.1		P
22	**SUPPLY CONNECTION AND EXTERNAL FLEXIBLE CABLES AND CORDS**		P
22.1	All cables, flexible cords etc. shall have appropriate current and voltage ratings	Output cord is suitably used within the current and voltage rating.	P
22.2	Input and output wiring inlet and outlet openings for external wiring: separate entries without damage to protective covering of cable or cord	Output cord with integral bushing	P
	Input and output wiring inlet and outlet openings for flexible cables or cords: insulating material or bushing of insulating material		P
	Bushings for external wiring: reliably fixed, not of rubber unless part of cord guard	Bushing for output cord.	P
22.3	Fixed transformer:		N/A
	- possible to connect after fixing		N/A
	- inside space for wires allow easy introduction and connection of conductors		N/A
	- fitting of cover without damage to conductors		N/A
	- contact between insulation of external supply wires and live parts of different polarity not allowed		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
22.4	Length of power supply cord for portable transformers:		N/A
	- not exceed 2 m for cross-sectional area of 0,5 mm^2		N/A
	- exceed 2 m for cross-sectional areas greater than 0,5 mm^2.		N/A
22.5	Power supply cords for transformers IP20 or higher and transformers for “indoor use only” ≥ IP20:		N/A
	- for transformers with a mass ≤ 3 kg: IEC 60227-5:2011 – type 60227 IEC 52 or ordinary tough rubber sheathed flexible cable or cords according to IEC 60245-4:2011 – type 60245 IEC 53;		N/A
	- for transformers with a mass > 3 kg: IEC 60227-5:2011 – type 60227 IEC 53 or ordinary tough rubber sheathed flexible cable or cords according to IEC 60245-4:2011 – type 60245 IEC 53.		N/A
	Power supply cords for transformers for outdoor use: ≥ IPX0: IEC 60245-4:2011 – type 60245 IEC 57		N/A
22.6	Power supply cords for single-phase portable transformers with input current ≤ 16A:		N/A
	- cord set fitted with an appliance coupler in accordance with IEC 60320(all parts)		N/A
22.7	Nominal cross-sectional area (mm²); input current (A) at rated output not less than shown in table 16		P
22.8	Class I transformer with power supply flexible cable: green/yellow core connected to earth terminal		N/A
	Plug for single-phase transformer with input current at rated output ≤16 A shall comply with IEC TR 60083, IEC 60 906-1 or IEC 60 309(all parts)		N/A
22.9	Type X, Y or Z attachments: see relevant part of IEC 61558-2.	For output cord: type Z	P
22.9.1	For type Z attachment: moulding enclosure and external flexible cable or cord do not affect insulation of cable		P
22.9.2	Inlet openings or inlet bushing: without risk of damage to protective covering of external flexible cable or cord		N/A
	Insulation between conductor and enclosure:		N/A
	- for Class I transformer: insulation of conductor plus separate basic insulation		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	- for Class II transformer: insulation of conductor plus double or reinforced insulation		N/A
	The sheath of an external flexible cable or cord equivalent to at least that of a cord complying with IEC 60227 (all parts) or 60245 (all parts) is regarded as basic insulation.		N/A
	A lining or a bushing of insulating material in a metallic enclosure is only regarded as supplementary insulation		N/A
	An enclosure of insulating material is regarded as reinforced insulation		N/A
22.9.3	Inlet bushings:		N/A
	- no damage to external flexible cable or cord		N/A
	- reliably fixed		N/A
	- not removable without tool		N/A
	- not integral with external flexible cable or cord (for type X attachment)		N/A
	- not of natural rubber except for Class I transformer with type X, Y and Z attachments		N/A
22.9.4	For transformers which are moved while operating:		N/A
	- cord guards, if any, of insulating material and fixed		N/A
	Compliance is tested by the oscillating test according to fig. 12:		N/A
	- loaded force during the test according to fig. 12		N/A
	- 10 N for a cross-sectional area > 0,75		N/A
	- 5 N for other cords		N/A
	After the test according to fig. 12:		N/A
	- no short-circuit between the conductors		N/A
	- no breakage of more than 10% of stands of any conductor		N/A
	- no separation of the conductor from the terminal		N/A
	- no loosening of any cord guards		N/A
	- no damage of the cord or cord guard		N/A
	- no broken strands piercing the insulation and not becoming accessible		N/A
22.9.5	Cord anchorages for type X attachment:		P
	- glands in portable transformers not used unless possibility for clamping all types and sizes of cable		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	- moulded-on designs, tying the cable into a knot and tying the end with string not allowed		N/A
	- labyrinths, if clearly how, permitted		N/A
	- replacement of cable easily possible		N/A
	- protection against strain and twisting clearly how		N/A
	- suitable for different types of cable unless only one type of cable for transformer		N/A
	- the entire flexible cable or cord with covering can be mounted into the cord anchorage		N/A
	- if tightened or loosened no damage		N/A
	- no contact between cable or cord and accessible or electrically connected clamping screws		N/A
	- cord clamped by metal screw not allowed		N/A
	- one part securely fixed to transformer		N/A
	- for Class I transformer: insulating material or insulated from metal parts		N/A
	- for Class II transformers: insulating material or supplementary insulation from metal parts		N/A
	Cord anchorages for type X, Y, Z attachments: cores of power external flexible cable or cord insulated from accessible metal parts by:		N/A
	- basic insulation (Class I transformers), separate insulating barrier/cord anchorage		N/A
	- supplementary insulation (Class II transformers), special lining/cable or cord sheath of cable sheath of cable		N/A
	Cord anchorages for type X and Y attachments:		N/A
	- replacement of external flexible cable or cord does not impair compliance with standard		N/A
	- the entire flexible cable or cord with covering can be mounted into the cord anchorage		N/A
	- if tightened or loosened no damage		N/A
	- no contact between cable or cord and accessible or electrically connected clamping screws		N/A
	- cord clamped by metal screws not allowed		N/A
	- knots in cord not used		N/A
	- labyrinths, if clearly how, permitted		N/A
	Tests for type X with special cords, type Y, type Z	Output cord are type Z for all models.	P

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	Test for type X attachments one test with a cord with smallest and one test with a cord with the largest cross-sectional area:		P
	- for the test with clamping screws or tightened with torque 2/3 of that specified in table 18		P
	- not possible to push cable into transformer		P
	- 25 pulls of 1 s		P
	- 1 min torque according to table 17		P
	- mass (kg); pull (N); torque (Nm) ……:	Mass <1kg; 30N; 0.1Nm	—
	- during test: cable not damaged		P
	- after test: longitudinal displacement ≤ 2 mm for cable or cord and ≤ 1 mm for conductors in terminals		P
	- creepage distances and clearances values specified in Cl. 26		P
22.9.6	Space for external cords or cable for fixed wiring and for type X and Y attachments:		N/A
	- before fitting cover, possibility to check correct connection and position of conductors		N/A
	- cover fitted without damage to supply cords		N/A
	- for portable transformers: contact with accessible metal parts if conductor becomes loose not allowed unless for type X and Y attachments terminations of cords do not slip free of conductor		N/A
	Space for external cords or cable for type X attachment and for connection to fixed wiring, in addition:		N/A
	- conductor easily introduced and connected		N/A
	- possibility of access to terminal for external conductor after removal of covers without special purpose tool		N/A
23	**TERMINALS FOR EXTERNAL CONDUCTORS**		N/A
23.1	Transformer for connection to fixed wiring and transformer without power supply cords with type Y and Z attachments: only connections by screws, nuts or equally effective devices.		N/A
	Terminals are integral part of the transformer:		N/A
	- comply with IEC 60 999-1 under transformer conditions		N/A
	Other terminals:		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	- separately checked according to IEC 60 998-2-1, IEC 60 998-2-2 or IEC 60 947-7-1		N/A
	- used in accordance with their marking		N/A
	- checked according to IEC 60 999-1 under transformer conditions		N/A
	Transformer with type X attachments: soldered connection permitted if reliance not placed upon soldering, crimping or welding alone unless by barriers, creepage distances and clearances between hazardous live parts and other conductive part cannot be reduced to less than 50% of specified value (Cl.26) should conductor break away		N/A
	Transformer with type Y and Z attachments for external conductors: soldered, welded, crimped, etc. connections allowed		N/A
	For Class II transformer: reliance not placed upon soldering, crimping or welding alone unless by barriers, creepage distances and clearances between hazardous live parts and other conductive parts cannot be reduced to less than 50% of specified value (Cl.26) should conductor break away		N/A
23.2	Terminals for type X with special cords Y and Z attachments shall be suitable for their purpose:		N/A
	- test by inspection according to 23.1 and 23.2		N/A
	- pull of 5 N to the connection before test according to 14.1		N/A
23.3	Other terminals than Y and Z attachments shall be so fixed that when the clamping means is tightened or loosened:		N/A
	- terminal does not work loose		N/A
	- internal wiring is not subjected to stress		N/A
	- creepage distances and clearance are not reduced below the values specified in Cl. 26		N/A
23.4	Other terminals than Y and Z attachments shall be so designed that:		N/A
	- they clamp the conductor between metallic surfaces with sufficient contact pressure		N/A
	- without damage to the conductor		N/A
	- test by inspection according to 23.3 and 23.4		N/A
	- 10 times fastening and loosening a conductor with the largest cross-sectional area with 2/3 of the torque specified in Cl. 25		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
23.5	Terminals for fixed wiring and for type X: located near their associated terminals of different polarities and the earth terminal if any		N/A
23.6	Terminal blocks not accessible without the aid of a tool		N/A
23.7	Transformer with type X attachments: stranded conductor test (8 mm removed):		N/A
	- Class I transformers: no connection between live parts and accessible metal parts		N/A
	- free wire of earth terminal: no touching of live parts		N/A
	- Class II transformers: no connection between live parts and accessible metal parts, no connection between live parts and metal parts separated from accessible metal parts by supplementary insulation		N/A
23.8	Terminals for a current > 25 A:		N/A
	- pressure plate, or		N/A
	- two clamping screws		N/A
23.9	When terminal, other than protective earth conductor, screws loosened as far as possible, no contact:		N/A
	- between terminal screws and accessible metal parts		N/A
	- between terminal screws and accessible metal parts separated only by basic or supplementary insulation for Class II transformers		N/A
24	**PROVISION FOR PROTECTIVE EARTHING**		P
24.1	Class I transformers: accessible conductive parts connected to earth terminal	Class II transformers	N/A
	Class II transformers: no provision for protective earth		N/A
24.2	Protective earth terminal for connection to fixed wiring and for type X attachment transformers: comply with Cl. 23, adequately locked, not possible to loosen without a tool		N/A
24.3	No risk of corrosion from contact between metal of earth terminal and other terminal		N/A
	In case of earth terminal body of Al, no risk of corrosion from contact between Cu and Al		N/A
	Body of earth terminal or screws/nuts of brass or other metal resistant to corrosion		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
24.4	Resistance of connection between earth terminal and metal parts ≤0,1Ω with a min. 25 A or 1,5 times rated input current at 1 min		N/A
24.5	Class I transformers with external flexible cables or cords:		N/A
	- current-carrying conductors becoming touch before the earth conductor		N/A
25	**SCREWS AND CONNECTIONS**		**N/A**
25.1	Screwed connections withstand mechanical stresses	No screw	N/A
	Screws transmitting contact pressure or likely to be tightened by the user or having a diameter < 2,8 mm, shall screw into metal		N/A
	Screws not of metal which is soft or liable to creep (Zn, Al)		N/A
	Screws of insulating material: not used for electrical connection		N/A
	Screws not of insulating material if their replacement by metal screws can impair supplementary or reinforced insulation		N/A
	Screws to be removed (replacement etc. of power supply cord) not of insulating material if their replacement by metal screws can impair basic insulation		N/A
	For a screw in engagement with the threads of insulating material: No damage after torque test: diameter (mm); torque (Nm); ten times		N/A
	For nuts and other screws: No damage after torque test: diameter (mm); torque (Nm); five times		N/A
25.2	Screws in engagement with thread of insulating material:		N/A
	- length of engagement ≥ 3 mm + 1/3 screw diameter or 8 mm whichever is shorter		N/A
	- correct introduction into screw hole		N/A
25.3	Electrical connections: contact pressure not transmitted through insulating material		N/A
25.4	In case of use of thread-forming (sheet metal) screws for connection of current-carrying parts: clamping and locking means provided		N/A
	Thread-cutting (self-tapping) screws used for the connection of current-carrying parts allowed if they generate a full form machine screw thread and if not operated by the user		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	Thread-cutting screws and thread-forming screws used for earth continuity allowed if at least 2 screws for each connection are used and it is not necessary to disturb the connection in normal use		N/A
25.5	Screws for current-carrying mechanical connections locked against loosening		N/A
	Rivets for current-carrying connections subject to torsion locked against loosening		N/A
25.6	Test of screwed glands with a torque according table 19. After the test no damage at the transformer and the gland.		N/A
26	**CREEPAGE DISTANCES, CLEARANCES AND DISTANCES THROUGH INSULATION**		P
26.2	Creepage distances and clearances		P
26.2.1	General		P
	The creepage distance and clearance values are shown in Table 20 and Table 21.		P
26.2.2	Windings covered with adhesive tape		P
	- all insulating materials are classified according to IEC 60085 and IEC 60216 (all parts);		N/A
	- the impulse voltage dielectric test of 6.1.2.2.1 of IEC 60664-1:2007 is fulfilled; and		P
	- test A of 26.2.4 is fulfilled		N/A
26.2.3	Uncemented insulating parts pollution degree P2 or P3	Pollution degree 2	P
	- all isolating material are classified acc. to IEC 60085 and IEC 60216(all parts)		P
	- values of pollution degree 1 are not applicable		P
26.2.4	Cemented insulating parts		N/A
	- all isolating materials are classified acc. to IEC 60085 and IEC 60216(all parts)		N/A
	- values of distance through insulation (dti) are fulfilled		N/A
	- creepage distances and clearances are not required		N/A
	- test A of this sub clause is fulfilled		N/A
	Test A		N/A
	- thermal class		N/A
	- working voltage		N/A
	- Test with three specially specimens, with uninsulated wires, without impregnation or potting	(see appended table)	N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	Two of the three specimens are subjected to:		N/A
	- the relevant humidity treatment according to 17.2 (48 h)		N/A
	- the relevant dielectric strength test of 18.3 multiplied with factor 1,35		N/A
	- One of the three specimens is subjected to the relevant dielectric strength test of 18.3 multiplied by the factor 1,35 immediately at the end of the last cycle with high temperature		N/A
	Impulse dielectric test according to 6.1.2.2.1 of IEC 60664-1:2007 – see Annex R of IEC 61558-1		N/A
26.2.5	Enclosed parts (e.g. by impregnation or potting)		N/A
26.2.5.1	- The requirements of reduced values as stated for pollution degree 1 (P1) are fulfilled		N/A
	- all isolating materials are classified acc. to IEC 60085 and IEC 60216(all parts)		N/A
	Test B		N/A
	- thermal class		N/A
	- test voltage of 500 V or the working voltage		N/A
	- Test with three specially specimens, potted or impregnated. The dielectric strength test is applied directly to the joint.	(see appended table)	N/A
	Two of the three specimens are subjected to:		N/A
	- the relevant humidity treatment according to 17.2 (48 h)		N/A
	- the relevant dielectric strength test of 18.3 multiplied with factor 1,25		N/A
	- One of the three specimens is subjected to the relevant dielectric strength test of 18.3 multiplied by the factor 1,25 immediately at the end of the last cycle with high temperature		N/A
	The three spacemen pass the Impulse dielectric test according to 6.1.2.2.1 of IEC 60664-1:2007– see Annex R of IEC 61558-1		N/A
26.2.5.2	- The requirements of distance through insulation (dti) are fulfilled. (P1 values are not required)		N/A
	- all isolating materials are classified acc. to IEC 60085 and IEC 60216(all parts)		N/A
	Test C		N/A
	- thermal class		N/A
	- test voltage of 500 V or the working voltage		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	- Test with three specimens, potted or impregnated. (finished components)	(see appended table)	N/A
	- Neither cracks, nor voids in the insulating compounds		N/A
	Two of the three specimens are subjected to:		N/A
	- the relevant humidity treatment according to 17.2 (48 h)		N/A
	- the relevant dielectric strength test of 18.3 multiplied with factor 1,35		N/A
	- One of the three specimens is subjected to the relevant dielectric strength test of 18.3 multiplied by the factor 1,35 immediately at the end of the last cycle with high temperature		N/A
	The three spacemen pass the Impulse dielectric test according to 6.1.2.2.1 of IEC 60664-1:2007 – see Annex R of IEC 61558-1		N/A
26.3	Distance through insulation		P
26.3.1	For supplementary, double or reinforced insulation, the required values of Tables 22 are fulfilled		P
	The insulation fulfil the material classification according IEC 60085 and 60216(all parts) or the test of 14.3		P
26.3.2	Reduced values of the thickness of insulation for supplementary or reinforced insulation are allowed if the following conditions are fulfilled:		N/A
	- the isolating materials are classified acc. to IEC 60085 and IEC 60216(all parts)		N/A
	- the test of 14.3 is fulfilled		N/A
	- If both requirements are fulfilled, the required values for solid insulation can be multiplied by 0,4		N/A
	- Minimum thickness of reinforced insulation ≥0,2 mm		N/A
	- Minimum thickness of supplementary insulation ≥0,1 mm		N/A
26.3.3	Insulation in thin sheet form		P
	- If the layers are non-separable (glued together):		N/A
	• The requirement of 3 layers is fulfilled		N/A
	• The mandrel test according 26.3.4 is fulfilled with 150±10 N		N/A
	• The required values for d.t.i. of thin layers in Tables 22 is fulfilled.		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	- If the layers are separated:		P
	• The requirement of 2 layers is fulfilled	Insulation tape wrap around external of switch mode transformer	P
	• If serrated tape is used, 1 additional layer (serrated) and one additional layer without serration is required		N/A
	• The mandrel test according 26.3.4 is fulfilled on each layer with 50±5 N		P
	• The required values for d.t.i. of thin layers in Tale 22 is fulfilled.		P
	- If the layers are separated (alternative):		N/A
	• The requirement of 3 layers is fulfilled		N/A
	• If serrated tape is used, 1 additional layer (serrated) and one additional layer without serration is required		N/A
	• The mandrel test according 26.3.4 is fulfilled on 2/3 of the layers with 100±5 N		N/A
	• The required values for d.t.i. of thin layers in Tale 22 is fulfilled.		N/A
	Test according to 14.3 and if the isolating materials are classified acc. to IEC 60085 and IEC 60216(all parts) no distances through insulation are required for insulation in thin sheet form		N/A
	The values for thin layers are used for insulation in thin sheet form as follows:		P
	- rated output > 100 VA values for thin layers apply		N/A
	- rated output ≥ 25 VA and ≤ 100 VA 2/3 of the values for thin layers apply		P
	- rated output < 25 VA 1/3 of the values for thin layers apply		N/A
26.3.4	Mandrel test of insulation in thin sheet form (specimen of 70±0,5 mm width are necessary):		P
	- If the layers are non-separable – at least 3 layers glued together fulfil the test:		N/A
	- pull force of 150±10 N		N/A
	- high voltage test of 5,0 kV or the test voltage of 18.3 multiplied by 1,35 whatever is the greater. No flashover, no breakdown.		N/A
	- If the layers are separable and 2/3 of at least 3 layers fulfil the test.		N/A
	- pull force of 100±5 N		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	- high voltage test of 5,0 kV or the test voltage of 18.3 multiplied by 1,25 whatever is the greater. No flashover, no breakdowns.		N/A
	- If the layers are separable 1 of at least 2 layers fulfil the test:		P
	- pull force of 50±5 N		P
	- high voltage test of 5,0 kV or the test voltage of 18.3 multiplied by 1,25 whatever is the greater. No flashover, no breakdown.		P
26.3.5	For transformers with FIW wires		N/A
	- thermal cycles		N/A
	- test voltage of 500 V or the working voltage		N/A
	- Test with three specimens	(see appended table)	N/A
	Two of the three specimens are subjected to:		N/A
	- the relevant humidity treatment according to 17.2 (48 h)		N/A
	- the relevant dielectric strength test of 18.3		N/A
	- One of the three specimens is subjected to the relevant dielectric strength test of 18.3 immediately at the end of the last cycle with high temperature		N/A
	The partial discharge test shall be done at the end of the cycling test at normal room temperature as performed in 18.3.1.		N/A
	The values of allowed voltage strength for other FIW dimensions than defined in Table 24 are calculated		N/A
26.101	Creepage distances and distances through insulation given in Table 21, Table 22 and Table 23 of IEC 61558-1:2017 are generally applicable (IEC 61558-2-16: 2021)	(see appended table)	P
26.102	In compliance with IEC 60664-4:2005, the requirements of 26.103 to 26.106 for creepage distances, clearances and solid insulation are required above 30 kHz and up to the frequency of 3 MHz. For frequencies above 3 MHz, the tests in accordance with 7.4 and 7.5 of IEC 60664-4:2005, high-frequency testing (high-frequency high-voltage test and high-frequency partial discharge test) shall be carried out.		P
26.103	Clearance (IEC 61558-2-16:2021)		P
	a) Clearance for frequency ≥ 30 kHz according figure 101 two determinations are necessary:		N/A
	• determination based on the rated impulse voltage of the rated supply voltage in accordance with Table 103 and Table 104.		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	• determination based on the measured peak working voltage in accordance with Table 106.		N/A
	b) Clearance for frequency ≤ 30 kHz according figure 101 two determinations are necessary:		P
	• determination based on the rated impulse voltage of the rated supply voltage in accordance with Table 103 and Table 104.		P
	• determination based on the measured peak working voltage in accordance with Table 105.		P
26.104	The working voltages of Table 105 and Table 106 for determination of clearances are peak working voltages. (IEC 61558-2-16: 2021)		P
	All peak working voltages including µs-peaks shall be used to determine clearances in accordance with Table 105 and Table 106.		P
26.105	Creepage distances (IEC 61558-2-16: 2021)		P
	Two determinations of creepage distances are necessary (see Figure 102)		P
	• determination based on the measured RMS working voltage in accordance with Table 21 of IEC 61558-1:2017;		P
	• determination based on the measured peak working voltage in accordance with Table 107 to Table 112 and the fundamental frequency shall be considered		P
	A high-frequency RMS ripple voltage content not more than 10% can be neglected.	II	P
	The values in Table 107 to Table 112 do not take into account the effects of tracking phenomena for frequencies above 30 kHz.		P
	The most severe value of the required creepage distances in accordance with Table 107 to Table 112 for frequencies above 30 kHz and the relevant values in Table 21 of IEC 61558-1:2017 shall take precedence.		P
	If the value of the creepage distance is lower than the value of the clearance, the value of the clearance shall be applicable for the creepage distance.		P
	The peak working voltage also includes any DC voltage and any repetitive peak impulse generated by the SMPS (see 26.105). A determination based on RMS values is also required (see 26.104 and Table 112).		N/A
26.106	Distance through insulation (IEC 61558-2-16:2021)		P
	Instead of partial discharge with high frequency voltage the test of the distance and the calculation of the electric field is applicable under the following conditions:		P
	- the max. frequency is < 10 MHz		P

