



## TEST REPORT IEC 61558-2-16

### 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

**Report Number.** .....: 64.250.18.06832.01 Rev.00

**Date of issue** .....: 2018-12-21

**Total number of pages**..... 85 pages

**Name of Testing Laboratory** ..... TÜV SÜD Certification and Testing (China) Co., Ltd. Guangzhou  
**preparing the Report**..... Branch

**Applicant's name**.....:

**Address** .....:

#### Test specification:

**Standard** .....: IEC 61558-2-16:2009, AMD1:2013 used in conjunction with IEC 61558-1:2005, AMD1:2009

**Test procedure**.....: Type test

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

**Test Report Form No.**.....: IEC61558\_2\_16E

**Test Report Form(s) Originator**.....: VDE Testing and Certification Institute

**Master TRF** .....: Dated 2016-12

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<b>Test item description .....</b>	AC Adapter	
<b>Trade Mark .....</b>		
<b>Manufacturer.....</b>	Same as applicant	
<b>Model/Type reference .....</b>	YNQX12TxxxxyyysL, YNQX12GxxxxyyysL (xxx, yyy and s are variables, see model list for details)	
<b>Ratings .....</b>	Input: 100-240VAC, 50/60Hz, 0.3A Output: See model list for details	
<b>Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):</b>		
<input checked="" type="checkbox"/> <b>Testing Laboratory:</b>	TÜV SÜD Certification and Testing (China) Co., Ltd. Guangzhou Branch	
<b>Testing location/ address .....</b>	5F, Communication Building 163 Pingyun Road, Huangpu Ave. West, Guangzhou 510656, P.R., CHINA	
<input type="checkbox"/> <b>Associated Testing Laboratory:</b>		
<b>Testing location/ address .....</b>		
<b>Tested by (name, function, signature) .....</b>	Jacob Du (Project Handler)	
<b>Approved by (name, function, signature) ...:</b>	Baggio Luo (Designated Reviewer)	
<input type="checkbox"/> <b>Testing procedure: TMP/CTF Stage 1:</b>		
<b>Testing location/ address .....</b>		
<b>Tested by (name, function, signature) .....</b>		
<b>Approved by (name, function, signature) ...:</b>		
<input type="checkbox"/> <b>Testing procedure: WMT/CTF Stage 2:</b>		
<b>Testing location/ address .....</b>		
<b>Tested by (name + signature) .....</b>		
<b>Witnessed by (name, function, signature) ..:</b>		
<b>Approved by (name, function, signature) ...:</b>		
<input type="checkbox"/> <b>Testing procedure: SMT/CTF Stage 3 or 4:</b>		
<b>Testing location/ address .....</b>		
<b>Tested by (name, function, signature) .....</b>		
<b>Witnessed by (name, function, signature) ..:</b>		
<b>Approved by (name, function, signature) ...:</b>		
<b>Supervised by (name, function, signature) :</b>		

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

Attachment No. 1: European Group and National Difference according to EN 61558-2-16:2009 /A1:2013 (2 pages)  
Attachment No. 2: Plug test report (11 pages)  
Attachment No. 3: EK1\_557-13 decision evaluation report (1 page)  
Attachment No. 4: PAH evaluation report (1 page)  
Attachment No. 5: Photo document (17 pages)

**Summary of testing:**

**Tests performed (name of test and test clause):**

The submitted samples were found to comply with the requirements of:

- EN 61558-2-16:2009+A1:2013
- EN 61558-1:2005+A1:2009
- The selected models for test are the most representative, if no specified, the model YNQX12G300050VL was the selected model for test:

Model type	Performed test
YNQX12G300050VL	Full test
YNQX12G250060VL	Input test, output test, working voltage test, normal heating test, output short-circuit test and overload test
YNQX12G240060VL	Output test
YNQX12T300050VL, YNQX12G300050BL, YNQX12T300050BL	Mechanical strength test, torque test and plug test

**Testing location:**

TÜV SÜD Certification and Testing (China) Co., Ltd. Guangzhou Branch  
5F, Communication Building 163 Pingyun Road, Huangpu Ave. West, Guangzhou 510656, P.R., CHINA

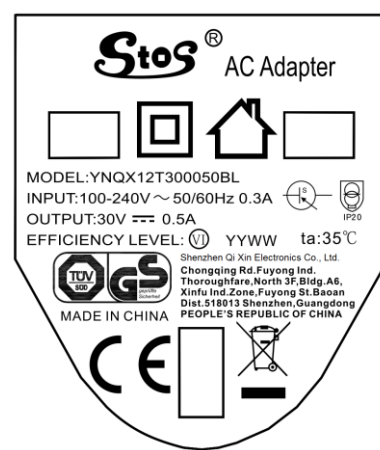
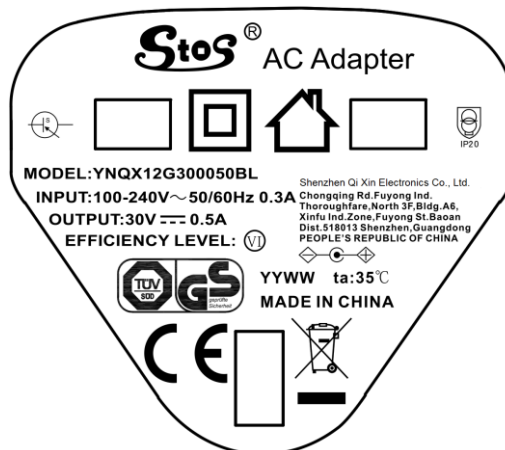
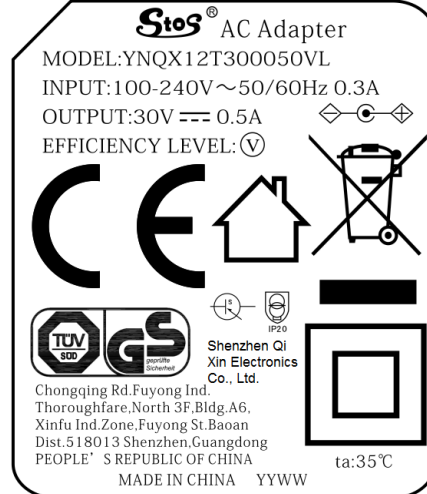
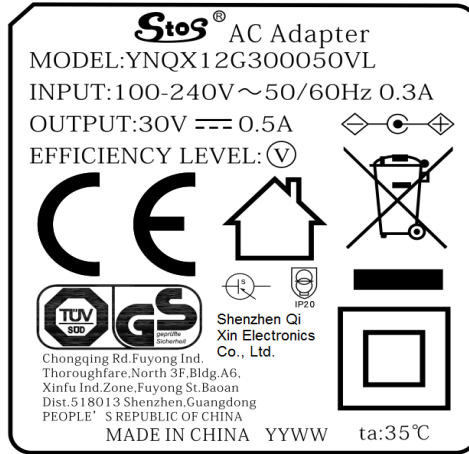
**Summary of compliance with National Differences:**

**List of countries addressed:** See the attachment No. 1 of National and Group Differences for details.

☒ **The product fulfils the requirements of** EN 61558-1:2005 + A1:2009, EN 61558-2-16:2009+A1:2013.

**Copy of marking plate (representative):**

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



**Remark:**

- 1) Representative labels as above, others are identical with it except for model designation, output rating.
- 2) Minimum height of CE mark is 5mm, minimum height of WEEE mark is 7mm, height of numbers and letters at least 2mm.
- 3) According to the German product safety law (ProdSG), the name and address of manufacturer (an EU-based importer or authorized representative if the manufacturer is not based in EU) shall be affixed on the product or, where that is not possible, on its packaging or in a document accompanying the product before the product is placed on the EU market.

<b>Test item particulars .....</b>	AC Adapter
<b>Classification of installation and use .....</b>	Class II equipment and Portable use
<b>Supply Connection .....</b>	Direct plug-in
<b>Possible test case verdicts:</b>	
- test case does not apply to the test object .....	N/A
- test object does meet the requirement .....	P (Pass)
- test object does not meet the requirement .....	F (Fail)
<b>Testing .....</b>	
<b>Date of receipt of test item .....</b>	2018-11-13
<b>Date (s) of performance of tests .....</b>	2018-11-13 to 2018-11-30
<b>General remarks:</b>	
<p>"(See Enclosure #)" refers to additional information appended to the report.          "(See appended table)" refers to a table appended to the report.</p> <p><b>Throughout this report a <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.</b></p> <p>The manufacturer/ Importer has to ensure the appliance placing on the EU market conforms to the applicable EU directives which provide the affixing of the CE marking, such as LVD, EMC, RoHS, ErP, and so on.</p>	
<b>Name and address of factory (ies) .....</b>	Same as applicant

### General product information:

#### Model description:

1. This AC Adapters are designed to supply power for general use.
2. The test samples are pre-production samples without serial numbers.
3. The maximum ambient temperature is 35°C.
4. The AC Adapters are direct plug-in appliances with Class II construction.
5. The top enclosure is sealed with bottom enclosure by ultra sonic welding.
6. Before placing the products in the different countries, the manufacturer must ensure that: Operating Instructions, Ratings Labels and Warnings Labels are in an Accepted or Official Language of the country in question; The equipment complies with the National Standards and/or Electrical Codes of the country, province or city or in question.

#### Model list:





Model No.	Output Voltage (VDC)	Output Current (A)	Max. Output Power (W)	Transformer
YNQX12TxxxxyyysL, YNQX12GxxxxyyysL	24.0-30.0	0.01-0.60	15.0	BCK1901-006

#### Notes:


- 1) xxx=240-300 denotes output voltage 24.0-30.0VDC in step 0.1V;
- 2) yyy=001-060 denotes output current 0.01-0.6A in step 0.01A;
- 3) s=V for European plug, or B for United Kingdom plug.

#### Difference between models:





1. All models are identical to each other except for the enclosure shape, AC plug, model designation, some components rating depended on the output.
2. The PCB and AC plug can be connected by internal lead wires or by L&N metallic plate.
3. The optional components: MOV1, L1A, R11, R3B, R4B, CY1, CY2+CY3, C5, C9, ZD1, R20, R21, R22, R23, R24.
4. The alternative components: LF1 & L1+L1A, C6 & C6A, CY1 & CY2+CY3.
5. The output rectifiers D3 & D3A & D3B can be equipped one of them or two of them.



IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
<b>8</b>	<b>MARKING AND OTHER INFORMATION</b>		<b>P</b>
8.1	Transformer marked with:		P
	a) rated supply voltage or voltage range (V) .....	See rating label	P
	b) rated output voltage (V) .....	See rating label	P
	c) rated output (VA, kVA or W) .....		N/A
	d) rated output current (A) .....	See rating label	P
	e) rated frequency (Hz) .....	See rating label	P
	f) rated power factor (if not 1) .....		N/A
	g) symbol AC for alternating current, or DC for direct current-output	~ for input and  for output	P
	h) symbol for electrical function (according to one or more part's 2) in addition with the symbol for SMPS (IEC 61558-2-16:09)	Symbol  and  used	P
	i) manufacturer's name or trademark or name of the responsible vendor	Manufacturer's name is shown	P
	j) model or type reference	See rating label	P
	k) vector group according to IEC 60076 for three-phase transformer		N/A
	l) symbol for Class II		P
	m) symbol for Class III		N/A
	n) index IPXX if other than IP00	IP20	P
	o) rated max. ambient temperature $t_a$ (if not 25 °C) .....	35°C	P
	p) rated minimum ambient temperature $t_a$ min, if <10° C and if a temperature sensitive device is used		N/A
	q) short-time duty cycle: operating time Intermittent duty cycle: operating and resting time (e.g. 5min/30min)		N/A
	r) for tw-marked transformers marked with the rated max. operating temperature, increased by multiples of 5 (e.g. tw 120; tw 125 )		N/A
	s) transformers used with forced air cooling shall be marked with "AF" in m/s		N/A
	t) Information from the manufacturer to the purchaser (data sheet) :		P
	– short-circuit voltage (% rated supply voltage) for stationary transformers > 1000 VA		N/A
	– electrical function of the transformer		P



IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
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		N/A
8.4	For each tapping or winding: rated output voltage and rated output		N/A
	necessary connections clearly indicated		N/A
8.5	For short-circuit proof transformers or non-inherently short-circuit proof transformers:		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 .....	Non-replaceable Fusible resistor used, "F1 3.3 ohm, 2W" marked near Fusible resistor.	P
	Manufacturer's model or type reference and rating of the device for non-inherently short-circuit proof transformers with incorporated replaceable protective device (other than fuses)		N/A
	Construction 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: "PRI"		N/A
	Identification of output terminals: "SEC"		N/A
	Symbol for any point/terminal in connection with frame or core		N/A
8.7	Indication for correct connection	Evident from the design of the transformer	N/A
8.8	Instruction sheet for type X, Y, Z attachments	Attachment Z for non-detachable power supply cord	P
8.9	Transformer for indoor use shall be marked with the relevant symbol.		P
8.10	Symbol for Class II construction not confused with maker's name or trademark.		P
	Class II transformer with parts to be mounted – delivered with all parts for class II after mounting.		N/A
	Symbol for class II transformer placed on the part which provides class II.		N/A
8.11	Correct symbols:		P
	Volts	V	P
	Amperes	A	P
	Volt amperes (or volt-amperes reactive for reactors)		N/A



IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	Watts		N/A
	Hertz	Hz	P
	Input		N/A
	Output		N/A
	Direct current		P
	Neutral		N/A
	Single-phase a.c.		P
	Three-phase a.c.		N/A
	Three-phase and neutral a.c.		N/A
	Power factor		N/A
	Class II construction		P
	Class III construction		N/A
	Fuse-link		N/A
	Rated max. ambient temperature	$t_a=35^{\circ}\text{C}$	P
	Frame or core terminal		N/A
	Protective earth		N/A
	IP number	IP20	P
	Earth (ground for functional earth)		N/A
	For indoor use only		P
	tw5 YYY		N/A
	tw10 YYY		N/A
	twx YYY		N/A
	Additional Symbols (IEC 61558-2-16:09)		P
	<b>SMPS</b> incorporating a <b>Fail-safe separating transformer</b>		N/A
	<b>SMPS</b> incorporating a <b>Non-short-circuit-proof separating transformer</b>		N/A
	<b>SMPS</b> incorporating a <b>Short-circuit-proof separating transformer</b> (inherently or non-inherently)		N/A
	<b>SMPS</b> incorporating a <b>Fail-safe isolating transformer</b>		N/A
	<b>SMPS</b> incorporating a <b>Non-short-circuit-proof isolating transformer</b>		N/A
	<b>SMPS</b> incorporating a <b>Short-circuit-proof isolating transformer</b> (inherently or non-inherently)		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	<b>SMPS</b> incorporating a <b>Fail-safe safety isolating transformer</b>		N/A
	<b>SMPS</b> incorporating a <b>Non-short-circuit-proof safety isolating transformer</b>		N/A
	<b>SMPS</b> incorporating a <b>Short-circuit-proof safety isolating transformer</b> (inherently or non-inherently)		P
	<b>SMPS</b> incorporating a <b>Fail-safe auto-transformer</b>		N/A
	<b>SMPS</b> incorporating a <b>Non-short-circuit proof auto-transformer</b>		N/A
	<b>SMPS</b> incorporating a <b>Short-circuit proof auto-transformer</b> (inherently or non-inherently)		N/A
	<b>SMPS</b> (Switch mode power supply unit)		P
8.12	Figures, letters or other visual means for different positions of regulating devices and switches		N/A
	OFF position indicated by figure 0		N/A
	Greater output, input etc. indicated by higher figure		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	Special information for installation (in the catalogue, data sheet, or instruction sheet) if necessary:		P
	For non-inherently short-circuit proof transformers with non-self-resetting or non-replaceable devices (weak-point, thermal link): The device cannot be reset or replaced		P
	For transformers generating a protective earth conductor current of 10 mA (see also cl. 18.5.2): The installation shall be made according to the wiring rules.		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	For associated- and IP00-transformers: At 10% over or under voltage in the supply voltage, the rated output of the transformer shall be selected accordingly.		N/A
	For stationary transformers exceeding 1000 VA: The short circuit voltage in % of the rated voltage		N/A
	For all transformers the electrical function: An information about the electrical function of the transformer (e.g. inherently short circuit proof safety isolating transformer)		P
	For associated- and IP00-transformers: The max. abnormal winding temperature		N/A
	For tw-transformers: The specific constant S is (e.g. S6 says S = 6000)		N/A
	For transformers with more than one output winding, not for series or parallel connection		N/A
	– an information in the instruction sheet: the transformer is not intended for series/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
<b>9</b>	<b>PROTECTION AGAINST ELECTRIC SHOCK</b>		<b>P</b>
9.1	Protection against contact with hazardous live parts		P
9.1.1	A live part is not a hazardous live part if:		P
	– it is separated from the supply by double or reinforced insulation		P
	– the requirements of 9.1.1.1 or 9.1.1.2 are fulfilled		P
9.1.1.1	The touch voltage is $\leq 35$ V(peak) a.c. or $\leq 60$ Vd.c.	Max. 28.42Vd.c. (output terminal)	P
9.1.1.2	If the touch voltage is $> 35$ V (peak)a.c. or $> 60$ V d.c., the following requirements shall be fulfilled:		P
	The touch current shall not exceed:		P
	– for a.c. 0,7 mA (peak)	Normal condition: 0.232mA (CY2 & CY3 in seires equipped); 0.44mA (CY1 equipped); Y capacitor: CY1=CY2=CY3=2200pF	P
	– for d.c. 2,0 mA (see Annex J)		N/A
	In addition, when a capacitor is connected to live parts:		—

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
9.1.1.2.1	discharge: $< 45 \mu\text{C}$ (between 60 V and 15 kV)		P
9.1.1.2.2	energy: $\leq 350 \text{ mJ}$ (voltage $>15 \text{ kV}$ )		N/A
9.1.2	Transformers shall have an adequate protection against accessibility to hazardous live parts:		P
	The enclosure of class I and class II transformers gives an adequate protection against accidental contact with hazardous live parts.		P
	Class I transformers: accessible parts are separated from hazardous live parts by at least basic insulation.		N/A
	Class II transformers: no accessibility to basic insulation, or conductive parts separated from hazardous live parts by basic insulation.		P
	Hazardous live parts are not accessible after removal of detachable parts.		N/A
	Hazardous live parts are not accessible after removal of detachable parts except for:		N/A
	– lamps having caps larger B9 and E10		N/A
	– type D fuse holder		N/A
	Lacquers, enamel, paper, cotton, oxide film on metal parts not used for protection against accidental contact with hazardous live parts:		P
	Shafts, handles, operating levers, knobs are not hazardous live parts.		N/A
	Compliance is checked by inspection and by relevant tests according to IEC 60 529		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. 2)		P
	for Class II transformers: metal 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		P
9.1.3	Accessibility of non-hazardous live parts		P
	Non-hazardous live parts of the output circuit may be accessible if they are isolated from the input circuit by double or reinforced insulation and if the following conditions are fulfilled:		P
	– The no load output voltage is $\leq 35 \text{ V peak a.c.}$ or $\leq 60 \text{ V ripple free d.c.}$ , both poles are accessible	Max. 28.42Vd.c. (output terminals)	P

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	– The no load output voltage is $> 35$ V peak a.c. or $> 60$ V ripple free d.c. and $\leq 250$ V a.c., only one pole may be accessible		N/A
9.2	Transformers with primary supply plug: 1 s after the interruption of the supply the voltage between the pins do not exceed 35 V (peak) a.c. or 60 V ripple free d.c.		N/A
	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) a.c. or 60 V ripple free d.c.		N/A
	The following tests are required :		N/A
	If the nominal capacitance is $\leq 0,1 \mu\text{F}$ – no test is conducted.	No X capacitor used.	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		N/A
	If the measured voltage is $> 60$ V ripple free d.c., the discharge must be $\leq 45 \mu\text{C}$ .		N/A
<b>10</b>	<b>CHANGE OF INPUT VOLTAGE SETTING</b>		<b>P</b>
	Voltage setting not possible to change without a tool		N/A
	Different rated supply voltages:		N/A
	– indication of voltage for which the transformer is set, is discernible on the transformer.		N/A
10.101	A wide range of the input (120 V a. c. to 240 V a.c voltage is allowed (IEC 61558-2-16:09):		P
	– if the output voltages does not exceed the rated output voltage		P
	– if the no-load voltage does not exceed the limits of output voltage deviation		P
<b>11</b>	<b>OUTPUT VOLTAGE AND OUTPUT CURRENT UNDER LOAD</b>		<b>P</b>
11.1	Difference from rated value (without rectifier; with rectifier):		P
	a) inherently short-circuit proof transformers with one rated output voltage for output voltage: a.c. $\leq 10\%$ ; d.c. $\leq 15\%$		N/A
	b) inherently short-circuit proof transformers with one more than 1 rated output voltage for highest output voltage: a.c. $\leq 10\%$ ; d.c. $\leq 15\%$		N/A
	c) idem for other output voltages: a.c. $\leq 15\%$ ; d.c. $\leq 20\%$		N/A
	d) other transformers for output voltages: a.c. $\leq 5\%$ ; d.c. $\leq 10\%$	(see appended table)	P

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
<b>12</b>	<b>NO-LOAD OUTPUT VOLTAGE (see supplementary requirements in Part 2)</b>		<b>P</b>
	Remark: with rectifier measuring on both sides of the rectifier		P
12.101	The no load output voltage shall not exceed (IEC 61558-2-16:09):		P
	– For SMPS incorporating separating or auto-transformers: 1000V a.c. or 1415 V ripple free d.c.		N/A
	– For SMPS including isolating transformers: 500 V a.c. or 708 V ripple-free d.c.		N/A
	– For SMPS including safety isolating transformers: 50 V a.c. or 120 V ripple-free d.c.	Max. 28.42Vd.c. (output terminal)	P
	For <b>independent transformers</b> , this output voltage limitation applies even when output windings, not for interconnection, are connected in series		N/A
12.202	The difference between output voltage at no load and the output voltage measured in clause 11 does not exceed the values of table 101 (IEC 61558-2-16:2009), Rated output (VA) Rated value %	(see appended table)	P
<b>13</b>	<b>SHORT-CIRCUIT VOLTAGE</b>		<b>N/A</b>
	Difference from marking for short-circuit voltage $\leq 20\%$		N/A
<b>14</b>	<b>HEATING</b>		<b>P</b>
14.1	General requirements		P
	No excessive temperature in normal use		P
	Room temperature: rated ambient temperature $t_a \pm 5^\circ\text{C}$		—
	Type X, Y, Z attachments: 1 pull (5 N) to the connection windings		P
	Upri (V): 1,1 times rated supply voltage loaded with rated impedance – for independent transformers	264Va.c. and 90Va.c.	—
	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		—
	Type X, Y, Z attachments: 1 pull (5 N) to the connection windings		P
	Max. temperature windings .....	(see appended table)	P
	– Class A: $\leq 100^\circ\text{C}$		N/A
	– Class E: $\leq 115^\circ\text{C}$		N/A
	– Class B: $\leq 120^\circ\text{C}$		P

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	– Class F: $\leq 140\text{ }^{\circ}\text{C}$		N/A
	– Class H: $\leq 165\text{ }^{\circ}\text{C}$		N/A
	– other classes		N/A
	Temperature of external enclosures of stationary transformers:		N/A
	– metal: $\leq 70\text{ }^{\circ}\text{C}$		N/A
	– other material: $\leq 80\text{ }^{\circ}\text{C}$		N/A
	Temperature of external enclosure of stationary transformer $\leq 85\text{ }^{\circ}\text{C}$ (not touchable with the IEC test finger)		N/A
	Temperature of external enclosures, handles, etc. of portable transformers:		P
	– continuously held parts of metal: $\leq 55\text{ }^{\circ}\text{C}$		N/A
	– continuously held parts of other material: $\leq 75\text{ }^{\circ}\text{C}$		N/A
	– not continuously held parts of metal: $\leq 60\text{ }^{\circ}\text{C}$		N/A
	– not continuously held parts of other material: $\leq 80\text{ }^{\circ}\text{C}$		P
	Temperature of terminals for external conductors $\leq 70\text{ }^{\circ}\text{C}$		N/A
	Temperature of terminals of switches $\leq 70\text{ }^{\circ}\text{C}$		N/A
	Temperature of internal and external wiring:		P
	– rubber: $\leq 65\text{ }^{\circ}\text{C}$		N/A
	– PVC: $\leq 70\text{ }^{\circ}\text{C}$	Min. $80^{\circ}\text{C}$ primary lead wire and output cord used (UL approved)	P
	Temperature of parts where safety can be affected:		N/A
	– rubber: $\leq 75\text{ }^{\circ}\text{C}$		N/A
	– phenol-formaldehyde: $\leq 105\text{ }^{\circ}\text{C}$		N/A
	– urea-formaldehyde: $\leq 85\text{ }^{\circ}\text{C}$		N/A
	– impregnated paper and fabric: $\leq 85\text{ }^{\circ}\text{C}$		N/A
	– impregnated wood: $\leq 85\text{ }^{\circ}\text{C}$		N/A
	– PVC, polystyrene and similar thermoplastic material: $\leq 65\text{ }^{\circ}\text{C}$		N/A
	– varnished cambric: $\leq 75\text{ }^{\circ}\text{C}$		N/A
	Temperature rise of supports $\leq 85\text{ }^{\circ}\text{C}$		P
	Temperature of printed boards:		P
	– bonded with phenol-formaldehyde: $\leq 105\text{ }^{\circ}\text{C}$		N/A
	– melamine-formaldehyde: $\leq 105\text{ }^{\circ}\text{C}$		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
	– phenol-furfural: $\leq 105^{\circ}\text{C}$		N/A
	– polyester: $\leq 105^{\circ}\text{C}$	130°C rating PCB used (UL approved)	P
	– bonded with epoxy: $\leq 140^{\circ}\text{C}$		N/A
	Electric strength between input and output windings (18.3, 1 min); test voltage (V) .....	AC 3860V	P
14.101	Winding temperature measured by thermocouples at the surface of the winding(IEC 61558-2-16:09)		P
	– if the internal frequencies is $> 1\text{kHz}$		P
	– the values of Table 1 for windings temperatures are reduced by $10^{\circ}\text{C}$		P
14.2	Application of 14.1 or 14.3 according to the insulation system		P
14.2.1	Class of isolating 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 isolating system		N/A
	Cycling test (10 cycles):		N/A
	– measuring of the no-load input current (mA)		N/A
14.3.1	– heat run (temperature in table 2)		N/A
14.3.2	– vibration test: 30 min; amplitude 0,35 mm; frequency range: 10 Hz, 55 Hz, 10 Hz		N/A
14.3.3	– moisture treatment (48 h, 17.2)		N/A
14.3.4	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 is $\leq 30\%$		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
<b>15</b>	<b>SHORT-CIRCUIT AND OVERLOAD PROTECTION</b>		<b>P</b>
15.1	General		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Tests direct after 14.1 at the same $t_a$ and without changing position.	(see appended table)	P
	Supply voltage between 0,9 times and 1,1 times of the rated supply voltage		—
	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
	Winding protected inherently (15.2)		N/A
	– Max. temperature of winding protected inherently (insulation class): $\leq 150^\circ\text{C}$ (A); $\leq 165^\circ\text{C}$ (E); $\leq 175^\circ\text{C}$ (B); $\leq 190^\circ\text{C}$ (F); $\leq 210^\circ\text{C}$ (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 4 (a) (insulation class): $\leq 200^\circ\text{C}$ (A); $\leq 215^\circ\text{C}$ (E); $\leq 225^\circ\text{C}$ (B); $\leq 240^\circ\text{C}$ (F); $\leq 260^\circ\text{C}$ (H)		N/A
	– Test according 15.3.1: max. temperature of winding <b>during the first hour, peak value</b> (insulation class): $\leq 200^\circ\text{C}$ (A); $\leq 215^\circ\text{C}$ (E); $\leq 225^\circ\text{C}$ (B); $\leq 240^\circ\text{C}$ (F); $\leq 260^\circ\text{C}$ (H)		P
	– Test according 15.3.1: max. temperature of winding <b>after first hour, peak value</b> (insulation class): $\leq 175^\circ\text{C}$ (A); $\leq 190^\circ\text{C}$ (E); $\leq 200^\circ\text{C}$ (B); $\leq 215^\circ\text{C}$ (F); $\leq 235^\circ\text{C}$ (H)		N/A
	– Test according 15.3.1: max. temperature of winding <b>after first hour, arithmetic mean value</b> (insulation class): $\leq 150^\circ\text{C}$ (A); $\leq 165^\circ\text{C}$ (E); $\leq 175^\circ\text{C}$ (B); $\leq 190^\circ\text{C}$ (F); $\leq 210^\circ\text{C}$ (H)		P
	Max. temperature of external enclosures (accessible by test finger) $\leq 105^\circ\text{C}$		P
	Max. temperature of insulation of wiring (rubber and PVC) $\leq 85^\circ\text{C}$		P
	Temperature rise of supports $\leq 105^\circ\text{C}$		P
15.2	For inherently short-circuit proof transformers and for transformers with rectifiers test by short circuit of the output winding at rated supply voltage x 1,1: temperature rises $\leq$ values in table 3		N/A
15.3	For non-inherently short-circuit proof transformers and for transformers with rectifiers: temperature rises $\leq$ values in table 3		P