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	- the field strength approximately comply with Figure 103		P
	- no voids or gaps are present in between the solid insulation		P
	For thick layers d1 ≥ 0,75 the peak value of the field strength is ≤ 2 kV/mm		N/A
	For thin layers d2 ≤ 30 µm the peak value of the field strength is ≤ 10 kV/mm		N/A
	For d1 > d > d2 formula (2) is used for calculation the field strength		N/A
27	**RESISTANCE TO HEAT, FIRE AND TRACKING**		P
27.1	General		P
27.2	Resistance to heat		P
27.2.1	All insulating parts are resistant to heat		P
	For parts of rubber, which passed the test of 19.9, no additional test is required.	No rubber used	N/A
	The tests are not required for cables and small connectors with a rated current ≤ 3 A, a rated voltage ≤ 24 V AC or 60 V DC and a power ≤ 72 W		P
27.2.2	External accessible parts		P
	The Ball-pressure test: diameter of impression ≤ 2 mm; heating cabinet temperature (°C) at 70±2 °C or the temperature T of 14.1 (T+15±2) is fulfilled.	(See appended table)	P
27.2.3	Internal parts		P
	For insulating material retaining current carrying parts in position, the ball-pressure test -: diameter of impression ≤ 2 mm; heating cabinet temperature (°C) at 125±2 °C or the temperature T of 14.1 (T + 15±2) is fulfilled	(See appended table)	P
27.3	Resistance to abnormal heat under fault conditions		N/A
27.4	Resistance to fire		P
27.4.1	All isolating parts of the transformer shall be resistant to ignition and spread of fire. The test according to IEC 60695-2-10 is required		P
27.4.2	External accessible parts (glow wire tests)		P
	- 650°C for enclosures		P
	- 650 °C for parts retaining current carrying parts in position and terminals for external conductors Current ≤ 0,2 A		P
	- 750° C for parts retaining current carrying parts in position and terminals for external conductors with fixed wiring. Current > 0,2 A		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	- 850° C for parts retaining current carrying parts in position and terminals for external conductors with non-fixed wiring. Current > 0,2 A		N/A
27.4.3	Internal parts		P
	- 550 °C for internal insulating material – not retaining current carrying parts in position		N/A
	- 650 °C for coil formers (bobbins)	T1	P
	- 650 °C for parts retaining current carrying parts in position and terminals for external conductors. Current ≤ 0,2 A		N/A
	- 750 °C for parts retaining current carrying parts in position and terminals for external conductors with fixed wiring. Current > 0,2 A	Bobbin, PCB	P
	- 850 °C for parts retaining current carrying parts in position and terminals for external conductors with non-fixed wiring. Current > 0,2 A		N/A
27.5	For IP other than IPX0: If insulating parts retaining current carrying parts in position and under P3 conditions, the material resistance to tracking is at least material of group IIIb		N/A
	Material group IIIb (100≤CTI≤175) is not recommended for application in pollution degree 3 above 630V		N/A
	Test (175 V): no flashover or breakdown before 50 drops		N/A
28	**RESISTANCE TO RUSTING**		**N/A**
	Ferrous parts protected against rusting		N/A
ANNEX E	**GLOW WIRE TEST**		**P**
E.1	The test is required according to IEC 60695-2-10 and IEC 60695-2-11 with the following additions:	Considered.	P
E.2	The requirements of 8.2, “Test temperatures” of IEC 60695-2-11:2014, apply with the temperature stated in 27.4 of IEC 61558-1		P
E.3	Clause 7, “Conditioning”, of IEC 60695-2-11:2014 apply, preconditioning is required		P
E.4	Clause 8, “Test procedure”, of IEC 60695-2-11:2014 apply, the tip of the glow wire is applied to the flat side of the surface.		P
ANNEX F	**REQUIREMENTS FOR MANUALLY OPERATED SWITCHES WHICH ARE PARTS OF THE TRANSFORMER**		**N/A**
F.2	Manually operated mechanical switches, tested as separate component, shall comply with IEC 61058:2016 under the conditions of F.2.		N/A

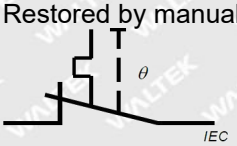
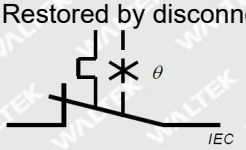
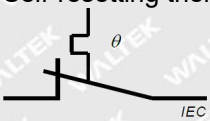
IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
F.3	Manually operated mechanical switches tested as part of the transformer shall comply with the conditions specified under F.3		N/A
ANNEX H	**ELECTRONIC CIRCUITS**		**P**
H.1	For transformers including electronic circuits, the following requirements apply additionally to Clauses 5, 15, 26. This annex is not required for associated transformers		P
H.2	General notes on tests (addition to clause 5)		P
H.3	SHORT-CIRCUIT AND OVERLOAD PROTECTION (ADDITION TO CLAUSE 15)		P
H.3.1	Circuits designed and applied so that fault conditions do not render the appliance unsafe		P
	During and after each test:		P
	- temperatures do not exceed values specified in table 5		P
	- transformer complies with conditions specified in sub-clause 15.1		P
	If a conductor of a pcb becomes open circuited, the transformer is considered to have withstood the particular test, provided that all six conditions as specified are met		N/A
H.3.2	Fault conditions a) to f) of sub-clause H.3.3 are not tested if the following conditions are met:		P
	- electronic circuit is a low-power circuit as specified		P
	- safety of the appliance as specified does not rely on correct functioning of the electronic circuit		P
H.3.3	Fault conditions tested as specified when relevant:		P
	a) short-circuit of creepage distances and clearances, if less than specified in Cl. 26		N/A
	b) open circuit at the terminals of any component		P
	c) short-circuit of capacitors, unless they comply with IEC 60 384-14		P
	d) short-circuit of any two terminals of an electronic component as specified		P
	e) any failure of an integrated circuit as specified		N/A
	f) low-power circuit: low-power points are connected to the supply source		P
	Cl. 15 is repeated with a simulated fault as indicated in a) to e), if the transformer incorporates an electronic circuit to ensure compliance with Cl. 15		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	Fault condition e) is applied for encapsulated and similar components		N/A
	PTC's and NTC's are not short-circuited if they are used as specified		N/A
H.3.4	If for a fuse-link complying with IEC 60 127-3 rated fuse current I1 is used, current I2 is measured as specified:		P
	- if I2 < 2,1 x I1 test of 15.8 is repeated with fuse-link short-circuited		N/A
	- if I2 > 2,75 x I1, no other tests are necessary		N/A
	If I2 > 2,1 x I1 and I2 < 2,75 x I1 test of 15.8 is repeated as specified		N/A
	For fuses other than those complying with IEC 60 127-3, the test is carried out as specified 15.3.2 to 15.3.5		P
H.4	CREEPAGE DISTANCES, CLEARANCES AND DISTANCES THROUGH INSULATION (ADDITION TO CLAUSE 26)		N/A
H.4.1	For live parts separated by basic insulation smaller cr and cl as in 26 are allowed, if H.3 is fulfilled.		N/A
	In optocouplers no requirements of cr and cl		N/A
	For coatings annex W applies. Smaller distances as required in IEC 60664-3:2016, clause 4 are applicable,		N/A
	For potted transformers cycling tests according to 26.2. are applicable		N/A
H.4.2	The ma. surface temperature of optocouplers is 50 K		N/A
ANNEX K	**INSULATED WINDING WIRES**		**P**
K.1	Wire construction:		P
	• insulated winding wire for basic or supplementary insulation (see 19.12.3)		N/A
	• insulated winding wire for reinforced insulation (see 19.12.3)	Approved TIW used	P
	• splid circular winding wires and stranded winding wires with 0,05 to 5,0 mm diameter		N/A
	• spirally wrapped insulation – overlapping		N/A
K.2	Type tests		N/A
K.2.1	General Tests between ambient temperature between 15°C and 35°C and at a humidity between 25% and 75 %		N/A
K.2.2	Electric strength test		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
K.2.2.1	Solid circular winding wires and stranded winding wires		N/A
	Test samples prepared according to clause 4.4.1 of IEC 60851-5:2008 (twisted pair)		N/A
	Dielectric strength test: 6 kV for reinforced insulation		N/A
	Dielectric strength test: 3 kV for basic or supplementary insulation		N/A
K.2.2.2	Square or rectangular wires.		N/A
	Test samples prepared according to clause 4.7.1 of IEC 60851-5:2008		N/A
	Dielectric strength test: 5,5 kV for reinforced insulation		N/A
	Dielectric strength test: 2,75 kV for basic or supplementary insulation		N/A
K.2.3	Flexibility and adherence		N/A
	Claus 5.1 in Test 8 of IEC 60851-3:2009 shall be used		N/A
	Test samples prepared according to clause 5.1.1.4 of IEC 60851-3:2009		N/A
	Dielectric strength test: 5,5 kV for reinforced insulation		N/A
	Dielectric strength test: 2,75 kV for basic or supplementary insulation		N/A
	Mandrel diameter according table K.1		N/A
	The tension to the wire during winding on mandrel is 118 N/mm² (118 MPa)		N/A
K.2.4	Heat shock		N/A
	Test samples prepared according to 3.2.1 (in Test 9) of IEC 60851-6:2012		N/A
	• high voltage test immediately after this test		N/A
	• Dielectric strength test: 5,5 kV for reinforced insulation		N/A
	• Dielectric strength test: 2,75 kV for basic or supplementary insulation		N/A
K.2.5	Retention of dielectric strength after bending (test as specified under test 13 of 4.6.1 c) of IEC 60 851-5)		N/A
	• high voltage test immediately after this test		N/A
	• Dielectric strength test: 5,5 kV for reinforced insulation		N/A
	• Dielectric strength test: 2,75 kV for basic or supplementary insulation		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
K.3	Testing during manufacturing		N/A
K.3.1	General Tests as subjected in K.3.2 and K.3.3		N/A
K.3.2	Routine test		N/A
	• Dielectric strength test: 4,2 kV for reinforced insulation		N/A
	• Dielectric strength test: 2,1 kV for basic or supplementary insulation		N/A
K.3.3	Sampling test		N/A
K.3.3.1	Solid circular winding wires and stranded winding wires		N/A
	Test with a twisted pair, prepared according clause 4.4.1 of IEC 60851-5:2008		N/A
	• Dielectric strength test: 6 kV for reinforced insulation		N/A
	• Dielectric strength test: 3 kV for basic or supplementary insulation		N/A
K.3.3.2	Square or rectangular wire		N/A
	Samples prepared according to clause 4.7.1 of IEC 60851-5:2008		N/A
	• Dielectric strength test: 5,5 kV for reinforced insulation		N/A
	• Dielectric strength test: 3 kV for basic or supplementary insulation		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict

ANNEX V	**ANNEX V, SYMBOLS TO BE USED FOR THERMAL CUT-OUTS**		**N/A**
Figure V.1	Restored by manual operation 		N/A
Figure V.2	Restored by disconnection of the supply 		N/A
Figure V.3	Thermal link		N/A
Figure V.4	Self-resetting thermal cut-out 		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict

11 and 12	TABLE: OUTPUT VOLTAGE AND OUTPUT CURRENT UNDER LOAD; NO-LOAD OUTPUT VOLTAGE					P
Clause		11		12		
type/rated output/	rated voltage (V)	sec. voltage (V)	delta Usec (%)	Usec V no-load output	delta Usec no-load output %	further information
GT-41052-1305 / 5.0VDC 2.60A	5.0	4.97	-0.6	5.19	4.43	100V/50Hz
	5.0	4.97	-0.6	5.19	4.43	100V/60Hz
	5.0	4.98	-0.4	5.19	4.22	240V/50Hz
	5.0	4.98	-0.4	5.19	4.22	240V/60Hz
GT-41052-1512 / 12.0VDC 1.25A	12.0	12.30	2.5	12.43	1.06	100V/50Hz
	12.0	12.30	2.5	12.43	1.06	100V/60Hz
	12.0	12.30	2.5	12.43	1.06	240V/50Hz
	12.0	12.30	2.5	12.43	1.06	240V/60Hz
GT-41052-1524 / 24.0VDC 0.625A	24.0	23.89	-0.45	23.99	0.42	100V/50Hz
	24.0	23.89	-0.45	23.99	0.42	100V/60Hz
	24.0	23.92	-0.33	23.99	0.29	240V/50Hz
	24.0	23.92	-0.33	23.99	0.29	240V/60Hz
GT-41052-1548 / 48.0VDC 0.31A	48.0	48.26	0.54	48.31	0.10	100V/50Hz
	48.0	48.25	0.52	48.31	0.12	100V/60Hz
	48.0	48.28	0.58	48.32	0.08	240V/50Hz
	48.0	48.27	0.56	48.31	0.08	240V/60Hz
Limits	---	---	±10	---	±20	---

14	TABLE: Heating Test					P
	Supply voltage (V) .....:	90V/ 60Hz	90V/ 60Hz	264V/ 50Hz	264V/ 50Hz	—
	Ambient (°C) .....:	See below	See below	See below	See below	—
Maximum measured temperature T of part/at.....:		T (°C)				max. temperature limit, (°C)
		Horizontal	Vertical	Horizontal	Vertical	--
Model: GT-41052-1305						
Enclosure inside near plug holder		93.0	91.9	72.5	75.5	105
Enclosure outside near plug holder		78.9	78.1	65.9	68.7	80
ZNR body		82.7	81.4	64.7	67.1	85
PCB near DB1		94.7	94.1	86.0	89.1	130
C1 body		93.0	92.2	76.4	80.1	105

IEC 61558-2-16					
Clause	Requirement + Test			Result - Remark	Verdict

CX1 body	83.4	82.5	68.0	70.7	105
NF1 coil	103.7	102.9	77.5	81.0	110
HS2 near Q1	100.1	99.7	98.1	101.4	Ref.
T1 winding	107.5	107.5	108.2	109.6	110
T1 core	104.7	104.7	105.4	108.1	110
PCB near T1	96.6	96.5	96.2	98.6	130
CY1 body	100.6	100.6	99.9	102.6	125
U1 body	89.8	89.8	89.5	91.9	100
C8 body	104.1	103.3	104.7	103.9	105
L2 body	94.8	94.9	94.5	97.3	110
Output wire	76.8	76.7	75.9	78.2	80
Enclosure inside near T1	86.3	84.5	85.4	86.3	105
Enclosure outside near T1	71.4	70.2	70.2	71.9	80
Support near pin	41.5	41.4	41.4	42.1	85
Ambient	40.0	40.0	40.0	40.0	--
Model: GT-41052-1512					
Enclosure inside near plug holder	89.8	89.2	70.8	72.7	105
Enclosure outside near plug holder	78.6	78.1	64.8	66.8	80
ZNR body	83.0	82.3	62.3	64.3	85
PCB near DB1	91.6	90.9	80.2	82.1	130
C1 body	74.3	73.5	59.1	61.2	105
CX1 body	87.1	86.6	66.8	68.9	105
NF1 coil	104.9	104.3	69.7	71.8	110
HS2 near Q1	91.5	91.1	86.2	87.8	Ref.
T1 winding	100.6	100.4	99.3	100.2	110
T1 core	97.8	97.5	96.9	97.8	110
PCB near T1	93.9	93.7	92.2	93.2	130
CY1 body	93.9	93.6	92.9	93.9	125
U1 body	81.3	80.9	80.4	81.1	100
C8 body	94.9	94.8	95.7	96.3	105
L2 body	77.5	77.2	77.6	77.9	110
Output wire	62.9	62.8	63.0	63.5	80
Enclosure inside near T1	86.1	84.5	84.2	85.2	105
Enclosure outside near T1	73.0	71.9	70.2	71.9	80
Support near pin	41.8	41.7	41.5	42.4	85
Ambient	40.0	40.0	40.0	40.0	--

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict

Model: GT-41052-1524					
Enclosure inside near plug holder	78.7	80.3	71.2	70.5	105
Enclosure outside near plug holder	70.9	72.0	66.5	65.9	80
ZNR body	74.1	75.8	63.2	62.5	85
PCB near DB1	88.6	90.6	90.7	90.2	130
C1 body	85.3	86.8	73.3	72.2	105
CX1 body	81.6	83.8	71.8	71.0	105
NF1 coil	97.4	99.6	78.1	77.2	110
HS2 near Q1	89.3	88.7	102.6	102.2	Ref.
T1 winding	89.4	91.0	98.8	98.6	110
T1 core	86.3	87.0	96.9	100.2	110
PCB near T1	74.0	78.8	95.6	84.2	130
CY1 body	82.1	83.4	98.4	98.3	125
U1 body	75.6	77.1	83.4	83.2	100
C8 body	75.6	77.1	91.7	91.5	105
L2 body	68.7	69.6	78.7	78.4	110
Output wire	62.6	63.4	70.3	70.0	80
Enclosure inside near T1	75.8	78.4	83.8	83.3	105
Enclosure outside near T1	66.9	69.1	73.1	72.4	80
Support near pin	42.0	42.6	42.0	41.7	85
Ambient	40.0	40.0	40.0	40.0	--
Model: GT-41052-1548					
Enclosure inside near plug holder	76.2	77.9	70.0	69.0	105
Enclosure outside near plug holder	69.4	70.5	66.1	65.1	80
ZNR body	70.5	73.3	63.4	62.5	85
PCB near DB1	88.3	88.3	100.6	100.1	130
C1 body	76.3	84.6	69.5	68.5	105
CX1 body	80.1	81.4	73.3	72.3	105
NF1 coil	102.8	96.7	80.3	79.3	110
HS2 near Q1	85.2	88.3	99.3	99.0	Ref.
T1 winding	89.4	88.4	105.2	105.2	110
T1 core	88.1	85.4	103.7	103.6	110
PCB near T1	85.1	73.1	101.0	101.0	130
CY1 body	82.0	81.3	96.4	96.2	125
U1 body	77.0	75.1	88.1	87.9	100
C8 body	81.6	75.3	103.0	103.5	105
L2 body	77.7	68.1	93.6	94.0	110

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict

Output wire	59.1	62.2	66.7	66.9	80
Enclosure inside near T1	78.5	75.3	91.3	91.0	105
Enclosure outside near T1	66.7	66.4	74.7	73.6	80
Support near pin	42.2	41.5	42.3	42.0	85
Ambient	40.0	40.0	40.0	40.0	--

Supplementary information:

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:
The heating test performed at unit continuous operation.