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Clause	Requirement + Test	Result - Remark	Verdict
15.3.1	Output terminals short-circuited: protection device operates, test at 0,9 ... 1,1 of the rated supply voltage	1)short-circuit after 14.2 at hot condition, electronic circuit protected immediately 2)short-circuit at cold condition, electronic circuit protected immediately	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 4.		N/A
15.3.3	If protected by a fuse accordance with either IEC 60 127 or ISO 8820, or a technical equivalent fuse, the transformer is loaded with the current as specified for the longest pre arcing time. <i>If protected by a miniature fuses in accordance to IEC 60127, 1,5 times of the rated fuse, until steady state condition (in addition)</i>		N/A
15.3.4	If protected by a circuit-breaker according to IEC 60 898 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 60 898) test with 0,95 times of operating current		P
	If an internal weak 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 3		N/A
15.4	For non-short-circuit proof transformers: temperature rises $\leq$ values in table 3, 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): $\leq t1$ ; $\leq 5$ h .....		N/A
15.5.2	During the test:		N/A
	– no flames, molten material, etc.		N/A
	– temperature of enclosure $\leq 175$ °C		N/A
	– temperature of plywood support $\leq 125$ °C		N/A
	After the test:		N/A

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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 of the SMPS fulfil the requirements of <b>Annex H of part 1</b> . After a fault: no electric shock, no fire hazard and no unintentional operation.	(Details see Annex H)	P
<b>16</b>	<b>MECHANICAL STRENGTH</b>		<b>P</b>
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		P
	– no damage for insulating barriers		N/A
	– handles, levers, etc. have not moved on shafts		N/A
16.2	Transformers (stationary and portable s. 16.1)		P
	For stationary and portable transformers: 3 blows, impact energy 0,5 Nm		P
16.3	Portable transformers (except of plug in transformers)		N/A
	For portable transformers: 100 falls, 25 mm		N/A
16.4	Transformers with integrated pins (plug in transformers), the following tests are carried out:		P
	a) plug-in transformers: tumbling barrel test: 50 x ≤ 250 g; 25 x ≥ 250 g	Approx. 123g, 50 times	P
	b) torque test of the plug pins with 0,4 Nm		P
	c) pull force according to table 5 for each pin		P
<b>17</b>	<b>PROTECTION AGAINST HARMFUL INGRESS OF WATER AND MOISTURE</b>		<b>P</b>
17.1	Degree of protection (IP code marked on the transformer)	IP20	P
	Test according to 17.1.1 and for other IP ratings test according to IEC 60 529:		P
	– stable operating temperature before starting the test for < IPX8		P
	– transformer mounted and wired as in normal use		P
	– fixed transformer mounted as in normal use by the tests according to 17.1.1 A to L		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	– portable transformers placed in the most unfavourable position and wired as in normal use		P
	– glands tightened with a torque equal to two-thirds of 25.6		N/A
	After the tests:		P
	– dielectric strength test according to 18.3		P
	Inspection:		P
	a) in dust-proof transformers no deposit of talcum powder		N/A
	b) no deposit of talcum powder inside dust-tight transformers		N/A
	c) 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
	d) no accumulation of water in transformers $\geq$ IPX1 so as to impair safety		N/A
	e) no trace of water entered in any part of water-tight transformer		N/A
	f) no entry into the transformer by the relevant test probe		P
17.1.1	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
	B) Solid-object-proof transformers:		N/A
	- wire 2,5 mm; force 3 N		N/A
	- IP4X, wire 1 mm; force 1 N		N/A
	C) Dust-proof transformers, IP5X; 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
	e) after 1 min transformer is switched off for cooling time of 3 h		N/A
	A) Dust-tight transformers (IP6X) test according to C)		N/A
	B) Drip-proof transformers (IPX1) test according to fig. 3 of IEC 60 529 for 10 min		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	C) 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
	D) 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
	E) 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
	F) Jet-proof transformer (IPX5) test according to fig. 6 of IEC 60 529 (nozzle 6,3mm)		N/A
	G) Powerful Jet-proof transformer (IPX6) test according to fig. 6 of IEC 60 529 (nozzle 12 mm)		N/A
	H) Watertight transformers (IPX7)		N/A
	I) Pressure watertight transformers (IPX8)		N/A
17.2	After moisture test (48 h for ≤ IP20, 168 h for other transformers):	30°C, 95% R.H. 48hour	P
	– insulation resistance and electric strength (Cl. 18)		P
<b>18</b>	<b>INSULATION RESISTANCE AND ELECTRIC STRENGTH</b>		<b>P</b>
18.2	Insulation resistance between:		P
	– live parts and body for basic insulation $\geq 2 \text{ M}\Omega$		N/A
	– live parts and body for reinforced insulation $\geq 7 \text{ M}\Omega$	>100 MΩ	P
	– input circuits and output circuits for basic insulation $\geq 2 \text{ M}\Omega$		N/A
	– input circuits and output circuits for double or reinforced insulation $\geq 5 \text{ M}\Omega$	>100 MΩ	P
	– each input circuit and all other input circuits connected together $\geq 2 \text{ M}\Omega$		N/A
	– each output circuit and all other output circuits connected together $\geq 2 \text{ M}\Omega$		N/A
	– hazardous live parts and metal parts with basic insulation (Class II transformers) $\geq 2 \text{ M}\Omega$		N/A
	– body and metal parts with basic insulation (Class II transformers) $\geq 5 \text{ M}\Omega$		N/A
	– metal foil in contact with inner and outer surfaces of enclosures $\geq 2 \text{ M}\Omega$	>100 MΩ	P
18.3	Electric strength test (1 min): no flashover or breakdown:		P

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Clause	Requirement + Test	Result - Remark	Verdict
	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) .....	Working voltage: 263Va.c. Test voltage: 3860Va.c. (between pri circuit and sec. circuit)	P
	3) basic or supplementary insulation between:		P
	a) live parts of different polarity; working voltage (V); test voltage (V) .....	Working voltage: 240Va.c. Test voltage: 1820Va.c. (between L and N)	P
	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) :	Working voltage: 240Va.c. Test voltage: 3640Va.c. (between pri circuit and enclosure)	P
	5) Functional insulation for windings intended to be connected in series or parallel (test voltage = working voltage + 500 V) (IEC 61558-2-16:09)		N/A
18.4	Does not apply (IEC 61558-2-16:09)		-
18.101	Impulse test according Table F5 of IEC 60664-1 with 1,2/50 $\mu$ s (IEC 61558-2-16)		P
	– After the test of 18.3, 10 impulses of each polarity between input and output terminals		P
	– During the tests no breakdown of the insulation between turns of a winding, between input and output circuits, or between windings and any conductive core		P
18.102 (A1)	Partial discharge tests according to IEC 60664-1, if the working voltage is > 750 V peak		N/A
	Partial discharge is $\leq 10$ pC at time P2 See Fig. 19.101		N/A
18.5	Touch current and protective earth current		P
18.5.1	Touch current		P



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Clause	Requirement + Test	Result - Remark	Verdict
	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 8. Measuring network according Figure J1 (Annex J). If the frequency is >30kHz, measuring across the 500 Ohm resistor of J1 (burn effects).		P
	Measurement of the touch current with switch p of picture 8 in both positions and in combination with switches e and n. The measured values are less than the required values of table 8b.	Under normal condition: Max. 0.282mA (to output terminals) Max. 0.01mA (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
18.5.2	Protective earth conductor current		-
	The transformer is connected as in clause 14 Impedance of the ammeter < 0,5 Ohm, connected between earth terminal of the transformer and protective earth conductor		N/A
	The measured values are less than the required values of table 8b.		N/A
<b>19</b>	<b>CONSTRUCTION</b>		<b>P</b>
19.1	Separation of input and output circuits		P
19.1.1	SMPS incorporating auto-transformers (IEC 61558-2-16:2009)		N/A
19.1.1.1	For plug connected auto-transformers with rated input voltage > rated output voltage the potential to earth shall not exceed the rated output voltage. (IEC 61558-2-16:2009)		N/A
19.1.1.2	SMPS with 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. (IEC 61558-2-16:2009)		N/A
19.1.1.3	A polarity detecting device only energises the output in the case: output potential to earth $\leq$ rated output voltage, also with reversed input plug. (IEC 61558-2-16:2009)		N/A
	– The contact separation of the device is $\geq$ 3mm		N/A
	– A current to earth does not exceed 0,75 mA.		N/A
	– All tests are repeated under fault conditions of H.2.3 of annex H of part 1. The potential to earth does not exceed the max output voltage for more than 5 s.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
19.1.2	SMPS incorporating separating transformers (IEC 61558-2-16:09)		N/A
19.1.2.1	Input and output circuits electrically separated. (IEC 61558-2-16:09)		N/A
19.1.2.2	The insulation between input and output winding(s) consist of basic insulation (IEC 61558-2-16:09)		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 (IEC 61558-2-16:2009)		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
19.1.2.3	The insulation between input windings and intermediate conductive parts and the output windings and intermediate part consist of basic insulation (IEC 61558-2-16:09)		N/A
	For class I SMPS the insulation between input and output windings via the intermediate conductive parts consist of basic insulation (IEC 61558-2-16:2009)		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. (IEC 61558-2-16:2009)		N/A
19.1.2.4	Parts of output circuits may be connected to protective earth (IEC 61558-2-16:09)		N/A
19.1.2.5	No direct contact between output circuits and the body, unless: (IEC 61558-2-16:2009)		N/A
	– Allowed for associated transformers by the equipment standard		N/A
	– Clause 19.8 of part 1 is fulfilled		N/A
19.1.3	SMPS incorporating isolating transformers and safety isolating transformers (IEC 61558-2-16:09)		P
19.1.3.1	Input and output circuits electrically separated (IEC 61558-2-16:09)		P
	No possibility of any connection between these circuits		P

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Clause	Requirement + Test	Result - Remark	Verdict
19.1.3.2	The insulation between input and output winding(s) consist of double or reinforced insulation (exception see 19.1.3.4) (IEC 61558-2-16:09)		P
	Class I SMPS <b>not</b> intended for connection to the mains by a plug:		—
	– 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 SMPS intended for connection to the mains by a plug (EN 61558-2-16:09):		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 SMPS (IEC 61558-2-16:2009)		P
	– Insulation between input windings and body consist of double or reinforced insulation rated to the input voltage		P
	– Insulation between output windings and body consist of double or reinforced insulation, rated to the output voltage		N/A
19.1.3.3	SMPS with intermediate conductive parts not connected to the body (between input/output) (EN 61558-2-16:09):		-
19.1.3.3.1	For class I and class II SMPS the insulation between input and output windings, via intermediate conductive parts, consist of double or reinforced insulation, rated to the working voltage (EN 61558-2-16:09).		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. (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
19.1.3.3.2	Class I transformers with earthed core, and not allowed for class II equipment (EN 61558-2-16:09)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	– Insulation from the input to the earthed core: basic insulation rated for the input voltage		N/A
	– Insulation from the output voltage to the earthed core: basic insulation rated for the output voltage		N/A
19.1.3.3.3	Insulation between : input to intermediate conductive parts and output and intermediate parts consist of at least basic insulation (EN 61558-2-16:09)	The copper between CY2 & CY3 is considered as intermediate conductive parts.	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.		N/A
19.1.3.4	For class I SMPS, with protective screen, <b>not</b> connected to the mains by a plug the following conditions comply (EN 61558-2-16:09):		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 SMPS with plug connection to the mains (EN 61558-2-16:09)		N/A
19.1.3.5	No connection between output circuit and protective earth, except of associated transformers (allowed by equipment standard) or 19.8 is fulfilled (EN 61558-2-16:09).		N/A
19.1.3.6	No connection between output circuit and body, except of associated transformers (allowed by equipment standard) (EN 61558-2-16:09)		P
19.1.3.7	The distance between input and output terminals for the connection of external wiring is $\geq 25$ mm		P

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Clause	Requirement + Test	Result - Remark	Verdict
19.1.3.8	Portable SMPS having an rated output $\leq 630$ VA (EN 61558-2-16:09)		P
19.1.3.9	No connection between output circuit and body except of associated transformers (allowed by equipment standard) (EN 61558-2-16:09)		P
19.1.3.10	Protective screening is not allowed for SMPS with plug connection to the mains (EN 61558-2-16:09)		N/A
19.2	Fiercely burning material not used		P
	Unimpregnated cotton, silk, paper and fibrous material not used as insulation		P
	Wax-impregnated, etc. not used		P
19.3	Portable transformer: short-circuit proof or fail-safe	Short-circuit proof transformer	P
19.4	Class II transformers: contact between accessible metal parts and conduits or metal sheaths of supply wiring impossible		N/A
19.5	Class II transformers: part of supplementary or reinforced insulation, during reassembly after routine servicing not omitted		P
19.6	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 $\leq 50\%$ specified values (Cl. 26)	Internal wire was double fixed by soldering and glue.	P
19.7	Conductive parts connected to accessible metal parts by resistors or capacitors shall be separated from hazardous live parts by double or reinforced insulation		P
19.8	Resistors or capacitors connected between hazardous live parts and the body (accessible metal parts) consist of:		P
	– components according to IEC 60 065, 14.1 or capacitor Y1 according to IEC 60 384-14		P
	– at least two separate components	Two approved Y capacitor in series used (when CY2 & CY3 used)	P
	– if one component is short-circuited or opened, values specified in Cl. 9 shall not be exceeded		P
	– if the working voltage is $\leq 250$ V, one Y1 capacitor according 60384-14 is allowed	CY1 used as alternative construction	P
19.9	Insulation material input/output and supplementary insulation of rubber resistant to ageing		N/A
	Creepage distances (if cracks) $\geq$ specified values (Cl. 26)		N/A
19.10	Protection against accidental contact by insulating coating:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	a) ageing test (section I, IEC 60 068-2-2), test Ba: 168 h; 70 °C		N/A
	b) impact test (spring-operated impact hammer according to IEC 60 068-2-63; 0,5 ± 0,05 J)		N/A
	c) scratch test (hardened steel pin) electric strength test according to Cl. 18		N/A
19.11	Handles, levers, knobs, etc.:		N/A
	– insulating material		N/A
	– supplementary insulation covering		N/A
	– separated from shafts or fixing by supplementary insulation		N/A
19.12	Windings 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 13		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 (A1)	Insulated windings wires providing basic, supplementary or reinforced insulation, meet the following requirements:	Approved TIW used	P
	• 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		P
	Spirally wrapped insulation:		N/A
	• creepage distances between wrapped layers > cl. 26 _ P1 values		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	<ul style="list-style-type: none"> <li>path between wrapped layers sealed, the test voltage of K2 is multiplied with 1,35</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>test 26.2.3 – Test A, passed for wrapped layers</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>the finished component pass the electric strength test according to cl. 18.3</li> </ul>		N/A
a)	Insulated winding wire used for basic or supplementary insulation in a wound part:		N/A
	<ul style="list-style-type: none"> <li>comply with annex K</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>two layers for supplementary insulation</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>one layer for basic insulation</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>one layer for mechanical separation between the insulated wires of primary and secondary. This layer fulfils the requirement of basic insulation.</li> </ul>		N/A
b)	Insulated winding wire used for reinforced insulation in a wound part:	Approved TIW used	P
	<ul style="list-style-type: none"> <li>comply with annex K</li> </ul>		P
	<ul style="list-style-type: none"> <li>three layers</li> </ul>		P
	<ul style="list-style-type: none"> <li>relevant dielectric strength test of 18.3</li> </ul>		P
	Where the insulated winding wire is wound:		P
	<ul style="list-style-type: none"> <li>upon metal or ferrite cores</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>upon enamelled wire</li> </ul>		P
	<ul style="list-style-type: none"> <li>under enamelled wire</li> </ul>		P
	<ul style="list-style-type: none"> <li>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.</li> </ul>		P
	<ul style="list-style-type: none"> <li>both windings shall not touch each other and also not the core.</li> </ul>		P
	100 % routine test of Annex K3 of part 1 is fulfilled		N/A
	no creepage distances and clearances for insulated winding wirers		N/A
	for TIW wires values of box 2) c) of table 13, table C.1 and table D.1 of part 1 and of clause 26.106 are not required		P
<b>FIW</b>	<u>Transformers which use FIW wire</u>		-
19.12.101 (A1)	Max. class F for transformers which use FIW-wire		N/A
19.12.102 (A1)	FIW wires comply with IEC 60851-5, Ed.4.1; IEC 60317-0-7 and IEC 60317-56, Ed.1.		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
	<ul style="list-style-type: none"> <li>other nominal diameter as mentioned in table 19.101 can be calculated with the formula after table 19.111</li> </ul>		N/A
	FIW wire used for basic or supplementary insulation for transformers according 19.1.2 (separating-transformers) of IEC 61558-2-16:		–
	<ul style="list-style-type: none"> <li>the test voltage of table 8a – part 1, based on the working voltage of basic or supplementary insulation, comply with the min. voltage strength of table 19.111</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>one layer for mechanical separation is located between the insulated wires of primary and secondary. This layer fulfil the requirement of basic insulation</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>between FIW and enamelled wire, no requirements of creepage distances and clearances</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>no touch of FIW and enamelled wires (grad 1, or grad 2 ...)</li> </ul>		N/A
	FIW wire used for double or reinforced insulation for transformers according 19.1.3 (isolating and safety isolating transformers) of IEC 61558-2-16 (PRI and SEC basic insulated FIW-wire):		N/A
	<ul style="list-style-type: none"> <li>the test voltage of table 8a – part 1, based on the working voltage of basic or supplementary insulation, comply with the min. voltage strength of table 19.111</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>for primary and secondary winding FIW-wire for basic insulation is used</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>one layer for mechanical separation is located between the insulated wires of primary and secondary. This layer fulfil the requirement of basic insulation</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>no touch between the basic insulated PRI and SEC FIW-wires</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>between PRI- and SEC-FIW wires, no requirements of creepage distances and clearances</li> </ul>		N/A
	Alternative construction used for reinforced insulation (reinforced insulated FIW wire and enamelled wire)		N/A
	<ul style="list-style-type: none"> <li>the test voltage of table 8a – part 1, based on the working voltage reinforced insulation, comply with the min. voltage strength of table 19.111</li> </ul>		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	<ul style="list-style-type: none"> <li>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</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>no touch between the FIW wire and the enamelled wire</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>between the reinforced FIW wire and any other parts, no requirements of creepage distances and clearances exist</li> </ul>		N/A
	Alternative construction with FIW wires, basic or supplementary insulated for transformers with double or reinforced insulation according to 19.1.3 (basic/supplementary insulated FIW wire + enamelled wire + creepage distance and clearances for basic insulation)		—
	<ul style="list-style-type: none"> <li>the test voltage of table 8a – part 1, based on the working voltage of basic or supplementary insulation, comply with the min. voltage strength of table 19.111</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>PRI or SEC basic insulated FIW wire and to the other winding (enamelled wire) requirements of supplementary insulation</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>creepage distances and clearances between the basic insulated FIW wire and the enamelled wire for basic or supplementary insulation are required.</li> </ul>		N/A
	Where the FIW wire is wound		N/A
	<ul style="list-style-type: none"> <li>upon metal or ferrite cores</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>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.</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>both windings shall not touch each other and also not the core.</li> </ul>		N/A
19.13	Handles, operating levers and the like shall be fixed		N/A
19.14	Protection against electric shock: covers securely fixed, 2 independent fixing means, one with tool	Enclosure secured by ultrasonic welding	P
19.15	Transformer with pins for fixed socket-outlets: no strain on socket-outlet		P
	Additional torque $\leq 0,25$ Nm	0.056Nm max.	P
19.16	Protection index for portable transformers:		P
	$\leq 200$ VA $\geq$ IP20 and instructions for use	IP20	P
	$> 200$ VA $\leq 2,5$ kVA $\geq$ IPX4 (single-phase)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	$> 200 \text{ VA} \leq 6,3 \text{ kVA} \geq \text{IPX4}$ (polyphase)		N/A
	$> 2,5 \text{ VA}$ (single-phase) $\geq \text{IP21}$		N/A
	$> 6,3 \text{ VA}$ (polyphase) $\geq \text{IP21}$		N/A
19.17	Transformers IPX1 - IPX6 totally enclosed, except for drain hole (diameter $\geq 5 \text{ mm}$ or $20 \text{ mm}^2$ with width $\geq 3 \text{ mm}$ ); drain hole not required for transformer completely filled with insulating materials		N/A
19.18	Transformers $\geq \text{IPX1}$ with a moulded, if any		N/A
19.19	Class I transformers with a non-detachable flexible cable or cord with earth conductor and a plug with earth contact		N/A
19.20	Live parts of SELV and PELV-circuits: separation not less than PRI/SEC of a safety isolating transformer		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		N/A
	Nominal voltage (V) $> 25 \text{ V a.c.}$ or $60 \text{ V d.c.}$ , the required insulation fulfils the high voltage test according to table 8 a		N/A
19.20.2	PELV-circuits double or reinforced insulation is necessary		N/A
19.21	FELV-circuits: protection against contact fulfils the min. test voltage required for the primary circuit		N/A
19.22	Class II transformers shall not be provided with means for protective earth		P
	For fixed transformers an earth conductor with double or reinforced insulation to accessible metal parts is allowed		N/A
19.23	Class III transformers shall not be provided with means for protective earth		N/A
<b>20</b>	<b>COMPONENTS</b>		<b>P</b>
	Components such as switches, plugs, fuses, lamp holders, flexible cables and cords, comply with relevant IEC standard		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

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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).		P
	– Components without markings tested under transformer conditions including inrush current.		P
	– If no IEC standard exists, the component is tested under transformer conditions.		P
20.1	Appliance couplers for main supply shall comply with:		N/A
	– IEC 60 320 for IPX0		N/A
	– IEC 60 309 for other		N/A
20.2	Automatic controls shall comply with IEC 60 730-1		N/A
20.3	Thermal-links comply with IEC 60691		N/A
20.4	Switches shall comply with annex F		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
20.5	Socket-outlets of the output circuit shall be such that there is no unsafe compatibility to plugs complying with input circuit.		P
	Plugs and socket-outlets for SELV systems with both a rated current = 3A and a rated voltage =24 V shall comply with following:		P
	SELV plug and socket-outlets shall comply with IEC 60 884-2-4 and IEC 60 906-3		N/A
	– It is not possible for plugs to enter socket-outlets of other standardised voltage system		P
	– Socket outlets do not accommodate plugs of other standardised voltage systems		P
	– Socket outlets do not have a protective earth contact		P
	PELV 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

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Clause	Requirement + Test	Result - Remark	Verdict
	– 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
20.6	Thermal cut-outs, overload releases etc. have adequate breaking capacity	Fuse resistor used	P
	– Thermal cut outs fulfil the relevant requirements of 20.7 and 20.8		N/A
	– Thermal links fulfil the relevant requirements of 20.8		N/A
	– The breaking capacity is in accordance with the relevant fuse standard		N/A
20.6.1	For Fuses According IEC 60127 and IEC 60269, the fuse current does not exceed 1,1 times of the rated value		N/A
20.7	Thermal cut outs shall meet the requirements of 20.7.1.1 and 20.7.2, or 20.7.1.2 and 20.7.2.		N/A
20.7.1	Requirements according to IEC 60730-1		N/A
20.7.1.1	Thermal cut-out tested as component shall comply with IEC 60 730-1		N/A
20.7.1.2	Thermal cut-out tested as a part of the transformer		N/A
	a) Thermal cut outs type 1 or type 2 (IEC 60730-1)		N/A
	b) Thermal cut outs fulfil the requirements of micro-interruption (type 1C or 2 C) or micro-disconnection, (type 1B or 2B) (see IEC 60730-1)		N/A
	c) Thermal cut outs with manual reset have a trip free mechanism (type 1E and 2E) (see IEC 60730-1)		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
	– 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

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Clause	Requirement + Test	Result - Remark	Verdict
	e) Thermal cut outs fulfil the electrical stress according IEC 60730-1, 6.14.2		N/A
	f) Characteristic of thermal cut-outs:		N/A
	– ratings according IEC 60730-1, cl. 5		N/A
	– classification according to:		-
	1) nature of supply to IEC 60730-1, cl. 6.1		N/A
	2) type of load controlled to IEC 60730-1, cl. 6.2		N/A
	3) degree of protection IPX0 to IEC 60730-1, cl. 6.5.1		N/A
	4) degree of protection IP0X to IEC 60730-1, cl. 6.5.2		N/A
	5) pollution degree to IEC 60730-1, cl. 6.5.3		N/A
	6) comparative tracking index to IEC 60730-1, cl. 6.13		N/A
	7) max. ambient temperature to IEC 60730-1, cl. 6.7		N/A
20.7.1.2	Thermal cut-out tested as a part of the transformer, test with 3 samples:		-
	– at least micro-interruption or micro-disconnection (IEC 60730-1)		N/A
	– 300 h aged at $t_a$ (transformer) + 10°C		N/A
	– subjected to a number of cycles for automatic operating according 20.7.1.1		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
20.7.2	Thermal cut-outs shall have adequate breaking capacity		-
20.7.2.1	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 $t_a$ min		N/A
	– 3 cycles at $t_a$ min for transformers with $t_a$ min		N/A
	– 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

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Clause	Requirement + Test	Result - Remark	Verdict
20.7.2.2	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 ta min		N/A
	– 24 h at ta and 24 h at ta min for transformers with ta min		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
20.7.3	Test of a PTC resistor:		-
	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
20.8	Thermal links shall be tested in one of the following two ways.		-
20.8.1	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 IEC 60691, cl. 8 b		N/A
	– suitability of sealing components, impregnating fluids or cleaning solvents IEC 60691, cl. 8 c		N/A
20.8.2	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 M		N/A
	– 3 cycles for replaceable thermal-links		N/A
	– 3 new specimens for not replaceable thermal-links		N/A
20.9	Self-resetting devices not used if mechanical, electrical, etc. hazards		N/A
20.10	Thermal cut-outs which can be reset by soldering operation are not allowed		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
20.11	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.	264V, 20 times, intervals 10s	P
<b>21</b>	<b>INTERNAL WIRING</b>		<b>P</b>
21.1	Internal wiring and electrical connections protected or enclosed	The internal and external wire were double fixed by soldering and glue; or the external wire was fixed by rivet and soldering	P
	Wire-ways smooth and free from sharp edges		P
21.2	Openings in sheet metal: edges rounded (radius $\geq 1,5$ mm) or bushings of insulating material		N/A
21.3	Bare conductors: distances adequately maintained		P
21.4	When external wires are connected to terminal, internal wiring shall not work loose	The internal and external wire were double fixed by soldering and glue; or the external wire was fixed by rivet and soldering	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
<b>22</b>	<b>SUPPLY CONNECTION AND EXTERNAL FLEXIBLE CABLES AND CORDS</b>		<b>P</b>
22.1	All cables, flexible cords etc. shall have appropriate current and voltage ratings		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		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		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
22.4	Length of power supply cord for portable transformers between 2 m and 4 m; without $0,5 \text{ mm}^2$		N/A
22.5	Power supply cords for transformers IPX0 and transformers "for indoor use only" $\geq$ IPX0:		N/A
	– for transformers with a mass $\leq 3$ kg: 60227 IEC52 ( H03VV-..) (60245 IEC 53)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	– for transformers with a mass > 3 kg: 60227 IEC53 (H05VV-..) or 60245 IEC 53		N/A
	Power supply cords for transformers for outdoor use: $\geq$ IPX0: 60245 IEC57 (H05RN-..)		N/A
22.6	Power supply cords for single-phase portable transformers with input current $\leq$ 16A:		N/A
	– cord set fitted with an appliance coupler in accordance with IEC 60320		N/A
22.7	Nominal cross-sectional area (mm <sup>2</sup> ); input current (A) at rated output not less than shown in table 9		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 $\leq$ 16 A according to IEC 60 083, IEC 60 906-1 or IEC 60 309		N/A
22.9	Type X, Y or Z attachments: see relevant part 2	Type Z	P
22.9.1	For type Z attachment: moulding enclosure and power supply cable do not affect insulation of cable		P
22.9.2	Inlet openings or inlet bushing: without risk of damage to protective covering of power supply cord		N/A
	Insulation between conductor and enclosure:		N/A
	– for Class I transformer: insulation of conductor plus separate basic insulation		N/A
	– for Class II transformer: insulation of conductor plus double or reinforced insulation		N/A
22.9.3	Inlet bushings:		N/A
	– no damage to power supply cord		N/A
	– reliably fixed		N/A
	– not removable without tool		N/A
	– not integral with power supply 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 portable 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. 7:		N/A
	– loaded force during the test according to fig. 7		N/A
	– 10 N for a cross-sectional area > 0,75		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	– 5 N for a cross-sectional area 0,75		N/A
	After the test according to fig. 7:		N/A
	– no short-circuit between the conductors		N/A
	– no breakage of more than 10% of strands 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:		N/A
	– glands in portable transformers not used unless possibility for clamping all types and sizes of cable		N/A
	– 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

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Clause	Requirement + Test	Result - Remark	Verdict
	– 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		P
	Test for type X attachments one test with a cord with smallest and one test with a cord with the largest cross-sectional area:		N/A
	– for the test with clamping screws or tightened with torque 2/3 of that specified in table 11		N/A
	– not possible to push cable into transformer		P
	– 25 pulls of 1 s		P
	– 1 min torque according to table 10		P
	– mass (kg); pull (N); torque (Nm) ..... : 0.123kg, 30N, 0.1Nm		—
	– during test: cable not damaged		P
	– after test: longitudinal displacement $\leq 2$ mm for cable or cord and $\leq 1$ mm for conductors in terminals	0.4mm	P
	– creepage distances and clearances $\geq$ 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

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Clause	Requirement + Test	Result - Remark	Verdict
	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
<b>23</b>	<b>TERMINALS FOR EXTERNAL CONDUCTORS</b>		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, terminals	No such terminals used	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
	– 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 metal parts should conductor break away $\geq 50\%$ of specified value (Cl. 26)		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 metal parts should conductor break away $\geq 50\%$ of specified value (Cl. 26)		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

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Clause	Requirement + Test	Result - Remark	Verdict
	– 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
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 inaccessible metal parts for Class II transformers		N/A
<b>24</b>	<b>PROVISION FOR PROTECTIVE EARTHING</b>		<b>P</b>
24.1	Class I transformers: accessible conductive parts connected to earth terminal	Class II transformer	N/A
	Class II transformers: no provision for earth		P

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Clause	Requirement + Test	Result - Remark	Verdict
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
24.4	Resistance of connection between earth terminal and metal parts 0,1 with a min. 25 A or 1,5 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
<b>25</b>	<b>SCREWS AND CONNECTIONS</b>		N/A
25.1	Screwed connections withstand mechanical stresses	No such screw used	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
	No damage after torque test: diameter (mm); torque (Nm); ten times		N/A
	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 + 1/2 screw diameter or 8 mm		N/A
	– correct introduction into screw hole		N/A
25.3	Electrical connections: contact pressure not transmitted through insulating material		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
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
	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 12. After the test no damage at the transformer and the gland.		N/A
<b>26</b>	<b>CREEPAGE DISTANCES AND CLEARANCES</b>		<b>P</b>
26.1	See 26.101		P
26.2	Creepage distances (cr) and clearances (cr)		P
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
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
26.2.3	Cemented insulating parts		N/A
	– all isolating materials are classified acc. to IEC 60085 and IEC 60216		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



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Clause	Requirement + Test	Result - Remark	Verdict
	– 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 $\mu$ s waveform) – see Annex R of IEC 61558-1		N/A
26.2.4	Enclosed parts, by impregnation or potting		N/A
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
	– 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 $\mu$ s waveform) – see Annex R of IEC 61558-1		N/A
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

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Clause	Requirement + Test	Result - Remark	Verdict
	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 $\mu$ s waveform) – see Annex R of IEC 61558-1		N/A
26.3	Distance through insulation		P
	For double or reinforced insulation, the required values of Tables 13, C1, and D1 – boxes 2b, 2c and 7 are fulfilled		P
	The insulation fulfil the material classification according IEC 60085 or 60216 or the test of 14.3	Approved insulation material used	P
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 $\geq 0,2$ mm		N/A
	– Minimum thickness of supplementary insulation $\geq 0,1$ mm		N/A
26.3.2	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

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Clause	Requirement + Test	Result - Remark	Verdict
	– 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:		P
	– The requirement of 3 layers is fulfilled		P
	– If serrated tape is used, 1 additional layer (serrated) and one additional layer without serration is required		N/A
	– The mandrel test according 26.3.3 is fulfilled on 2/3 of the layers with 100 N		P
	– The required values for d.t.i. of Tables 13, C.1 and D.1 – marked by index "e" is fulfilled.	Dti: 0.05mm x 3=0.15mm (3 layers of insulation tape wrapped around transformer	P
	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:		P
	– rated output > 100 VA values in square brackets apply		N/A
	– rated output $\geq 25 \text{ VA} \leq 100 \text{ VA}$ 2/3 of the value in square brackets apply		N/A
	– rated output $\leq 25 \text{ VA}$ 1/3 of the value in square brackets apply		P
26.3.3	Mandrel test of insulation in thin sheet form (specimen of 70 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 N		N/A

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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 breakdown.		N/A
	– If the layers are separable and 2/3 of at least 3 layers fulfil the test.		P
	– pull force of 100 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 breakdowns.	5000V	P
	– 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
26.101	Creepage distances, clearances and distances through insulation, specified values according to (EN 61558-2-16:09):		P
	– table 13, material group IIIa (part 1)		P
	– table C, material group II (part 1)		N/A
	– table D, material group I (part 1)		N/A
	– working voltage		P
	– rated supply frequency 50/60 Hz		P
	– rated internal frequency		P
	1. Insulation between input and output circuits (basic insulation):		N/A
	a) measured values $\geq$ specified values (mm) .....		N/A
	2. Insulation between input and output circuits (double or reinforced insulation):		P
	a) measured values $\geq$ specified values (mm) .....	(see appended table)	P
	b) measured values $\geq$ specified values (mm) .....		N/A
	c) measured values $\geq$ specified values (mm) .....		P
	3. Insulation between adjacent input circuits: measured values $\geq$ specified values (mm) :		N/A
	Insulation between adjacent output circuits: measured values $\geq$ specified values (mm) . :		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	4. Insulation between terminals for external connection:		N/A
	a) measured values $\geq$ specified values (mm) .....		N/A
	b) measured values $\geq$ specified values (mm) .....		N/A
	c) measured values $\geq$ specified values (mm) .....		N/A
	5. Basic or supplementary insulation:		P
	a) measured values $\geq$ specified values (mm) .....	(see appended table)	P
	b) measured values $\geq$ specified values (mm) .....		N/A
	c) measured values $\geq$ specified values (mm) .....		N/A
	d) measured values $\geq$ specified values (mm) .....		N/A
	e) measured values $\geq$ specified values (mm) .....		N/A
	6. Reinforced or double insulation: measured values $\geq$ specified values (mm) .....		P
	7. Distance through insulation:		P
	a) measured values $\geq$ specified values (mm) .....		N/A
	b) measured values $\geq$ specified values (mm) .....		N/A
	c) measured values $\geq$ specified values (mm) .....		P
26.102	Values of IEC 61558-2-16 applicable for frequency up to 3 MHz (EN 61558-2-16:09)	(see appended table)	P
	For frequency above 3 MHz clause 7 of IEC 60664-4 is applicable (high frequency testing)		N/A
26.103	Clearance (EN 61558-2-16:09)		P
	a) Clearance for frequency $\geq$ 30 kHz according figure 101 two determinations are necessary:	Max. 81 kHz	P
	– determination based on peak working voltage according Table 104 :		P
	Peak working voltage		P
	Basic insulation: required / measured		P
	Double or reinforced insulation: required / measured value		P

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Clause	Requirement + Test	Result - Remark	Verdict
	– and alternative if applicable for approximately homogeneous field according to Table 102		P
	Peak working voltage		P
	Basic insulation: required / measured		P
	Double or reinforced insulation: required / measured value		P
	– determination based on measured r.m.s. working voltage according Tables 13, C1 and D1 (see clause 26.101)		P
	The minimum clearance is the greater of the two values.		P
	b) Clearance for frequency $\leq 30$ kHz according figure 101 two determinations are necessary:		P
	– 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)		P
	The minimum clearance is the greater of the two values.		P
26.104	The working voltages of Table 102, 103 and 104 are peak voltages including $\mu$ sec peaks EN 61558-2-16:09)		P
	The working voltage according to Table 13 of part 1 are r.m.s. voltages		P
26.105	Creepage distances		P
	Two determinations of creepage distances are necessary (see Figure 102)		P
	– determination based on measured peak working voltage according Tables 105 to 110		P
	Peak working voltage		P
	Pollution degree	2	P
	Basic or supplementary insulation: required / measured		P
	Double or reinforced insulation: required / measured value		P
	– determination based on measured r.m.s. working voltage according Tables 13, C1 and D1 (see clause 26.101)		P
	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		P

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Clause	Requirement + Test	Result - Remark	Verdict
26.106	Distance through insulation (EN 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
	–		N/A
	–		N/A
	For thick layers $d_1 \geq 0,75$ the peak value of the field strength is $\leq 2$ kV/mm		N/A
	For thin layers $d_2 \leq 30 \mu\text{m}$ the peak value of the field strength is $\leq 10$ kV/mm		N/A
	For $d_1 > d > d_2$ equation (1) is used for calculation the field strength		N/A
26.107 (A1)	For transformers with FIW wires the following test is required		N/A
	<ul style="list-style-type: none"> <li>10 cycles are required</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>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</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>1 h at 25° C</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>2 h at 0° C</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>1 h at 25° C – (next cycle start again with 68 h max winding temp + 10)</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>during the 10 cycles test 2 x working voltage is connected between PRI and SEC</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>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</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>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)</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>the partial discharge test according to 18.101 is done after the cycling test and after the high voltage test, if the <b>peak</b> working voltage is &gt;750 V</li> </ul>		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
<b>27</b>	<b>RESISTANCE TO HEAT, FIRE AND TRACKING</b>		<b>P</b>
27.1	Resistance to heat		-
	All insulating parts are resistant to heat		P
	For parts of rubber, which passed the test of 19.9, no additional test is required.		N/A
	The tests are not required for cables and small connectors with a rated current $\leq 3$ A, a rated voltage $\leq 24$ V a.c. or 60 V d.c. and a power $\leq 72$ W		P
27.1.1	External accessible parts		-
	The Ball-pressure test -: diameter of impression $\leq 2$ mm; heating cabinet temperature ( $^{\circ}\text{C}$ ) at $70^{\circ}\text{C}$ or the temperature T of 14.1 (T + 15) - is fulfilled.	Enclosure/Plug holder: $125^{\circ}\text{C}$ , 1.3mm Plastic material of output connector: $125^{\circ}\text{C}$ , 1.1mm max.	P
27.1.2	Internal parts		-
	For insulating material retaining current carrying parts in position, the ball-pressure test -: diameter of impression $\leq 2$ mm; heating cabinet temperature ( $^{\circ}\text{C}$ ) at $125^{\circ}\text{C}$ or the temperature T of 14.1 (T + 15) - is fulfilled	Plug holder: $125^{\circ}\text{C}$ , 1.3mm T1 bobbin: $125^{\circ}\text{C}$ , 0.9mm max. PCB: $125^{\circ}\text{C}$ , 0.5mm max.	P
27.2	Resistance to abnormal heat under fault conditions		N/A
27.3	Resistance to fire		-
	All isolating parts of the transformer shall be resistant to ignition and spread of fire. The test according to IEC 60696-2-10 is required		-
27.3.1	External accessible parts (glow wire tests)		P
	– $650^{\circ}\text{C}$ for enclosures	Enclosure / Plug holder (no ignition)	P
	– $650^{\circ}\text{C}$ for parts retaining current carrying parts in position and terminals for external conductors Current $\leq 0,2$ A		N/A
	– $750^{\circ}\text{C}$ for parts retaining current carrying parts in position and terminals for external conductors with fixed wiring. Current $> 0,2$ A		N/A
	– $850^{\circ}\text{C}$ for parts retaining current carrying parts in position and terminals for external conductors with non-fixed wiring. Current $> 0,2$ A	Plastic material of output connector (no ignition), Enclosure / Plug holder (no ignition)	P
27.3.2	Internal parts		P
	– $550^{\circ}\text{C}$ for internal insulating material – not retaining current carrying parts in position	Insulation sheet (no ignition)	P
	– $650^{\circ}\text{C}$ for coil formers (bobbins)	T1 bobbin (no ignition)	P



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Clause	Requirement + Test	Result - Remark	Verdict
	– 650 °C for parts retaining current carrying parts in position and terminals for external conductors. Current $\leq 0,2$ 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		N/A
	– 850 °C for parts retaining current carrying parts in position and terminals for external conductors with non-fixed wiring. Current $> 0,2$ A	PCB (no ignition), T1 bobbin (no ignition), Enclosure / Plug holder (no ignition)	P
27.4	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 IIIa	IP20	N/A
	Test (175 V): no flashover or breakdown before 50 drops		N/A
<b>28</b>	<b>RESISTANCE TO RUSTING</b>		<b>P</b>
	Ferrous parts protected against rusting		P

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Clause	Requirement + Test	Result - Remark	Verdict

IEC 61558-1			
Clause	Requirement + Test	Result - Remark	Verdict
<b>E</b>	<b>ANNEX E , GLOW WIRE TEST</b>		<b>P</b>
	The test is required according to IEC 60695-2-10 and IEC 60695-2-11 with the following additions:		-
E.1	Clause 6, "Severities" of IEC 6095-2-11, apply with the temperature stated in 27.3 of IEC 61558-1		P
E2	Clause 8, "Conditioning", of IEC 60695-2-11 apply, preconditioning is required		P
E3	Clause 10, "Test Procedure", of IEC 60695-2-11 apply, The tip of the glow wire is applied to the flat side of the surface.		P
<b>F</b>	<b>ANNEX F, REQUIREMENTS FOR MANUALLY OPERATED SWITCHES WHICH ARE PARTS OF THE TRANSFORMER</b>		<b>N/A</b>
F.2	Manually operated mechanical switches, tested as separate component, shall comply with IEC 61058 under the conditions of F2.		N/A
F.§	Manually operated mechanical switches tested as part of the transformer shall comply with the conditions specified under F.3		N/A
<b>H</b>	<b>ANNEX H, ELECTRONIC CIRCUITS (IEC 61558-1)</b>		<b>P</b>
H1	General notes on tests (addition to clause 5)		P
H.2	SHORT-CIRCUIT AND OVERLOAD PROTECTION (ADDITION TO CLAUSE 15)		P
H.2.1	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 3 of Cl. 15.1		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.2.2	Fault conditions a) to f) of sub-clause H.2.3 are not tested if the following conditions are met:		N/A
	– electronic circuit is a low-power circuit as specified		N/A
	– safety of the appliance as specified does not rely on correct functioning of the electronic circuit		N/A
H.2.3	Fault conditions tested as specified when relevant:		P

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

IEC 61558-1			
Clause	Requirement + Test	Result - Remark	Verdict
	a) short-circuit of creepage distances and clearances, if less than specified in Cl. 26		P
	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		P
	f) low-power circuit: low-power points are connected to the supply source		N/A
	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		P
	Fault condition e) is applied for encapsulated and similar components		P
	PTC's and NTC's are not short-circuited if they are used as specified		N/A
H.2.4	If for a fuse-link complying with IEC 60 127-3 rated fuse current I1 is used, current I2 is measured as specified:		N/A
	– if $I2 < 2,1 \times I1$ test of 15.8 is repeated with fuse-link short-circuited		N/A
	– if $I2 > 2,75 \times I1$ , no other tests are necessary		N/A
	If $I2 > 2,1 \times I1$ and $I2 < 2,75 \times I1$ 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		N/A
H.3	CREEPAGE DISTANCES, CLEARANCES AND DISTANCES THROUGH INSULATION		P
H.3.1	For live parts separated by basic insulation smaller cr and cl as in 26 are allowed, if H2 is fulfilled.		P
	In optocouplers no requirements of cr and cl		N/A
	For coatings annex W applies. Smaller distances as required in IEC 60664-3, clause 4 are applicable,		N/A
	For potted transformers cycling tests acc, 26.2. are applicable		N/A
H.3.2	The ma. surface temperature of optocouplers is 50 K		N/A

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

IEC 61558-1			
Clause	Requirement + Test	Result - Remark	Verdict
<b>K (A1)</b>	<b>ANNEX K, INSULATED WINDING WIRES FOR USE AS MULTIPLE LAYER INSULATION</b>		<b>P</b>
K.1	Wire construction:		P
	<ul style="list-style-type: none"> <li>insulated winding wire for basic or supplementary insulation (see 19.12.3)</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>insulated winding wire for reinforced insulation (see 19.12.3)</li> </ul>	Approved TIW used	P
	<ul style="list-style-type: none"> <li>solid circular winding wires and stranded winding wires with 0,05 to 5 mm diameter</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>spirally wrapped insulation – overlapping</li> </ul>		N/A
K.2	Type tests		N/A
K.2.1	General Tests between ambient temperature between 15° C and 35° C and at an humidity between 45% and 75 %		N/A
K.2.2	Electric strength test		N/A
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

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

IEC 61558-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Mandrel diameter according table K.1		N/A
	The tension to the wire during winding on mandrel is 118 N/mm <sup>2</sup> (118 MPa)		N/A
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
	<ul style="list-style-type: none"> <li>high voltage test immediately after this test</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>Dielectric strength test: 5,5 kV for reinforced insulation</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>Dielectric strength test: 2,75 kV for basic or supplementary insulation</li> </ul>		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
	<ul style="list-style-type: none"> <li>high voltage test immediately after this test</li> <li>Dielectric strength test: 5,5 kV for reinforced insulation</li> <li>Dielectric strength test: 2,75 kV for basic or supplementary insulation</li> </ul>		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
	<ul style="list-style-type: none"> <li>Dielectric strength test: 4,2 kV for reinforced insulation</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>Dielectric strength test: 2,1 kV for basic or supplementary insulation</li> </ul>		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
	<ul style="list-style-type: none"> <li>Dielectric strength test: 6 kV for reinforced insulation</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>Dielectric strength test: 3 kV for basic or supplementary insulation</li> </ul>		N/A
K.3.3.2	Square rectangular wire		N/A
	Samples prepared according to clause 4.7.1 of IEC 60851-5:2008		N/A





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

IEC 61558-1			
Clause	Requirement + Test	Result - Remark	Verdict
	<ul style="list-style-type: none"> <li>Dielectric strength test: 5,5 kV for reinforced insulation</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>Dielectric strength test: 3 kV for basic or supplementary insulation</li> </ul>		N/A
<b>U</b>	<b>ANNEX U – INFORMATIVE – OPTIONAL TW – MARKING FOR TRANSFORMERS</b>		N/A
	The tests of Annex U are based on constant S = 4500. Other constants are possible, if the test of U.5.2 is done with positive result.		N/A
U1	General notes and tests		N/A
	8 transformers of one type are necessary for the test. Tests according U5.		N/A
U.2	Heating (addition to clause 14)		N/A
14.4	Thermal endurance test		N/A
	Test according U5 and measurements according 11.1		N/A
	Transformers tested as an integral part of the equipment (option), assigned with tw		N/A
	The thermal conditions are so adjusted, that the duration of test is as indicated by the manufacturer.		N/A
	If no indications are given, the test period is 30 days		N/A
	After the test, when the transformers have returned to room temperature, they fulfil the following requirements:		N/A
	a) The output voltage has not changed from the measured value at the beginning by more than allowed value of clause 11.1		N/A
	b) The insulation resistance between input and output winding and between windings and body is, measured with 500 V d.c. , not less than 1 MOhm		N/A
	c) The transformer fulfil the dielectric strength test with 35% of the values in Clause 18, Table 8.a.		N/A
	The test result is positive, is min. 6 of the 7 samples have passed the test.		N/A
	The test result is negative, if 2 or more samples fail the test		N/A
	If the result is negative, the test can be repeated with 7 new samples		N/A
U.3	Short circuit and overload protection (addition to clause 15)		N/A

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

IEC 61558-1			
Clause	Requirement + Test	Result - Remark	Verdict
	At short circuit and overload tests the winding temperature if less than the required value of table U.1		N/A
U.5	General requirements and information about thermal endurance test on windings		N/A
U.5.1	Thermal endurance test		N/A
	Transformers tested at rated output		N/A
	Loads outside of the oven		N/A
	7 transformers are placed in the oven		N/A
	The temperature of the hottest winding of each of the 7 transformers is-together with the oven temperature, at the applicable temperature of table U.2		N/A
	After 4 hours measuring of the actual winding temperatures. Regulation of the oven temperature if necessary		N/A
	After 24 hours again measuring of the winding temperature. The temperatures of the 7 samples are very near to the required temperature of the values of table U.2. The test time of the coldest winding is not longer than twice the theoretical test time based on table U.2		N/A
U.5.2	The use of constant S other than 4500 in tw tests		N/A
U.5.2.1	Procedure a)		N/A
	The manufacturer prepares test results with a minimum of samples of 30.		N/A
	T and log L are calculated from the dates		N/A
	The diagram according to Figure U.2 will be founded.		N/A
U.5.2.3	Procedure b)		N/A
	The testing authority shall test 14 new transformers		N/A
	Test 1, based on clause U.5.1 but at the calculated test room temperature for 10 days. The test is continued until all transformer fail.		N/A
	Calculation of the mean life L <sub>2</sub> at temperature T <sub>2</sub> according to U4		N/A
	Test 2, based on clause U.5.1 but at a calculated room temperature T <sub>2</sub> (for 120 days).The test time with T <sub>2</sub> exceeds L <sub>2</sub> .		N/A
	If all transformers fail before L <sub>2</sub> , the result is negative.		N/A
<b>V</b>	<b>ANNEX V, SYMBOLS TO BE USED FOR THERMAL CUT-OUTS</b>		N/A

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
IEC 61558-1			
V.2.1.1	Restored by manual operation  IEC 489/98		N/A
V.2.1.2	Restored by disconnection of the supply  IEC 490/98		N/A
V.2.1.3	Thermal link  IEC 491/98		N/A
V.2.2	Self-resetting thermal cut-out  IEC 492/98		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
YNQX12G 240060VL	100V/50Hz	23.77	-0.96	23.97	+0.84	Limit: $\pm 10\%/\pm 20\%$
YNQX12G 240060VL	100V/60Hz	23.78	-0.92	24.03	+1.05	Limit: $\pm 10\%/\pm 20\%$
YNQX12G 240060VL	240V/50Hz	23.78	-0.92	23.96	+0.76	Limit: $\pm 10\%/\pm 20\%$
YNQX12G 240060VL	240V/60Hz	23.79	-0.88	24.00	+0.88	Limit: $\pm 10\%/\pm 20\%$
YNQX12G 250060VL	100V/50Hz	23.48	-6.08	23.72	+1.02	Limit: $\pm 10\%/\pm 20\%$
YNQX12G 250060VL	100V/60Hz	23.47	-6.12	23.68	+0.89	Limit: $\pm 10\%/\pm 20\%$
YNQX12G 250060VL	240V/50Hz	23.46	-6.16	23.68	+0.94	Limit: $\pm 10\%/\pm 20\%$
YNQX12G 250060VL	240V/60Hz	23.46	-6.16	23.67	+0.90	Limit: $\pm 10\%/\pm 20\%$
YNQX12G 300050VL	100V/50Hz	27.64	-7.87	28.41	+2.79	Limit: $\pm 10\%/\pm 20\%$
YNQX12G 300050VL	100V/60Hz	27.62	-7.93	28.42	+2.90	Limit: $\pm 10\%/\pm 20\%$
YNQX12G 300050VL	240V/50Hz	27.69	-7.70	28.41	+2.60	Limit: $\pm 10\%/\pm 20\%$
YNQX12G 300050VL	240V/60Hz	27.69	-7.70	28.42	+2.64	Limit: $\pm 10\%/\pm 20\%$

14	TABLE: HEATING						P
type/rated output	r-cold $\Omega$	r-warm $\Omega$	temp. $^{\circ}\text{C}$	ext. encl. $^{\circ}\text{C}$	support $^{\circ}\text{C}$	int. + ext. wire	further information
--	--	--	--	--	--	--	--
Supplementary information: see below table							