15	TABLE: SHORT-CIRCUIT AND OVERLOAD PROTECTION						P
	ambient temperature (°C) ..... :		40.0				
type/rated output	r-cold Ω	r-warm Ω	temp. °C	ext. encl. °C	support °C	int. + ext. wire	further information
GT-41052-1305 / 5.0Vdc, 1.2A	--	--	130.9	81.2	42.4	88.8	--
GT-41052-1512 / 12.0Vdc, 1.25A	--	--	126.9	84.5	42.4	71.6	--
GT-41052-1524 / 24.0Vdc, 0.625A	--	--	149.8	91.3	43.5	74.2	--
GT-41052-1524 / 48.0Vdc, 0.31A	--	--	117.5	83.6	44.0	74.4	--

Note: Input: 264VAC 50Hz

1. The model of GT-41052-1305 that when output overload to 3.3A, unit shut down, recoverable, no damage, no hazard. T1 max. temp.: 130.9°C
2. The model of GT-41052-1512 that when output overload to 1.9A, unit shut down, recoverable, no damage, no hazard. T1 max. temp.: 126.9°C
3. The model of GT-41052-1524 that when output overload to 1.20A, unit shut down, recoverable, no damage, no hazard. T1 max. temp.: 149.8°C
4. The model of GT-41052-1548 that when output overload to 0.60A, unit shut down, recoverable, no damage, no hazard. T1 max. temp.: 117.5°C
5. Rated ambient temperature ta: 40°C

18.2	TABLE: insulation resistance measurements	P
Insulation resistance R between:	R (MΩ)	Required R (MΩ)
Model: GT-41052-1305		
Different polarity of Live part after open fuse (L/N)	>100	2
Live part (L/N) to enclosure (rounded with metal foil)	>100	7
Live part (L/N) to output terminal	>100	5
1 layer insulation tape	>100	5

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict

T1: primary and secondary	>100	5
T1: core and secondary	>100	5
metal foil in contact with inner and outer surfaces of enclosures	>100	7
Model: GT-41052-1512		
Different polarity of Live part after open fuse (L/N)	>100	2
Live part (L/N) to enclosure (rounded with metal foil)	>100	7
Live part (L/N) to output terminal	>100	5
1 layer insulation tape	>100	5
T1: primary and secondary	>100	5
T1: core and secondary	>100	5
metal foil in contact with inner and outer surfaces of enclosures	>100	7
Model: GT-41052-1524		
Different polarity of Live part after open fuse (L/N)	>100	2
Live part (L/N) to enclosure (rounded with metal foil)	>100	7
Live part (L/N) to output terminal	>100	5
1 layer insulation tape	>100	5
T1: primary and secondary	>100	5
T1: core and secondary	>100	5
metal foil in contact with inner and outer surfaces of enclosures	>100	7
Model: GT-41052-1548		
Different polarity of Live part after open fuse (L/N)	>100	2
Live part (L/N) to enclosure (rounded with metal foil)	>100	7
Live part (L/N) to output terminal	>100	5
1 layer insulation tape	>100	5
T1: primary and secondary	>100	5
T1: core and secondary	>100	5
metal foil in contact with inner and outer surfaces of enclosures	>100	7
Supplementary information:		

18.3	**TABLE: Dielectric Strength**	**P**

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict

Test voltage applied between:	Test potential applied (V)	Breakdown / flashover (Yes/No)
Model: GT-41052-1305		
Different polarity of Live part after open fuse (L/N)	1820 AC	No
Live part (L/N) to enclosure (rounded with metal foil)	3640 AC	No
Live part (L/N) to output terminal	4240 AC	No
T1: primary and secondary	4240 AC	No
T1: core and secondary	4240 AC	No
3 layers of insulating tape	4240 AC	No
metal foil in contact with inner and outer surfaces of enclosures	3640 AC	No
Model: GT-41052-1512		
Different polarity of Live part after open fuse (L/N)	1820 AC	No
Live part (L/N) to enclosure (rounded with metal foil)	3640 AC	No
Live part (L/N) to output terminal	4240 AC	No
T1: primary and secondary	4240 AC	No
T1: core and secondary	4240 AC	No
3 layers of insulating tape	4240 AC	No
metal foil in contact with inner and outer surfaces of enclosures	3640 AC	No
Model: GT-41052-1524		
Different polarity of Live part after open fuse (L/N)	1820 AC	No
Live part (L/N) to enclosure (rounded with metal foil)	3640 AC	No
Live part (L/N) to output terminal	4240 AC	No
T1: primary and secondary	4240 AC	No
T1: core and secondary	4240 AC	No
3 layers of insulating tape	4240 AC	No
metal foil in contact with inner and outer surfaces of enclosures	3640 AC	No
Model: GT-41052-1548		
Different polarity of Live part after open fuse (L/N)	1820 AC	No
Live part (L/N) to enclosure (rounded with metal foil)	3640 AC	No
Live part (L/N) to output terminal	4240 AC	No
T1: primary and secondary	4240 AC	No
T1: core and secondary	4240 AC	No

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict

3 layers of insulating tape	4240 AC	No
metal foil in contact with inner and outer surfaces of enclosures	3640 AC	No
Supplementary information:		

20	TABLE: Components				P
Object / part No.	**Manufacturer/ trademark**	**Type / model**	**Technical data**	**Standard**	**Mark(s) of conformity[1)]**
AU plug	GlobTek, Inc.	Q-SAA	--	AS/NZS 3112:2017+A1:2021	Test report No.: WTX25D12332661Z
Enclosure and Plug holder	SABIC INNOVATIVE PLASTICS US LLC	915R(GG) 945(GG)	Min. V-0, Min. 120°C, Min. 2.0mm thickness	UL 94	UL E121562
Alt.)	LG Chem (Guangzhou) Engineering Plastics Co Ltd	LUPOY EF-1006F(m)	Min. V-0, Min. 120°C, Min. 2.0mm thickness	UL 94	UL E248280
Alt.)	Covestro Deutschland AG [PC Resins]	FR6005 + (z)	Min. V-0, Min. 105°C, Min. 2.0mm thickness	UL 94	UL E41613
Alt.)	SILVER AGE ENGINEERING PLASTICS (DONGGUAN) CO LTD	PC2330	Min. V-0, Min. 115°C, Min. 2.0mm thickness	UL 94	UL E225348
Alt.)	SABIC INNOVATIVE PLASTICS B V	915R(GG) 945(GG)	Min. V-0, Min. 120°C, Min. 2.0mm thickness	UL 94	UL E45329
Alt.)	SABIC JAPAN LLC	915R(GG) 945(GG)	Min. V-0, Min. 120°C, Min. 2.0mm thickness	UL 94	UL E207780
PCB	WALEX ELECTRONIC (WUXI) CO LTD	T2, T2A, T2B, T4	V-0, 130°C, Min. 1.2 mm thickness	UL 796	UL E154355
Alt.)	SHANGHAI AREX PRECISION ELECTRONIC CO LTD	02V0, 03V0, 04V0	V-0, 130°C, Min. 1.2 mm thickness	UL 796	UL E186016

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict

20	TABLE: Components				P
Object / part No.	**Manufacturer/ trademark**	**Type / model**	**Technical data**	**Standard**	**Mark(s) of conformity[1)]**
Alt.)	SHENZHEN TONGCHUANG XIN ELECTRONICS CO LTD	TCX	V-0, 130°C, Min. 1.2 mm thickness	UL 796	UL E250336
Alt.)	SUZHOU CITY YILIHUA ELECTRONICS CO LTD	YLH-1	V-0, 130°C, Min. 1.2 mm thickness	UL 796	UL E251781
Alt.)	Interchangeable	Interchangeable	V-0, 130°C, Min. 1.2 mm thickness	UL 796	UL
Fuse (F1)	Conquer Electronics Co.,Ltd.	MST series	T2 A, 250 V	IEC/EN 60127-1, IEC/EN 60127-3, UL 248-1, UL 248-14,	VDE40017118.UL E82636
Alt.)	SUZHOU WALTER ELECTRONIC CO LTD	2010	T2 A, 250 V	IEC/EN 60127-1, IEC/EN 60127-3, UL 248-1, UL 248-14,	VDE 40018781, UL E220181
Alt.)	Bel Fuse Ltd.	*RST Serie(s) RSTA Serie(s)*	T2 A, 250 V	IEC/EN 60127-1, IEC/EN 60127-3, UL 248-1, UL 248-14,	VDE 40011144, VDE 40039089
Alt.)	Cooper Bussmann LLC	SS-5	T2 A, 250 V	IEC/EN 60127-1, IEC/EN 60127-3, UL 248-1, UL 248-14,	VDE 40015513, UL E19180
Alt.)	Shenzhen Lanson Electronics Co. Ltd.	SMT	T2 A, 250 V	IEC/EN 60127-1, IEC/EN 60127-3	VDE 40012592
Alt.)	Dongguan Better Electronics Technology Co. Ltd.	932	T2 A, 250 V	IEC/EN 60127-1, IEC/EN 60127-3, UL 248-1, UL 248-14,	VDE 40033369, UL E300003
Alt.)	Hollyland Company Limited	5ET	T2 A, 250 V	IEC/EN 60127-1, IEC/EN 60127-3, UL 248-1, UL 248-14,	VDE 40015669, UL E156471

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict

20	TABLE: Components				P
Object / part No.	**Manufacturer/ trademark**	**Type / model**	**Technical data**	**Standard**	**Mark(s) of conformity[1)]**
Alt.)	Sunny East Enterprise Co. Ltd.	CFD	T2 A, 250 V	IEC/EN 60127-1, IEC/EN 60127-3	VDE 40030246
Alt.)	Conquer Electronics Co.. Ltd.	MET	T2 A, 250 V	IEC/EN 60127-1, IEC/EN 60127-3	VDE 40017157
Bridging-Capacitor(CY1)	TDK Taiwan Corporation	CD	each. 250Vac, 125°C, Max. 2200pF, Y1	IEC 60384-14, EN 60384-14, UL 60384-14	VDE 40029780, UL E37861
Alt.)	SUCCESS ELECTRONICS (HUIZHOU) CO.,LTD	SE,SB	each. 250Vac, 125°C, Max. 2200pF, Y1	IEC 60384-14, EN 60384-14, UL 60384-14	VDE 40037221, VDE 40037211, UL E114280
Alt.)	Murata Electronics (Thailand) Ltd.	KX series	each. 250Vac, 125°C, Max. 2200pF, Y1	IEC 60384-14, EN 60384-14, UL 60384-14	VDE 40002796, UL E37921
Alt.)	Walsin Technology Corp.	AH	each. 250Vac, 125°C, Max. 2200pF, Y1	IEC 60384-14, EN 60384-14, UL 60384-14	VDE 40001804, UL E146544
Alt.)	JYA-NAY Co., Ltd.	JN	each. 250Vac, 125°C, Max. 2200pF, Y1	IEC 60384-14, EN 60384-14, UL 60384-14	TUV 69242987, UL E201384
Alt.)	Haohua Electronic Co.	CT7	each. 250Vac, 125°C, Max. 2200pF, Y1	IEC 60384-14, EN 60384-14, UL 60384-14	VDE 40003902, UL E233106
Alt.)	Jerro Electronics Corp.	JX-series	each. 250Vac, 125°C, Max. 2200pF, Y1	IEC 60384-14, EN 60384-14, UL 60384-14	VDE 40032158, UL E333001
Alt.)	SHANTOU FREE TRADE ZONE SONGTIAN ELECTRONIC TECHNOLOGY CO., LTD	CD	each. 250Vac, 125°C, Max. 2200pF, Y1	IEC 60384-14, EN 60384-14, UL 60384-14	VDE 40025754, UL E208107
Varistor (ZNR) (Optional)	XIAMEN SET ELECTRONICS CO LTD	TFV8S471K, TFV10S471K	300Vac, coating is V-0, 125 °C, 6KV/3KA, pulse test passed	IEC 61051-1, IEC 61051-2, IEC 61051-2-2	TUV J 50554061

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict

20	TABLE: Components				P
Object / part No.	**Manufacturer/ trademark**	**Type / model**	**Technical data**	**Standard**	**Mark(s) of conformity[1)]**
Alt.)	Thinking Electronic Industrial Co., L td.	TVR10471K TVR14471K	Max. Continuous voltage: min.300 Vac(rms),125°C, The coating is V-0	IEC 61051-1, IEC 61051-2, IEC 61051-2-2	VDE 005944
Alt.)	Thinking Electronic Industrial Co., L td.	TVR10471-M	Max. Continuous voltage: min.300 Vac(rms),125°C, The coating is V-0	IEC 61051-1, IEC 61051-2, IEC 61051-2-2 UL 1449	VDE 40036061, UL E314979
Alt.)	Centra Science Corp.	10D471K. 14D471K	Max. Continuous voltage: min.300 Vac(rms),125°C, The coating is V-0	IEC 61051-1, IEC 61051-2, IEC 61051-2-2	VDE 40008220
Alt.)	Success Electronics Co Ltd	SVR10D471K, SVR14D471K	Max. Continuous voltage: min.300 Vac(rms),125°C, The coating is V-0	IEC 61051-1, IEC 61051-2, IEC 61051-2-2	VDE 40030401
Alt.)	Success Electronics Co Ltd	SVR10D471K	Max. Continuous voltage: min.300 Vac(rms),125°C, The coating is V-0	IEC 61051-1, IEC 61051-2, IEC 61051-2-2 UL 1449	VDE 123677, UL E502378
Alt.)	Walsin Technology Co.. Ltd.	VZ10D471K VZ14D471K	Max. Continuous voltage: min.300 Vac(rms),125°C, The coating is V-0	IEC 61051-1, IEC 61051-2, IEC 61051-2-2	VDE 40010090
Alt.)	Lien Shun Electronics Co.. Ltd.	10D471K 14D471K	Max. Continuous voltage: min.300 Vac(rms),125°C, The coating is V-0	IEC 61051-1, IEC 61051-2, IEC 61051-2-2	VDE 40005858
Alt.)	Ceramate Techn. Co., Ltd.	GNR10D471K GNR14D471K	Max. Continuous voltage: min.300 Vac(rms),125°C, The coating is V-0	IEC 61051-1, IEC 61051-2, IEC 61051-2-2	VDE 40031745

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict

20	TABLE: Components				P
Object / part No.	**Manufacturer/ trademark**	**Type / model**	**Technical data**	**Standard**	**Mark(s) of conformity[1)]**
Alt.)	Brightking(Shenzhen) Co..Ltd.	14D471K. 10D471K	Max. Continuous voltage: min.300 Vac(rms),125°C, The coating is V-0	IEC 61051-1, IEC 61051-2, IEC 61051-2-2	VDE 40027827
Alt.)	BRIGHTKING(SHENZHEN)COLTD	471KH10-(+)	Max. Continuous voltage: min.300 Vac(rms),125°C, The coating is V-0	IEC 61051-1, IEC 61051-2, IEC 61051-2-2 UL 1449	TUV B170296048003, UL E327997
Alt.)	Joyin Co., Ltd.	10N471K 10S471K 14N471K	Max. Continuous voltage: min.300 Vac(rms),125°C, The coating is V-0	IEC 61051-1, IEC 61051-2, IEC 61051-2-2	VDE 005937
Alt.)	SHANTOU HIGH-NEWTECHNOLOGYDEVELOPMNTZONE SONGTIANENTERPRISE COL TD	07D471K 10D471K 14D471K 10D621K	Max. Continuous voltage: min.300 Vac(rms),125°C, The coating is V-0	IEC 61051-1, IEC 61051-2, IEC 61051-2-2	VDE 40023049
Alt.)	Guangdong Huiwan Electronics Technology Co Ltd	V-621K-10 DH V-621K-14 DH	Max. Continuous voltage: min.300 Vac(rms),125°C, The coating is V-0	IEC 61051-1, IEC 61051-2, IEC 61051-2-2	VDE 40043880
X Capacitor (CX1)	Cheng Tung Industrial Co., Ltd.	CTX	0.15uF Min. 250Vac, Min. 100°C, min. X2 type	IEC 60384-14, EN 60384-14, UL 60384-14	ENEC-02671-M1
Alt.)	TENTAELECTRICINDUSTRIALCO LTD	MEX	0.15uF Min. 250Vac, Min. 100°C, min. X2 type	IEC 60384-14, EN 60384-14, UL 60384-14	VDE 119119 UL E222911
Alt.)	JOEYELECTRONICS(DONGGUAN)CO LTD	MPX	0.15uF Min. 250Vac, Min. 100°C, min. X2 type	IEC 60384-14, EN 60384-14, UL 60384-14	VDE 40032481 UL E216807
Alt.)	Ultra Tech Xiphi Enterprise Co. Ltd.	HQX	0.15uF Min. 250Vac, Min. 100°C, min. X2 type	IEC 60384-14, EN 60384-14, UL 60384-14	VDE 40024534 UL E183780

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict

20	TABLE: Components				P
Object / part No.	**Manufacturer/ trademark**	**Type / model**	**Technical data**	**Standard**	**Mark(s) of conformity[1)]**
Alt.)	Dain Electronics Co., Ltd.	MPX, NPX, MEX	0.15uF Min. 250Vac, Min. 100°C, min. X2 type	IEC 60384-14, EN 60384-14, UL 60384-14	VDE 40018798 UL E147776
Alt.)	SHANTOU HIGH-NEW TECHNOLOGY DEVELOPMNT ZONE SONGTIAN ENTERPRISE CO LTD	MPX ,MKP	0.15uF Min. 250Vac, Min. 100°C, min. X2 type	IEC 60384-14, EN 60384-14, UL 60384-14	VDE 40024534 UL E183780
Alt.)	SINHUA ELECTRONICS (HUZHOU) CO LTD	MPX-Series	0.15uF Min. 250Vac, Min. 100°C, min. X2 type	IEC 60384-14, EN 60384-14, UL 60384-14	UL E237560
Photo Coupler (U2)	Everlight Electronics Co.. Ltd.	EL817	Dti≥0.4mm,Ext.dcr&cl≥7.6mm thermal cycling test, 110°C	IEC 60747-5-5	VDE 132249
Alt.)	COSMO Electronics Corporation	K1010,KP1010	Dti≥0.4mm,Ext.dcr&cl≥5.4mm thermal cycling test, 115°C	IEC 60747-5-5	VDE 101347
Alt.)	Lite-On Technology Corporation	LTV-817	Dti≥0.4mm,Ext.dcr&cl≥7.0mm, thermal cycling test, 100°C	IEC 60747-5-5	VDE 40015248
Alt.)	Fairchild Semiconductor Pte Ltd	H11A817B, FOD817B	Dti≥0.4mm,Ext.dcr&cl≥7.0mm, thermal cycling test, 110°C	IEC 60747-5-5	VDE 40026857
Alt.)	Sharp Corporation Electronic Components and Devices Group	PC817	Dti≥0.4mm,Ext.dcr&cl≥6.4mm, thermal cyclingtest,110°C	IEC 60747-5-5	VDE 40008087
Alt.)	Bright Led Electronics Corp	BPC-817 A/B/C/D/L, BPC-817 S	Dti=0.4mm,Ext.dcr=7.6mm, thermal cycling test, 100°C	IEC 60747-5-5	VDE 40007240

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict

20	TABLE: Components				P
Object / part No.	**Manufacturer/ trademark**	**Type / model**	**Technical data**	**Standard**	**Mark(s) of conformity[1)]**
Alt.)	Bright Led Electronics Corp.	BPC-817M	Dti=0.4mm, Ext.dcr=8.0mm, thermal cycling test, 100°C	IEC 60747-5-5	VDE40007240
Alt.)	Toshiba Electronic Devices & Storage Corporation	TLP817K, TLP817KF	Dti>0,4mm, Extcr> 7.0mm, Isolation 3000Vac min., thermal cycling test, 115°C	IEC 60747-5-5	VDE40031808
Bleeder Resistor (RA, RB)	Yageo Corporation	RV series	Max. 2MΩ, Min. 1/4W	IEC/EN 62368-1	UL CB (Cert. No.: DK-108482-UL)
Alt.)	Ralec Electronic Corp	RTV series	Max. 2MΩ, Min. 1/4W	IEC/EN 62368-1	UL CB (Cert. No.: DK-66106-M1-UL)
Alt.)	Guangdong Fenghua Advanced Technology Holding Co., Ltd.	RVS series	Max. 2MΩ, Min. 1/4W	IEC/EN 62368-1	Nemko CB (NO109708)
Alt.)	Viking Tech Corporation Kaoshiung Branch	HVRC series	Max. 2MΩ, Min. 1/4W	IEC/EN 62368-1	UL CB (Cert. No.: DK-121748-UL)
Alt.)	TZAI YUAN ENTERPRISE CO LTD	HSMD OR SMD	Max. 2MΩ, Min. 1/4W	IEC/EN 62368-1	UL CB (Cert. No.: DK-29431-M1-UL)
Alt.)	WALSIN TECHNOLOGY CORP	WF12N, WF20N, WF25N, WF08N,WF06N	Max. 2MΩ, Min. 1/4W	IEC/EN 62368-1	UL CB (Cert. No.: DK-119162-UL)
Alt.)	Yageo Corporation	AH series	Max. 2MΩ, Min. 1/4W	IEC/EN 62368-1	DK-110207-UL
Alt.)	PDC	FVS03, FVS05, FVS06, FVS20, TF25V, TF06V, TF08V, TF12V, TF20V, FVS25	Max. 2MΩ, Min. 1/4W	IEC/EN 62368-1	DK-101615-UL

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict

20	TABLE: Components				P
Object / part No.	**Manufacturer/ trademark**	**Type / model**	**Technical data**	**Standard**	**Mark(s) of conformity[1)]**
Line filter(NF1)	GlobTek, Shan Dong Boam Electric Co Ltd, WUXI HAOPUWEI ELECTRONICS CO.,LTD, ENG	NF00001D	32mH, 130 °C	IEC 61558-1, IEC 61558-2-1	Tested with appliance
- Bobbin	CHANG CHUN PLASTICS CO LTD	T375J(G5)(G6) T375HF	V-0,150°C	UL94	UL E59481
Transformer (T1)	GlobTek	XF00167 (5-7V), XF00168 (7.01-15V), XF00169 (15.01-24V), XF00299 (24.01-48V)	Class B (EIS: type GTX-130-TM)	IEC 61558-1, IEC 61558-2-16 UL 1446	Tested in the equipment UL E243347
Alt.)	Haopuwei	XF00167 (5-7V), XF00168 (7.01-15V)., XF00169 (15.01-24V), XF00299 (24.01-48V)	Class B (EIS: type ZT-130)	IEC 61558-1, IEC 61558-2-16 UL 1446	Tested with appliance, UL E315275
Alt.)	BOAM	XF00167 (5-7V), XF00168 (7.01-15V)., XF00169 (15.01-24V), XF00299 (24.01-48V)	Class B (EIS: type BOAM -01 or B1)	IEC 61558-1, IEC 61558-2-16 UL 1446	Tested with appliance, UL E252329
- Triple-insulated wire (Secondary)	Great Leoflon Industrial Co.. Ltd.	TRW(B)*	130°C	IEC 61558-1 IEC 61558-2-16 UL 2353	Tested in equipment UL E211989
Alt.)	COSMOLINK CO. Ltd.	TIW-M	130°C	IEC 61558-1 IEC 61558-2-16 UL 2353	Tested in equipment UL E213764
Alt.)	Furukawa Electric Co., Ltd.	TEX-E	130°C	IEC 61558-1 IEC 61558-2-16 UL 2353	Tested in equipment UL E206440

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict

20	TABLE: Components				P
Object / part No.	**Manufacturer/ trademark**	**Type / model**	**Technical data**	**Standard**	**Mark(s) of conformity[1)]**
Alt.)	SHENZHENJIUDING NEWMATERIAL COLTD	DTFW-B	130°C	IEC 61558-1 IEC 61558-2-16 UL 2353	Tested in equipment UL E357999
Alt.)	TOTOKU ELECTRIC CO LTD	TIW-2SLZX$+, TIW-2SLZXY$+	130°C	IEC 61558-1 UL 2353	VDE 40044910, UL E166483
Alt.)	E&B TECHNOLOGY CO LTD	E&B-XXXB, E&B-XXXB-1	130°C	IEC 61558-1 IEC 61558-2-16 UL 2353	Tested in equipment UL E315265
Alt.)	SHENZHENJIUDING NEWMATERIAL COLTD	DTIW-B	130°C	IEC 61558-1 IEC 61558-2-16 UL 2353	Tested in equipment UL E357999
- Bobbin	CHANG CHUN PLASTICS CO LTD	T375J(G5)(G6) T375HF	Phenolic, V-0, 150°C	UL 94	UL E59481
Alt.)	SUMITOMOBAKELITE COLTD	PM-9820. PM-9630	Phenolic, V-0, 150°C	UL 94	UL E41429
Alt.)	SHOWA DENKOMATERIALSTECHNOSERVICE CO.LTD	CP-J-8800	Phenolic, V-0,150°C	UL 94	UL E514814
- Insulating tape	3M COMPANY ELECTRICALMARKETS DIV(EMD)	1350F-1(b), 1350T-1, 44	Min.130°C	UL 510	UL E17385
Alt.)	BONDTECPACIFIC CO LTD	370S(b)	Min.130°C	UL 510	UL E175868
Alt.)	JINGJIANG YAHUA PRESSURESENSITIVE GLUE CO LTD	PZ*(b), CT*(c)(g) CT(b)(g)	Min.130°C	UL 510	UL E165111
Alt.)	HUIZHOU YAHUAELECTRONICTECHNOLOGYCO LTD	CT	Min.130°C	UL 510	UL E495875
Alt.)	JINGJIANG JINGYIADHESIVEPRODUCT COLTD	JY25-A(b)	Min.130°C	UL 510	UL E246950

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict

20	TABLE: Components				P
Object / part No.	**Manufacturer/ trademark**	**Type / model**	**Technical data**	**Standard**	**Mark(s) of conformity[1)]**
Alt.)	CHANG SHU LIANG YI TAPE INDUSTRY CO LID	LY-XX*	Min.130°C	UL 510	UL E246820
Output wire	Interchangeable	Interchangeable	Min. VW-1. Min.20AWG. Min.300V Min.80°C	UL 758	UL
Rectifier (BD1)	Interchangeable	Interchangeable	Min.800V,1A	IEC 61558-1 IEC 61558-2-16	Tested with appliance
Electrolytic capacitor (C1)	Interchangeable	Interchangeable	Min.400V, Max.22uF,105°C	IEC 61558-1 IEC 61558-2-16	Tested with appliance
MOSFET (Q1)	Interchangeable	Interchangeable	Min.7A, 600V	IEC 61558-1 IEC 61558-2-16	Tested with appliance
Supplementary information: 1) Provided evidence ensures the agreed level of compliance. *2)* All transformer T1 sources have same construction.					

25	TABLE: Threaded Part Torque Test		N/A
Threaded part identification	**Diameter of thread (mm)**	**Column number (I, II, or III)**	**Applied torque (Nm)**
Supplementary information:			

26	TABLE: Working voltage measurement.		P
Location	RMS voltage (V)	Peak voltage (V)	Comments
Model: GT-41052-1305			
T1 Pin 2 to pin A	272	539	
T1 Pin 2 to pin B	**277**	**541**	Max. RMS voltage and Peak voltage
T1 Pin 3 to pin A	203	362	
T1 Pin 3 to pin B	195	334	

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict

T1 Pin 4 to pin A	195	345	
T1 Pin 4 to pin B	201	339	
T1 Pin 5 to pin A	216	391	
T1 Pin 5 to pin B	226	420	
Between two pin CY1	200	336	
U2 Pin 1 to pin 3	203	341	
U2 Pin 1 to pin 4	205	344	
U2 Pin 2 to pin 3	203	342	
U2 Pin 2 to pin 4	206	345	
Model: GT-41052-1512			
T1 Pin 2 to pin A	261	540	
T1 Pin 2 to pin B	**289**	**555**	Max. RMS voltage and Peak voltage
T1 Pin 3 to pin A	215	400	
T1 Pin 3 to pin B	201	348	
T1 Pin 4 to pin A	185	347	
T1 Pin 4 to pin B	191	333	
T1 Pin 5 to pin A	199	359	
T1 Pin 5 to pin B	213	408	
Between two pin CY1	196	333	
U2 Pin 1 to pin 3	205	354	
U2 Pin 1 to pin 4	207	357	
U2 Pin 2 to pin 3	204	356	
U2 Pin 2 to pin 4	207	359	
Model: GT-41052-1524			
T1 Pin 2 to pin A	238	479	
T1 Pin 2 to pin B	**265**	**507**	Max. RMS voltage and Peak voltage
T1 Pin 3 to pin A	222	445	
T1 Pin 3 to pin B	195	334	
T1 Pin 4 to pin A	200	377	
T1 Pin 4 to pin B	207	346	
T1 Pin 5 to pin A	201	353	
T1 Pin 5 to pin B	227	433	
Between two pin CY1	209	346	
U2 Pin 1 to pin 3	222	371	
U2 Pin 1 to pin 4	224	374	

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict

U2 Pin 2 to pin 3	222	373	
U2 Pin 2 to pin 4	225	375	
Model: GT-41052-1548			
T1 Pin 2 to pin A	**311**	439	Max. RMS voltage
T1 Pin 2 to pin B	250	474	
T1 Pin 3 to pin A	166	284	
T1 Pin 3 to pin B	212	385	
T1 Pin 4 to pin A	247	396	
T1 Pin 4 to pin B	201	358	
T1 Pin 5 to pin A	266	**478**	Max. Peak voltage
T1 Pin 5 to pin B	216	373	
Between two pin CY1	210	354	
U2 Pin 1 to pin 3	214	353	
U2 Pin 1 to pin 4	216	356	
U2 Pin 2 to pin 3	215	355	
U2 Pin 2 to pin 4	217	357	

Note(s):
Operating conditions: Input voltage: = AC 240V (rated voltage)
Used to determine the test voltage of dielectric strength and clearance, creepage distance and Dti.

26	**TABLE: Clearance And Creepage Distance Measurements**					**P**
clearance cl and creepage distance dcr at/of:	**Up (V)**	**U r.m.s. (V)**	**Required cl (mm) *)**	**cl (mm)**	**required dcr (mm)**	**dcr (mm)**
Model: GT-41052-1512						
L & N trace before fuse (BI)	BI	240	2.4	3.0	2.5	3.0
Two terminals of fuse (BI)	BI	240	2.4	2.8	2.5	2.8
Between two pin CY1 (RI)	RI	240	4.5	6.0	4.8	6.0
Between two pin U2 (RI)	RI	240	4.5	5.0	4.8	5.3
Live parts to accessible parts (RI)	RI	240	4.5	5.5	4.8	5.5
Primary circuits to secondary circuits (PCB trace under T1) (RI)	RI	289	5.3	6.0	5.8	6.0
Transformer primary winding to secondary pins (RI)	RI	289	5.3	6.5	5.8	6.5
Transformer primary core/pins to secondary pins (RI)	RI	289	5.3	6.5	5.8	6.5

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information:

BI = basic insulation SI = supplementary insulation RI = reinforced insulation

All component considered above 10N /5sec

*) The products are not intended to use in environment which altitude exceed 2000m..

**) Linear interpolation is used.

The models of GT-41052-1305, GT-41052-1512, GT-41052-1524 are the same PCB Layout and construction

All transformers XF00167, XF00168 and XF00169 have same structure and some tiny differences, not affect to safety.

26	TABLE: Clearance And Creepage Distance Measurements					P
clearance cl and creepage distance dcr at/of:	**Up (V)**	**U r.m.s. (V)**	**Required cl (mm) *)**	**cl (mm)**	**required dcr (mm)**	**dcr (mm)**
Model: GT-41052-1548						
L & N trace before fuse (BI)	BI	240	2.4	2.5	2.5	2.5
Two terminals of fuse (BI)	BI	240	2.4	2.7	2.5	2.7
Between two pin CY1 (RI)	RI	240	4.5	6.4	4.8	6.4
Between two pin U2 (RI)	RI	240	4.5	6.1	4.8	6.1
Live parts to accessible parts (RI)	RI	240	4.5	5.8	4.8	5.8
Primary circuits to secondary circuits (PCB trace under T1) (RI)	RI	311	5.7	6.4	6.3	6.4
Transformer primary winding to secondary pins (RI)	RI	311	5.7	6.5	6.3	6.5
Transformer primary core/pins to secondary pins (RI)	RI	311	5.7	6.5	6.3	6.5

Supplementary information:

BI = basic insulation SI = supplementary insulation RI = reinforced insulation

All component considered above 10N /5sec

*) The products are not intended to use in environment which altitude exceed 2000m..

**) Linear interpolation is used.

26	TABLE: Distance Through Insulation Measurements			P
Distance through insulation di at/of:	**U r.m.s. (V)**	**Test voltage (V)**	**Required di (mm)**	**di (mm)**
Enclosure	240	3640	1.0	2.0

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict

Input to output through transformer	311	5300	Triple insulation winding add basic insulation	Triple insulation winding + 2-layer insulation
Supplementary information:				

26.2 TEST A	TABLE: CREEPAGE DISTANCES AND CLEARANCES AND DISTANCES THROUGH INSULATION				N/A
	Test with three special prepared specimens with uninsulated wires, without potting or impregnation				
cycles with 2 x working voltage between pri / sec	68 h at the temperature acc. Cl. 14 (min. 85 °C)	1 hour 25 °C	2 hour 0 °C	1 hour 25 °C	
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					

26.2 TEST B	TABLE: CREEPAGE DISTANCES AND CLEARANCES AND DISTANCES THROUGH INSULATION				N/A
	Test with three specially prepared specimens with potting or impregnation (P1)				
cycles with 2 x working voltage between pri / sec	68 h at the temperature acc. Cl. 14 (min. 85 °C)	1 hour 25 °C	2 hour 0 °C	1 hour 25 °C	
1.					
2.					
3.					
4.					
5.					
6.					
7.					

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict

26.2 TEST B	TABLE: CREEPAGE DISTANCES AND CLEARANCES AND DISTANCES THROUGH INSULATION				N/A
	Test with three specially prepared specimens with potting or impregnation (P1)				
cycles with 2 x working voltage between pri / sec	68 h at the temperature acc. Cl. 14 (min. 85 °C)	1 hour 25 °C	2 hour 0 °C	1 hour 25 °C	
8.					
9.					
10.					

26.2 TEST C	TABLE: CREEPAGE DISTANCES AND CLEARANCES AND DISTANCES THROUGH INSULATION				N/A
	Test with three specially prepared specimens with potting (only dti is required)				
cycles with 2 x working voltage between pri / sec	68 h at the temperature acc. Cl. 14 (min. 85 °C)	1 hour 25 °C	2 hour 0 °C	1 hour 25 °C	
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					

26.3.5	TABLE: CREEPAGE DISTANCES AND CLEARANCES AND DISTANCES THROUGH INSULATION				N/A
	Test for transformers, use FIW-wire				
cycles with 2 x working voltage between pri / sec	68 h at the temperature acc. Cl. 14 (min. 85 °C)	1 hour 25 °C	2 hour 0 °C	1 hour 25 °C	
1.					
2.					

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict

26.3.5	TABLE: CREEPAGE DISTANCES AND CLEARANCES AND DISTANCES THROUGH INSULATION					N/A
	Test for transformers, use FIW-wire					
cycles with 2 x working voltage between pri / sec	68 h at the temperature acc. Cl. 14 (min. 85 °C)	1 hour 25 °C	2 hour 0 °C	1 hour 25 °C		
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						

27.2	TABLE: Ball Pressure Test of Thermoplastics			P
Material	Temperature (°C)	Result (mm)	Comments	
Enclosure	125	1.41	See table 20	
PCB	125	0.46	See table 20	
Bobbin of T1	125	0.49	See table 20	
Remark: --				

27.4	TABLE: Resistance to heat and fire - Glow wire tests							P
Object/ Part No./ Material	Manufacturer / trademark	Glow wire test (GWT); (°C)						Verdict
		550	650		750		850	
			te	ti	te	ti		
T1 bobbin	See table 20	--	0	0	0	0	--	Pass
CX1 body	See table 20	--	--	--	0	0	Pass	Pass
PCB	See table 20	--	--	--	0	0	Pass	Pass
Enclosure	See table 20	--	0	0	0	0	--	Pass
Plug holder	See table 20	--	--	--	0	0	Pass	Pass
Output connector	See table 20	--	--	--	0.14	15.26	Pass	Pass

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict

Ignition of the specified layer placed underneath the test specimen (Yes/No).....:	
Supplementary information:	

ANNEX H	Electronic circuits fault test		P
	ambient temperature (°C) ..... :	25.0	
	Test voltage(V) ..... :	264V	

Component No.	fault	Test voltage	Test time	Fuse No.	Fuse current(A)	Result
Model: GT-41052-1305						
BD1(L-+)	SC	264	1s	F1	0	Fuse (F1) opened immediately, unrecoverable,BD1 damage, no hazard.
C1	SC	264	1s	F1	0	Fuse (F1) opened immediately, unrecoverable, C1 damage, no hazard.
Q1 (D-S)	SC	264	1s	F1	0	Fuse (F1) opened immediately, unrecoverable, Q1 damage, no hazard.
Q1 (D-G)	SC	264	1s	F1	0	Unit shut down immediately, unrecoverable, Q1 damage, no hazard.
Q1 (G-S)	SC	264	10min	F1	0.02	Unit shut down immediately, recoverable, no damage, no hazard.
U1 (CS-C)	SC	264	10min	F1	0.02	Unit shut down immediately, recoverable, no damage, no hazard.
T1 (pin 2-3)	SC	264	10min	F1	0.02	Unit shut down immediately, recoverable, no damage, no hazard.
T1 (pin 4-5)	SC	264	10min	F1	0.02	Unit shut down immediately, recoverable, no damage, no hazard.
T1 (pin A-B)	SC	264	10min	F1	0.03	Unit shut down immediately, recoverable, no damage, no hazard.

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict

U2 (pin 1)	OC	264	10min	F1	0.02	Unit shut down immediately, recoverable, no damage, no hazard.
U2 (pin 3)	OC	264	10min	F1	0.02	Unit shut down immediately, recoverable, no damage, no hazard.
U2 (pin 1-2)	SC	264	10min	F1	0.03	Unit shut down immediately, recoverable, no damage, no hazard.
U2 (pin 3-4)	SC	264	10min	F1	0.02	Unit shut down immediately, recoverable, no damage, no hazard.
D4/D3	SC	264	10min	F1	0.03	Unit shut down immediately, recoverable, no damage, no hazard.
C8	SC	264	10min	F1	0.02	Unit shut down immediately, recoverable, no damage, no hazard.
Output	SC	264	10min	F1	0.02	Unit shut down immediately, recoverable, no damage, no hazard.
Model: GT-41052-1512						
BD1(L-+)	SC	264	1s	F1	0	Fuse (F1) opened immediately, unrecoverable,BD1 damage, no hazard.
C1	SC	264	1s	F1	0	Fuse (F1) opened immediately, unrecoverable, BD1 damage, no hazard.
Q1 (D-S)	SC	264	1s	F1	0	Fuse (F1) opened immediately, unrecoverable, Q1 damage, no hazard.
Q1 (D-G)	SC	264	10min	F1	0	Unit shut down immediately, unrecoverable, Q1 damage, no hazard.
Q1 (G-S)	SC	264	10min	F1	0.02	Unit shut down immediately, recoverable, no damage, no hazard.

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict

ANNEX H	Electronic circuits fault test						P
U1 (CS-C)	SC	264	10min	F1	0.02	Unit shut down immediately, recoverable, no damage, no hazard.	
T1 (pin 2-3)	SC	264	10min	F1	0.03	Unit shut down immediately, recoverable, no damage, no hazard.	
T1 (pin 4-5)	SC	264	10min	F1	0.02	Unit shut down immediately, recoverable, no damage, no hazard.	
T1 (pin A-B)	SC	264	10min	F1	0.02	Unit shut down immediately, recoverable, no damage, no hazard.	
U2 (pin 1)	OC	264	10min	F1	0.03	Unit shut down immediately, recoverable, no damage, no hazard.	
U2 (pin 3)	OC	264	10min	F1	0.02	Unit shut down immediately, recoverable, no damage, no hazard.	
U2 (pin 1-2)	SC	264	10min	F1	0.02	Unit shut down immediately, recoverable, no damage, no hazard.	
U2 (pin 3-4)	SC	264	10min	F1	0.02	Unit shut down immediately, recoverable, no damage, no hazard.	
D4/D3	SC	264	10min	F1	0.02	Unit shut down immediately, recoverable, no damage, no hazard.	
C8	SC	264	10min	F1	0.02	Unit shut down immediately, recoverable, no damage, no hazard.	
Output	SC	264	10min	F1	0.03	Unit shut down immediately, recoverable, no damage, no hazard.	
Model: GT-41052-1524							

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict

ANNEX H	Electronic circuits fault test						P
BD1(L-+)	SC	264	1s	F1	0	Fuse (F1) opened immediately, unrecoverable,BD1 damage, no hazard.	
C1	SC	264	1s	F1	0	Fuse (F1) opened immediately, unrecoverable, BD1 damage, no hazard.	
Q1 (D-S)	SC	264	1s	F1	0	Fuse (F1) opened immediately, unrecoverable, Q1 damage, no hazard.	
Q1 (D-G)	SC	264	10min	F1	0	Unit shut down immediately, unrecoverable, Q1 damage, no hazard.	
Q1 (G-S)	SC	264	10min	F1	0.02	Unit shut down immediately, recoverable, no damage, no hazard.	
U1 (CS-C)	SC	264	10min	F1	0.03	Unit shut down immediately, recoverable, no damage, no hazard.	
T1 (pin 2-3)	SC	264	10min	F1	0.02	Unit shut down immediately, recoverable, no damage, no hazard.	
T1 (pin 4-5)	SC	264	10min	F1	0.02	Unit shut down immediately, recoverable, no damage, no hazard.	
T1 (pin A-B)	SC	264	10min	F1	0.02	Unit shut down immediately, recoverable, no damage, no hazard.	
U2 (pin 1)	OC	264	10min	F1	0.02	Unit shut down immediately, recoverable, no damage, no hazard.	
U2 (pin 3)	OC	264	10min	F1	0.03	Unit shut down immediately, recoverable, no damage, no hazard.	
U2 (pin 1-2)	SC	264	10min	F1	0.02	Unit shut down immediately, recoverable, no damage, no hazard.	

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict

ANNEX H	Electronic circuits fault test						P
U2 (pin 3-4)	SC	264	10min	F1	0.03	Unit shut down immediately, recoverable, no damage, no hazard.	
D4/D3	SC	264	10min	F1	0.03	Unit shut down immediately, recoverable, no damage, no hazard.	
C8	SC	264	10min	F1	0.02	Unit shut down immediately, recoverable, no damage, no hazard.	
Output	SC	264	10min	F1	0.02	Unit shut down immediately, recoverable, no damage, no hazard.	
Model: GT-41052-1548							
BD1(L-+)	SC	264	1s	F1	0	Fuse (F1) opened immediately, unrecoverable,BD1 damage, no hazard.	
C1	SC	264	1s	F1	0	Fuse (F1) opened immediately, unrecoverable, BD1 damage, no hazard.	
Q1 (D-S)	SC	264	1s	F1	0	Fuse (F1) opened immediately, unrecoverable, Q1 damage, no hazard.	
Q1 (D-G)	SC	264	10min	F1	0	Unit shut down immediately, unrecoverable, Q1 damage, no hazard.	
Q1 (G-S)	SC	264	10min	F1	0.03	Unit shut down immediately, recoverable, no damage, no hazard.	
U1 (CS-C)	SC	264	10min	F1	0.02	Unit shut down immediately, recoverable, no damage, no hazard.	
T1 (pin 2-3)	SC	264	10min	F1	0.02	Unit shut down immediately, recoverable, no damage, no hazard.	

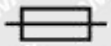
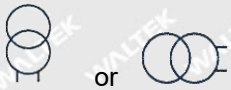
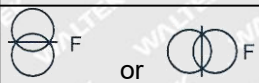
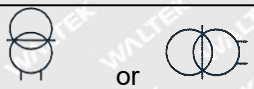
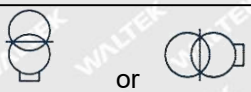
IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict

ANNEX H	Electronic circuits fault test						P
T1 (pin 4-5)	SC	264	10min	F1	0.03	Unit shut down immediately, recoverable, no damage, no hazard.	
T1 (pin A-B)	SC	264	10min	F1	0.02	Unit shut down immediately, recoverable, no damage, no hazard.	
U2 (pin 1)	OC	264	10min	F1	0.03	Unit shut down immediately, recoverable, no damage, no hazard.	
U2 (pin 3)	OC	264	10min	F1	0.02	Unit shut down immediately, recoverable, no damage, no hazard.	
U2 (pin 1-2)	SC	264	10min	F1	0.02	Unit shut down immediately, recoverable, no damage, no hazard.	
U2 (pin 3-4)	SC	264	10min	F1	0.02	Unit shut down immediately, recoverable, no damage, no hazard.	
D4/D3	SC	264	10min	F1	0.03	Unit shut down immediately, recoverable, no damage, no hazard.	
C8	SC	264	10min	F1	0.03	Unit shut down immediately, recoverable, no damage, no hazard.	
Output	SC	264	10min	F1	0.02	Unit shut down immediately, recoverable, no damage, no hazard.	

Note: S-C: Shout circuit, O-C: Open circuit

* Internal protection operated (list component) repeat all fuse sources (see appended tables 20) 10 times and 16A circuit breaker did not open. Results were same.