14	TABLE: HEATING				P
	Test voltage (V) .....			See below	—
	Ambient ( $^{\circ}\text{C}$ ) .....			35.0	—
Thermocouple locations:		max. temperature measured, ( $^{\circ}\text{C}$ )			max. temperature limit, ( $^{\circ}\text{C}$ )
		90V		264V	
		Vertical	Horizontal	Vertical	Horizontal

IEC 61558-2-16					
Clause	Requirement + Test		Result - Remark		Verdict
Model: YNQX12G250060VL (with LF1 used)					
Plug holder	46.6	46.3	43.5	42.1	Ref.
Primary lead wire	74.4	72.9	60.4	57.2	80
MOV1 body	76.5	75.6	71.1	68.7	85
PCB near BD1	93.5	92.4	74.9	72.7	130
C1 body	75.4	74.8	68.2	66.3	105
C2 body	92.3	89.9	79.5	76.5	105
LF1 winding	90.9	90.5	74.4	72.9	130
PCB near Q1	104.5	100.5	95.2	90.9	130
T1 coil	106.3	102.1	102.5	97.9	110
T1 core	100.6	96.5	99.2	94.6	110
CY1 body	80.5	78.8	76.0	74.0	125
PCB near D3A	70.1	67.6	69.6	66.5	130
C4 body	66.8	64.3	66.5	63.4	105
C5 body	65.8	62.1	65.0	60.8	105
Output wire	63.9	60.9	63.3	59.6	80
Enclosure inside top of T1	71.6	67.5	67.2	62.9	Ref.
Enclosure inside bottom of T1	70.8	68.4	68.3	65.7	Ref.
Enclosure outside top of T1	63.7	58.3	60.7	55.1	80
Enclosure outside bottom of T1	61.9	60.1	60.3	58.1	80
Support	46.8	45.6	44.0	42.0	85
Model: YNQX12G250060VL (with L1 used)					
Plug holder	46.4	--	--	--	Ref.
Primary lead wire	71.0	--	--	--	80
MOV1 body	75.4	--	--	--	85
PCB near BD1	91.3	--	--	--	130
C1 body	76.1	--	--	--	105
C2 body	91.5	--	--	--	105
LF1 winding	84.7	--	--	--	130
PCB near Q1	104.0	--	--	--	130
T1 coil	106.2	--	--	--	110
T1 core	100.0	--	--	--	110
CY1 body	78.7	--	--	--	125
PCB near D3A	69.5	--	--	--	130

IEC 61558-2-16					
Clause	Requirement + Test			Result - Remark	Verdict
C4 body	65.7	--	--	--	105
C5 body	65.5	--	--	--	105
Output wire	63.6	--	--	--	80
Enclosure inside top of T1	71.7	--	--	--	Ref.
Enclosure inside bottom of T1	72.3	--	--	--	Ref.
Enclosure outside top of T1	64.5	--	--	--	80
Enclosure outside bottom of T1	63.7	--	--	--	80
Support	46.3	--	--	--	85
Model: YNQX12G300050VL (with LF1 used)					
Plug holder	45.0	46.1	45.3	48.4	Ref.
Primary lead wire	73.2	76.1	70.6	74.2	80
MOV1 body	74.3	78.1	71.9	77.5	85
PCB near BD1	80.4	83.3	75.1	78.9	130
C1 body	72.7	76.6	69.3	73.9	105
C2 body	80.2	83.3	83.2	87.6	105
LF1 winding	81.8	86.4	77.0	82.5	130
PCB near Q1	91.3	92.9	110.2	113.8	130
T1 coil	93.3	94.9	104.1	107.0	110
T1 core	91.9	93.0	101.1	105.5	110
CY1 body	69.4	72.0	73.8	77.6	125
PCB near D3A	64.1	65.8	68.5	70.7	130
C4 body	59.3	61.1	62.7	67.8	105
C5 body	60.5	61.3	66.4	70.7	105
Output wire	54.9	56.4	58.8	63.7	80
Enclosure inside top of T1	58.2	61.0	62.7	67.8	Ref.
Enclosure inside bottom of T1	67.2	68.9	74.5	77.6	Ref.
Enclosure outside top of T1	53.0	55.6	56.5	60.9	80
Enclosure outside bottom of T1	54.1	55.1	57.7	59.9	80
Support	43.3	45.5	43.3	48.3	85
Model: YNQX12G300050VL (with L1 used)					
Plug holder	--	--	--	47.9	Ref.
Primary lead wire	--	--	--	74.9	80
MOV1 body	--	--	--	77.4	85

IEC 61558-2-16					
Clause	Requirement + Test			Result - Remark	Verdict
PCB near BD1	--	--	--	78.7	130
C1 body	--	--	--	73.8	105
C2 body	--	--	--	87.4	105
LF1 winding	--	--	--	82.4	130
PCB near Q1	--	--	--	113.7	130
T1 coil	--	--	--	105.9	110
T1 core	--	--	--	102.4	110
CY1 body	--	--	--	77.2	125
PCB near D3A	--	--	--	70.6	130
C4 body	--	--	--	65.9	105
C5 body	--	--	--	66.9	105
Output wire	--	--	--	60.6	80
Enclosure inside top of T1	--	--	--	67.4	Ref.
Enclosure inside bottom of T1	--	--	--	77.4	Ref.
Enclosure outside top of T1	--	--	--	60.8	80
Enclosure outside bottom of T1	--	--	--	59.4	80
Support	--	--	--	46.1	85
Supplementary information: 1. Thermocouple method used. 2. Tma is 35°C Max., all the tests were performed in chamber. 3. Horizontal means the adapter is plugged into horizontal socket-outlet; Vertical means the adapter is plugged into vertical wall socket-outlet. 4. UL approved primary lead wire & output wire with rating 80°C used.					

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

15	TABLE: SHORT-CIRCUIT AND OVERLOAD PROTECTION							N/A
	ambient temperature (°C) .....					—		—
type/rated output	r-cold Ω	r-warm Ω	temp. °C	ext. encl. °C	support °C	int. + ext. wire	further information	
--	--	--	--	--	--	--	--	
Supplementary information: see below table.								

15	TABLE: Short circuit and overload protection		P
	Test voltage (V) .....:.....	264V	—
	Ambient (°C) .....:	35.0	—
Thermocouple locations:		max. temperature measured, (°C)	max. temperature limit, (°C)
Model: YNQX12G250060VL			
Primary lead wire	67.5	85	
T1 coil	116.6	165	
T1 core	108.2	165	
Output wire	67.4	85	
Enclosure outside top of T1	66.3	105	
Enclosure outside bottom of T1	65.6	105	
Support	46.5	105	
Model: YNQX12G300050VL			
Primary lead wire	80.6	85	
T1 coil	125.2	165	
T1 core	124.5	165	
Output wire	69.3	85	
Enclosure outside top of T1	70.7	105	
Enclosure outside bottom of T1	68.3	105	
Support	48.9	105	
Supplementary information: All the conditions were considered for clause 15, and the most unfavourable data was recorded.			

18.2	<b>TABLE: insulation resistance measurements</b>							P
Insulation resistance R between:				R (M $\Omega$ )		Required R (M $\Omega$ )		
Between mains poles (primary fusible resistor disconnected)				>100		2		

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
	One layer insulation sheet (all source)	>100	2
	Between plastic enclosure inside and outside	>100	7
	Between live parts and external enclosure	>100	7
	Between live parts and output circuit	>100	5
	Between primary winding/core of transformer and secondary winding of transformer	>100	5
	Insulation tape (all source)	>100	5
Supplementary information:--			

18.3	TABLE: Dielectric Strength			P
Test voltage applied between:		Test potential applied (V)	Breakdown / flashover (Yes/No)	
Between mains poles (primary fusible resistor disconnected)		1820Va.c.	No	
Insulation sheet (all source)		1820Va.c.	No	
Between plastic enclosure inside and outside		3640Va.c.	No	
Between live parts and external enclosure		3640Va.c.	No	
Between live parts and output circuit		3860Va.c.	No	
Between primary winding/core of transformer and secondary winding of transformer		3860Va.c.	No	
Two layers of insulation tape (all source)		5000Va.c.	No	
Supplementary information: --				

20	TABLE: Critical components information					P
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity <sup>1)</sup>	
Enclosure	Sabic Innovative Plastics US L L C	SE1X(GG)(f1)	PPE+PS, V-1, 105°C, min. 2.0mm thickness	UL 94, UL 746C	UL E121562	
Plug holder	Sabic Innovative Plastics US L L C	SE1X(GG)(f1)	PPE+PS, V-1, 105°C	UL 94, UL 746C	UL E121562	
Insulation sheet under PCB	SICHUAN LONGHUA FILM CO LTD	PC-870, PC-870-A	80°C, V-0, min. 0.23mm thickness	UL 94, UL 746C	UL E254551	
(Alternative)	SHENZHEN BORN SUN INDUSTRIAL CO LTD	BN-ZD16, BN-ZD19	115°C, VTM-0, min. 0.25mm thickness	UL 94, UL 746C	UL E256822	

IEC 61558-2-16					
Clause	Requirement + Test		Result - Remark		Verdict
Primary lead wire	DONGGUAN ZHIHE ELECTRICAL CABLE TECH CO LTD	1007	Min. 24AWG, min. 300V, min. 80°C, VW-1	UL 758	UL E258239
(Alternative)	DONGGUAN CHENG XING ELECTRONIC CO LTD	1007	Min. 24AWG, min. 300V, min. 80°C, VW-1	UL 758	UL E249743
(Alternative)	SHENZHEN SHI YIHUAXING ELECTRON CO LTD	1007	Min. 24AWG, min. 300V, min. 80°C, VW-1	UL 758	UL E318553
(Alternative)	DONGGUAN ZELONGKANG WIRE CO., LTD	1007	Min. 24AWG, min. 300V, min. 80°C, VW-1	UL 758	UL E330488
Output cord	SHENZHEN SHI YIHUAXING ELECTRON CO LTD	2464, 2468, 1185, 2651	Min. 20AWG, 300V, min. 80°C, VW-1	UL 758	UL E318553
(Alternative)	DONGGUAN XIEHE WIRE CO LTD	2464, 2468, 1185, 2651	Min. 20AWG, 300V, min. 80°C, VW-1	UL 758	UL E251491
(Alternative)	YONG HAO ELECTRICAL INDUSTRY CO LTD	2464, 2468, 1185, 2651	Min. 20AWG, 300V, min. 80°C, VW-1	UL 758	UL E240426
(Alternative)	DONGGUAN XIEHE WIRE CO LTD	2464, 2468, 1185	Min. 20AWG, 300V, min. 80°C, VW-1	UL 758	UL E251491
(Alternative)	BRIGHT WIRE & CABLE CO LTD	2468	Min. 20AWG, 300V, min. 80°C, VW-1	UL 758	UL E322506
Plastic material of output connector	NAN YA PLASTICS (HUI ZHOU) CORP LTD	1400G3	PBT, V-0	UL 94, UL 746C	UL E235269
(Alternative)	DONGGUAN BEST PLASTIC CO LTD	PBT301-G20	PBT, V-0	UL 94, UL 746C	UL E320069
PCB	MEI ZHOU ZHI KE CIRCUIT BOARD CO LTD	ZK-1, ZK-2	V-0, 130°C	UL 796	UL E320262

IEC 61558-2-16					
Clause	Requirement + Test		Result - Remark		Verdict
(Alternative)	SHAOXING SHANGYU SHUNJIA ELECTRONIC CO LTD	SJ-1, SJ-2	V-0, 130°C	UL 796	UL E495291
(Alternative)	HUIZHOU ZHENGHUA ELECTRONICS CO LTD	ZH-2, ZH-3	V-0, 130°C	UL 796	UL E318724
(Alternative)	WENZHOU HUABANG ELECTRONICS CO LTD	H-01, H-02	V-0, 130°C	UL 796	UL E251053
(Alternative)	SHANDONG JINBAO TECH-INNOV CORPORATION	ZD-90F1, ZD-95(G)F	V-0, 130°C	UL 796	UL E141940
(Alternative)	SHENZHEN JIN SHI YU ELECTRONIC CO LTD	JSY-1	V-0, 130°C	UL 796	UL E331780
Fusible resistor (F1)	Anhui Changsheng Electronics Co., Ltd	RXF21-2W	3.3 ohm, 2W	IEC/EN 61558-1, IEC/EN 61558-2-16	Tested with appliance
(Alternative)	CHIAN CHIA ELECTRONIC (SHENZHEN) CO., LTD	RXF21-2W	3.3 ohm, 2W	IEC/EN 61558-1, IEC/EN 61558-2-16	Tested with appliance
Heat-shrinkable tubing (for F1 used)	SHENZHEN WOER HEAT-SHRINKABLE MATERIAL CO LTD	RSFR(CB), RSFR-H	VW-1, min. 300Vac, 125°C	UL 224	UL E203950
(Alternative)	GUANGZHOU KAIHENG NEW MATERIAL CO LTD	K-102, K-102 (CB)	VW-1, min. 300Vac, 125°C	UL 224	UL E321827
(Alternative)	CHANGYUAN ELECTRONICS GROUP CO LTD	CB-HFT	VW-1, 600Vac, 125°C	UL 224	UL E180908
(Alternative)	DONGGUAN SALIPT CO LTD	SALIPT S-901-600, SALIPT S-HPT-600	VW-1, 600Vac, 125°C	UL 224	UL E209436



IEC 61558-2-16					
Clause	Requirement + Test		Result - Remark		Verdict
Varistor (MOV1) (Optional)	Thinking Electronic Industrial Co., Ltd.	TVR10471-M, TVR10561-M, TVR10681-M, TVR14471-M, TVR14561-M, TVR14681-M	Min. 300V AC, 85°C	IEC/EN 61051-1, IEC/EN 61051-2+A1, IEC/EN 61051-2-2	VDE 40036061
(Alternative)	Shaanxi Huaxing electronic group Co., Ltd.	MYG20G10K471, MYG20G10K561, MYG20G10K681	Min. 300V AC, 85°C	IEC/EN 61051-1, IEC/EN 61051-2+A1, IEC/EN 61051-2-2	VDE 40018747
(Alternative)	Shantou High-New Technology Dev. Zone Songtian Enterprise Co., Ltd.	10D471K, 10D561K, 10D681K	Min. 300V AC, 85°C	IEC/EN 61051-1, IEC/EN 61051-2+A1, IEC/EN 61051-2-2	VDE 40023049
(Alternative)	Hongzhi Enterprises Ltd.	HEL10D471K, HEL10D561K, HEL10D681K	Min. 300V AC, 85°C	IEC/EN 61051-1, IEC/EN 61051-2+A1, IEC/EN 61051-2-2	VDE 40037512
Y-capacitor (CY1) (Optional)	Nanjing Yuyue Electronics Co., Ltd.	CT7	Max. 2200pF, min. 250Vac, 125°C, Y1 type	IEC/EN 60384-14	VDE 40008010
(Alternative)	Dongguan City Dafu Electronics Co. Ltd.	CT7 Y1 Series	Max. 2200pF, min. 250Vac, 125°C, Y1 type	IEC/EN 60384-14	VDE 40041523
(Alternative)	GCE (Dongguan) Electronics Co., Ltd	GY1 series	Max. 2200pF, min. 250Vac, 125°C, Y1 type	IEC/EN 60384-14	VDE 40040844
(Alternative)	Haohua Electronic Co.,	CT 7	Max. 2200pF, min. 250Vac, 125°C, Y1 type	IEC/EN 60384-14	VDE 40003902
(Alternative)	Shenzhen Haotian Electronic Co., Ltd.	HT	Max. 2200pF, 400Vac, 125°C, Y1 type	IEC/EN 60384-14	VDE 40029300
(Alternative)	Hsuan Tai Electronic Co. Ltd.	CY	Max. 2200pF, 400Vac, 125°C, Y1 type	IEC/EN 60384-14	VDE 40008912
(Alternative)	Success Electronics Co., Ltd.	SB	Max. 2200pF, min. 250Vac, 125°C, Y1 type	IEC/EN 60384-14	VDE 40020001
(Alternative)	Success Electronics Co., Ltd.	SE	Max. 2200pF, min. 250Vac, 125°C, Y1 type	IEC/EN 60384-14	VDE 40020002

IEC 61558-2-16					
Clause	Requirement + Test		Result - Remark		Verdict
(Alternative)	Yinan Don's Electronic Component Co., Ltd.	CT81	Max. 2200pF, min. 250Vac, 125°C, Y1 type	IEC/EN 60384-14	VDE 135256
(Alternative)	Dongguan Easy-Gather Electronic Co., Ltd.	DCF	Max. 2200pF, 400Vac, 125°C, Y1 type	IEC/EN 60384-14	VDE 40022942
(Alternative)	Guangdong South Hongming Electronic Science and Technology Co., Ltd.	F	Max. 2200pF, min. 250Vac, 125°C, Y1 type	IEC/EN 60384-14	VDE 40036393
Y- capacitor (CY2 & CY3) (Optional) (Alternative)	Nanjing Yuyue Electronics Co., Ltd.	Series CT7	Max. 2200pF, min. 250Vac, 125°C, Y2 type	IEC/EN 60384-14	VDE 40008013
(Alternative)	Dongguan City Dafu Electronics Co. Ltd.	CT7 Y2 Series	Max. 2200pF, min. 250Vac, 125°C, Y2 type	IEC/EN 60384-14	VDE 40041521
(Alternative)	GCE (Dongguan) Electronics Co., Ltd	G Y2 series	Max. 2200pF, min. 250Vac, 125°C, Y2 type	IEC/EN 60384-14	VDE 40040783
(Alternative)	Haohua Electronic Co.,	CT7	Max. 2200pF, min. 250Vac, 125°C, Y2 type	IEC/EN 60384-14	VDE 40013601
(Alternative)	Shenzhen Haotian Electronic Co., Ltd.	HTC	Max. 2200pF, min. 250Vac, 125°C, Y2 type	IEC/EN 60384-14	VDE 40039430
(Alternative)	Success Electronics Co., Ltd.	SB	Max. 2200pF, min. 250Vac, 125°C, Y2 type	IEC/EN 60384-14	VDE 40016621
(Alternative)	Success Electronics Co., Ltd.	SE	Max. 2200pF, min. 250Vac, 125°C, Y2 type	IEC/EN 60384-14	VDE 122995
(Alternative)	Yinan Don's Electronic Component Co., Ltd.	CT81	Max. 2200pF, min. 250Vac, 125°C, Y2 type	IEC/EN 60384-14	VDE 135256
(Alternative)	Dongguan Easy-gather Electronic Co., Ltd.	DCF	Max. 2200pF, min. 250Vac, 125°C, Y2 type	IEC/EN 60384-14	VDE 40015758

IEC 61558-2-16					
Clause	Requirement + Test		Result - Remark		Verdict
(Alternative)	Guangdong South Hongming Electronic Science and Technology Co., Ltd.	F	Max. 2200pF, min. 250Vac, 125°C, Y2 type	IEC/EN 60384-14	VDE 40036246
(Alternative)	Shantou High-New Technology Dev. Zone Songtian Enterprise Co., Ltd.	CE Series	Max. 2200pF, min. 250Vac, 125°C, Y2 type	IEC/EN 60384-14	VDE 40025748
(Alternative)	DongGuan City Jiankun Electronics Technology Co. Ltd	JK series	Max. 2200pF, min. 250Vac, 125°C, Y2 type	IEC/EN 60384-14	VDE 40041536
Line filter (L1)	Anhui changsheng electronics co., Ltd	LGA0510-152K	Min. 1.35mH, 130°C	IEC/EN 61558-1, IEC/EN 61558-2-16	Tested with appliance
(Alternative)	DongGuan Yingna Electronic Technology co., Ltd	DR8*10	130°C, 0.25mm*100±1Ts	IEC/EN 61558-1, IEC/EN 61558-2-16	Tested with appliance
	Shenzhen Xin Sea eagle Electronic Technology co., Ltd				
	Shenzhen Fuhuahao Technology co., Ltd				
Line filter (LF1) (Alternative)	DongGuan Yingna Electronic Technology co., Ltd	EE8.3	130°C, N1/N2 (pin 1-2/3-4): 0.15mm*77±10Ts	IEC/EN 61558-1, IEC/EN 61558-2-16	Tested with appliance
	Shenzhen Xin Sea eagle Electronic Technology co., Ltd				
	Shenzhen Fuhuahao Technology co., Ltd				

IEC 61558-2-16					
Clause	Requirement + Test		Result - Remark		Verdict
Transformer (T1)	Shenzhen Qi Xin Electronics Co., Ltd.	BCK1901-006	Class B	IEC/EN 61558-1, IEC/EN 61558-2-16	Tested with appliance
	SHENZHEN SANXUANTONF U ELECTRONICS CO., LTD.				
	Luoding Qi Yanghui Electronics Co., LTD				
- Bobbin	SUMITOMO BAKELITE CO LTD	PM-9630, PM-9820	Phenolic, V-0, 150°C, min. thickness 0.5mm	UL 746C	UL E41429
(Alternative)	Hitachi Chemical Co Ltd	CP-J-8800	Phenolic, V-0; 150°C, min. thickness 0.5mm	UL 746C	UL E42956
(Alternative)	Chang Chun Plastics Co Ltd	T375J, T200NA, T355J	Phenolic, V-0, 150°C, min. thickness 0.62mm	UL 746C	UL E59481
- Magnet Wire (for pri. winding)	SHANTOU SHENGANG ELECTRICAL INDUSTRIAL CO LTD	2UEW/130	130°C	UL 1446	UL E239508
(Alternative)	SHENZHEN CHENGWEI INDUSTRY CO LTD	2UEW-E-(&)-(*)	130°C	UL 1446	UL E227475
(Alternative)	WA TAI ELECTROTECH NICAL MATERIALS FACTORY LTD	UEW	130°C	UL 1446	UL E243939
(Alternative)	HUIZHOU GOLDEN OCEAN MAGNET WIRE FACTORY	UEW-x	130°C	UL 1446	UL E225143
(Alternative)	PACIFIC ELECTRIC WIRE & CABLE (SHENZHEN) CO LTD	UEW/U, UEWN/U, UEWS/U	Min. 130°C	UL 1446	UL E201757

IEC 61558-2-16					
Clause	Requirement + Test		Result - Remark		Verdict
- Triple insulated wire	Totoku Electric Co., Ltd.	TIW-2	Reinforced insulation wire, rated 130°C	IEC/EN 61558-1, IEC/EN 61558-2-16	VDE 40044910
(Alternative)	Totoku Electric Co., Ltd.	TIW-3	Reinforced insulation wire, rated 130°C	IEC/EN 61558-1, IEC/EN 61558-2-16	VDE 40044889
(Alternative)	Great Leoflon Industrial Co., Ltd.	TRW(B)-M erie(s)	Reinforced insulation wire, rated 130°C	IEC/EN 60950-1, IEC/EN 61558-2-16	VDE 136581
(Alternative)	Great Leoflon Industrial Co., Ltd.	TRW(F)-M Serie(s)	Reinforced insulation wire, rated 155°C	IEC/EN 60950-1, IEC/EN 61558-2-16	VDE 136581
(Alternative)	Rubadue Wire Co., Inc.	TCA 3	Reinforced insulation wire, rated 155°C	IEC/EN 60950-1, IEC/EN 61558-2-16	VDE 40000223
- Insulation tape	SYMBIO INC	35660 (a), 35660Y (e), 35661 (c)	130°C	UL 510	UL E50292
(Alternative)	Jingjiang Yahua Pressure Sensitive Glue Co Ltd	PZ, CT	130°C	UL 510	UL E165111
(Alternative)	JINGJIANG JINGYANG INSULATING PRODUCT CO LTD	JY-133	130°C	UL 510	UL E309872
- Margin tape	Jingjiang Yahua Pressure Sensitive Glue Co Ltd	WF* (c)(h)	130°C	UL 510	UL E165111
(Alternative)	3M COMPANY ELECTRICAL MARKETS DIV (EMD)	44 (a), 44-T (a), 44T-A (a)	130°C	UL 510	UL E17385
- Tube	FUREDA PLASTIC CO LTD	FRD-TT-T, FRD-TT-S	Min. 300VAC, 200°C, VW-1	UL 224	UL E254113
(Alternative)	GREAT HOLDING INDUSTRIAL CO LTD	TFL, TFT, TFS	Min. 150VAC, 200°C, VW-1	UL 224	UL E156256
(Alternative)	CHANGYUAN ELECTRONICS GROUP CO LTD	CB-TT-T, CB-TT-S, CB-TT-L	Min. 150VAC, 200°C, VW-1	UL 224	UL E180908

IEC 61558-2-16					
Clause	Requirement + Test		Result - Remark		Verdict
-Varnish	SUZHOU TAIHU ELECTRIC ADVANCED MATERIAL CO LTD	ET-90(a), T-4260(a)	Min. 130°C	UL 1446	UL E228349
(Alternative)	HANG CHEUNG COATINGS (HUIYANG) LTD	8562*	155°C	UL 1446	UL E200154
(Alternative)	ELANTAS ELECTRICAL INSULATION ELANTAS PDG INC	468-2 (d)	Min. 130°C	UL 1446	UL E75225
Supplementary information: 1) Provided evidence ensures the agreed level of compliance. See OD-CB2039.					

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)	Remarks
For Model: YNQX12G250060VL				
T1 Pin 1 to Pin 7		211	348	--
T1 Pin 2 to Pin 7		225	364	--
T1 Pin 3 to Pin 7		263	544	Max. Vpeak and Max. Vrms
T1 Pin 4 to Pin 7		227	416	--
T1 Pin 1 to Pin 8		215	420	--
T1 Pin 2 to Pin 8		226	392	--
T1 Pin 3 to Pin 8		243	504	--
T1 Pin 4 to Pin 8		225	346	--
CY1 Pri. to Sec.		212	348	--
For Model: YNQX12G300050VL				
T1 Pin 1 to Pin 7		213	348	--
T1 Pin 2 to Pin 7		226	364	--
T1 Pin 3 to Pin 7		254	556	Max. Vpeak and Max. Vrms
T1 Pin 4 to Pin 7		227	416	--

IEC 61558-2-16			
Clause	Requirement + Test	Result - Remark	Verdict
T1 Pin 1 to Pin 8	214	424	--
T1 Pin 2 to Pin 8	226	388	--
T1 Pin 3 to Pin 8	238	516	--
T1 Pin 4 to Pin 8	225	372	--
CY1 Pri. to Sec.	212	344	--
supplementary information: Tested under 240Vac			

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 cr (mm)	cr (mm)
L and N before Fusible resistor (F1) (BI)	<420	240	2.4	3.4	2.5	3.4
Two terminals of F1 (BI)	<420	240	2.4	3.1	2.5	3.1
L to F1 body (BI)	<420	240	2.4	2.8	2.5	2.8
F1 body and C3 body (BI)	<420	240	2.4	2.9	2.5	2.9
Two pins under CY2 (BI)	<420	240	2.4	2.6	2.5	2.7
Two pins under CY3 (SI)	<420	240	2.4	2.8	2.5	3.2
PCB trace under CY1 pri. pins and sec. pins (RI)	<420	240	4.5	5.4	5.0	5.5
PCB trace under T1 pri. pins and sec. pins (RI)	556	263	5.0	6.0	5.4	6.0
T1 Pri. Winding to Sec. winding/pin (RI)	556	263	5.0	6.6	5.4	6.6
T1 Sec. Winding/pin to Iron core (RI)	556	263	5.0	5.6	5.4	5.6
T1 core and sec. component (D3B) (RI)	556	263	5.0	7.0	5.4	7.0
Pri. circuit and accessible enclosure (RI) (for models YNQX12TxxxxyysL)	<420	240	4.5	5.6	5.0	5.6
Pri. circuit and accessible enclosure (RI) (for models YNQX12GxxxxyysL)	<420	240	4.5	5.4	5.0	5.4
Supplementary information:						
1. The core of T1 is considered as primary hazardous live part.						
2. BI: Basic insulation; SI: Supplementary insulation; RI: Reinforced insulation.						
3. If no specified, the worst condition was considered.						