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
AA	**ANNEX AA**		**N/A**
	PARTIAL DISCHARGE (PD) TEST		**N/A**
BB	**ANNEX BB**		**N/A**
	Particular requirements for associated transformers for switch mode power supplies with internal frequencies > 500 Hz		N/A
	See separate test report-form for these Annex.		N/A
BB.8	MARKING AND OTHER INFORMATION		N/A
BB.8.2	Marking for transformers IP00 or for associated transformers: type and trademark, instruction sheets		N/A
BB.8.11	Correct symbols:		N/A
	Volts	V	N/A
	Amperes	A (mA)	N/A
	Volt amperes (or volt-amperes reactive for reactors)	VA or (VAR)	N/A
	Watts	W	N/A
	Hertz	Hz	N/A
	Input	PRI	N/A
	Output	SEC	N/A
	Direct current	d.c. (DC) or ⎓	N/A
	Neutral	N	N/A
	Single-phase a.c.	∼	N/A
	Three-phase a.c.	3 ∼	N/A
	Three-phase and neutral a.c.	3N ∼	N/A
	Power factor	cos φ	N/A
	Class II construction	⧈	N/A
	Class III construction	III	N/A
	Equipment of overvoltage category I	I	N/A
	Equipment of overvoltage category II	II	N/A
	Equipment of overvoltage category III	III	N/A
	Equipment of overvoltage category IV	IV	N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	Fuse-link		N/A
	Rated max. ambient temperature	t_a	N/A
	Rated minimum ambient temperature	t_{amin}	N/A
	Rated minimum temperature	t_{min}	N/A
	Frame or core terminal		N/A
	Protective earth		N/A
	IP number	IPXX	N/A
	Earth (ground for functional earth)		N/A
	For indoor use only		N/A
	To indicate that the appliance is intended to be usable up to the maximum altitude 3 000 m.		N/A
	To indicate that the power supply unit shall not be used, if pins of the plug part are damaged.		N/A
	Additional Symbols (IEC 61558-2-16:09)		N/A
	SMPS incorporating a Fail-safe separating transformer		N/A
	SMPS incorporating a Non-short-circuit-proof separating transformer		N/A
	SMPS incorporating a Short-circuit-proof separating transformer (inherently or non-inherently)		N/A
	SMPS incorporating a Fail-safe isolating transformer		N/A
	SMPS incorporating a Non-short-circuit-proof isolating transformer		N/A
	SMPS incorporating a Short-circuit-proof isolating transformer (inherently or non-inherently)		N/A
	SMPS incorporating a Fail-safe safety isolating transformer		N/A
	SMPS incorporating a Non-short-circuit-proof safety isolating transformer		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	SMPS incorporating a Short-circuit-proof safety isolating transformer (inherently or non-inherently)		N/A
	SMPS incorporating a Fail-safe auto-transformer	or	N/A
	SMPS incorporating a Non-short-circuit proof auto-transformer	or	N/A
	SMPS incorporating a Short-circuit proof auto-transformer (inherently or non-inherently)	or	N/A
	SMPS (Switch mode power supply unit)		N/A
BB.9	PROTECTION AGAINST ELECTRIC SHOCK		N/A
BB.10	CHANGE OF INPUT VOLTAGE SETTING		N/A
BB.11	OUTPUT VOLTAGE AND OUTPUT CURRENT UNDER LOAD		N/A
BB.12	NO-LOAD OUTPUT VOLTAGE (see supplementary requirements in Part 2)		N/A
BB.13	SHORT-CIRCUIT VOLTAGE		N/A
BB.14	HEATING		N/A
BB.14.2	Application of 14.1 or 14.3 according to the insulation system		N/A
BB.14.2.1	Class of isolating system (classified materials according to IEC 60 085 and IEC 60 216)		N/A
BB.14.2.2	No classified material, or system but the measured temperature does not exceed the value of Class A		N/A
BB.14.2.3	No classified material or system but the measured temperature exceeds the value for Class A, the live parts of the transformers are submitted to the test of 14.3		N/A
BB.14.3	Accelerated ageing test for undeclared class of isolating system		N/A
	Cycling test (10 cycles):		N/A
	– measuring of the no-load input current (mA)		N/A
BB.14.3.1	– heat run (temperature in table 2)		N/A
BB.14.3.2	– vibration test: 30 min; amplitude 0,35 mm; frequency range: 10 Hz, 55 Hz, 10 Hz		N/A
BB.14.3.3	– moisture treatment (48 h, 17.2)		N/A
BB.14.3.4	Measurements and tests at the beginning and after each test:		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	– deviation of the no-load input current, measured at the beginning of the test is 30%		N/A
	– insulation resistance acc. cl.18.1 and 18.2		N/A
	– electric strength, no breakdown (18.3); 2 min; test voltage 35% of specified value (table VI)		N/A
	– Transformers (50 or 60 Hz version) are tested after the dielectric strength test as follows: under no load; duration: 5 min; Upri(V):1,2 times rated supply voltage; frequency (Hz): 2 times rated frequency		N/A
BB.15	SHORT-CIRCUIT AND OVERLOAD PROTECTION		N/A
BB.16	MECHANICAL STRENGTH		N/A
BB.17	PROTECTION AGAINST HARMFUL INGRESS OF WATER AND MOISTURE		N/A
BB.18	INSULATION RESISTANCE AND ELECTRIC STRENGTH		N/A
BB.18.2	Insulation resistance between:		N/A
	– live parts and body for basic insulation 2 M		N/A
	– live parts and body for reinforced insulation 7 M		N/A
	– input circuits and output circuits for basic insulation 2 M		N/A
	– input circuits and output circuits for double or reinforced insulation 5 M		N/A
	– each input circuit and all other input circuits connected together 2 M		N/A
	– each output circuit and all other output circuits connected together 2 M		N/A
	– hazardous live parts and metal parts with basic insulation (Class II transformers) 2 M		N/A
	– body and metal parts with basic insulation (Class II transformers) 5 M		N/A
	– metal foil in contact with inner and outer surfaces of enclosures 2 M		N/A
BB.18.3	Electric strength test (1 min): no flashover or breakdown:		N/A
	1) basic insulation between input circuits and output circuits; working voltage (V); test voltage (V) ..... :		N/A
	2) double or reinforced insulation between input circuits and output circuits; working voltage (V); test voltage (V) ..... :		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	3) basic or supplementary insulation between:		N/A
	a) live parts of different polarity; working voltage (V); test voltage (V)		N/A
	b) live parts and the body if intended to be connected to protective earth ..... :		N/A
	c) inlet bushings and cord guards and anchorages ..... :		N/A
	d) live parts and an intermediate conductive part ..... :		N/A
	e) intermediate conductive parts and body . :		N/A
	4) Reinforced insulation between the body and live parts; working voltage (V); test voltage (V) ..... :		N/A
	5) Functional insulation for windings intended to be connected in series or parallel (test voltage = working voltage + 500 V) (IEC 61558-2-16:2009)		N/A
18.102 (A1)	Partial discharge tests according IEC 60664-1 , if the working voltage is > 750 V peak		N/A
	Partial discharge is ≤ 10 pC at time P2 See Fig. 19.101		N/A
BB.19	CONSTRUCTION		N/A
BB.19.1	General construction		N/A
BB.19.1.1	General		N/A
BB.19.1.2	Auto-transformers		N/A
BB.19.1.2.1	For plug connected auto-transformers with rated input voltage > rated output voltage the potential to earth shall not exceed the rated output voltage.		N/A
BB.19.1.2.2	Polarised input and output plug and socket-outlet system: an instruction is given with the information, that the transformer shall not be used with non-polarised plug and socket outlet system.		N/A
BB.19.1.2.3	A polarity detecting device only energises the output in the case: output potential to earth ≤ rated output voltage, also with reversed input plug.		N/A
	– The contact separation of the device is ≥ 3mm		N/A
	– A current to earth does not exceed 0,75 mA.		N/A
	– All tests are repeated under fault conditions of H.3.3 of annex H of part 1. The potential to earth does not exceed the max output voltage for more than 5 s.		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
BB.19.1.3	Separating transformers		N/A
BB.19.1.3.1	Input and output circuits electrically separated.		N/A
BB.19.1.3.2	The insulation between input and output winding(s) consist of basic insulation		N/A
	Class I SMPS		N/A
	– Insulation between input windings and body consist of basic insulation		N/A
	– Insulation between output windings and body consist of basic insulation		N/A
	Class II SMPS		N/A
	– Insulation between input windings and body consist of double or reinforced insulation		N/A
	– Insulation between output windings and body consist of double or reinforced insulation		N/A
BB.19.1.3.3	The insulation between input windings and intermediate conductive parts and the output windings and intermediate part consist of basic insulation		N/A
	For class I SMPS the insulation between input and output windings via the intermediate conductive parts consist of basic insulation		N/A
	For class II SMPS the insulation between input winding and the body and between the output windings and the body via the intermediate conductive parts consist of double or reinforced insulation.		N/A
BB.19.1.3.4	Parts of output circuits may be connected to protective earth		N/A
BB.19.1.3.5	No direct contact between output circuits and the body, unless:		N/A
	– Allowed for associated transformers by the equipment standard		N/A
BB.19.1.4	Isolating transformers and safety isolating transformers		N/A
BB.19.1.4.1	Input and output circuits electrically separated		N/A
	No possibility of any connection between these circuits		N/A
BB.19.1.4.2	The insulation between input and output winding(s) consist of double or reinforced insulation (exception see 19.1.4.4)		N/A
	Class I transformers **not** intended for connection to the mains by a plug:		—

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	– Insulation between input windings and body connected to earth consist of basic insulation rated to the input voltage		N/A
	– Insulation between output windings and body, connected to earth consist of basic insulation rated for the output voltage		N/A
	Class I transformers intended for connection to the mains by a plug:		N/A
	– Insulation between input windings and body connected to earth consist of basic insulation rated to the working voltage		N/A
	– Insulation between output windings and body, connected to earth consist of supplementary insulation rated for the working voltage		N/A
	Class II transformers		N/A
	– Insulation between input windings and body consist of double or reinforced insulation rated to the input voltage		N/A
	– Insulation between output windings and body consist of double or reinforced insulation, rated to the output voltage		N/A
BB.19.1.4.3	For transformers with intermediate conductive parts not connected to the body (between input/output):		-
BB.19.1.4.3.1	For class I and class II transformers the insulation between input and output windings, via intermediate conductive parts, consist of double or reinforced insulation, rated to the working voltage.		N/A
	– For class II transformers the insulation between input winding and the body and between the output windings and the body via the intermediate conductive parts consist of double or reinforced insulation. (rated to the input voltage, for SELV circuits only basic insulation to the body)		N/A
	– For transformers, different from independent, the insulation between input and output windings, via intermediate conductive parts, consist of double or reinforced insulation, rated to the working voltage.		N/A
BB.19.1.4.3.2	Class I transformers with earthed core, and not allowed for class II equipment		N/A
	– Insulation from the input to the earthed core: basic insulation rated for the input voltage		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	– Insulation from the output voltage to the earthed core: basic insulation rated for the output voltage		N/A
BB.19.1.4.3.3	Insulation between : input to intermediate conductive parts and output and intermediate parts consist of at least basic insulation		N/A
	– If the insulation from input or output to the intermediate metal part is less than basic insulation, the part is considered to be connected to input or output.		N/A
BB.19.1.4.4	For class I transformers, with protective screen, **no**t connected to the mains by a plug the following conditions comply:		N/A
	– The insulation between input winding and protective screen consist of basic insulation (rated input voltage)		N/A
	– The insulation between output winding and protective screen consist of basic insulation (rated output voltage)		N/A
	– The protective screen consist of metal foil or a wire wound screen extending the full width of the windings and has no gaps or holes		N/A
	– Where the protective screen does not cover the entire width of the input winding, additional insulation to ensure double insulation in this area, is used.		N/A
	– If the screen is made by a foil, the turns are isolated, overlap at least 3 mm		N/A
	– The cross-section of the screen and the lead out wire is at least corresponding to the rated current of the overload device		N/A
	– The lead out wire is soldered or fixed to the protective screen.		N/A
	Protective screening is not allowed for transformers with plug connection to the mains		N/A
BB.19.1.4.5	No connection between output circuit and protective earth, except of associated transformers (allowed by equipment standard) or 19.8 is fulfilled.		N/A
BB.19.1.4.6	No connection between output circuit and body, except of associated transformers (allowed by equipment standard)		N/A
BB.19.1.4.7	The distance between input and output terminals for the connection of external wiring is ≥ 25 mm		N/A
BB.19.1.4.8	Portable transformers having an rated output ≤ 630 VA shall be class II.		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
BB.19.1.4.9	No connection between output circuit and body except of associated transformers (allowed by equipment standard)		N/A
BB.19.1.4.10	Protective screening is not allowed for transformers with plug connection to the mains		N/A
BB.19.12	Windings construction		N/A
BB.19.12.1	Undue displacement in all types of transformers not allowed:		N/A
	– of input or output windings or turns thereof		N/A
	– of internal wiring or wires for external connection		N/A
	– of parts of windings or of internal wiring in case of rupture or loosening		N/A
BB.19.12.2	Serrated tape:		N/A
	– distance through insulation according to table 13		N/A
	– one additional layer of serrated tape, and		N/A
	– one additional layer without serration		N/A
	– in case of cheek less bobbins the end turns of each layer shall be prevented from being displaced		N/A
BB.19.12.3	Insulated windings wires providing basic, supplementary or reinforced insulation, meet the following requirements:		N/A
	• Multi-layer extruded or spirally wrapped insulation, passed the tests of annex K		N/A
	• Basic insulation: two wrapped or one extruded wire		N/A
	• Supplementary insulation: two layers, wrapped or extruded		N/A
	• Reinforced insulation: three layers wrapped or extruded		N/A
	Spirally wrapped insulation:		N/A
	• creepage distances between wrapped layers > cl. 26 _ P1 values		N/A
	• path between wrapped layers sealed, the test voltage of K2 is multiplied with 1,35		N/A
	• test 26.2.4 – Test A, passed for wrapped layers		N/A
	• the finished component pass the electric strength test according to cl. 18.3		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
a)	Insulated winding wire used for basic or supplementary insulation in a wound part:		N/A
	• comply with annex K		N/A
	• two layers for supplementary insulation		N/A
	• one layer for basic insulation		N/A
	• one layer for mechanical separation between the insulated wires of primary and secondary. This layer fulfils the requirement of basic insulation.		N/A
b)	Insulated winding wire used for reinforced insulation in a wound part:		N/A
	• comply with annex K		N/A
	• three layers		N/A
	• relevant dielectric strength test of 18.3		N/A
	Where the insulated winding wire is wound:		N/A
	• upon metal or ferrite cores		N/A
	• upon enamelled wire		N/A
	• under enamelled wire		N/A
	• one layer for mechanical separation between the insulated wires and the core or the enamelled wires is required. This layer fulfils the requirement of basic insulation.		N/A
	• both windings shall not touch each other and also not the core.		N/A
	100 % routine test of Annex K3 of part 1 is fulfilled		N/A
	no creepage distances and clearances for insulated winding wires		N/A
c)	Toroidal cores used with TIW wires for double or reinforced insulation between the primary and secondary circuits shall comply with the following:		N/A
	1) a coating which fulfils the requirements of basic insulation between a winding and the core		N/A
	2) The primary winding consists of TIW wire with 3 layers (reinforced insulation) and the secondary winding consists of enamelled wire. These independent windings shall not be able to contact each other either by mechanical separation or a gap which fulfil the dielectric strength tests for basic insulation.		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	3) For polyfilar windings (primary and secondary windings in contact with each other), the primary winding consists of TIW wire with 3 layers and the secondary winding consists of a TIW wire with 1 layer (requirements for primary and secondary windings can be changed). This construction also is allowed for use with EE-cores or similar.		N/A
d)	Toroidal cores used with FIW wires for double or reinforced insulation between the primary and secondary circuits shall comply with the following:		N/A
	1) a coating, which fulfil the requirements of basic insulation.		N/A
	2) The primary winding consists of FIW wire for reinforced insulation and the secondary winding consist of FIW wire – of basic insulation. These independent windings shall not be able to contact each other either by mechanical separation or a gap which fulfil the dielectric strength test for basic insulation.		N/A
	3) For polyfilar windings (primary and secondary windings in contact with each other), the primary winding and the secondary winding consist of FIW wire for reinforced insulation. This construction also is allowed to use for EE-core or similar.		N/A
e)	Toroidal cores used with TIW in combination with FIW wire, for double or reinforced insulation between the primary and secondary circuits shall comply with the following:		N/A
	1) a coating, which fulfils the requirements of basic insulation.		N/A
	2) The primary winding consists of FIW wire for reinforced insulation, and the secondary winding consists of TIW wire for basic insulation (1 layer). These independent windings shall not be able to contact each other either by mechanical separation or a gap which fulfil the dielectric strength tests for basic insulation.		N/A
	3) For polyfilar windings (primary and secondary windings in contact with each other), the primary winding consists of TIW wire for reinforced insulation (3 layer) and the secondary winding consists of FIW wire for reinforced insulation. This construction also is allowed for use with EE-cores or similar.		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
f)	Toroidal cores used with TIW in combination with FIW wire, for basic insulation between the primary and secondary circuits shall comply with the following:		N/A
	1) a coating, which fulfils the requirements of basic insulation		N/A
	2) The primary winding consists of FIW wire for basic insulation, and the secondary winding consists of TIW wire for basic insulation (1 layer). These independent windings shall not be able to contact each other either by mechanical separation or a gap which fulfils the dielectric strength tests for basic insulation.		N/A
	3) For polyfilar windings (primary and secondary windings in contact with each other), the primary winding consists of TIW wire for supplementary insulation (2 layers) and the secondary winding consists of FIW wire for basic insulation. This construction also is allowed for use with EE-cores or similar.		N/A
	4) Further polyfilar constructions with FIW and TIW wires in combination with enamelled wires for basic insulation only: 4.1) Primary winding consists of enamelled wire, secondary winding consists of FIW wire for reinforced insulation 4.2) Primary winding consists of enamelled wire, secondary winding consists of TIW wire for reinforced insulation		N/A
BB.19.12.3.1	Max. class F for transformers which use FIW-wire		N/A
BB.19.12.3.2	FIW wires comply with IEC 60851-5:2008, IEC 60317-0-7 and IEC 60317-56.		N/A
	• other nominal diameter as mentioned in table 24 can be calculated with the Formula (6) in 26.3.5:		N/A
	FIW wire used for basic or supplementary insulation for transformers according 19.1.3:		–
	• the test voltage of table 14, based on the working voltage of basic or supplementary insulation, comply with the min. voltage strength of table 24		N/A
	• one layer for mechanical separation is located between the insulated wires of primary and secondary. This layer fulfil the requirement of basic insulation		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	• between FIW and enamelled wire, no requirements of creepage distances and clearances		N/A
	• no touch of FIW and enamelled wires		N/A
	FIW wire used for double or reinforced insulation for transformers according 19.1.4:		N/A
	• the test voltage of table 14, based on the working voltage of basic or supplementary insulation, comply with the min. voltage strength of table 24		N/A
	• for primary and secondary winding FIW-wire for basic insulation is used		N/A
	• one layer for mechanical separation is located between the insulated wires of primary and secondary. This layer fulfil the requirement of basic insulation		N/A
	• no touch between the basic insulated PRI and SEC FIW-wires		N/A
	• between PRI- and SEC-FIW wires, no requirements of creepage distances and clearances		N/A
	Alternative construction used for reinforced insulation (reinforced insulated FIW wire and enamelled wire)		N/A
	• the test voltage of table 14, based on the working voltage reinforced insulation, comply with the min. voltage strength of table 24		N/A
	• one layer for mechanical separation is located between the reinforced insulated FIW wire and the enamelled wire. This layer fulfil the requirement of basic insulation		N/A
	• no touch between the FIW wire and the enamelled wire		N/A
	• between the reinforced FIW wire and any other parts, no requirements of creepage distances and clearances exist		N/A
	Alternative construction with FIW wires, basic or supplementary insulated for transformers with double or reinforced insulation:		–
	• the test voltage of table 14, based on the working voltage of basic or supplementary insulation, comply with the min. voltage strength of table 24		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	• PRI or SEC basic insulated FIW wire and to the other winding (enamelled wire) requirements of supplementary insulation		N/A
	• creepage distances and clearances between the basic insulated FIW wire and the enamelled wire for basic or supplementary insulation are required.		N/A
	Where the FIW wire is wound		N/A
	• upon metal or ferrite cores		N/A
	• one layer for mechanical separation between the insulated wires and the core or the enamelled wires is required. This layer fulfils the requirement of basic insulation.		N/A
	• both windings shall not touch each other and also not the core.		N/A
BB.20	COMPONENTS		N/A
BB.21	INTERNAL WIRING		N/A
BB.22	SUPPLY CONNECTION AND EXTERNAL FLEXIBLE CABLES AND CORDS		N/A
BB.23	TERMINALS FOR EXTERNAL CONDUCTORS		N/A
BB.24	PROVISION FOR PROTECTIVE EARTHING		N/A
BB.25	SCREWS AND CONNECTIONS		N/A
BB.26	CREEPAGE DISTANCES AND CLEARANCES		N/A
BB.26.1	See 26.101		N/A
BB.26.2	Creepage distances (cr) and clearances (cr)		N/A
BB.26.2.1	Windings covered with adhesive tape		N/A
	– the values of pollution degree 1 are fulfilled		N/A
	– all isolating material are classified acc. to IEC 60085 and IEC 60216		N/A
	– test A of 26.2.3 is fulfilled		N/A
BB.26.2.2	Uncemented insulating parts pollution degree P2 or P3		N/A
	– all isolating material are classified acc. to IEC 60085 and IEC 60216		N/A
	– values of pollution degree 1 are not applicable		N/A
BB.26.2.3	Cemented insulating parts		N/A
	– all isolating materials are classified acc. to IEC 60085 and IEC 60216		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	– values of distance through insulation (dti) are fulfilled		N/A
	– creepage distances and clearances are not required		N/A
	– test A of this sub clause is fulfilled		N/A
	Test A		N/A
	– thermal class		N/A
	– working voltage		N/A
	– Test with three specially specimens, with uninsulated wires, without impregnation or potting	(see appended table)	N/A
	Two of the three specimens are subjected to:		N/A
	– the relevant humidity treatment according to 17.2 (48 h)		N/A
	– the relevant dielectric strength test of 18.3 multiplied with factor 1,35		N/A
	– One of the three specimens is subjected to the relevant dielectric strength test of 18.3 multiplied by the factor 1,35 immediately at the end of the last cycle with high temperature		N/A
	Impulse dielectric test according to 4.1.1.2.1 of IEC 60 664-1 (1,2 / 50 s waveform) – see Annex R of IEC 61558-1		N/A
BB.26.2.4	Enclosed parts, by impregnation or potting		N/A
BB.26.2.4.1	– The requirements of reduced values as stated for pollution degree 1 (P1) are fulfilled		N/A
	– all isolating materials are classified acc. to IEC 60085 and IEC 60216		N/A
	Test B		N/A
	– thermal class		N/A
	– working voltage		N/A
	– Test with three specially specimens, potted or impregnated. The dielectric strength test is applied directly to the joint.	(see appended table)	N/A
	Two of the three specimens are subjected to:		N/A
	– the relevant humidity treatment according to 17.2 (48 h)		N/A
	– the relevant dielectric strength test of 18.3 multiplied with factor 1,25		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	– One of the three specimens is subjected to the relevant dielectric strength test of 18.3 multiplied by the factor 1,25 immediately at the end of the last cycle with high temperature		N/A
	The three spacemen pass the Impulse dielectric test according to 4.1.1.2.1 of IEC 60 664-1 (1,2 / 50 s waveform) – see Annex R of IEC 61558-1		N/A
BB.26.2.4.2	– The requirements of distance through insulation (dti) are fulfilled. (P1 values are not required)		N/A
	– all isolating materials are classified acc. to IEC 60085 and IEC 60216		N/A
	Test C		N/A
	– thermal class		N/A
	– working voltage		N/A
	– Test with three specimens, potted or impregnated. (finished components)	(see appended table)	N/A
	– Neither cracks, nor voids in the insulating compounds		N/A
	Two of the three specimens are subjected to:		N/A
	– the relevant humidity treatment according to 17.2 (48 h)		N/A
	– the relevant dielectric strength test of 18.3 multiplied with factor 1,35		N/A
	– One of the three specimens is subjected to the relevant dielectric strength test of 18.3 multiplied by the factor 1,35 immediately at the end of the last cycle with high temperature		N/A
	The three spacemen pass the Impulse dielectric test according to 4.1.1.2.1 of IEC 60 664-1 (1,2 / 50 s waveform) – see Annex R of IEC 61558-1		N/A
BB.26.3	Distance through insulation		N/A
	For double or reinforced insulation, the required values of Tables 13, C1, and D1 – boxes 2b, 2c and 7 are fulfilled		N/A
	The insulation fulfil the material classification according IEC 60085 or 60216 or the test of 14.3		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
BB.26.3.1	Reduced values of the thickness of insulation for supplementary or reinforced insulation are allowed if the following conditions are fulfilled:		N/A
	– the isolating materials are classified acc. to IEC 60085 and IEC 60216		N/A
	– the test of 14.3 is fulfilled		N/A
	– If both requirements are fulfilled, the required values for solid insulation can be multiplied by 0,4		N/A
	– Minimum thickness of reinforced insulation ≥0,2 mm		N/A
	– Minimum thickness of supplementary insulation ≥0,1 mm		N/A
BB.26.3.2	Insulation in thin sheet form		N/A
	– If the layers are non-separable (glued together):		N/A
	– The requirement of 3 layers is fulfilled		N/A
	– The mandrel test according 26.3.3 is fulfilled with 150 N		N/A
	– The required values for d.t.i. of Tables 13, C.1 and D.1 – marked by index ”e” is fulfilled.		N/A
	– If the layers are separated:		N/A
	– The requirement of 2 layers is fulfilled		N/A
	– If serrated tape is used, 1 additional layer (serrated) and one additional layer without serration is required		N/A
	– The mandrel test according 26.3.3 is fulfilled on each layer with 50 N		N/A
	– The required values for d.t.i. of Tables 13, C.1 and D.1 – marked by index ”e” is fulfilled.		N/A
	– If the layers are separated (alternative:		N/A
	- The requirement of 3 layers is fulfilled		N/A
	– If serrated tape is used, 1 additional layer (serrated) and one additional layer without serration is required		N/A
	– The mandrel test according 26.3.3 is fulfilled on 2/3 of the layers with 100 N		N/A
	– The required values for d.t.i. of Tables 13, C.1 and D.1 – marked by index ”e” is fulfilled.		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	Test according to 14.3 and if the isolating materials are classified acc. to IEC 60085 and IEC 60216 no distances through insulation are required for insulation in thin sheet form		N/A
	The figures within square brackets in box 2 and 7 of table 13 (C.1/D.1) are used for insulation in thin sheet form as follows:		N/A
	– rated output > 100 VA values in square brackets apply		N/A
	– rated output 25 VA 100 VA 2/3 of the value in square brackets apply		N/A
	– rated output __ 25 VA 1/3 of the value in square brackets apply		N/A
BB.26.3.3	Mandrel test of insulation in thin sheet form (specimen of 70 mm width are necessary):		N/A
	– If the layers are non-separable – at least 3 layers glued together fulfil the test:		N/A
	– pull force of 150 N		N/A
	– high voltage test of 5,0 kV or the test voltage of 18.3 multiplied by 1,25 whatever is the greater. No flashover, no breakdown.		N/A
	– If the layers are separable and 2/3 of at least 3 layers fulfil the test.		N/A
	– pull force of 100 N		N/A
	– high voltage test of 5,0 kV or the test voltage of 18.3 multiplied by 1,25 whatever is the greater. No flashover, no breakdowns.		N/A
	– If the layers are separable 1 of at least 2 layers fulfil the test:		N/A
	– pull force of 50 N		N/A
	– high voltage test of 5,0 kV or the test voltage of 18.3 multiplied by 1,25 whatever is the greater. No flashover, no breakdown.		N/A
BB.26.101	Creepage distances, clearances and distances through insulation, specified values according to (IEC 61558-2-16:09):		N/A
	– table 13, material group IIIa (part 1)		N/A
	– table C, material group II (part 1)		N/A
	– table D, material group I (part 1)		N/A
	– working voltage		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	– rated supply frequency 50/60 Hz		N/A
	– rated internal frequency		N/A
	1. Insulation between input and output circuits (basic insulation):		N/A
	a) measured values specified values (mm) .....:		N/A
	2. Insulation between input and output circuits (double or reinforced insulation):		N/A
	a) measured values specified values (mm) .....:		N/A
	b) measured values specified values (mm) .....:		N/A
	c) measured values specified values (mm) .....:		N/A
	3. Insulation between adjacent input circuits: measured values specified values (mm) .....:		N/A
	Insulation between adjacent output circuits: measured values specified values (mm) .....:		N/A
	4. Insulation between terminals for external connection:		N/A
	a) measured values specified values (mm) .....:		N/A
	b) measured values specified values (mm) .....:		N/A
	c) measured values specified values (mm) .....:		N/A
	5. Basic or supplementary insulation:		N/A
	a) measured values specified values (mm) .....:		N/A
	b) measured values specified values (mm) .....:		N/A
	c) measured values specified values (mm) .....:		N/A
	d) measured values specified values (mm) .....:		N/A
	e) measured values specified values (mm) .....:		N/A
	6. Reinforced or double insulation: measured values specified values (mm) .....:		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	7. Distance through insulation:		N/A
	a) measured values specified values (mm) .....:		N/A
	b) measured values specified values (mm) .....:		N/A
	c) measured values specified values (mm) .....:		N/A
BB.26.102	Values of IEC 61558-2-16 applicable for frequency up to 3 MHz (IEC 61558-2-16:09)		N/A
	For frequency above 3 MHz clause 7 of IEC 60664-4 is applicable (high frequency testing)		N/A
BB.26.103	Clearance (IEC 61558-2-16:09)		N/A
	a.) Clearance for frequency ≥ 30 kHz according figure 101 two determinations are necessary:		N/A
	– determination based on peak working voltage according Table 104 :		N/A
	Peak working voltage		N/A
	Basic insulation: required / measured		N/A
	Double or reinforced insulation: required / measured value		N/A
	– and alternative if applicable for approximately homogeneous field according to Table 102		N/A
	Peak working voltage		N/A
	Basic insulation: required / measured		N/A
	Double or reinforced insulation: required / measured value		N/A
	– determination based on measured r.m.s. working voltage according Tables 13, C1 and D1 (see clause 26.101)		N/A
	The minimum clearance is the greater of the two values.		N/A
	b.) Clearance for frequency ≤ 30 kHz according figure 101 two determinations are necessary:		N/A
	– determination based on peak working voltage with recurring peak voltages according Table 103 :		N/A
	– determination based on measured r.m.s. working voltage according Tables 13, C1 and D1 (see clause 26.101)		N/A
	The minimum clearance is the greater of the two values.		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
BB.26.104	The working voltages of Table 102, 103 and 104 are peak voltages including µsec peaks IEC 61558-2-16:09)		N/A
	The working voltage according to Table 13 of part 1 are r.m.s. voltages		N/A
BB.26.105	Creepage distances		N/A
	Two determinations of creepage distances are necessary (see Figure 102)		N/A
	– determination based on measured peak working voltage according Tables 105 to 110		N/A
	Peak working voltage		N/A
	Pollution degree		N/A
	Basic or supplementary insulation: required / measured		N/A
	Double or reinforced insulation: required / measured value		N/A
	– determination based on measured r.m.s. working voltage according Tables 13, C1 and D1 (see clause 26.101)		N/A
	If the values based on table 105 to 110 are lower than the relevant values in Tables 13, C.1 or D.1, the higher values shall be applicable		N/A
BB.26.106	Distance through insulation (IEC 61558-2-16:09)		N/A
	Instead of partial discharge with high frequency voltage the test of the distance and the calculation of the electric field is applicable under the following conditions:		N/A
	– the max. frequency is < 10 MHz		N/A
	– the field strength approximately comply with Figure 103		N/A
	– no voids or gaps are present in between the solid insulation		N/A
	For thick layers d1 ≥ 0,75 the peak value of the field strength is ≤ 2 kV/mm		N/A
	For thin layers d2 ≤ 30 µm the peak value of the field strength is ≤ 10 kV/mm		N/A
	For d1 > d > d2 equation (1) is used for calculation the field strength		N/A
BB.26.107 (A1)	For transformers with FIW wires the following test is required		N/A
	• 10 cycles are required		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	• 68 h test at max heating temperature + 10°C or test at max. allowed winding temperature based on the insulation class (required in table 1) + 10°C		N/A
	• 1 h at 25° C		N/A
	• 2 h at 0° C		N/A
	• 1 h at 25° C – (next cycle start again with 68 h max winding temp + 10)		N/A
	• during the 10 cycles test 2 x working voltage is connected between PRI and SEC		N/A
	• after 10 cycle test 2 transformers are subjected to the 17.2 test for 48 h and direct after the 48 h the dielectric strength test of 18.3 (100 % test voltage) is done		N/A
	• after the 10 cycle test the third sample is tested at the end of the last cycle in the hot position with the dielectric strength test of 18.3 (100 % test voltage)		N/A
	• the partial discharge test according to 18.101 is done after the cycling test and after the high voltage test, if the **peak** working voltage is >750 V		N/A
BB.27	RESISTANCE TO HEAT, FIRE AND TRACKING		N/A
BB.E	**ANNEX E , GLOW WIRE TEST**		**N/A**
	The test is required according to IEC 60695-2-10 and IEC 60695-2-11 with the following additions:		N/A
BB.E.1	Clause 6, ”Severities” of IEC 6095-2-11, apply with the temperature stated in 27.3 of IEC 61558-1		N/A
BB.E2	Clause 8, ”Conditioning”, of IEC 60695-2-11 apply, preconditioning is required		N/A
BB.E3	Clause 10, ”Test Procedure”, of IEC 60695-2-11apply, The tip of the glow wire is applied to the flat side of the surface.		N/A

BB.F	**ANNEX F, REQUIREMENTS FOR MANUALLY OPERATED SWITCHES WHICH ARE PARTS OF THE TRANSFORMER**	**N/A**

BB.H	**ANNEX H, ELECTRONIC CIRCUITS** (IEC 61558-1)	**N/A**

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
BB.K	**ANNEX K, INSULATED WINDING WIRES FOR USE AS MULTIPLE LAYER INSULATION**		**N/A**
BB.K.1	Wire construction:		N/A
	• insulated winding wire for basic or supplementary insulation (see 19.12.3)		N/A
	• insulated winding wire for reinforced insulation (see 19.12.3)		N/A
	• splid circular winding wires and stranded winding wires with 0,05 to 5 mm diameter		N/A
	• spirally wrapped insulation - overlapping		N/A
BB.K.2	Type tests		N/A
BB.K.2.1	General Tests between ambient temperature between 15° C and 35° C and at an humidity between 45% and 75 %		N/A
BB K.2.2	Electric strength test		N/A
BB K.2.2.1	Solid circular winding wires and stranded winding wires		N/A
	Test samples prepared according to clause 4.4.1 of IEC 60851-5:2008 (twisted pair)		N/A
	Dielectric strength test: 6 kV for reinforced insulation		N/A
	Dielectric strength test: 3 kV for basic or supplementary insulation		N/A
BB K.2.2.2	Square or rectangular wires .		N/A
	Test samples prepared according to clause 4.7.1 of IEC 60851-5:2008		N/A
	Dielectric strength test: 5,5 kV for reinforced insulation		N/A
	Dielectric strength test: 2,75 kV for basic or supplementary insulation		N/A
BB K.2.3	Flexibility and adherence		N/A
	Claus 5.1 in Test 8 of IEC 60851-3:2009 shall be used		N/A
	Test samples prepared according to clause 5.1.1.4 of IEC 60851-3:2009		N/A
	Dielectric strength test: 5,5 kV for reinforced insulation		N/A
	Dielectric strength test: 2,75 kV for basic or supplementary insulation		N/A
	Mandrel diameter according table K.1		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	The tension to the wire during winding on mandrel is 118 N/mm² (118 MPa)		N/A
BB.K.2.4	Heat shock		N/A
	Test samples prepared according to 3.1.1 (in Test 9) of IEC 60851-6:1996		N/A
	• high voltage test immediately after this test		N/A
	• Dielectric strength test: 5,5 kV for reinforced insulation		N/A
	• Dielectric strength test: 2,75 kV for basic or supplementary insulation		N/A
BB.K.2.5	Retention of dielectric strength after bending (test as specified under test 13 of 4.6.1 c) of IEC 60 851-5)		N/A
	• high voltage test immediately after this test		N/A
	• Dielectric strength test: 5,5 kV for reinforced insulation		
	• Dielectric strength test: 2,75 kV for basic or supplementary insulation		
BB.K.3	Testing during manufacturing		N/A
BB.K.3.1	General Tests as subjected in K.3.2 and K.3.3		N/A
BB K.3.2	Routine test		N/A
	• Dielectric strength test: 4,2 kV for reinforced insulation		N/A
	• Dielectric strength test: 2,1 kV for basic or supplementary insulation		N/A
BB K.3.3	Sampling test		N/A
BB K.3.3.1	Solid circular winding wires and stranded winding wires		N/A
	Test with a twisted pair, prepared according clause 4.4.1 of IEC 60851-5:2008		N/A
	• Dielectric strength test: 6 kV for reinforced insulation		N/A
	• Dielectric strength test: 3 kV for basic or supplementary insulation		N/A
BB K.3.3.2	Square rectangular wire		N/A
	Samples prepared according to clause 4.7.1 of IEC 60851-5:2008		N/A
	• Dielectric strength test: 5,5 kV for reinforced insulation		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	• Dielectric strength test: 3 kV for basic or supplementary insulation		N/A

BB.U	**ANNEX U – INFORMATIVE – OPTIONAL TW – MARKING FOR TRANSFORMERS**	**N/A**
V	**ANNEX V, SYMBOLS TO BE USED FOR THERMAL CUT-OUTS**	**N/A**

BB.26.2 TEST A	**TABLE: CREEPAGE DISTANCES AND CLEARANCES AND DISTANCES THROUGH INSULATION**				**N/A**
	Test with three special prepared specimens with uninsulated wires, without potting or impregnation				
cycles with 2 x working voltage between pri / sec	68 h at the temperature acc. Cl. 14 (min. 85 °C)	1 hour 25 °C	2 hour 0 °C	1 hour 25 °C	
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					

BB.26.2 TEST B	**TABLE: CREEPAGE DISTANCES AND CLEARANCES AND DISTANCES THROUGH INSULATION**				N/A
	Test with three specially prepared specimens with potted – P1 values are required				
cycles with 2 x working voltage between pri / sec	68 h at the temperature acc. Cl. 14 (min. 85 °C)	1 hour 25 °C	2 hour 0 °C	1 hour 25 °C	
1.					
2.					
3.					
4.					
5.					
6.					
7.					

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict

BB.26.2 TEST B	TABLE: CREEPAGE DISTANCES AND CLEARANCES AND DISTANCES THROUGH INSULATION				N/A
	Test with three specially prepared specimens with potted – P1 values are required				
cycles with 2 x working voltage between pri / sec	68 h at the temperature acc. Cl. 14 (min. 85 °C)	1 hour 25 °C	2 hour 0 °C	1 hour 25 °C	
8.					
9.					
10.					

BB.26.2 TEST C	TABLE: CREEPAGE DISTANCES AND CLEARANCES AND DISTANCES THROUGH INSULATION				N/A
	Test with three specially prepared specimens with potting (only dti is required)				
cycles with 2 x working voltage between pri / sec	68 h at the temperature acc. Cl. 14 (min. 85 °C)	1 hour 25 °C	2 hour 0 °C	1 hour 25 °C	
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					

BB.26.3.5	TABLE: CREEPAGE DISTANCES AND CLEARANCES AND DISTANCES THROUGH INSULATION				N/A
	Test for transformers, use FIW-wire				
cycles with 2 x working voltage between pri / sec	68 h at the temperature acc. Cl. 14 (min. 85 °C)	1 hour 25 °C	2 hour 0 °C	1 hour 25 °C	
1.					
2.					
3.					

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict

BB.26.3.5	TABLE: CREEPAGE DISTANCES AND CLEARANCES AND DISTANCES THROUGH INSULATION				N/A
	Test for transformers, use FIW-wire				
cycles with 2 x working voltage between pri / sec	68 h at the temperature acc. Cl. 14 (min. 85 °C)	1 hour 25 °C	2 hour 0 °C	1 hour 25 °C	
4.					
5.					
6.					
7.					
8.					
9.					
10.					

BB 18.2	TABLE: insulation resistance measurements	N/A
Insulation resistance R between:	R (MΩ)	Required R (MΩ)
Supplementary information:		

BB 18.3	TABLE: Dielectric Strength	N/A
Test voltage applied between:	Test potential applied (V)	Breakdown / flashover (Yes/No)
Supplementary information:		

BB 26	TABLE: Clearance And Creepage Distance Measurements					N/A
clearance cl and creepage distance dcr at/of:	Up (V)	U r.m.s. (V)	Required cl (mm)	cl (mm)	required dcr (mm)	dcr (mm)
Supplementary information:						

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict

BB 26	TABLE: Distance Through Insulation Measurements			N/A
Distance through insulation di at/of:	U r.m.s. (V)	Test voltage (V)	Required di (mm)	di (mm)
Supplementary information:				

IEC61558_2_16H ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	ATTACHMENT TO TEST REPORT **IEC 61558-2-16** **AUSTRALIA/NEW ZEALAND NATIONAL DIFFERENCES** (Safety of power transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V – Safety – Part 2-16: Particular requirements and tests switch mode power supply units and transformers for switch mode power supply units)		
Differences according to.....:	AS/NZS 61558.2.16:2022+A1:2023 AS/NZS 61558.1:2018 +A1:2020 + A2:2020		
TRF template used:.....:	IECEE OD-2020-F3:2022, Ed. 1.2		
Attachment Form No..... :	AU_NZ_ND_IEC61558_2_16H		
Attachment Originator.....:	NZ Electrotechnical Committee/Standards New Zealand		
Master Attachment..... :	Date 2023-09-15		
Copyright © 2023 IEC System for Conformity Testing and Certification of Electrical Equipment (IECEE), Geneva, Switzerland. All rights reserved.			
	National Differences		--
5	**GENERAL CONDITIONS FOR THE TESTS**		P
5.2	*Add* the following variation:		P
	If the tests of AZ.19.201 need to be performed they are carried out on separate specimens, the number of specimens is that required by AS/NZS 3112. (AS/NZS 61558.1:2018/A2:2020)		P
5.5	Replace the text with the following variation:		P
	For a.c., test voltages are of substantially sinusoidal wave form, and, if not otherwise specified, have a frequency of 50 Hz. (AS/NZS 61558.1:2018)		P
16	**MECHANICAL STRENGTH**		N/A
16.4	*Replace* the text with the following variation:		N/A
	VOID (AS/NZS 61558.1:2018/A2:2020)		N/A
19	**CONSTRUCTION**		P
19.15	Replace the test specification with the following variation:		N/A
	VOID (AS/NZS 61558.1:2018/A2:2020)		N/A
19.201	Transformers having integral pins for insertion into socket outlets shall comply with the appropriate requirements of AS/NZS 3112.	See AU plug test report: WTX25D12332661Z	P

IEC61558_2_16H ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	Compliance is checked as specified in Appendix J of AS/NZS 3112 (AS/NZS 61558.1:2018)		P
20	**COMPONENTS**		P
	Replace the first paragraph with the following variation:		P
	Components shall comply with the safety requirements specified in the relevant IEC or Australian/New Zealand Standards as far as they reasonably apply. (AS/NZS 61558.1:2018)		P
	Replace the third paragraph with the following variation:		P
	Compliance with the IEC or Australian/New Zealand Standards for the relevant component does not necessarily ensure compliance with the requirements of this Standard (AS/NZS 61558.1:2018)		P
20.6	Insert the following variation:		P
	Plugs and socket-outlets for SELV systems may also comply with the requirements of Appendix E in AS/NZS 3112 (AS/NZS 61558.1:2018/A2:2020)		P
22	**SUPPLY CONNECTION AND OTHER EXTERNAL FLEXIBLE CABLES OR CORDS**		P
22.4	Replace the text by the following variation:		N/A
	VOID. (AS/NZS 61558.1:2018)		N/A
22.6	Replace the text by the following variation		P
	Power supply cords may be cord sets fitted with appliance couplers in accordance with IEC 60320, provided the transformers are single-phase portable transformers with input current not exceeding 10 A at the rated output (AS/NZS 61558.1:2018)		P
22.8	Replace the second paragraph in the requirement, with the following variation:		N/A
	Power supply cords of portable transformers shall be fitted with an appropriately rated plug complying with AS/NZS 3112 or AS/NZS 3123 or IEC 60309 (AS/NZS 61558.1:2018)		N/A

IEC61558_2_16E ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
ANNEX H	**ELECTRONIC CIRCUITS**		P
H.3.1	Add the following to the test specification after the existing third paragraph		P
	During and after the tests the no-load output voltage of an accessible safety extra-low voltage outlet or connector or Universal Serial Bus (USB) outlet shall not have increased by more than 3 V or 10% of its no-load output voltage in normal use, whichever is higher. (AS/NZS 61558.1:2018)	Max. 0.19V or 3.6% (for model GT-41052-1305) Max. 0.43V or 3.6%(for model GT-41052-1512) Max. 0.01V or 0.04% (for model GT-41052-1524) Max. 0.32V or 0.7%(for model GT-41052-1548)	P
	Special national conditions (if any)		N/A
	Australia		N/A
8	**MARKING AND OTHER INFORMATION**		P
8.1	After Item a) insert the following variation:		P
	The marking of rated supply voltage or rated supply voltage range of single-phase transformers shall cover 240 V and for poly-phase transformers, 415 V (AS/NZS 61558.1:2018/A2:2020)		P
	New Zealand		P
8	**MARKING AND OTHER INFORMATION**		P
8.1	After Item a) insert the following variation:		P
	The marking of rated supply voltage of single-phase transformers shall be 230 V and for poly-phase transformers shall be 400 V. (AS/NZS 61558.1:2018/A2:2020)		P
	The marking of rated supply voltage range of single-phase transformers shall cover 230 V and for poly-phase transformers, 400 V (AS/NZS 61558.1:2018/A2:2020)		P