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

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	0.9	2.0
Insulation tape		263	5000	0.1	0.15
Supplementary information: --					

<b>26.2 TEST A</b>	<b>TABLE: CREEPAGE DISTANCES AND CLEARANCES AND DISTANCES THROUGH INSULATION</b>					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.	—	—	—	—	—	

<b>BB.26.2 TEST B</b>	<b>TABLE: CREEPAGE DISTANCES AND CLEARANCES AND DISTANCES THROUGH INSULATION</b>					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.	—	—	—	—	—	



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

<b>BB.26.2 TEST B</b>	<b>TABLE: CREEPAGE DISTANCES AND CLEARANCES AND DISTANCES THROUGH INSULATION</b>					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	
5.	—	—	—	—	—	—
6.	—	—	—	—	—	—
7.	—	—	—	—	—	—
8.	—	—	—	—	—	—
9.	—	—	—	—	—	—
10.	—	—	—	—	—	—

<b>26.2 TEST C</b>	<b>TABLE: CREEPAGE DISTANCES AND CLEARANCES AND DISTANCES THROUGH INSULATION</b>					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.	—	—	—	—	—	—

<b>26.107 61558-2- 16/A1</b>	<b>TABLE: CREEPAGE DISTANCES AND CLEARANCES AND DISTANCES THROUGH INSULATION</b>					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	—

IEC 61558-2-16						
Clause	Requirement + Test			Result - Remark		Verdict
26.107 61558-2-16/A1	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.	—	—	—	—	—	
4.	—	—	—	—	—	
5.	—	—	—	—	—	
6.	—	—	—	—	—	
7.	—	—	—	—	—	
8.	—	—	—	—	—	
9.	—	—	—	—	—	
10.	—	—	—	—	—	

27	TABLE: RESISTANCE TO HEAT AND FIRE - GLOW WIRE TESTS							P
OBJECT/ PART NO./ MATERIAL	MANUFACTU RER/ TRADEMARK	GLOW WIRE TEST (GWT); (°C)						VERDICT
		550	650		750		850	
			te	ti	te	ti		
Insulation sheet under PCB / PC- 870	SICHUAN LONGHUA FILM CO LTD	Pass	--	--	--	--	--	Pass
Insulation sheet under PCB / PC- 870-A		Pass	--	--	--	--	--	Pass
Insulation sheet under PCB / BN- ZD16	SHENZHEN BORNSUN INDUSTRIAL CO LTD	Pass	--	--	--	--	--	Pass
Insulation sheet under PCB / BN- ZD19		Pass	--	--	--	--	--	Pass
Enclosure & Plug holder / SE1X(GG)(f 1)	SABIC INNOVATIVE PLASTICS US L L C	--	No ignition	No ignition	--	--	Pass	Pass



IEC 61558-2-16								
Clause	Requirement + Test					Result - Remark		Verdict
T1 Bobbin / PM-9820	SUMITOMO BAKELITE CO LTD	--	No ignition	No ignition	--	--	Pass	Pass
T1 Bobbin / PM-9630	SUMITOMO BAKELITE CO LTD	--	No ignition	No ignition	--	--	Pass	Pass
T1 Bobbin / T375J	Chang Chun Plastics Co Ltd	--	No ignition	No ignition	--	--	Pass	Pass
T1 Bobbin / T200NA	CHANG Chang Chun Plastics Co Ltd	--	No ignition	No ignition	--	--	Pass	Pass
T1 Bobbin / T355J	Chang Chun Plastics Co Ltd	--	No ignition	No ignition	--	--	Pass	Pass
T1 Bobbin / CP-J-8800	Hitachi Chemical Co Ltd	--	No ignition	No ignition	--	--	Pass	Pass
PCB / ZK-1	MEI ZHOU ZHI KE CIRCUIT BOARD CO LTD	--	--	--	--	--	Pass	Pass
PCB / ZK-2		--	--	--	--	--	Pass	Pass
PCB / SJ-1	SHAOXING SHANGYU SHUNJIA ELECTRONIC CO LTD	--	--	--	--	--	Pass	Pass
PCB / SJ-2		--	--	--	--	--	Pass	Pass
PCB / ZH-2	HUIZHOU ZHENGHUA ELECTRONICS CO LTD	--	--	--	--	--	Pass	Pass
PCB / ZH-3		--	--	--	--	--	Pass	Pass
PCB / H-01	WENZHOU HUABANG ELECTRONICS CO LTD	--	--	--	--	--	Pass	Pass
PCB / H-02		--	--	--	--	--	Pass	Pass
PCB / ZD-90F1	SHANDONG JINBAO TECH-INNOV CORPORATION	--	--	--	--	--	Pass	Pass
PCB / ZD-95(G)F		--	--	--	--	--	Pass	Pass
PCB / JSY-1	SHENZHEN JIN SHI YU ELECTRONIC CO LTD	--	--	--	--	--	Pass	Pass

IEC 61558-2-16								
Clause	Requirement + Test					Result - Remark		Verdict
Plastic material of output connector / 1400G3	NAN YA PLASTICS (HUI ZHOU) CORP LTD	--	--	--	--	--	Pass	Pass
Plastic material of output connector / PBT301-G20	DONGGUAN BEST PLASTIC CO LTD	--	--	--	--	--	Pass	Pass
Object/ Part No./ Material	Manufacturer/ trademark	Glow-wire flammability index (GWFI), °C				GW ignition temp. (GWIT), °C		Verdict
		550	650	750	850	675	775	
—	—	—	—	—	—	—	—	—
If no, then surrounding parts passed the needle-flame test of annex E (Yes/No) :								N/A
The test specimen passed the test by virtue of most of the flaming material being withdrawn with the glow-wire (Yes/No)? :								Yes
Ignition of the specified layer placed underneath the test specimen (Yes/No) :								No
Supplementary information: 550 °C GWT not relevant (or applicable) to parts of material classified at least HB40 or if relevant HBF The GWIT pre-selection option, the 850 °C GWFI pre-selection option, and the 850 °C GWT are not relevant (or applicable) for attended appliances.								

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Clause	Requirement + Test	Result - Remark	Verdict

Annex H	TABLE: Electronic circuit						P
	Ambient temperature (°C) .....					35, if no specified	—
	Power source for EUT: Manufacturer, model/type, output rating .....					--	—
Component No.	Fault	Supply voltage (V)	Test time	Fuse #	Fuse current (A)	Observation	
Model: YNQX12G300050VL							
BD1 pin ~/+	S-C	264	1s	F1	--	Fusible resistor F1 open immediately, BD1 damaged, no hazard. Repeated 3 times and got the same results.	
C1	S-C	264	1s	F1	--	Fusible resistor F1 open immediately, BD1 damaged, no hazard. Repeated 3 times and got the same results.	
C2	S-C	264	1s	F1	--	Fusible resistor F1 open immediately, BD1 damaged, no hazard. Repeated 3 times and got the same results.	
Q1 pin D-S	S-C	264	1s	F1	--	Fusible resistor F1 open immediately, RSA, RSB damaged, no hazard. Repeated 3 times and got the same results.	
Q1 pin D-G	S-C	264	1s	F1	--	Fusible resistor F1 open immediately, Q1, RSA, RSB damaged, no hazard. Repeated 3 times and got the same results.	
Q1 pin S-G	S-C	264	10min	F1	0.014	Unit shut down immediately, no hazard.	
RSA/RSB	S-C	264	1s	F1	--	Fusible resistor F1 open immediately, Q1 damaged, no hazard. Repeated 3 times and got the same results.	
U1 pin 6-2	S-C	264	10min	F1	0.014	Unit shut down immediately, no hazard.	
T1 1-3	S-C	264	10min	F1	0.014	Unit shut down immediately, no hazard.	
T1 2-4	S-C	264	10min	F1	0.014	Unit shut down immediately, no hazard.	
T1 8-7	S-C	264	10min	F1	0.014	Unit shut down immediately, no hazard.	
C8	S-C	264	10min	F1	0.014	Unit shut down immediately, no hazard.	
D3	S-C	264	10min	F1	0.014	Unit shut down immediately, no hazard.	

IEC 61558-2-16						
Clause	Requirement + Test					Result - Remark
C4	S-C	264	10min	F1	0.014	Unit shut down immediately, no hazard.
Output	S-C	264	10min	F1	0.014	Unit shut down immediately, no hazard.
Model: YNQX12G240060VL						
Output	S-C	264V	10min	F1	0.015	Unit shut down immediately, no hazard.
Supplementary information: 1. "S-C" means short-circuited test, "O-C" means open-circuited test; U <sub>o</sub> means output voltage at normal load, U <sub>oc</sub> means output voltage without load. (Unit: 3860 V a.c.) 2. Thermocouple method used. 3. Limited temperature for winding is 165°C (Class B) under 35°C ambient. 4. All types of fusible resistor were conducted the tests and got the same results. 5. All tests were considered in AC 90V also, same result generated.						

Annex U	U.5.1 THERMAL ENDURANCE TEST													
Type ref.	—													
Rated PRI-Voltage	—													
Rated SEC-Voltage	—													
Material of Winding	—													
Material of bobbin	—													
Material of resin	—													
Material of potting	—													
Material of foil	—													
Components removed for test	—													
tw	—													
S	—													
Objective test duration (days)	—													
Theoretical test temperature	—													
Sample	1		2		3		4		5		6		7	
Winding	PRI	SEC	PRI	SEC	PRI	SEC	PRI	SEC	PRI	SEC	PRI	SEC	PRI	SEC
Start – R <sub>k</sub>	—	—	—	—	—	—	—	—	—	—	—	—	—	—
After 4 h – R <sub>w</sub>	—	—	—	—	—	—	—	—	—	—	—	—	—	—

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Clause	Requirement + Test										Result - Remark			Verdict
After 4 h – winding temperature	—	—	—	—	—	—	—	—	—	—	—	—	—	—
After 4 h - oven temperature	—	—	—	—	—	—	—	—	—	—	—	—	—	—
After 24 h – Rw	—	—	—	—	—	—	—	—	—	—	—	—	—	—
After 24 h – winding temperature	—	—	—	—	—	—	—	—	—	—	—	—	—	—
After 24 h - oven temperature	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Final test period (days)	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Output voltage (11.1) under load	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Insulating resistance	—	—	—	—	—	—	—	—	—	—	—	—	—	—
High voltage test (35% of the values in Table 8.a)	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<b>Annex U</b>	<b>U.5.2 The use of another constant S other than 4500 in tw tests Test1:10 days</b>													
Type ref.	—													
Rated PRI-Voltage	—													
Rated SEC-Voltage	—													
Material of Winding	—													
Material of bobbin	—													
Material of resin	—													
Material of potting	—													
Material of foil	—													
Components removed for test	—													
tw	—													
S	—													
Objective test duration (days)	—													
Theoretical test temperature	—													

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

Sample	1		2		3		4		5		6		7	
Winding	PRI	SEC	PRI	SEC	PRI	SEC	PRI	SEC	PRI	SEC	PRI	SEC	PRI	SEC
Start – Rk	—	—	—	—	—	—	—	—	—	—	—	—	—	—
After 4 h – Rw	—	—	—	—	—	—	—	—	—	—	—	—	—	—
After 4 h – winding temperature	—	—	—	—	—	—	—	—	—	—	—	—	—	—
After 4 h - oven temperature	—		—		—		—		—		—		—	
After 24 h – Rw	—	—	—	—	—	—	—	—	—	—	—	—	—	—
After 24 h – winding temperature	—	—	—	—	—	—	—	—	—	—	—	—	—	—
After 24 h - oven temperature	—		—		—		—		—		—		—	
Final test period (days)	—		—		—		—		—		—		—	
Output voltage (11.1) under load	—		—		—		—		—		—		—	
Insulating resistance	—		—		—		—		—		—		—	
High voltage test (35% of the values in Table 8.a)	—		—		—		—		—		—		—	

**IEC 61558-2-16**

<b>Annex U</b>	<b>U.5.2 The use of another constant S other than 4500 in tw tests Test2:120 days</b>
Type ref.	—
Rated PRI-Voltage	—
Rated SEC-Voltage	—
Material of Winding	—
Material of bobbin	—
Material of resin	—
Material of potting	—
Material of foil	—
Components removed for test	—





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Clause	Requirement + Test										Result - Remark				Verdict

tw	—														
S	—														
Objective test duration (days)	—														
Theoretical test temperature	—														
Sample	1		2		3		4		5		6		7		
Winding	PRI	SEC	PRI	SEC	PRI	SEC	PRI	SEC	PRI	SEC	PRI	SEC	PRI	SEC	
Start – Rk	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
After 4 h – Rw	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
After 4 h – winding temperature	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
After 4 h - oven temperature	—		—		—		—		—		—		—		
After 24 h – Rw	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
After 24 h – winding temperature	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
After 24 h - oven temperature	—		—		—		—		—		—		—		
Final test period (days)	—		—		—		—		—		—		—		
Output voltage (11.1) under load	—		—		—		—		—		—		—		
Insulating resistance	—		—		—		—		—		—		—		
High voltage test (35% of the values in Table 8.a)	—		—		—		—		—		—		—		

<b>AA</b>	<b>Annex AA</b>		N/A
	Partial discharge (PD) test		N/A

<b>BB</b>	<b>Annex BB</b>		N/A
	<b>Particular requirements for associated transformers for switch mode power supplies with internal frequencies &gt; 500 Hz</b>		N/A
	See separate test report-form for these Annex.		N/A

---END---

## Attachment No. 1

EN 61558-2-16:2009+A1:2013																																																																															
Clause	Requirement + Test		Result - Remark	Verdict																																																																											
Annex ZA	<b>Normative references to international publications with their corresponding European publications</b>  <b>Addition to Annex ZA of EN 61558-1:</b> <table><tr><th><u>Publication</u></th><th><u>Year</u></th><th><u>Title</u></th><th><u>EN/HD</u></th><th><u>Year</u></th></tr><tr><td>IEC 60227</td><td>Series</td><td>Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V</td><td>– <sup>1)</sup></td><td>–</td></tr><tr><td>IEC 60364-4-41 (mod)</td><td>– <sup>2)</sup></td><td>Low-voltage electrical installations - Part 4-41: Protection for safety - Protection against electric shock</td><td>HD 60364-4-41 + corr. July</td><td>2007 <sup>3)</sup> 2007</td></tr><tr><td>IEC 60601-1</td><td>– <sup>2)</sup></td><td>Medical electrical equipment - Part 1: General requirements for basic safety and essential performance</td><td>EN 60601-1</td><td>2006 <sup>3)</sup></td></tr><tr><td>IEC 60664-4</td><td>2005</td><td>Insulation coordination for equipment within low-voltage systems - Part 4: Consideration of high-frequency voltage stress</td><td>EN 60664-4 + corr. October</td><td>2006 2006</td></tr><tr><td>IEC 60950-1 (mod)</td><td>– <sup>2)</sup></td><td>Information technology equipment - Safety - Part 1: General requirements</td><td>EN 60950-1 + A11</td><td>2006 <sup>3)</sup> 2009</td></tr><tr><td>IEC 61010-1</td><td>– <sup>2)</sup></td><td>Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements</td><td>EN 61010-1 + corr. June</td><td>2001 <sup>3)</sup> 2002</td></tr><tr><td>IEC 61204-7</td><td>2006</td><td>Low voltage power supplies, d.c. output - Part 7: Safety requirements</td><td>EN 61204-7 + A11</td><td>2006 2009</td></tr><tr><td>IEC 61347 (mod)</td><td>Series</td><td>Lamp controlgear</td><td>EN 61347</td><td>Series</td></tr><tr><td>IEC 61558-1</td><td>2005</td><td>Safety of power transformers, power supplies, reactors and similar products - Part 1: General requirements and tests</td><td>EN 61558-1 + corr. August</td><td>2005 2006</td></tr><tr><td>IEC 61558-2-1</td><td>– <sup>2)</sup></td><td>Safety of power transformers, power supplies, reactors and similar products - Part 2-1: Particular requirements and tests for separating transformers and power supplies incorporating separating transformers for general applications</td><td>EN 61558-2-1</td><td>2007 <sup>3)</sup></td></tr><tr><td>IEC 61558-2-4</td><td>– <sup>2)</sup></td><td>Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V - Part 2-4: Particular requirements and tests for isolating transformers and power supply units incorporating isolating transformers</td><td>EN 61558-2-4</td><td>2009 <sup>3)</sup></td></tr><tr><td>IEC 61558-2-6</td><td>– <sup>2)</sup></td><td>Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V - Part 2-6: Particular requirements and tests for safety isolating transformers and power supply units incorporating safety isolating transformers</td><td>EN 61558-2-6</td><td>2009 <sup>3)</sup></td></tr><tr><td>IEC 61558-2-13</td><td>– <sup>2)</sup></td><td>Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V - Part 2-13: Particular requirements and tests for auto transformers and power supply units incorporating auto transformers</td><td>EN 61558-2-13</td><td>2009 <sup>3)</sup></td></tr><tr><td>IEC 62040</td><td>Series</td><td>Uninterruptible Power Systems (UPS)</td><td>EN 62040</td><td>Series</td></tr></table>			<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>	IEC 60227	Series	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V	– <sup>1)</sup>	–	IEC 60364-4-41 (mod)	– <sup>2)</sup>	Low-voltage electrical installations - Part 4-41: Protection for safety - Protection against electric shock	HD 60364-4-41 + corr. July	2007 <sup>3)</sup> 2007	IEC 60601-1	– <sup>2)</sup>	Medical electrical equipment - Part 1: General requirements for basic safety and essential performance	EN 60601-1	2006 <sup>3)</sup>	IEC 60664-4	2005	Insulation coordination for equipment within low-voltage systems - Part 4: Consideration of high-frequency voltage stress	EN 60664-4 + corr. October	2006 2006	IEC 60950-1 (mod)	– <sup>2)</sup>	Information technology equipment - Safety - Part 1: General requirements	EN 60950-1 + A11	2006 <sup>3)</sup> 2009	IEC 61010-1	– <sup>2)</sup>	Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements	EN 61010-1 + corr. June	2001 <sup>3)</sup> 2002	IEC 61204-7	2006	Low voltage power supplies, d.c. output - Part 7: Safety requirements	EN 61204-7 + A11	2006 2009	IEC 61347 (mod)	Series	Lamp controlgear	EN 61347	Series	IEC 61558-1	2005	Safety of power transformers, power supplies, reactors and similar products - Part 1: General requirements and tests	EN 61558-1 + corr. August	2005 2006	IEC 61558-2-1	– <sup>2)</sup>	Safety of power transformers, power supplies, reactors and similar products - Part 2-1: Particular requirements and tests for separating transformers and power supplies incorporating separating transformers for general applications	EN 61558-2-1	2007 <sup>3)</sup>	IEC 61558-2-4	– <sup>2)</sup>	Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V - Part 2-4: Particular requirements and tests for isolating transformers and power supply units incorporating isolating transformers	EN 61558-2-4	2009 <sup>3)</sup>	IEC 61558-2-6	– <sup>2)</sup>	Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V - Part 2-6: Particular requirements and tests for safety isolating transformers and power supply units incorporating safety isolating transformers	EN 61558-2-6	2009 <sup>3)</sup>	IEC 61558-2-13	– <sup>2)</sup>	Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V - Part 2-13: Particular requirements and tests for auto transformers and power supply units incorporating auto transformers	EN 61558-2-13	2009 <sup>3)</sup>	IEC 62040	Series	Uninterruptible Power Systems (UPS)	EN 62040	Series	P
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EN 61558-2-16:2009+A1:2013																																		
Clause	Requirement + Test		Result - Remark	Verdict																														
Annex ZA	<div><p style="text-align: center;"><b>Annex ZA</b> (normative)</p><p style="text-align: center;"><b>Normative references to international publications with their corresponding European publications</b></p><p>The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.</p><p>NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.</p><p><i>Add, to the existing list of references, the following new references:</i></p><table><tr><th><u>Publication</u></th><th><u>Year</u></th><th><u>Title</u></th><th><u>EN/HD</u></th><th><u>Year</u></th></tr><tr><td>IEC 60317-0-7</td><td>2012</td><td>Specifications for particular types of winding wires - Part 0-7: General requirements - Fully insulated (FIW) zero-defect enamelled round copper wire with nominal conductor diameter of 0,040 mm to 1,600 mm</td><td>EN 60317-0-7</td><td>2012</td></tr><tr><td>IEC 60317-43</td><td>-</td><td>Specifications for particular types of winding wires - Part 43: Aromatic polyimide tape wrapped round copper wire, class 240</td><td>EN 60317-43</td><td>-</td></tr><tr><td>IEC 60317-56</td><td>-</td><td>Specifications for particular types of winding wires - Part 56: Solderable fully insulated (FIW) zero-defect polyurethane enamelled round copper wire with nominal conductor diameter of 0,040 mm to 1,600 mm, class 180</td><td>EN 60317-56</td><td>-</td></tr><tr><td>IEC 60851-3</td><td>2009</td><td>Winding wires - Test methods - Part 3: Mechanical properties</td><td>EN 60851-3</td><td>2009</td></tr><tr><td>IEC 60851-5</td><td>2008</td><td>Winding wires - Test methods - Part 5: Electrical properties</td><td>EN 60851-5</td><td>2008</td></tr></table></div>			<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>	IEC 60317-0-7	2012	Specifications for particular types of winding wires - Part 0-7: General requirements - Fully insulated (FIW) zero-defect enamelled round copper wire with nominal conductor diameter of 0,040 mm to 1,600 mm	EN 60317-0-7	2012	IEC 60317-43	-	Specifications for particular types of winding wires - Part 43: Aromatic polyimide tape wrapped round copper wire, class 240	EN 60317-43	-	IEC 60317-56	-	Specifications for particular types of winding wires - Part 56: Solderable fully insulated (FIW) zero-defect polyurethane enamelled round copper wire with nominal conductor diameter of 0,040 mm to 1,600 mm, class 180	EN 60317-56	-	IEC 60851-3	2009	Winding wires - Test methods - Part 3: Mechanical properties	EN 60851-3	2009	IEC 60851-5	2008	Winding wires - Test methods - Part 5: Electrical properties	EN 60851-5	2008	P
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IEC 60851-3	2009	Winding wires - Test methods - Part 3: Mechanical properties	EN 60851-3	2009																														
IEC 60851-5	2008	Winding wires - Test methods - Part 5: Electrical properties	EN 60851-5	2008																														



## Attachment No. 2

### Contains

Cover page	1 page
EU plug portion test report	3 pages
UK plug portion test report (3 pins)	7 pages
Total:	11 pages



## Attachment No. 2

### “EU plug portion test” according to EN 50075:1990

For model: YNQX12TxxxxyyVL, YNQX12GxxxxyyVL

Clause	Requirement- Test	Result- Remark	Verdict
7	Dimension of plug shall comply with Standard Sheet 1	(See appended table)	P

8	Protection against electric shock		P
8.1	Live parts of the plugs, with the exception of the bare metal pins, should not be accessible. (75N, 60 second in 35°C ambient)		P
8.2	It should not be possible to make connection between a pin of a plug and live socket contact of a socket while the other pin is accessible.		P
8.3	External parts of the plugs made of insulating material.		P

9	Construction		P
9.3	Plugs shall have adequate mechanical strength to withstand the stresses imposed during use.		P
9.4	Pins of plugs shall be locked against rotation and adequately fixed into body of the plug.		P
9.6	Plug shall be shaped in such a way and made of such material that they can easily be withdrawn by hand from the socket outlet		P

13	Mechanical Strength		P
13.1	Compression test, 150N		P
13.2	Tumbling barrel test for adapter After test, The pin shall not turn when a torque of 0.4Nm is applied, First in one direction for 1 min and then in the opposite direction for 1 min.	Tumbling barrel: 1000 times (The EK1 557-13 requirement was considered)	P
13.3	Abrasion test on the insulating sleeves		P
13.4	Pin shall not have displaced in body of the plug more than 1mm; force (N)	50N Displacement: 0.21mm max.	P

15	Current-carrying parts and connection		P
15.2	Electric connection shall be so designed that contact pressure is not transmitted through insulation.		P
15.3	Current-carrying parts		P
	Copper		P
	Alloy containing at least 58% of copper or equivalent	≥59%	P



## Attachment No. 2

Clause	Requirement- Test	Result- Remark	Verdict
17	Resistance of insulating material to abnormal heat and fire		P
	Glow-wire test		P
	Parts of insulating material to retain current-carrying parts:750°C		P
	Other parts: 650°C		P

For model: YNQX12TxxxxyyVL

7	Table: Dimension of plug				P
	Location	1 <sup>st</sup> Sample	2 <sup>nd</sup> Sample	3 <sup>rd</sup> sample	Limit (mm)
	A	25.85	25.83	25.84	26.1 ± 0.5 <sup>*1</sup>
	B	13.71	13.72	13.73	13.7 ± 0.7 <sup>*1</sup>
	C	34.88	34.86	34.85	35.3 ± 0.7 <sup>*1</sup>
	(see note *1)	18.19	18.22	18.24	≥18
	D	18.68	18.69	18.68	19 ± 0.5
	E	3.97	3.97	3.97	Ø4.0 ± 0.06
	F	3.42	3.41	3.42	Ø3.8 Max.
	F	3.88	3.88	3.89	Ø4.0 Max. <sup>*3</sup>
	F	3.80	3.86	3.85	4 Max. <sup>*3</sup>
	G	10.23	10.22	10.22	10-11
	a1	18.54	18.56	18.52	18-19.2 <sup>*2</sup>
	a2	17.57	17.58	17.62	17-18 <sup>*2</sup>
	H	N/A	N/A	N/A	4 Min.
	I	5.82	5.88	5.87	R5-R6
	J	45°	45°	45°	---
Alternative for end of pins					
	K	N/A	N/A	N/A	Ø0.7- Ø1.7
	L	N/A	N/A	N/A	90° Max.
	M	N/A	N/A	N/A	2 Max.