PHOTO:

Appearance view

Photo 1

Photo 2

Photo 3

Photo 4

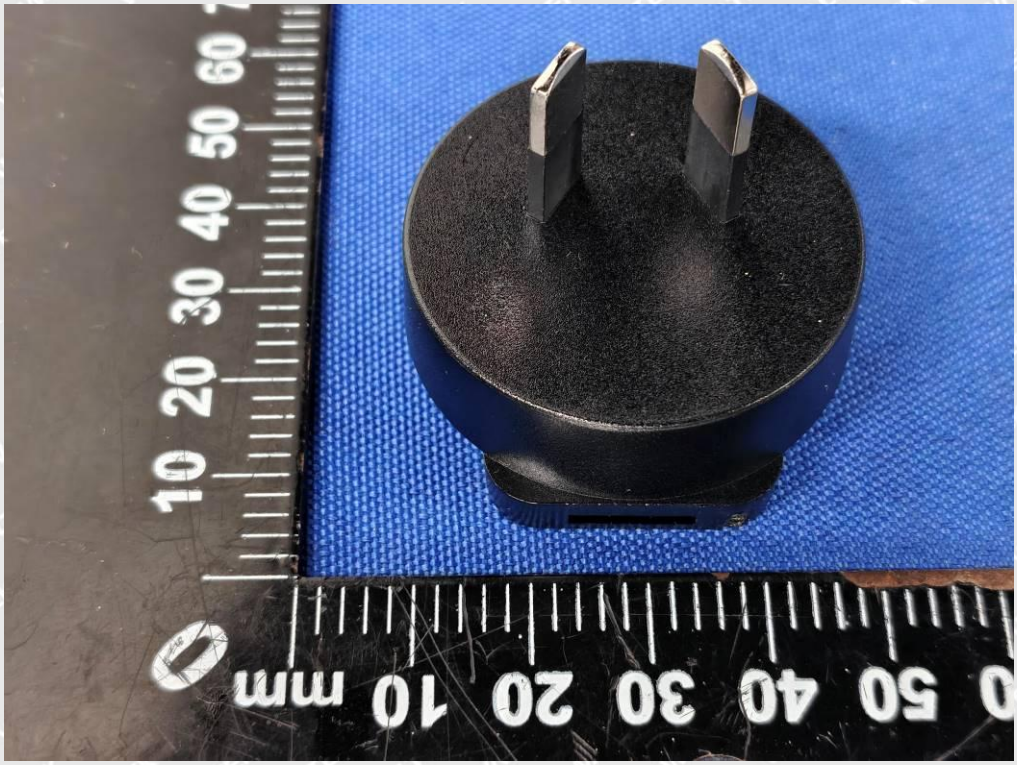


Photo 5

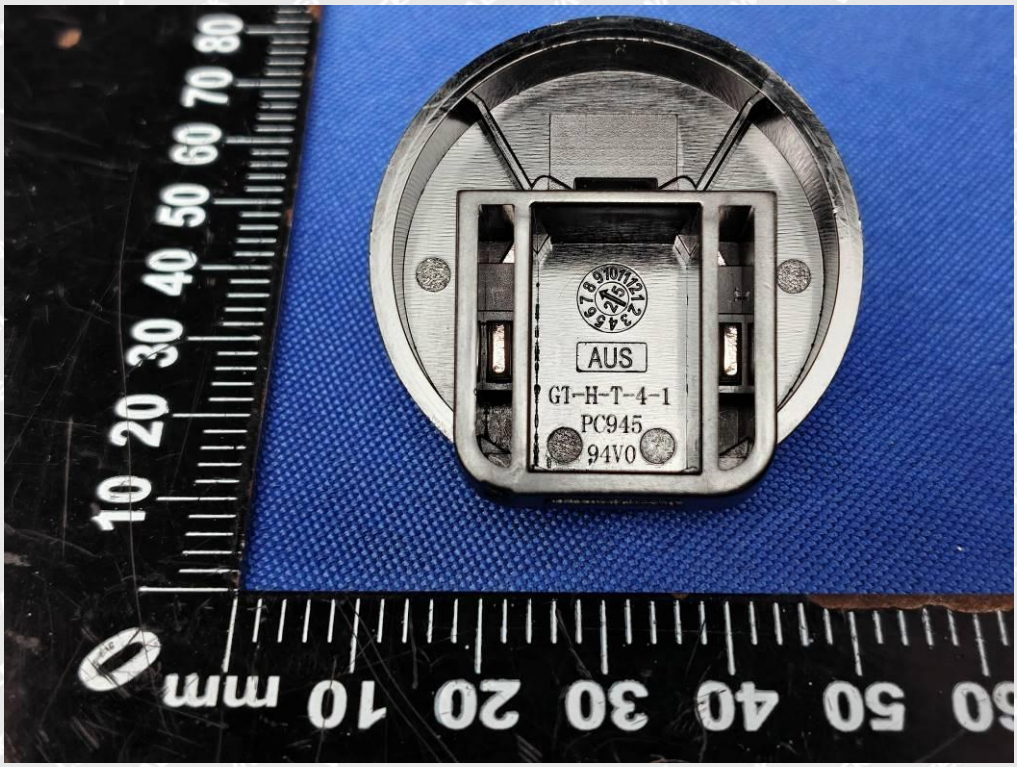


Photo 6

Inside view

Photo 7 (**Model GT-41052-1305**)

Photo 8 (**Model GT-41052-1305**)

Photo 9 (**Model GT-41052-1305**)

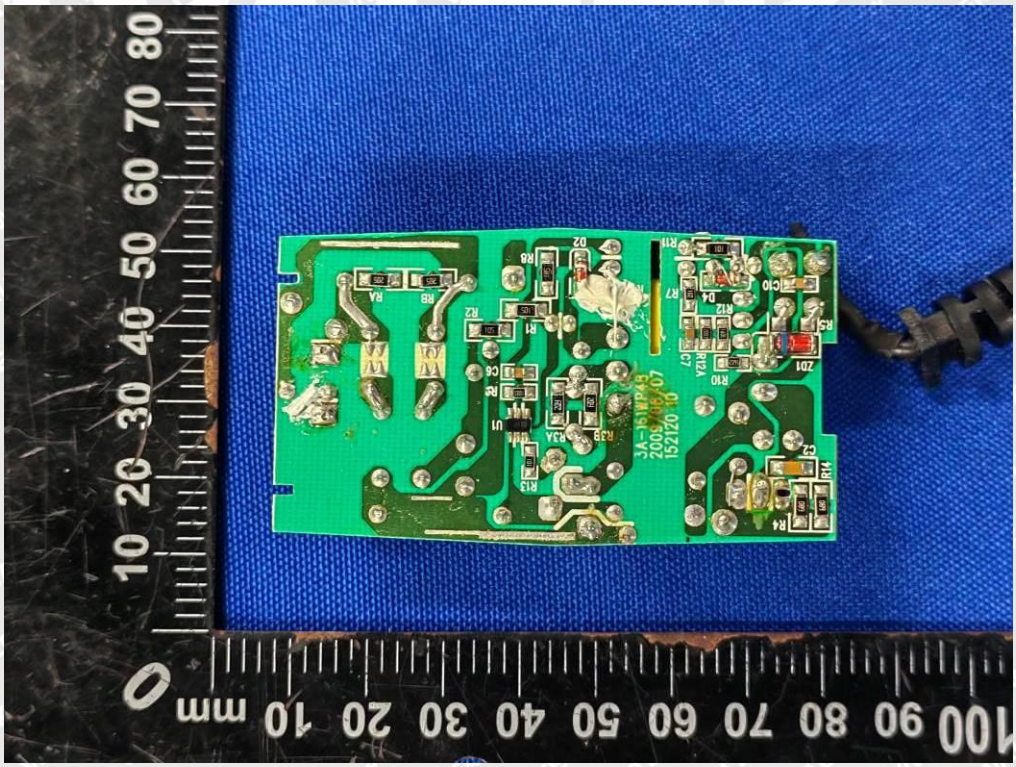


Photo 10 (**Model GT-41052-1305**)

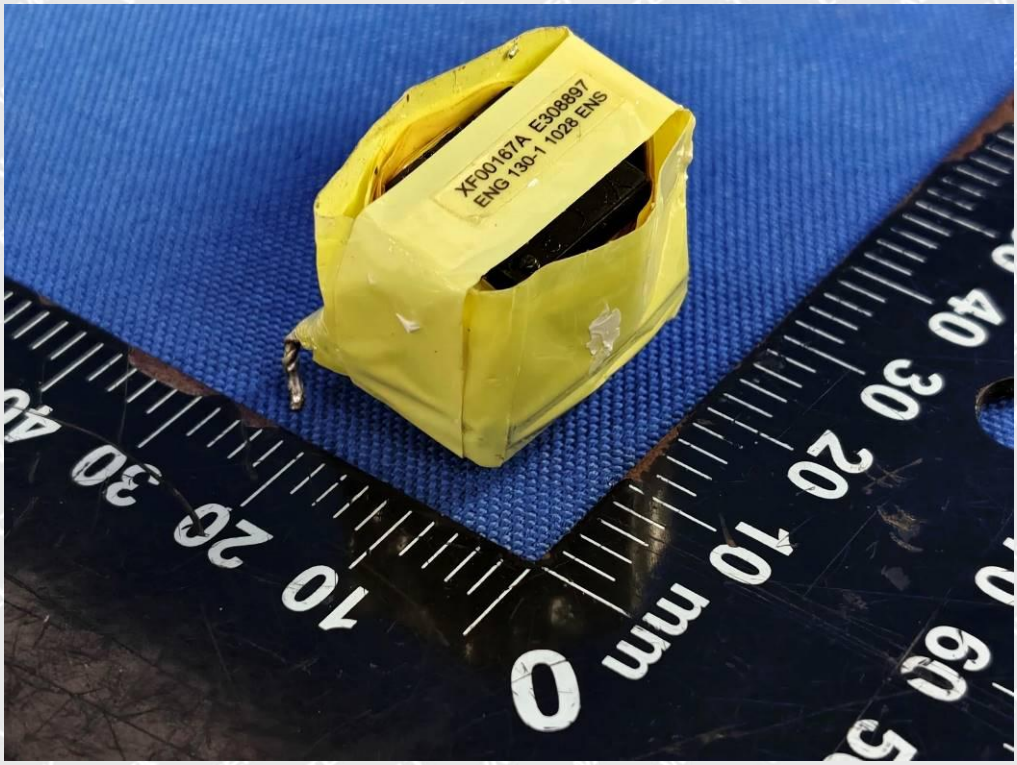


Photo 11 (**Model GT-41052-1305**)

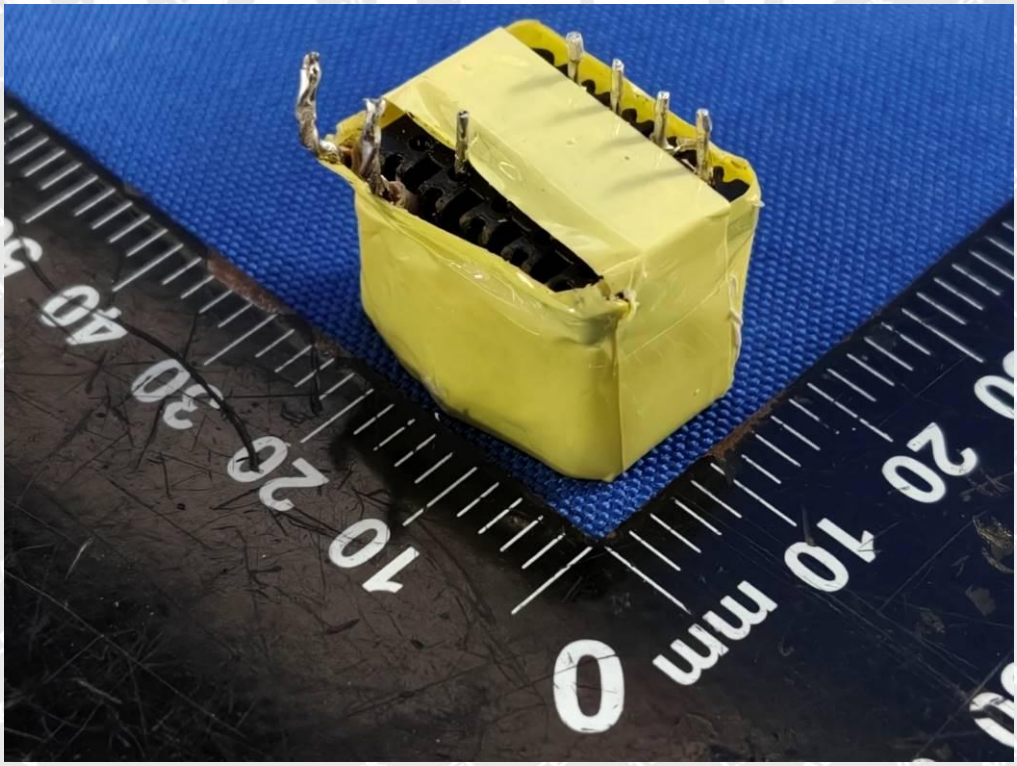


Photo 12 (**Model GT-41052-1305**)

Photo 13 (**Model GT-41052-1512**)

Photo 14 (**Model GT-41052-1512**)

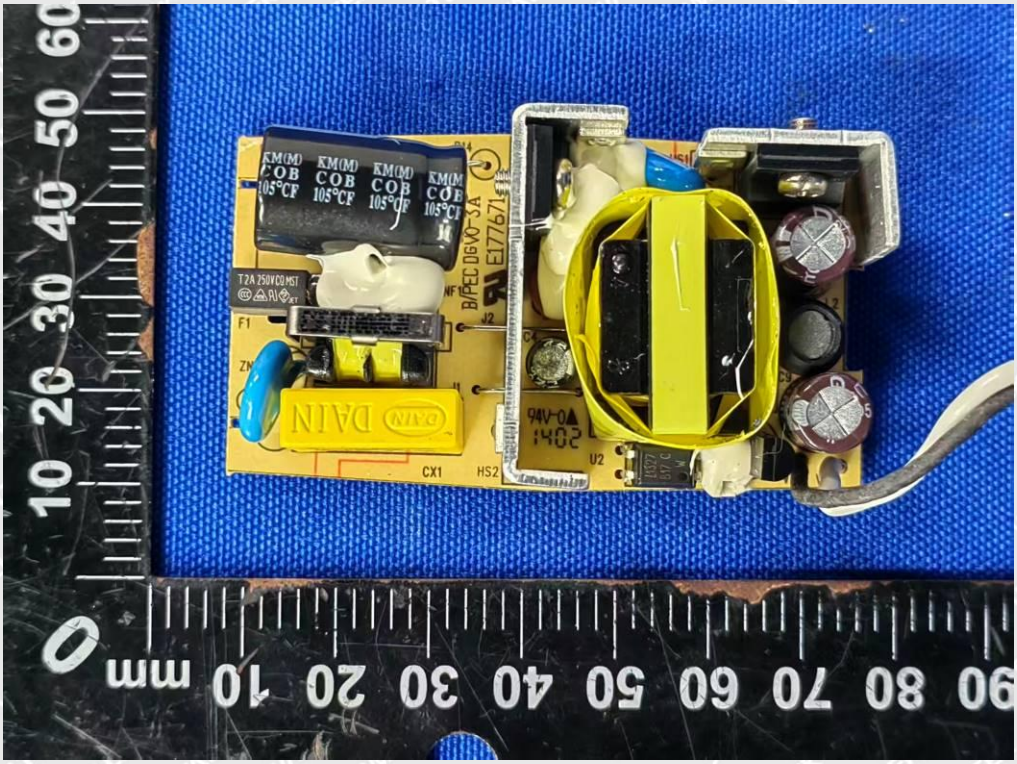


Photo 15 (**Model GT-41052-1512**)

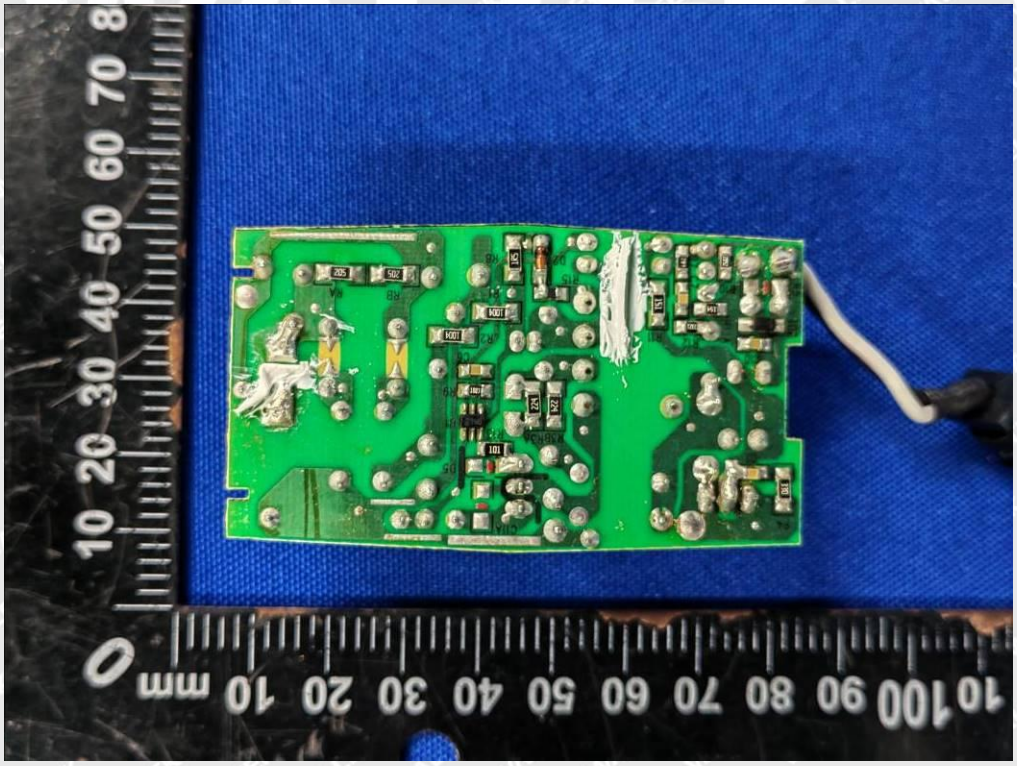


Photo 16 (**Model GT-41052-1512**)

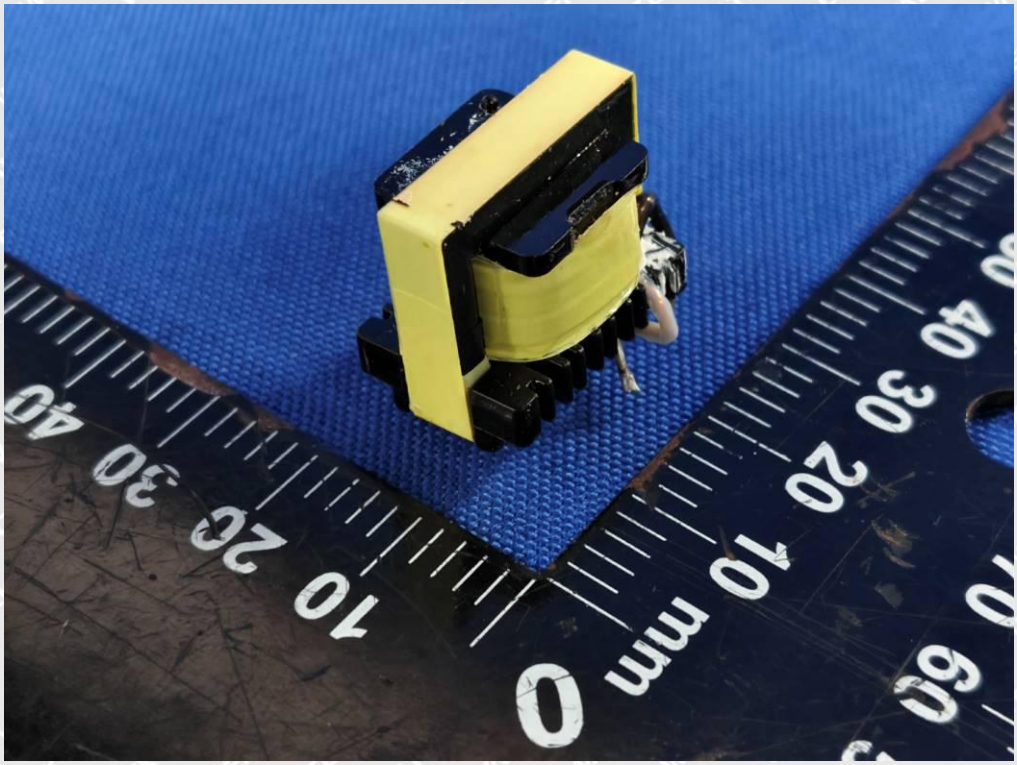


Photo 17 (**Model GT-41052-1512**)

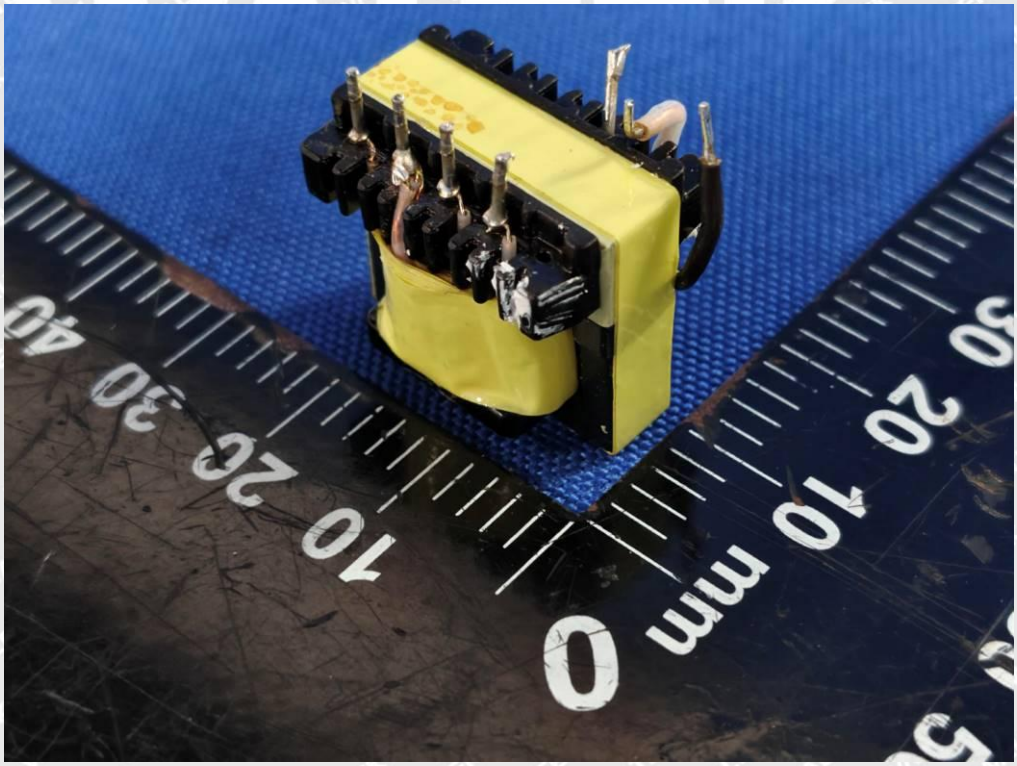


Photo 18 (**Model GT-41052-1512**)

Photo 19 (**Model GT-41052-1524**)

Photo 20 (**Model GT-41052-1524**)

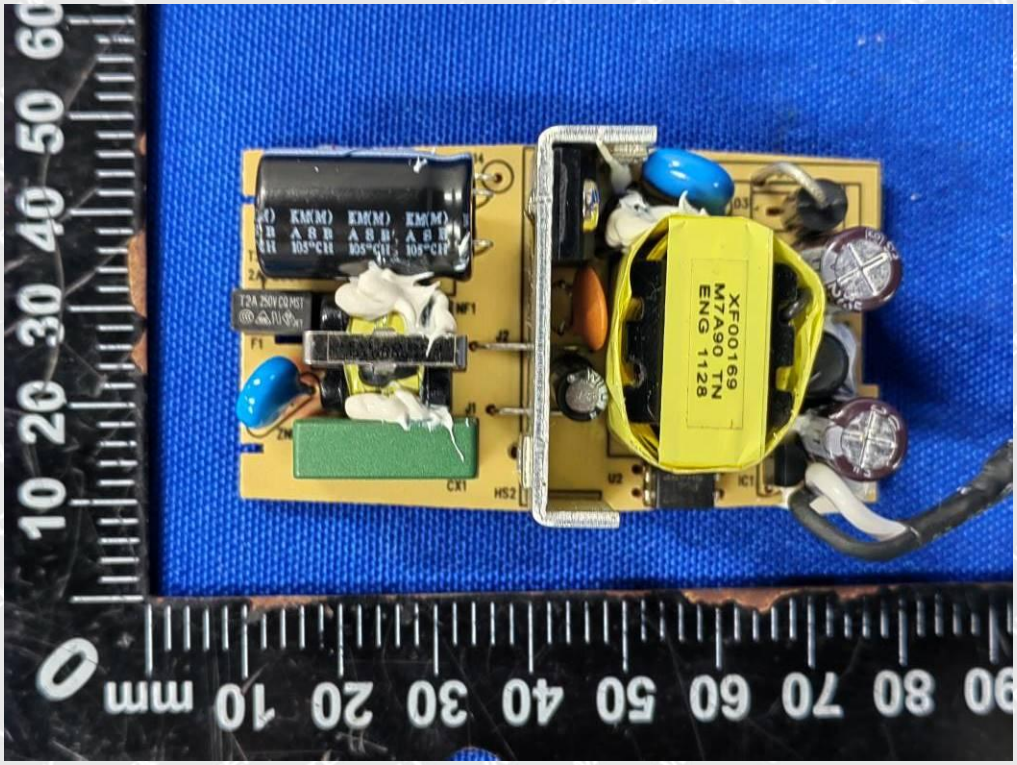


Photo 21 (**Model GT-41052-1524**)

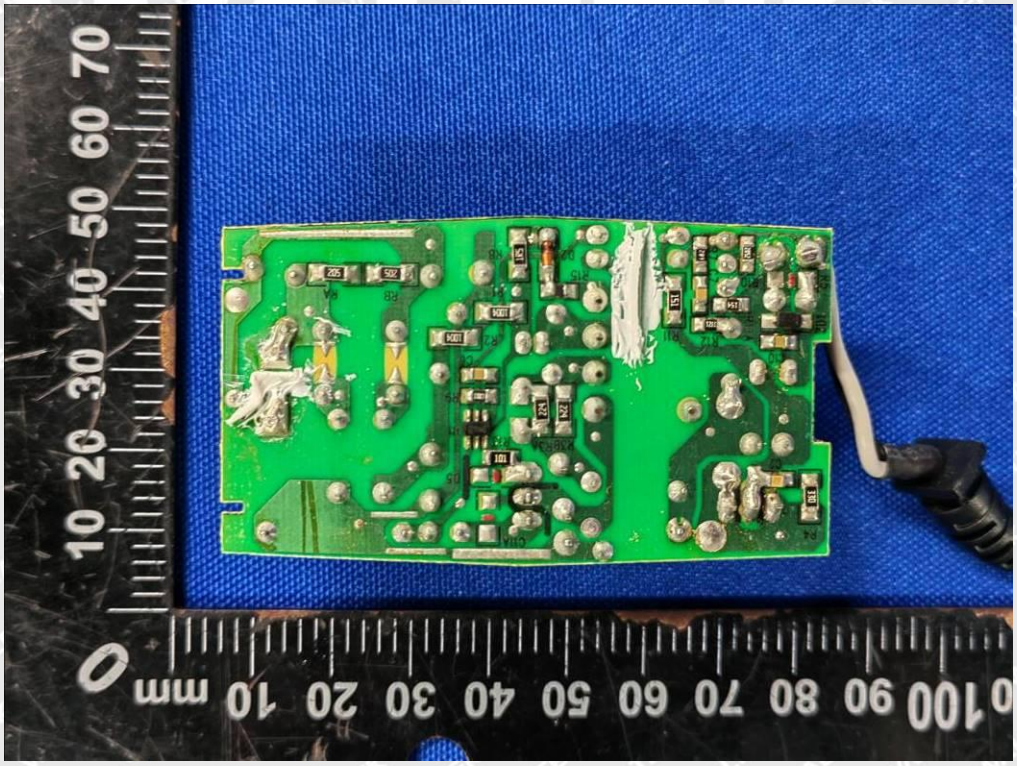


Photo 22 (**Model GT-41052-1524**)

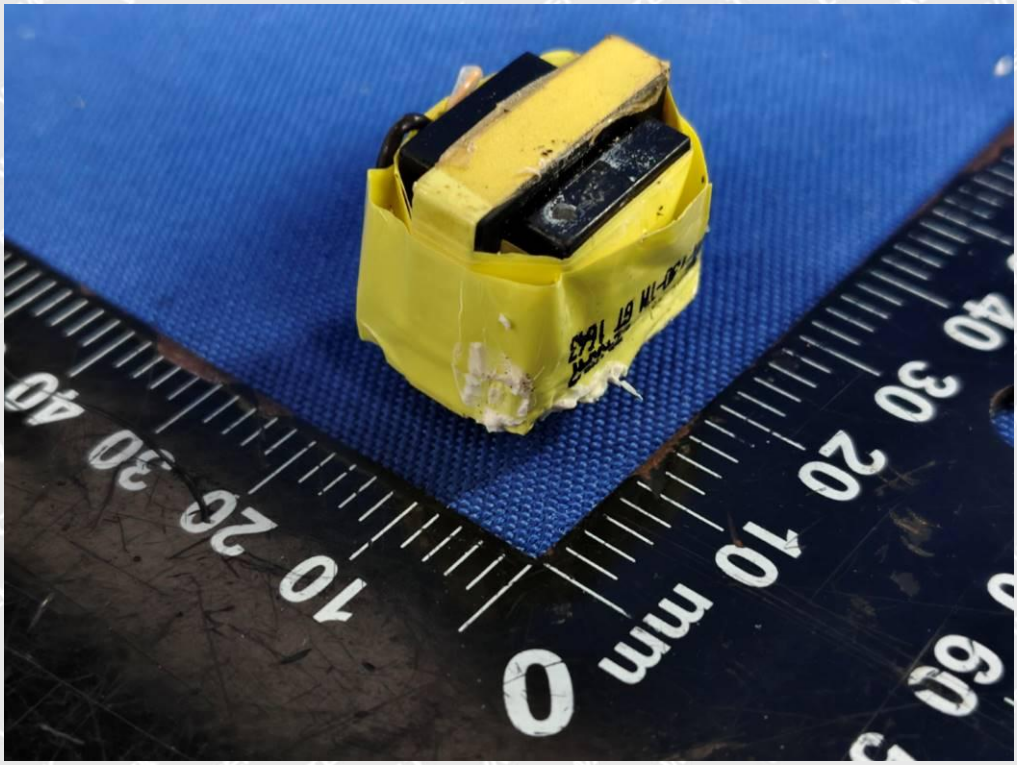


Photo 23 (**Model GT-41052-1524**)

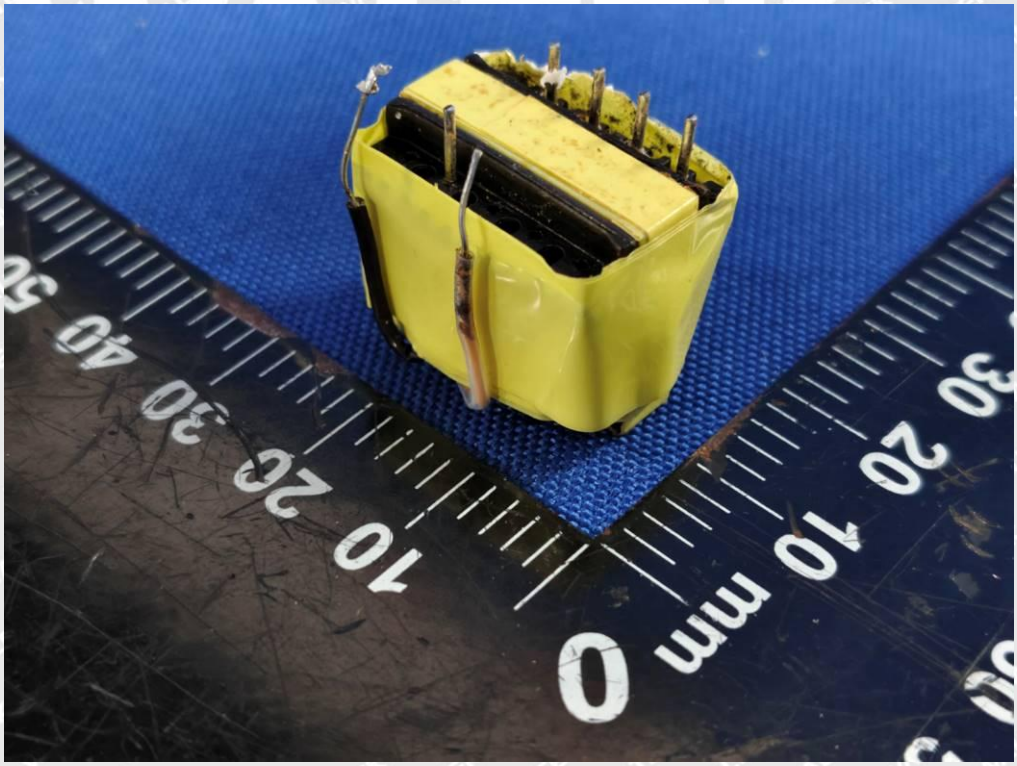


Photo 24 (**Model GT-41052-1524**)

Photo 25 (**Model GT-41052-1548**)

Photo 26 (**Model GT-41052-1548**)

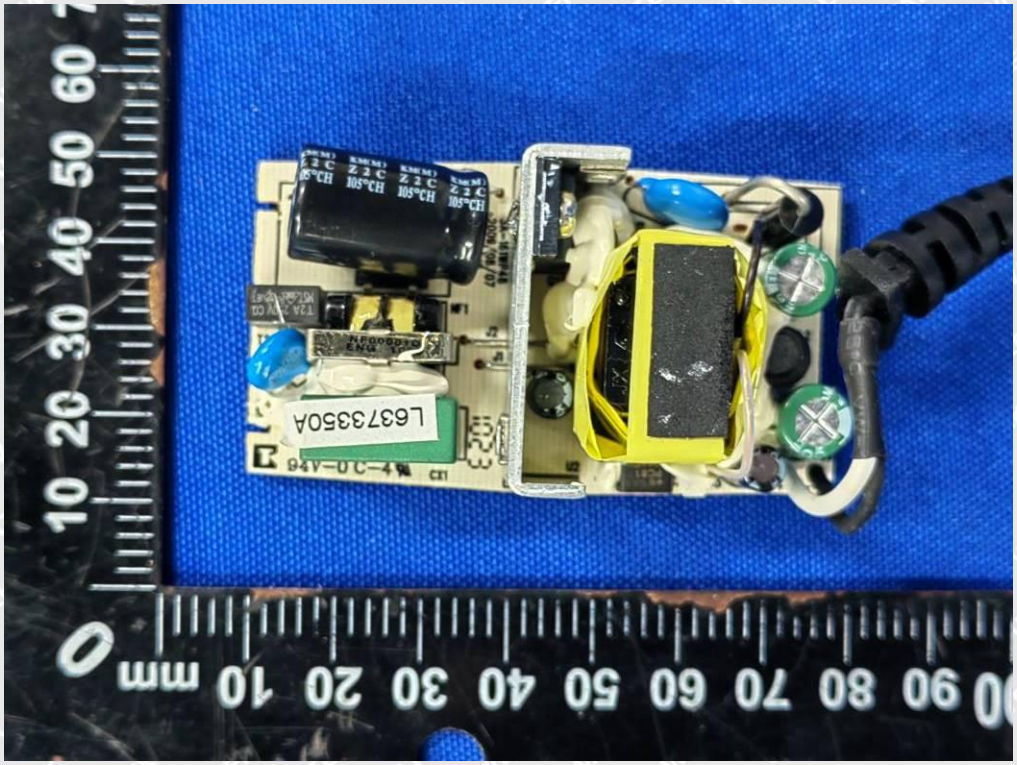


Photo 27 (**Model GT-41052-1548**)

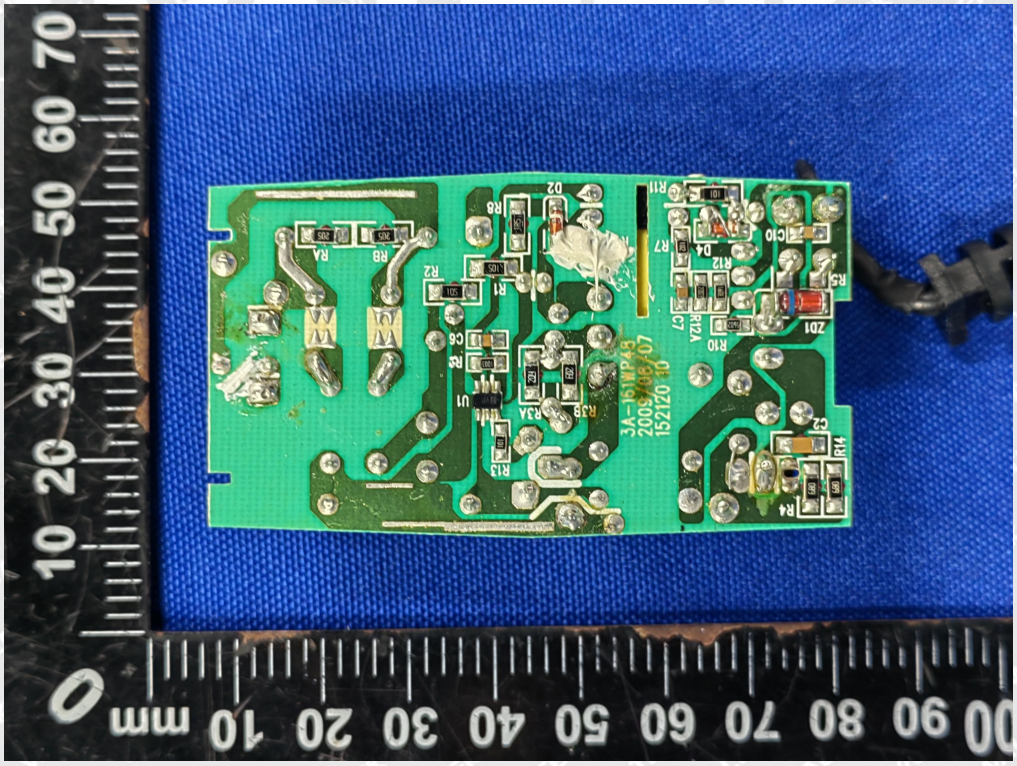


Photo 28 (**Model GT-41052-1548**)

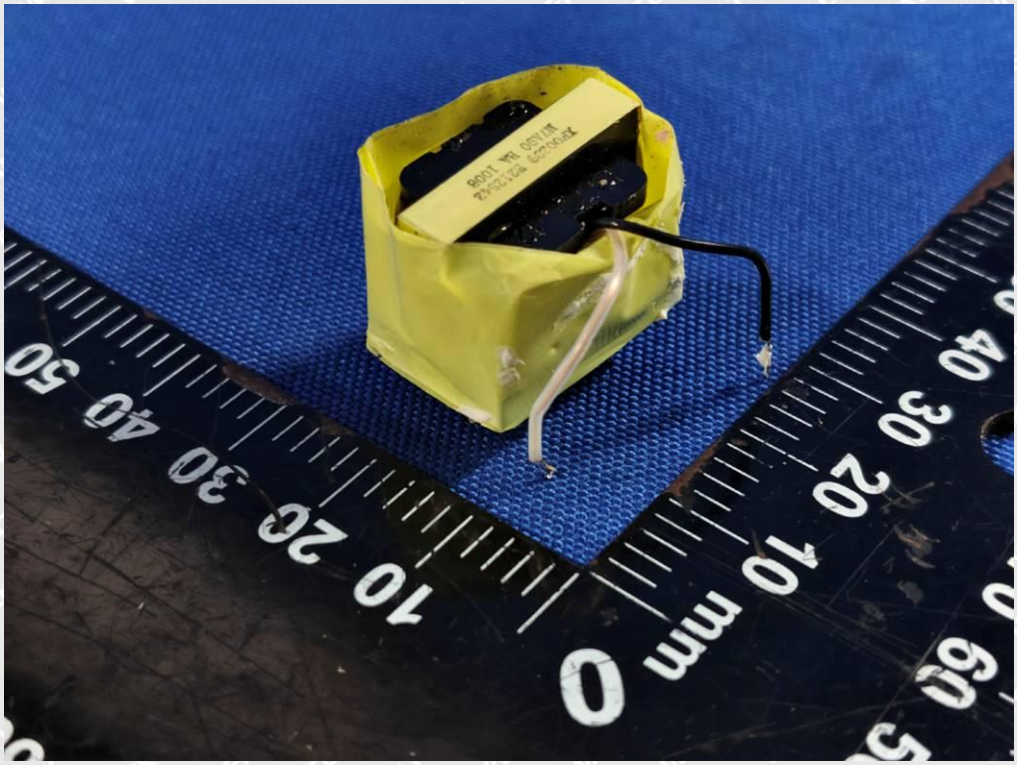


Photo 29 (**Model GT-41052-1548**)

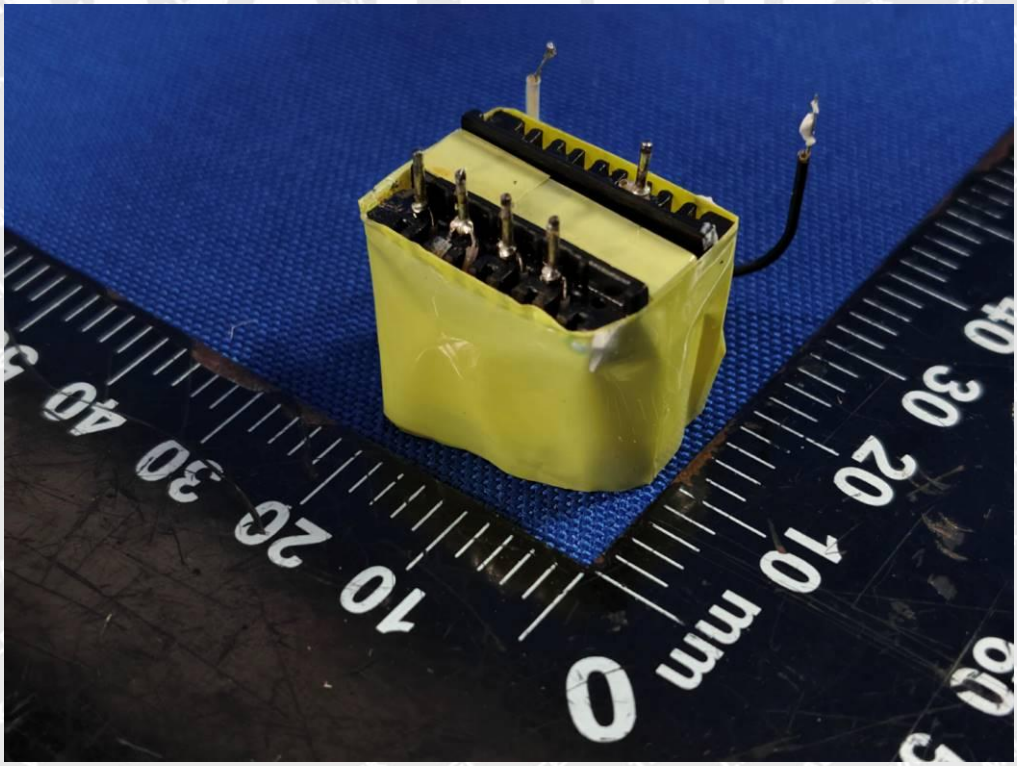


Photo 30 (**Model GT-41052-1548**)

====== End of Report ======