For model: YNQX12GxxxxyyVL

7	Table: Dimension of plug				P
	Location	1 <sup>st</sup> Sample	2 <sup>nd</sup> Sample	3 <sup>rd</sup> sample	Limit (mm)
	A	26.12	26.13	26.11	26.1 ± 0.5 <sup>*1</sup>
	B	13.56	13.55	13.58	13.7 ± 0.7 <sup>*1</sup>
	C	34.74	34.76	34.75	35.3 ± 0.7 <sup>*1</sup>
	(see note *1)	18.05	18.02	18.07	≥18
	D	18.69	18.69	18.68	19 ± 0.5
	E	3.97	3.97	3.96	Ø4.0 ± 0.06
	F	3.42	3.41	3.42	Ø3.8 Max.
	F	3.88	3.88	3.89	Ø4.0 Max. <sup>*3</sup>
	F	3.80	3.76	3.79	4 Max. <sup>*3</sup>
	G	10.15	10.12	10.12	10-11
	a1	18.54	18.53	18.52	18-19.2 <sup>*2</sup>
	a2	17.87	17.88	17.92	17-18 <sup>*2</sup>
	H	N/A	N/A	N/A	4 Min.

## Attachment No. 2

I	5.50	5.58	5.67	R5-R6
J	45°	45°	45°	---
Alternative for end of pins				
K	N/A	N/A	N/A	Ø0.7- Ø1.7
L	N/A	N/A	N/A	90° Max.
M	N/A	N/A	N/A	2 Max.

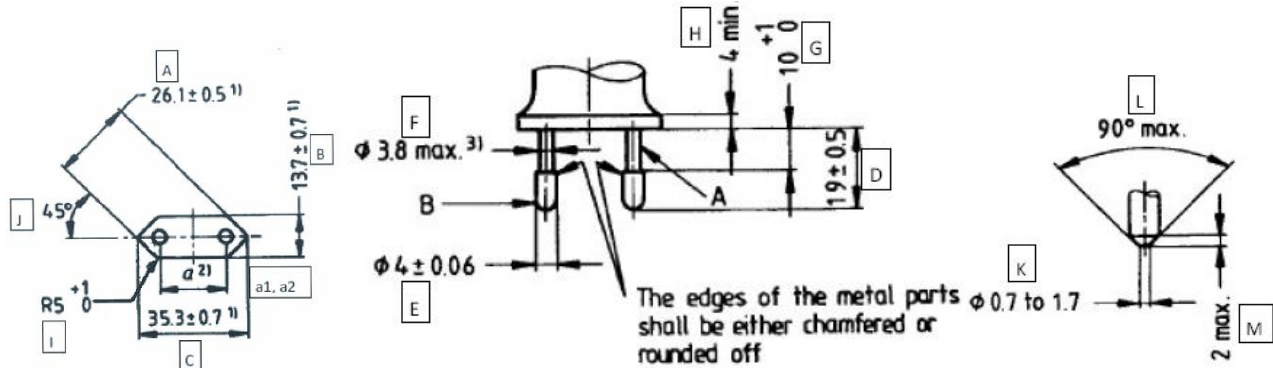
### Note

\*1: These dimension shall not exceeded within a distance of 18mm from the engagement face of plug.

\*2: a1: in the plane of the engagement face, a2: at the ends of pins.

\*3: This dimension maybe increased to 4mm within a distance of 4mm from engagement face of plug.

Remark: see standard sheet 1 for details of location of measurement.



Standard sheet 1



## Attachment No. 2

For model: YNQX12TxxxxxyyBL, YNQX12GxxxxxyyBL

BS 1363-1:2016			
Clause	Requirement – Test	Result – Remarks	Verdict
12.1	Disposition of pins		P
12.2	Dimensions	(See appended table)	P
12.2.1	Gauging test according to figure 5, the plug portion shall enter the gauge fully with a force less than 10N	Applied force: 3N (for YNQX12TxxxxxyyBL & YNQX12GxxxxxyyBL)	P
	In the case of adaptors with ISODs, the test given in 13.8 of BS 1363-2:2016 shall be applied and the maximum withdrawal force from a socket-outlet conforming to BS 1363-2:2016 shall not exceed 36N	Applied force: 9N (for YNQX12TxxxxxyyBL & YNQX12GxxxxxyyBL)	P
12.3	Distance of pins from periphery	L: 9.58mm; N: 9.60mm (for YNQX12TxxxxxyyBL & YNQX12GxxxxxyyBL)	P
12.7	Fixing of cover		N/A
12.9	Construction of pins		P
12.9.1	All exposed surfaces of the adaptor plug pins shall be smooth and free from burrs or sharp edges and other irregularities.		P
12.9.2	Those surfaces of the non-solid plug pins which are visible when the plug is correctly assembled shall be free of apertures.		N/A
12.9.3	All seams and joints of non-solid pins shall be closed over their entire length.		P
12.9.3.1	Conformity shall be checked by inspection and in case of doubt by the following test. Push a steel test probe of 0.2 mm diameter into all seams and joints. Check that the test probe does not enter into any seam or joint to a depth greater than the thickness of the material from which the plug pin is formed.		P
12.9.4.1	For solid pins, applying a force 1100N on the pin according to figure 32.		P
12.9.4.2	For non-solid pins, conformity shall be checked by the following test. 1) Applying a force 800N on the pin according to Figure 32. 50 times without impact. 2) Separate specimens applying a force 1100N on the pin according to Figure 32.		N/A
12.9.4.3	For ISOD, applying a force 400N on the pin according to figure 32.		P





## Attachment No. 2

BS 1363-1:2016			
Clause	Requirement – Test	Result – Remarks	Verdict
12.9.5	Plugs with nickel plated brass pins, non-solid pins and/or ISODs shall not cause excessive wear to socket contacts or shutters of socket-outlets in accordance with BS 1363-2:2016. For plugs with nickel plated brass pins and/or non-solid pins conformity shall be checked by 12.9.5.1. For plugs with ISODs conformity shall be checked by 12.9.5.2.		P
12.9.5.1	Adaptors with non-solid pins shall not cause excessive wear to socket contacts or shutters of sockets-outlets		N/A
12.9.5.2	Adaptors with ISOD shall not cause excessive wear to socket contacts or shutters of sockets-outlets. One type of socket-outlet shall preferably have a shutter-operating ramp of metal.		P
12.9.6.1	1 Nm torque test on the opposite two directions according to figure 33		P
12.11	Retention of pins		P
12.12	Flexibility of pins		P
12.13	Suitable means shall be provided for withdrawing the plug without subjecting the flexible cable to stress.		P
12.16	Insulating sleeves on pins		P
12.17	Abrasion resistance of insulating sleeve		P

BS 1363-3:2016			
Clause	Requirement – Test	Result – Remarks	Verdict
13.10	The total mass of the equipment with all specified connectors shall not exceed 800g. The torque exerted on socket shall not exceed 0.7 Nm	Measured torque: 0.04Nm max.	P

Additional test for adaptor with UK plug need to comply with IEC60950-1 (CB bulletin, IEC60950-1:2005+A1:2009, clause 4.3.6)			
Clause	Requirement – Test	Result – Remarks	Verdict
12.17.4	Placed in a heating cabinet at 125(-8, 0)°C for a period of 120(-5, 0)min, after which the specimen is removed and immediately cooled by immersion in water at approximately room temperature. The thickness of the insulation remaining at the point of impression is measured and shall not have been reduced by more than 50 %.		P
22.2	75°C ball pressure test to ISOD.		P



## Attachment No. 2

Additional test for adaptor with UK plug need to comply with IEC60950-1 (CB bulletin, IEC60950-1:2005+A1:2009, clause 4.3.6)			
Clause	Requirement – Test	Result – Remarks	Verdict
23	750°C GWT to ISOD.		P

For model: YNQX12TxxxxyyBL

Clause 12.2: Dimensions measurement				
Dimensions(mm)	Sample 1	Sample 2	Sample 3	Limit
A	24.53	24.55	24.54	25.37 max
B	33.30	33.30	33.28	34.6 max
C	N/A	N/A	N/A	15 min.
D	9.58	9.59	9.59	9.5 min.
E (L-E)	11.08	11.06	11.08	11.05-11.18
E (N-E)	11.09	11.07	11.07	11.05-11.18
F (L-E)	22.16	22.14	22.14	22.10-22.36
F (N-E)	22.15	22.13	22.15	22.10-22.36
G1	6.26	6.26	6.27	6.22-6.48
G2	6.27	6.26	6.27	6.22-6.48
H	3.98	4.01	4.00	3.90-4.05
I	23.19	23.18	23.19	22.23-23.23
J	1.82	1.81	1.80	1.35-1.85
K(earth)	N/A	N/A	N/A	7.80-8.05
K (ISOD)	7.98	7.97	7.98	7.75-8.05
L (line)	8.96	8.93	8.96	9.5 max
L (neutral)	8.91	8.94	8.98	9.5 max
M (line)	8.94	8.98	8.94	9.2 max
M (neutral)	8.95	8.93	8.90	9.2 max
N (line)	3.96	3.97	3.96	3.90-4.05
N (neutral)	3.96	3.96	3.96	3.90-4.05
O (line)	17.90	17.91	17.90	17.20-18.20
O (neutral)	17.86	17.87	17.88	17.20-18.20
P (line)	1.62	1.59	1.62	1.35-1.85
P (neutral)	1.57	1.61	1.60	1.35-1.85
Q	6.53	6.54	6.56	6.35 min.
R (line)	1.72	1.70	1.75	1.2-2.0
R (neutral)	1.73	1.71	1.77	1.2-2.0
W	0.38	0.45	0.41	R 0.1-1.0
θ 1	61.0 °	60.6 °	60.2 °	58°-62°
θ 2 (line)	70.2 °	70.6 °	71.2 °	60°-80°
θ 2 (neutral)	71.0 °	70.0 °	70.4 °	60°-80°
X1 (for Solid ISOD only)	0.02	0.04	0.03	0.15 max
X2 (for Solid ISOD only)	0.03	0.03	0.04	0.15 max
H1 (for Castellated ISOD only)	N/A	N/A	N/A	≥ 0.6H (use the max. measured value to calculate limit)
K1 (for Castellated ISOD only)	N/A	N/A	N/A	≥ 0.13K (use the max. measured value to calculate limit)
K2 (for Castellated ISOD)	N/A	N/A	N/A	≥ 0.13K (use the max. measured value to



## Attachment No. 2

only)				calculate limit)
X3 (for Castellated ISOD only)	N/A	N/A	N/A	0.15 max
X4 (for Castellated ISOD only)	N/A	N/A	N/A	0.15 max
Alternative chamfers on L and N pin				
S (line)	1.62	1.59	1.62	1.35-1.85
S (neutral)	1.57	1.61	1.60	1.35-1.85
θ 3 (line)	60.2°	60.6°	60.2°	58°-62°
θ 3 (neutral)	60.8°	61.2°	60.4°	58°-62°
θ 4 (line)	60.2°	60.6°	60.2°	58°-62°
θ 4 (neutral)	60.8°	61.2°	60.4°	58°-62°
T (line)	1.62	1.59	1.62	1.35-1.85
T(neutral)	1.57	1.61	1.60	1.35-1.85
U (line)	N/A	N/A	N/A	0.2 Max.
U(neutral)	N/A	N/A	N/A	0.2 Max.
V (line)	N/A	N/A	N/A	1.35-1.85
V(neutral)	N/A	N/A	N/A	1.35-1.85

For model: YNQX12GxxxxyyBL

Clause 12.2: Dimensions measurement				
Dimensions(mm)	Sample 1	Sample 2	Sample 3	Limit
A	24.23	24.25	24.24	25.37 max
B	33.30	33.30	33.28	34.6 max
C	N/A	N/A	N/A	15 min.
D	9.58	9.59	9.59	9.5 min.
E (L-E)	11.08	11.06	11.08	11.05-11.18
E (N-E)	11.09	11.07	11.07	11.05-11.18
F (L-E)	22.16	22.14	22.14	22.10-22.36
F (N-E)	22.15	22.13	22.15	22.10-22.36
G1	6.26	6.26	6.27	6.22-6.48
G2	6.27	6.26	6.27	6.22-6.48
H	3.98	4.01	4.00	3.90-4.05
I	23.19	23.18	23.19	22.23-23.23
J	1.82	1.81	1.80	1.35-1.85
K(earth)	N/A	N/A	N/A	7.80-8.05
K (ISOD)	7.98	7.97	7.98	7.75-8.05
L (line)	8.96	8.93	8.96	9.5 max
L (neutral)	8.91	8.94	8.98	9.5 max
M (line)	8.94	8.98	8.94	9.2 max
M (neutral)	8.95	8.93	8.90	9.2 max
N (line)	3.96	3.97	3.96	3.90-4.05
N (neutral)	3.96	3.96	3.96	3.90-4.05
O (line)	17.90	17.91	17.90	17.20-18.20
O (neutral)	17.86	17.87	17.88	17.20-18.20
P (line)	1.62	1.59	1.62	1.35-1.85
P (neutral)	1.57	1.61	1.60	1.35-1.85
Q	6.53	6.54	6.56	6.35 min.
R (line)	1.81	1.79	1.80	1.2-2.0
R (neutral)	1.80	1.79	1.78	1.2-2.0
W	0.42	0.46	0.49	R 0.1-1.0

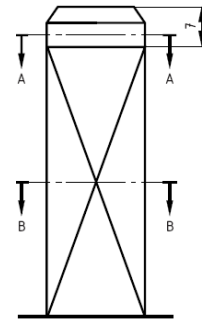
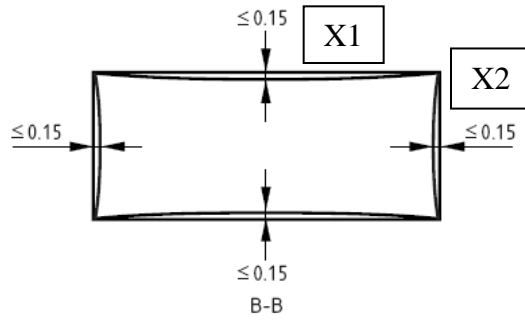


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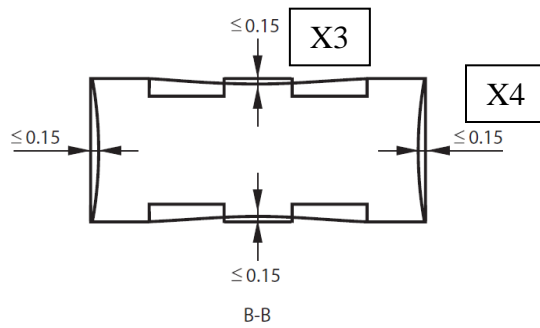
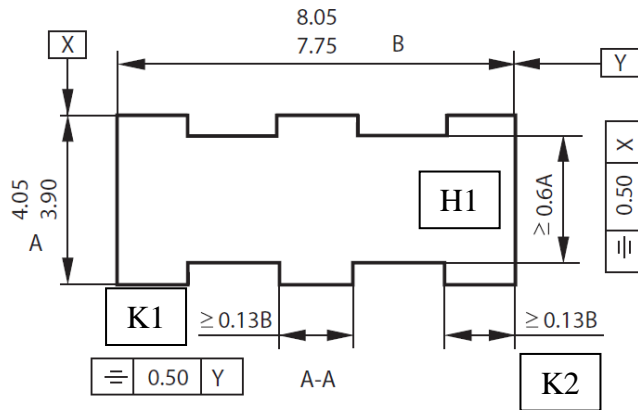
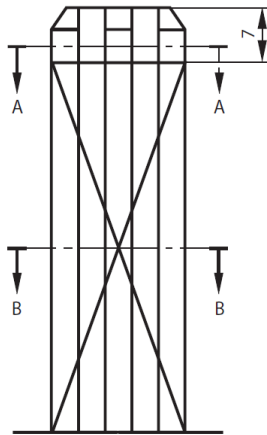
θ 1	61.2°	60.8°	60.2°	58°-62°
θ 2 (line)	70.5°	70.6°	71.2°	60°-80°
θ 2 (neutral)	71.4°	70.8°	70.3°	60°-80°
X1 (for Solid ISOD only)	0.03	0.03	0.03	0.15 max
X2 (for Solid ISOD only)	0.03	0.03	0.03	0.15 max
H1 (for Castellated ISOD only)	N/A	N/A	N/A	≥ 0.6H (use the max. measured value to calculate limit)
K1 (for Castellated ISOD only)	N/A	N/A	N/A	≥ 0.13K (use the max. measured value to calculate limit)
K2 (for Castellated ISOD only)	N/A	N/A	N/A	≥ 0.13K (use the max. measured value to calculate limit)
X3 (for Castellated ISOD only)	N/A	N/A	N/A	0.15 max
X4 (for Castellated ISOD only)	N/A	N/A	N/A	0.15 max
Alternative chamfers on L and N pin				
S (line)	1.40	1.41	1.39	1.35-1.85
S (neutral)	1.41	1.42	1.40	1.35-1.85
θ 3 (line)	60.2°	60.6°	61.2°	58°-62°
θ 3 (neutral)	61.4°	60.8°	60.3°	58°-62°
θ 4 (line)	60.2°	60.6°	61.2°	58°-62°
θ 4 (neutral)	61.4°	60.8°	60.3°	58°-62°
T (line)	1.40	1.41	1.39	1.35-1.85
T(neutral)	1.41	1.42	1.40	1.35-1.85
U (line)	N/A	N/A	N/A	0.2 Max.
U(neutral)	N/A	N/A	N/A	0.2 Max.
V (line)	N/A	N/A	N/A	1.35-1.85
V(neutral)	N/A	N/A	N/A	1.35-1.85



## Attachment No. 2



### Castellated ISOD



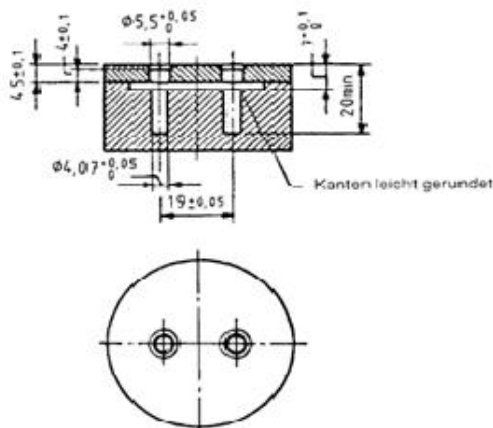
## Attachment No. 3

Clause	Requirement – Test	Measuring result – Remark	Verdict
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### ATTACHMENT TO TEST REPORT

#### Applicable for all standards applied for testing of plug-in power supplies Germany NATIONAL DIFFERENCES GS Scheme

<b>Differences according to</b> .....	all standards applied for testing of plug-in power supplies e.g. EN 60065, EN 60335, EN 60601, EN 60950-1, EN 61010, EN 61558, EN 60598, EN 61029, EN 60745, VDE 0620
<b>Attachment Form No.</b> .....	Germany_ND_GS_Scheme_EK1 557-13
<b>Attachment Originator</b> .....	TÜV SÜD Product Service GmbH
<b>Master Attachment</b> .....	Date 2013-07

Clause	Requirement + Test	Result - Remark	Verdict
	<b>Special national conditions</b>  <b>Germany GS Scheme according EK1 557-13</b>		
	<p>The moulded plug of plug-in power supplies will be considered as component and will be generally evaluated in Germany according to DIN VDE 0620-1:2010 respectively DIN VDE 0620-1:2013 and DIN VDE 0620-2-1:2013. After the test according to DIN VDE 0620-2-1:2013, sub-clause 24.2, the plug be shall still pass the test according to DIN VDE 0620-101:1992 clause 7, figure 2 "Gauge for interchangeability" It should be possible to insert the plug without applying an excessive force such that the end surface touches the surface of the gauge</p> 	<p>Remark: The complete plug-in power supply is considered as a "plug" and has to be tested in the tumbling barrel.</p> <p>1000 times tumbling barrel test (for YNQX12TxxxxyyVL, YNQX12GxxxxyyVL)</p>	P

# Attachment No.: 4

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## Material List for PAH Risk Assessment

Report Reference No.: 64.250.18.06832.01 Rev.00

Product Description: AC Adapter, Model No.: YNQX12TxxxyyysL, YNQX12GxxxyyysL (s=V or B)

Material No.	Location/ Function of the Material	Type/Model No. of the Material	Supplier/Manufacture Name	Category	Rigidity	Smell	Color	Chemical test needed?	Test Result	Evidence attached Technical Report No.
1	Plug holder	See CDF in test report	See CDF in test report	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/> 3	<input type="checkbox"/> Soft <input type="checkbox"/> Flexible <input checked="" type="checkbox"/> Rigid	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input checked="" type="checkbox"/> black or dark-colored <input checked="" type="checkbox"/> white or light-colored	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed	---
2	Enclosure	See CDF in test report	See CDF in test report	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/> 3	<input type="checkbox"/> Soft <input type="checkbox"/> Flexible <input checked="" type="checkbox"/> Rigid	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input checked="" type="checkbox"/> black or dark-colored <input checked="" type="checkbox"/> white or light-colored	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed	---
3	Output cord	See CDF in test report	See CDF in test report	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/> 3	<input checked="" type="checkbox"/> Soft <input type="checkbox"/> Flexible <input type="checkbox"/> Rigid	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input checked="" type="checkbox"/> black or dark-colored <input checked="" type="checkbox"/> white or light-colored	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed	---

Remark: 1) all of above materials only touch short moment, so no chemical test need.

2) The manufacturer shall be responsible to ensure all various sources shall be in compliance with PAH (AfPS GS 2014:01 PAK 3.1).



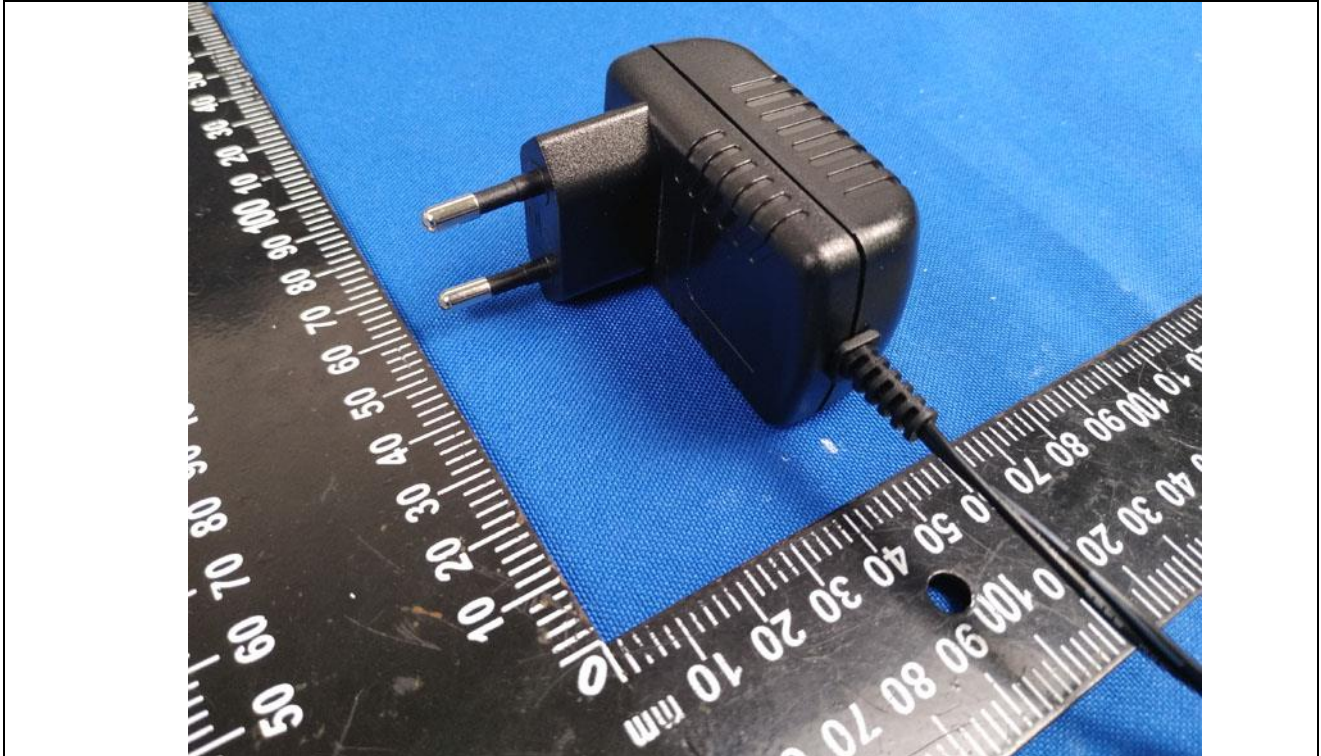
## Attachment No. 5

Photo documentation

Page 1 of 17

Report No.: 64.250.18.06832.01 Rev.00

Details of: Overall view of unit, for models YNQX12TxxxxyyVL



Details of: Overall view of unit, for models YNQX12TxxxxyyVL





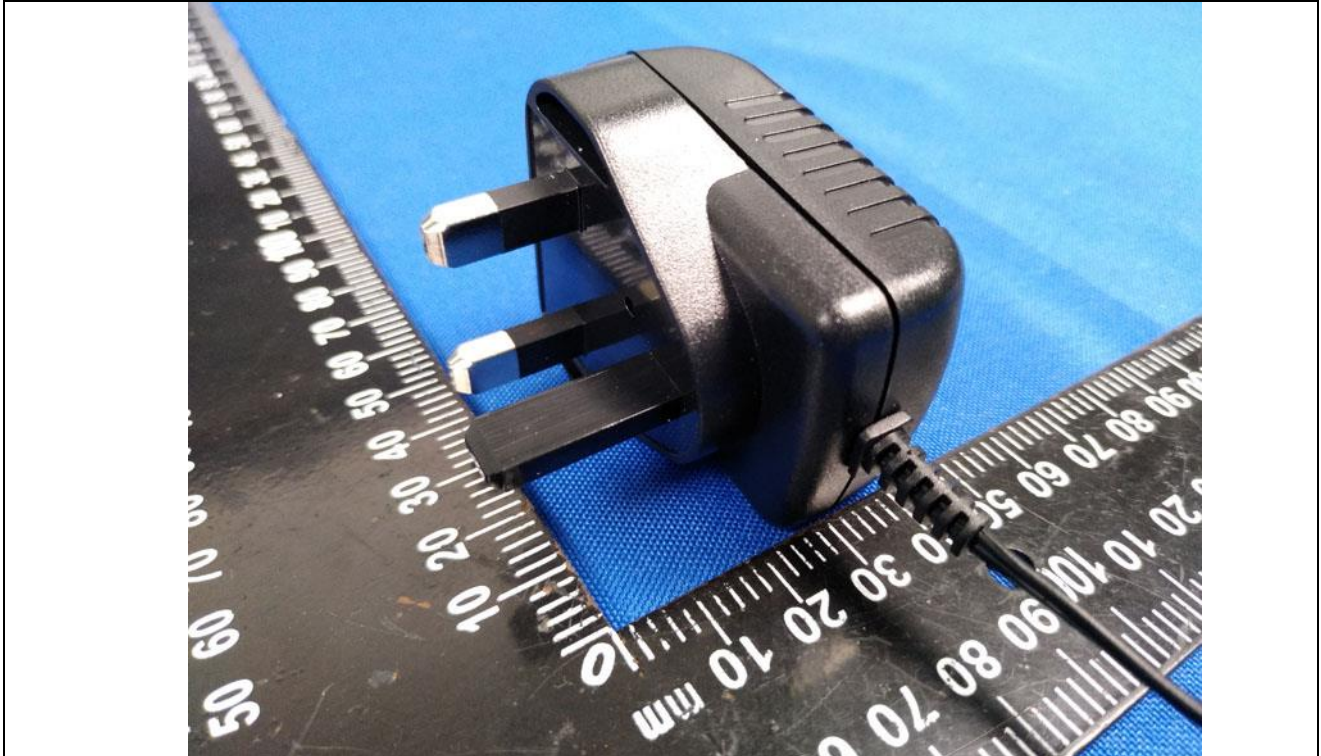
## Attachment No. 5

Photo documentation

Page 2 of 17

Report No.: 64.250.18.06832.01 Rev.00

Details of: Overall view of unit, for models YNQX12TxxxxyyBL



Details of: Overall view of unit, for models YNQX12TxxxxyyBL





## Attachment No. 5

Photo documentation

Page 3 of 17

Report No.: 64.250.18.06832.01 Rev.00

Details of: Overall view of unit, for models YNQX12GxxxxxyVL



Details of: Overall view of unit, for models YNQX12GxxxxxyVL





## Attachment No. 5

Photo documentation

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Report No.: 64.250.18.06832.01 Rev.00

Details of: Overall view of unit, for models YNQX12GxxxxyyBL



Details of: Overall view of unit, for models YNQX12GxxxxyyBL





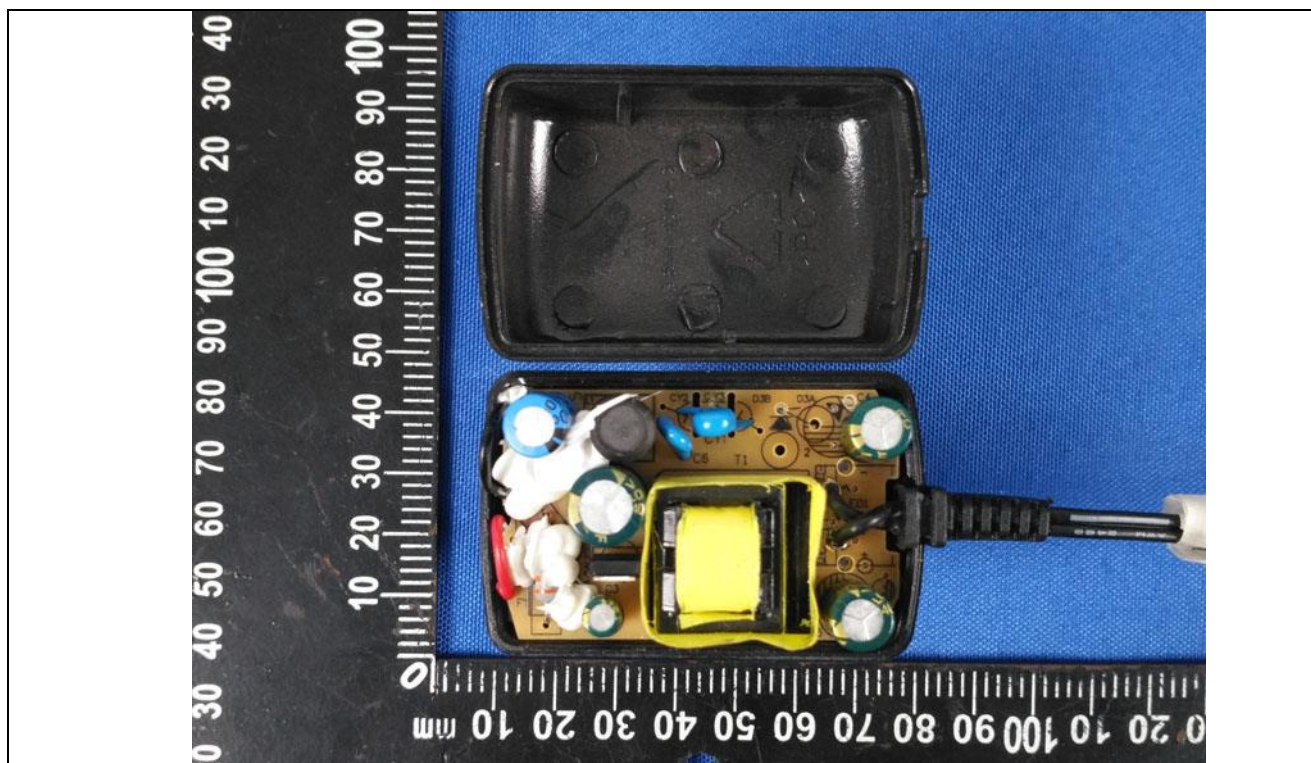
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Photo documentation

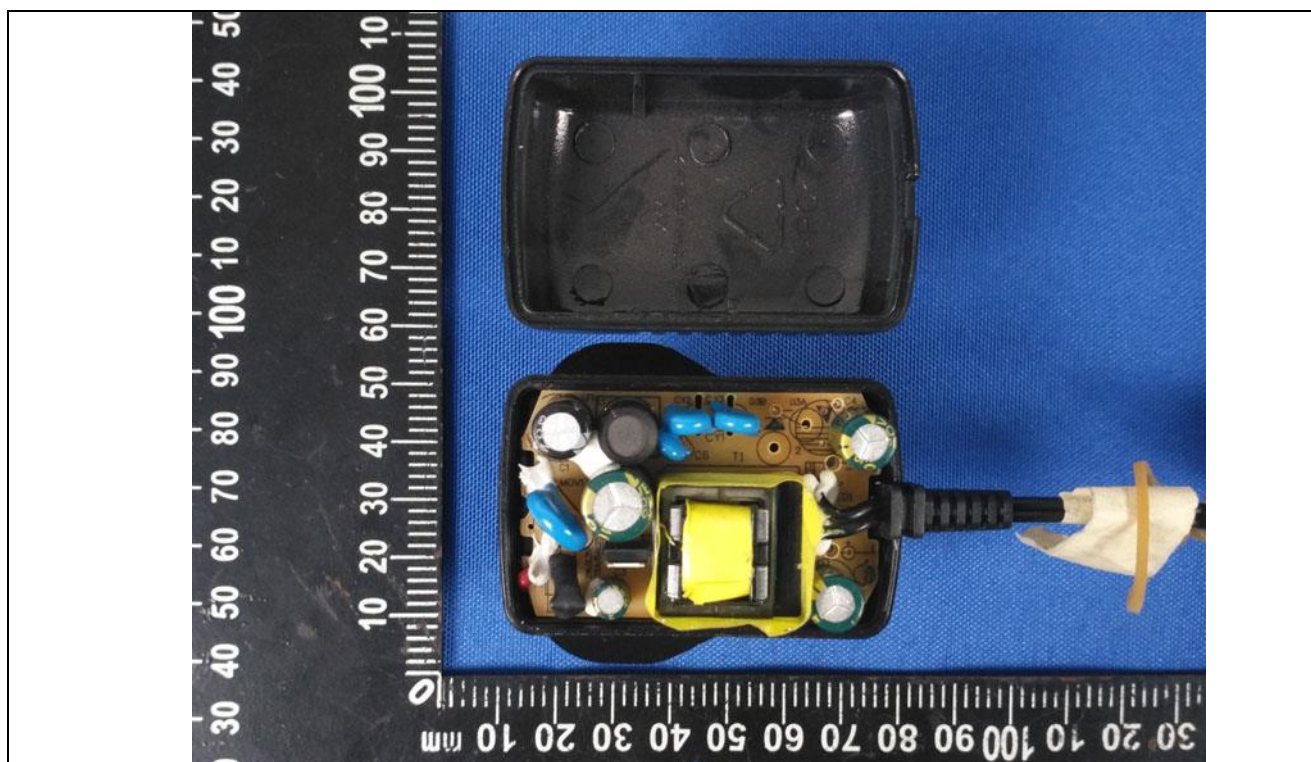
Page 5 of 17

Report No.: 64.250.18.06832.01 Rev.00

Details of: Inside view of unit, for model YNQX12TxxxxyyVL (the output cord was fixed on PCB by rivet and soldering)



Details of: Inside view of unit, for models YNQX12TxxxxyyBL





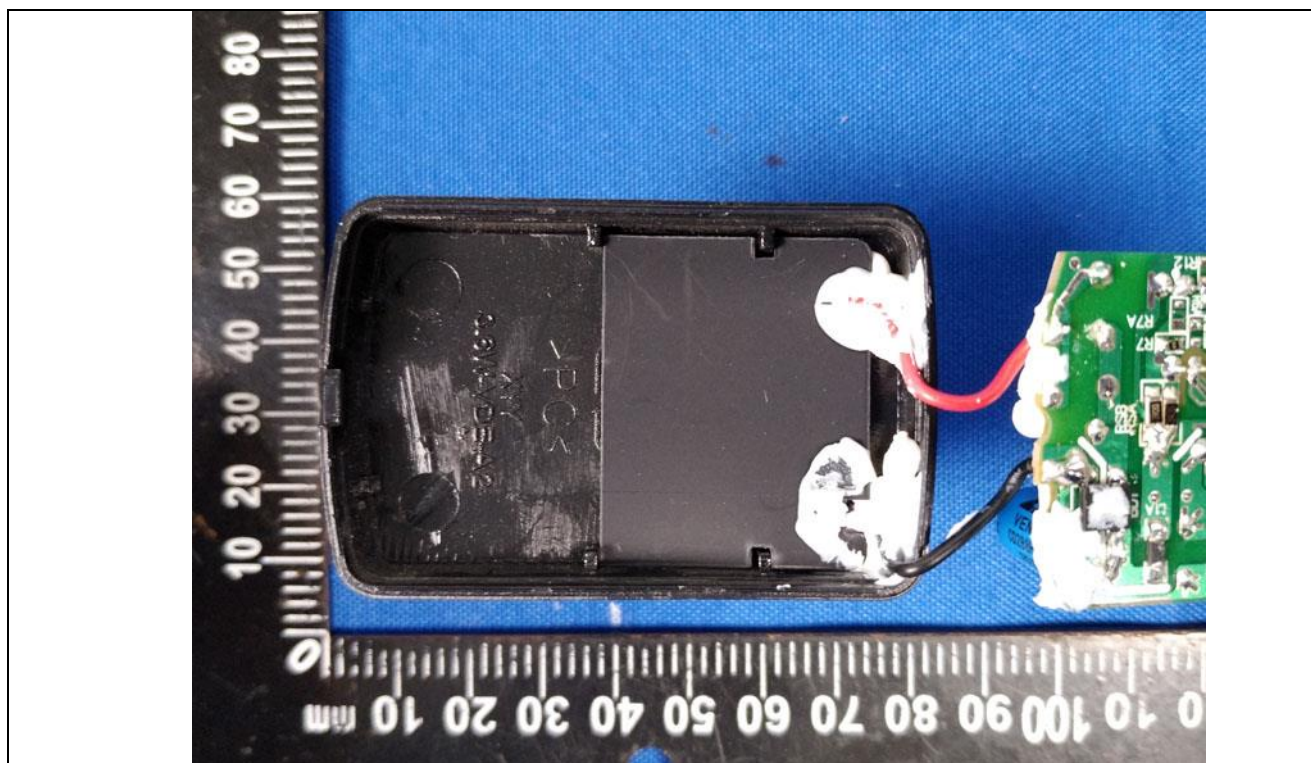
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Photo documentation

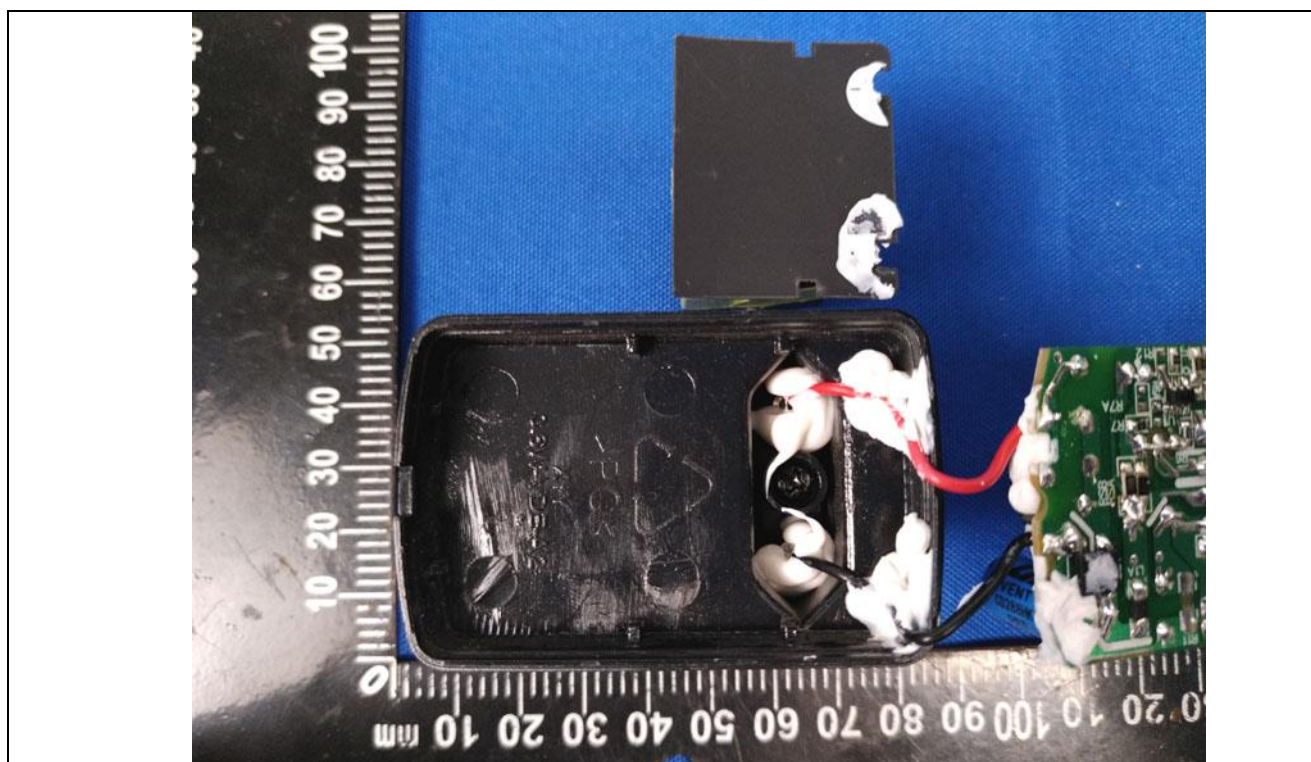
Page 6 of 17

Report No.: 64.250.18.06832.01 Rev.00

Details of: Inside view of unit, for models YNQX12TxxxxyyVL



Details of: Inside view of unit, for models YNQX12TxxxxyyVL





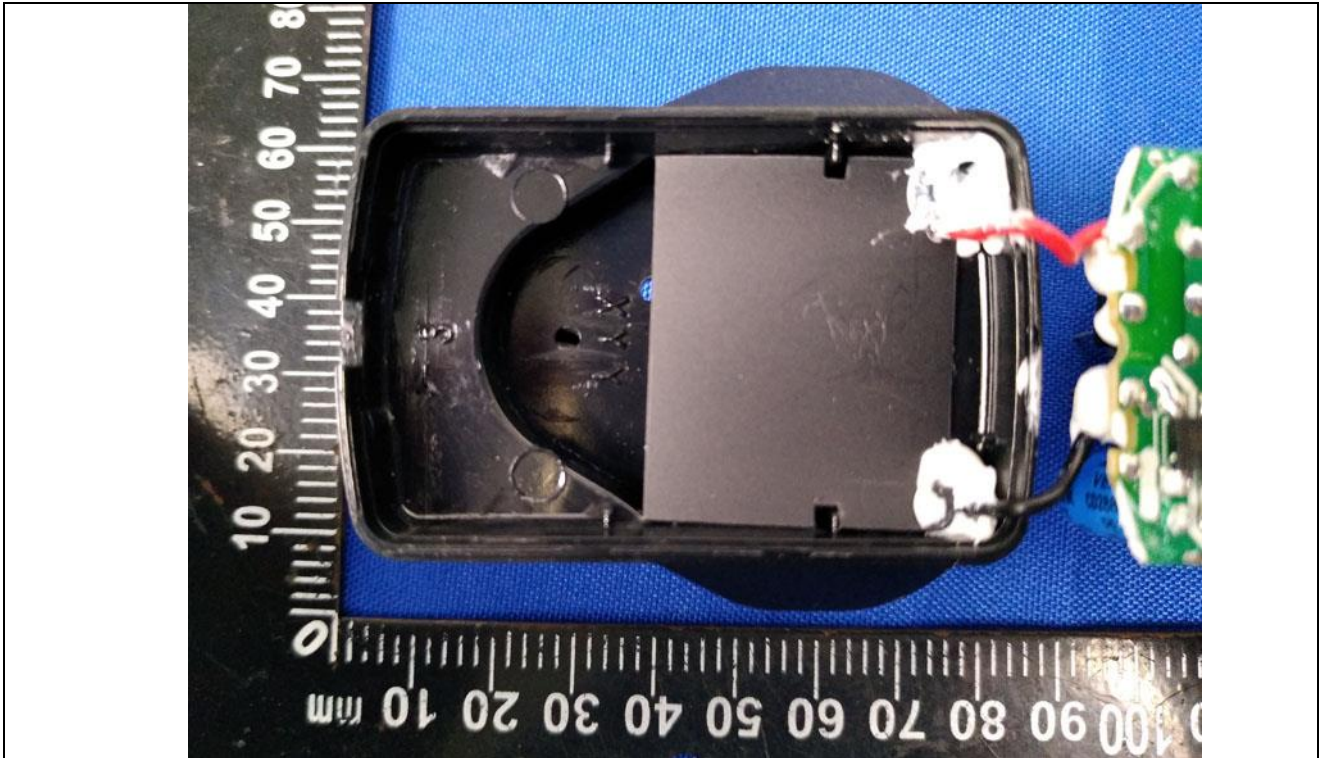
## Attachment No. 5

Photo documentation

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Details of: Inside view of unit, for models YNQX12TxxxxyyBL



Details of: Inside view of unit, for models YNQX12TxxxxyyBL





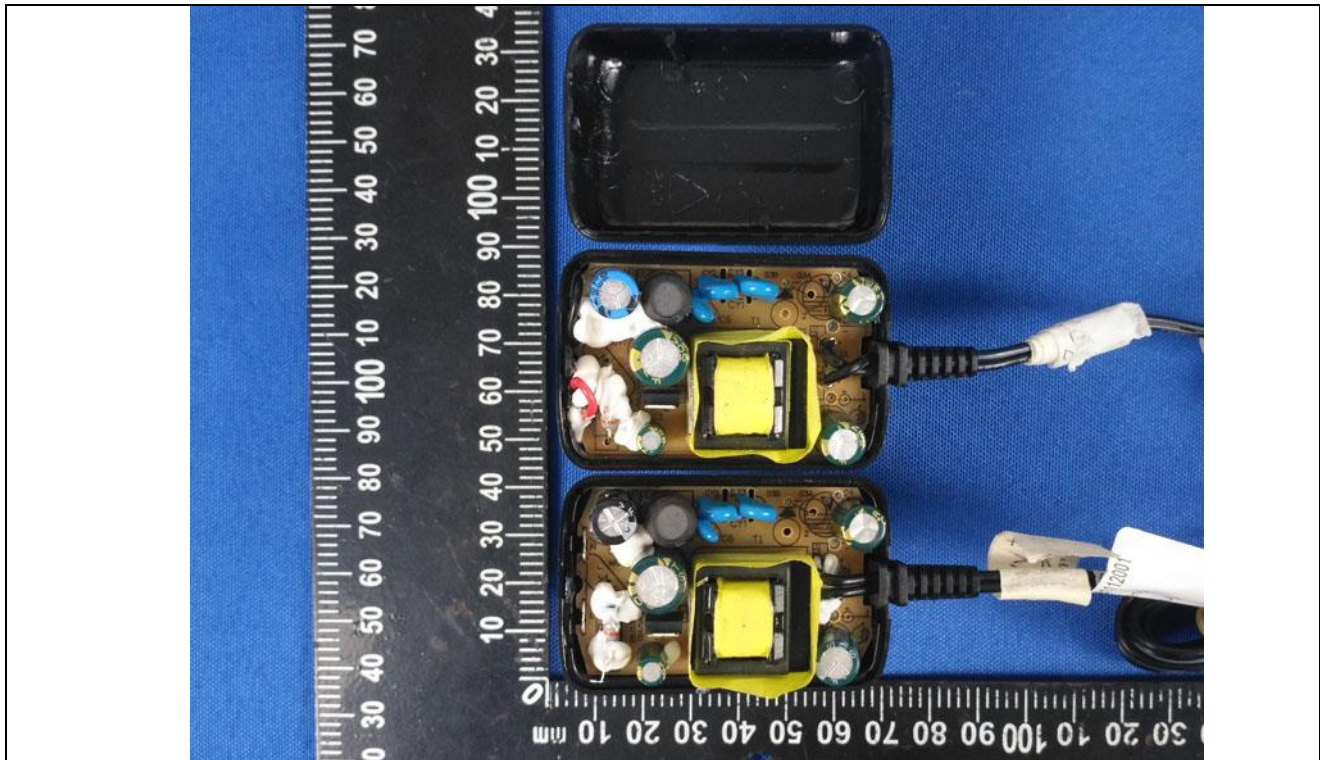
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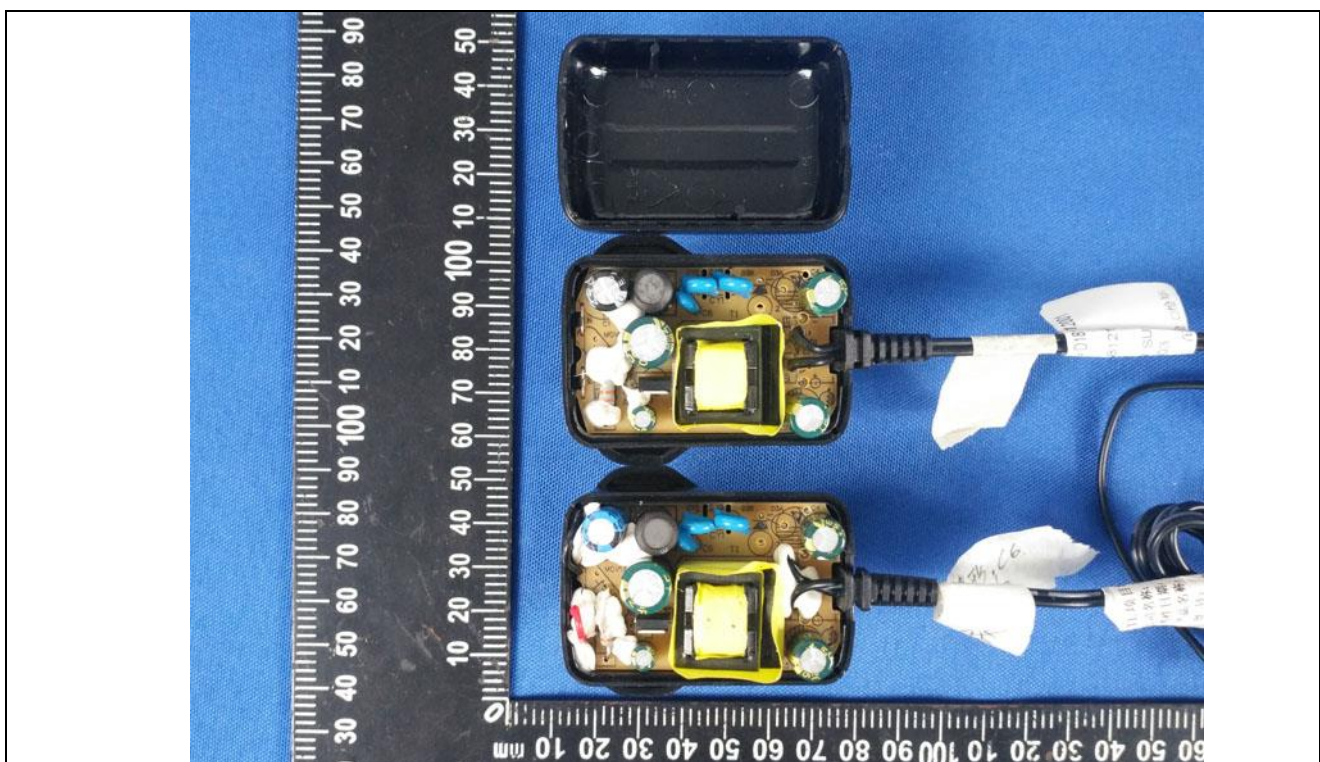
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Details of: Inside view of unit, for models YNQX12GxxxxxyVL



Details of: Inside view of unit, for models YNQX12GxxxxxyBL





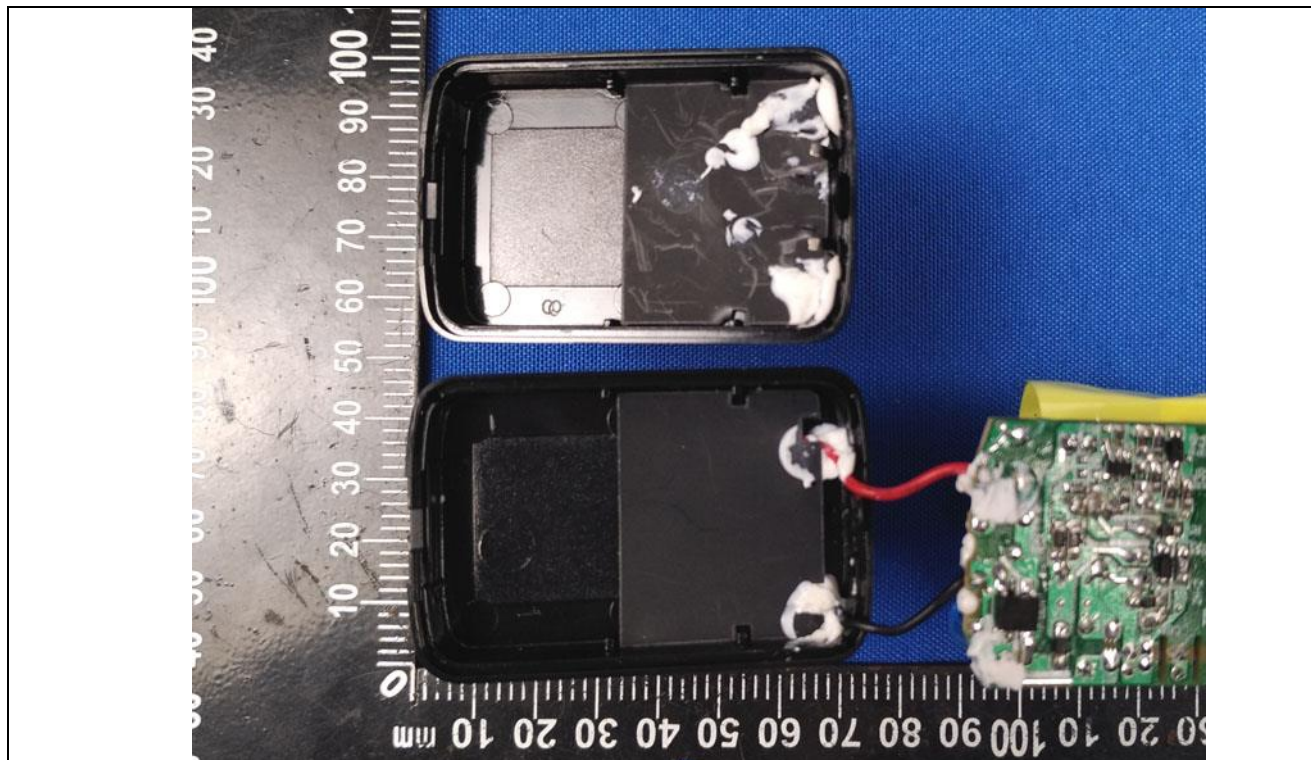
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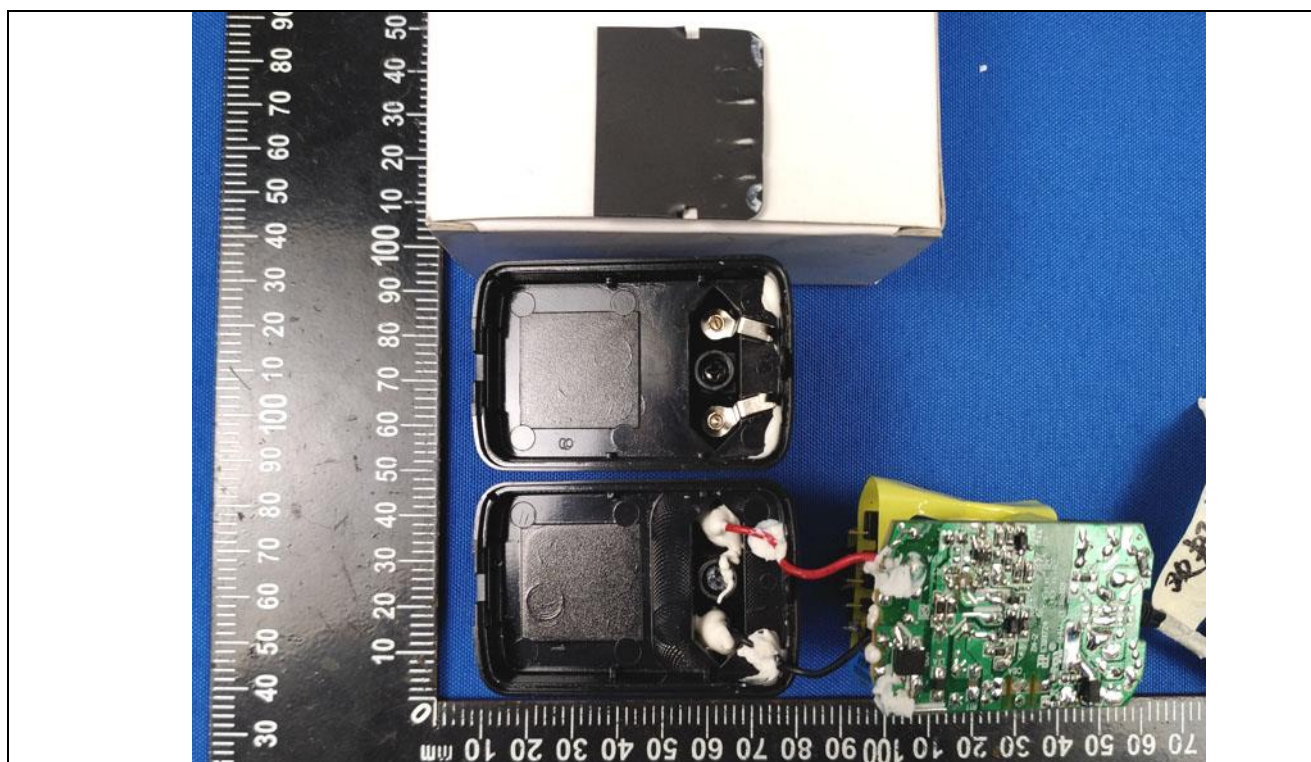
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Details of: Inside view of unit, for models YNQX12GxxxxxxVL



Details of: Inside view of unit, for models YNQX12GxxxxxxVL





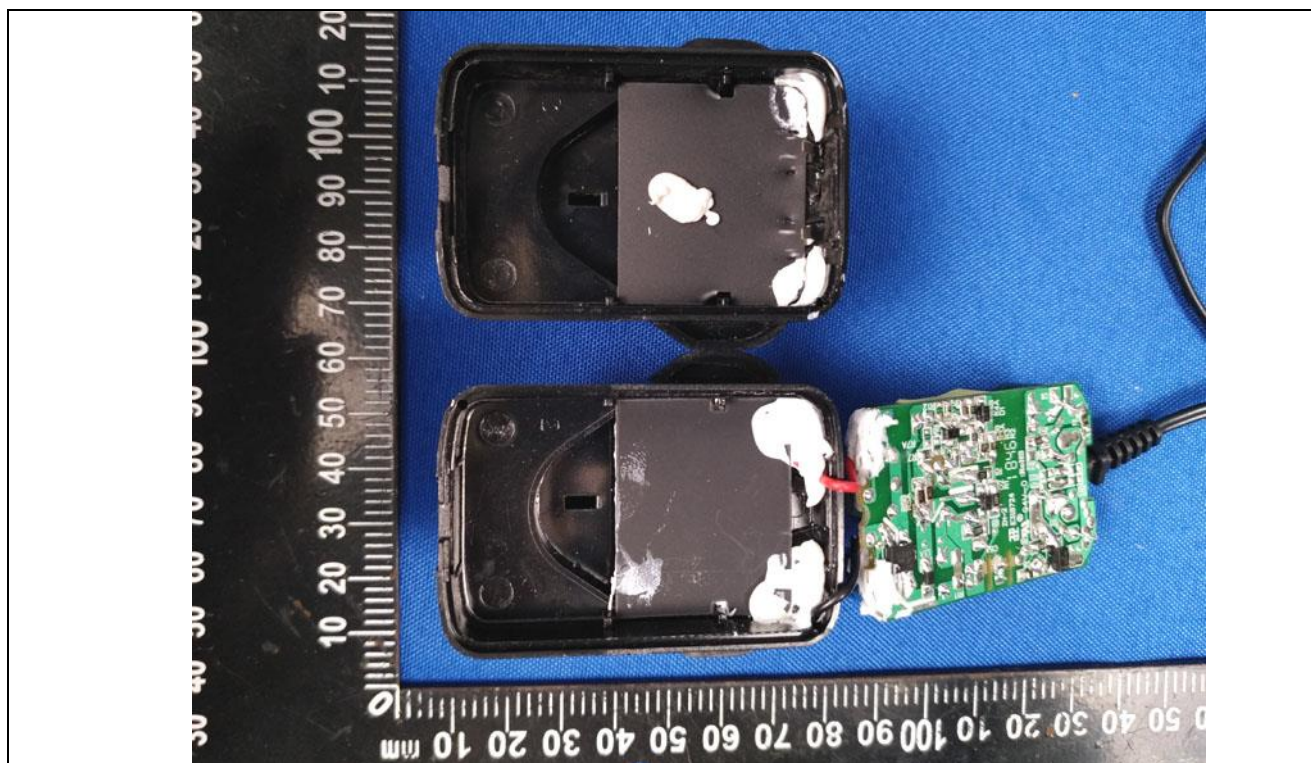
## Attachment No. 5

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Details of: Inside view of unit, for models YNQX12GxxxxxyBL



Details of: Inside view of unit, for models YNQX12GxxxxxyBL





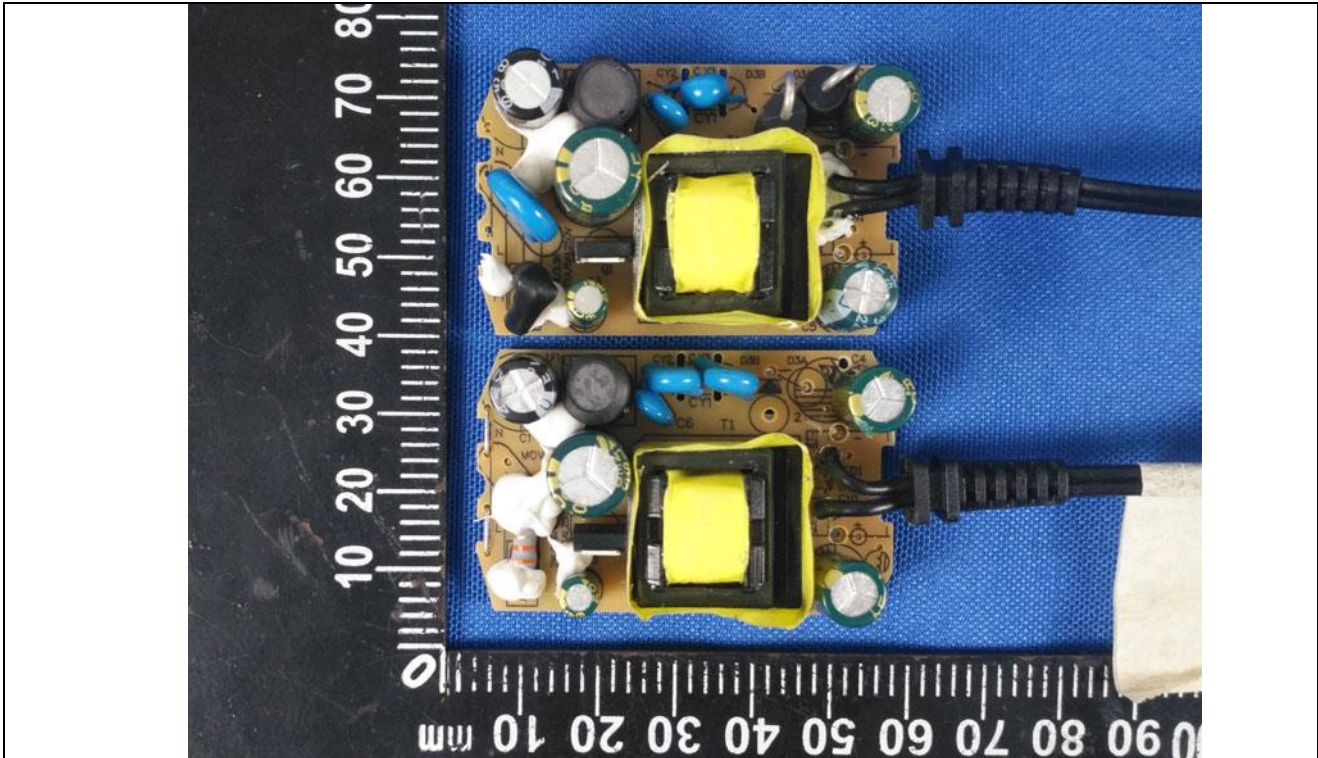
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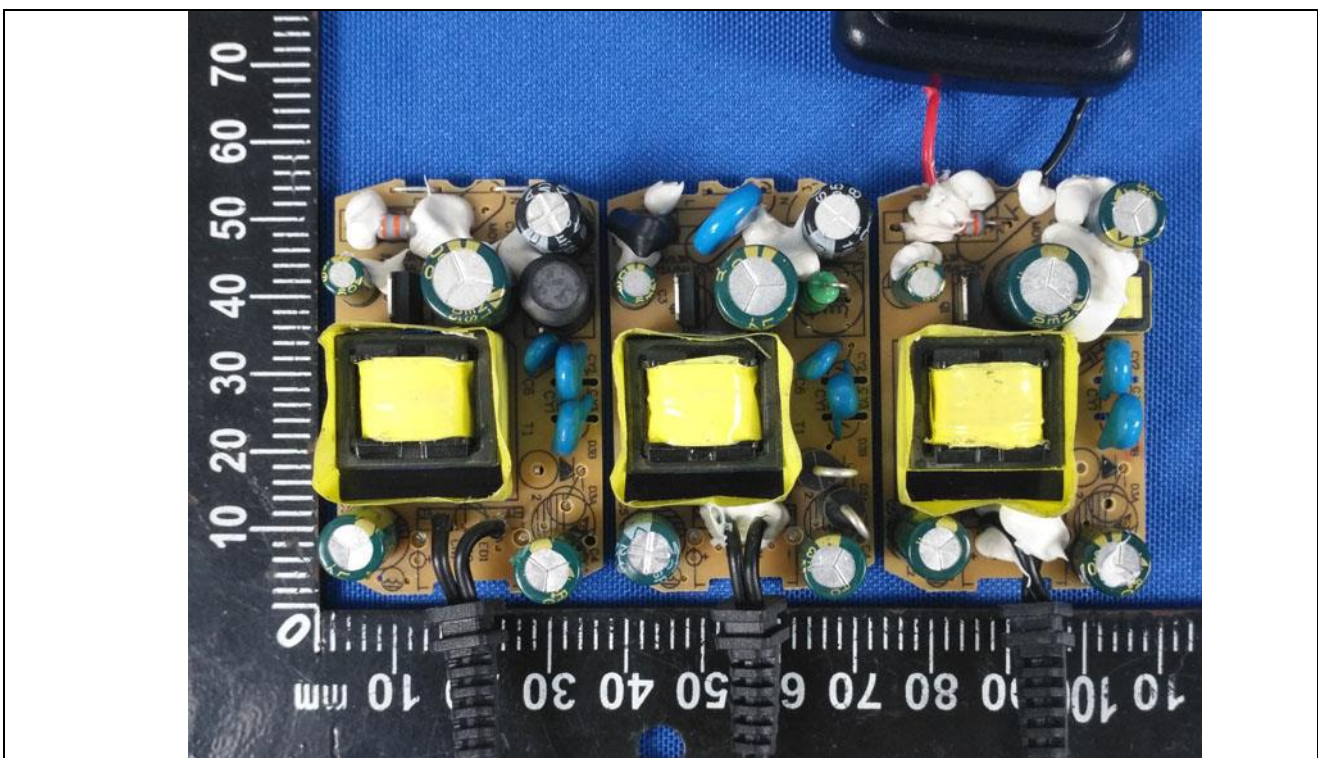
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Details of: Top view of PCB, for all models (with & without MOV1 install, CY1 or CY2+CY3 are alternative)



Details of: Top view of PCB, for all models (L1 or LF1 are alternative) (the output cord was fixed on PCB by rivet & soldering or by soldering & glued)





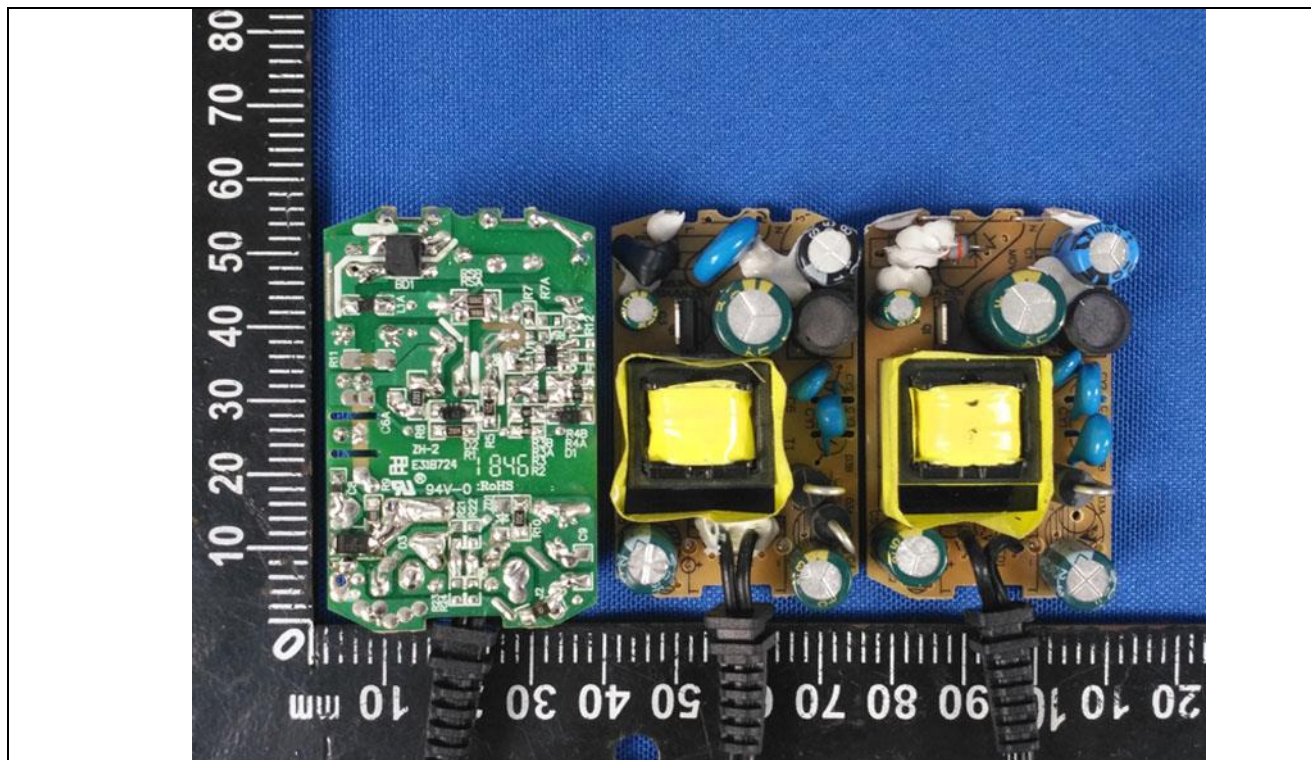
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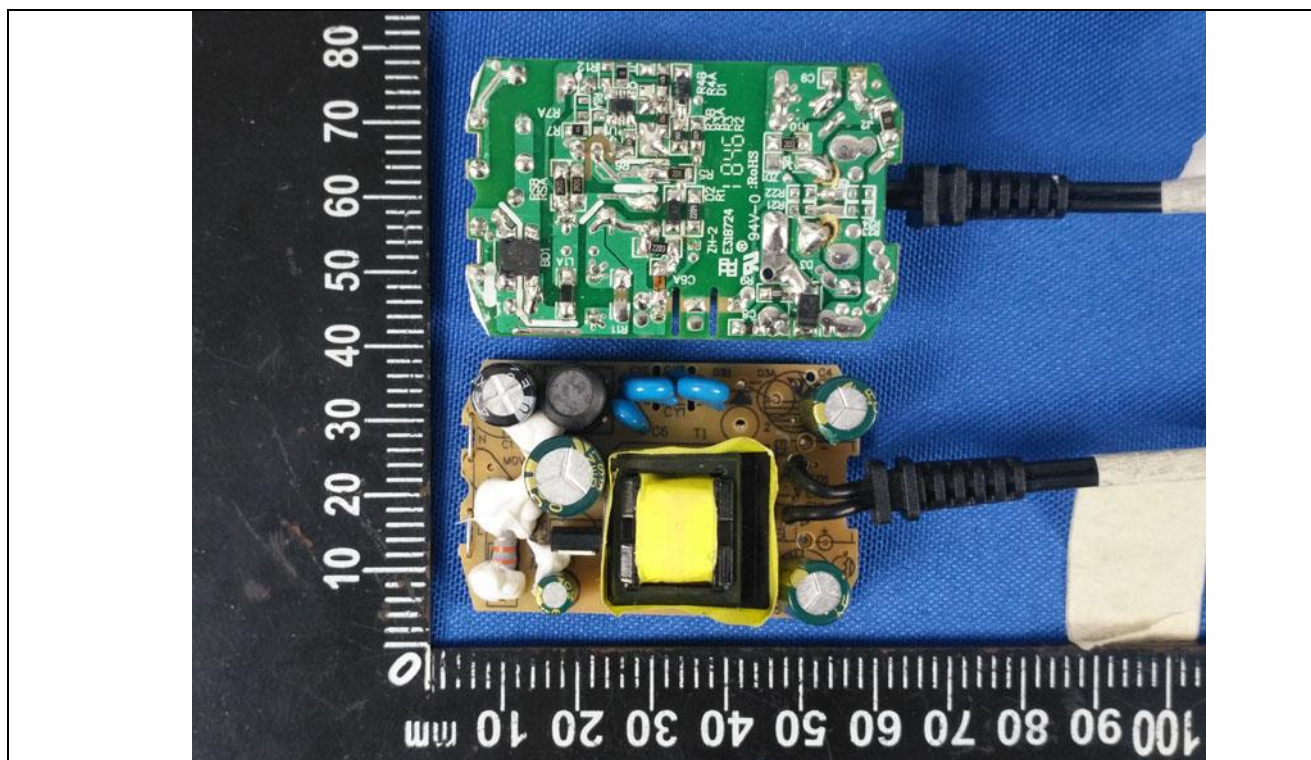
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Details of: Top & bottom view of PCB, for all models (D3 & D3A & D3B can be equipped one of them or two of them)



Details of: Top & bottom view of PCB, for all models (C6A or C6 are alternative)





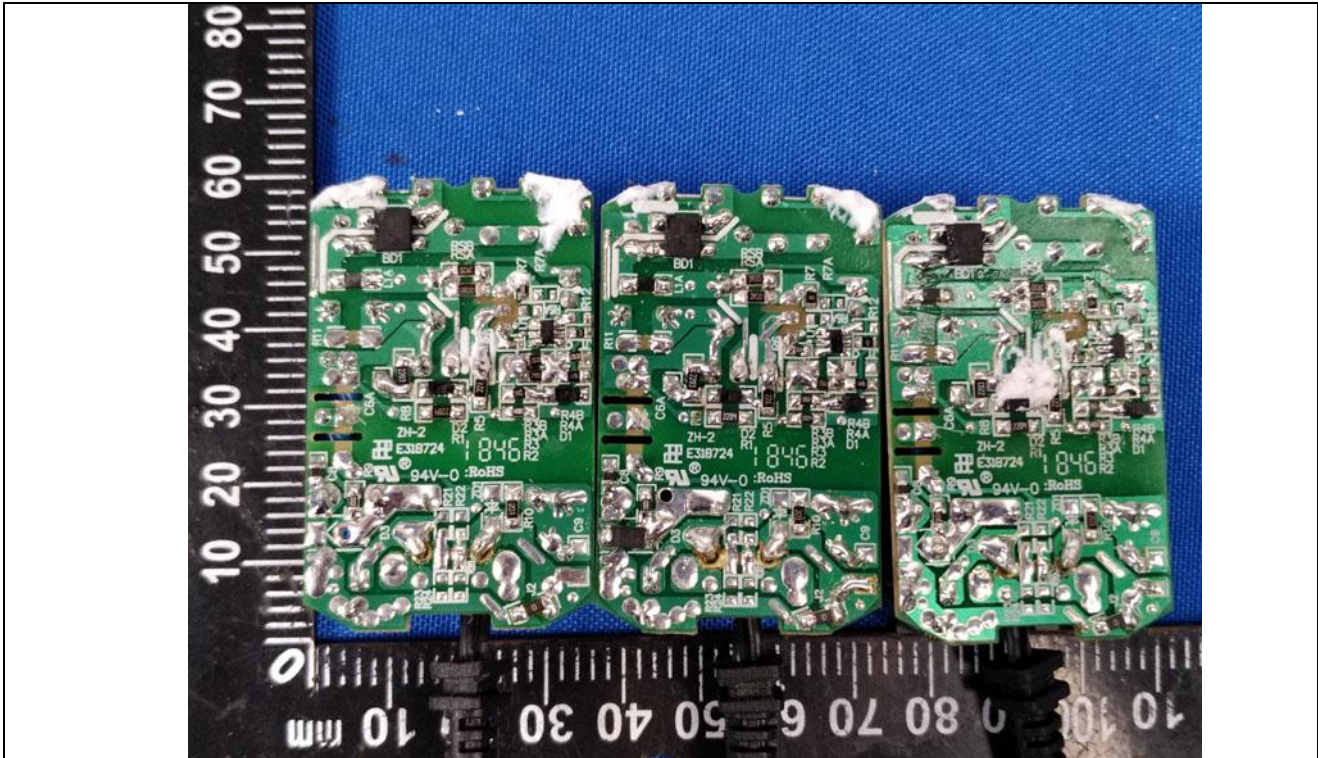
## Attachment No. 5

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Details of: Bottom view of PCB, for all models (R3B, R4B are optional)



Details of: Overall view of T1



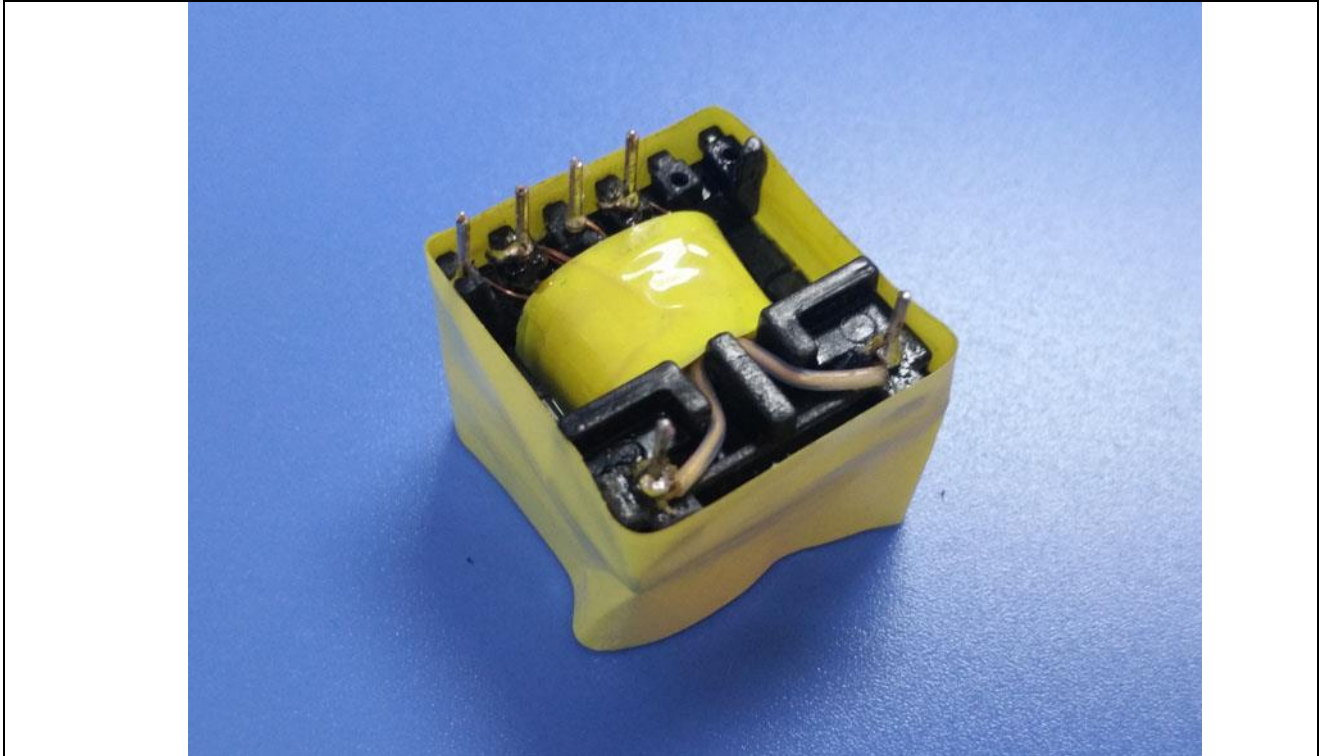
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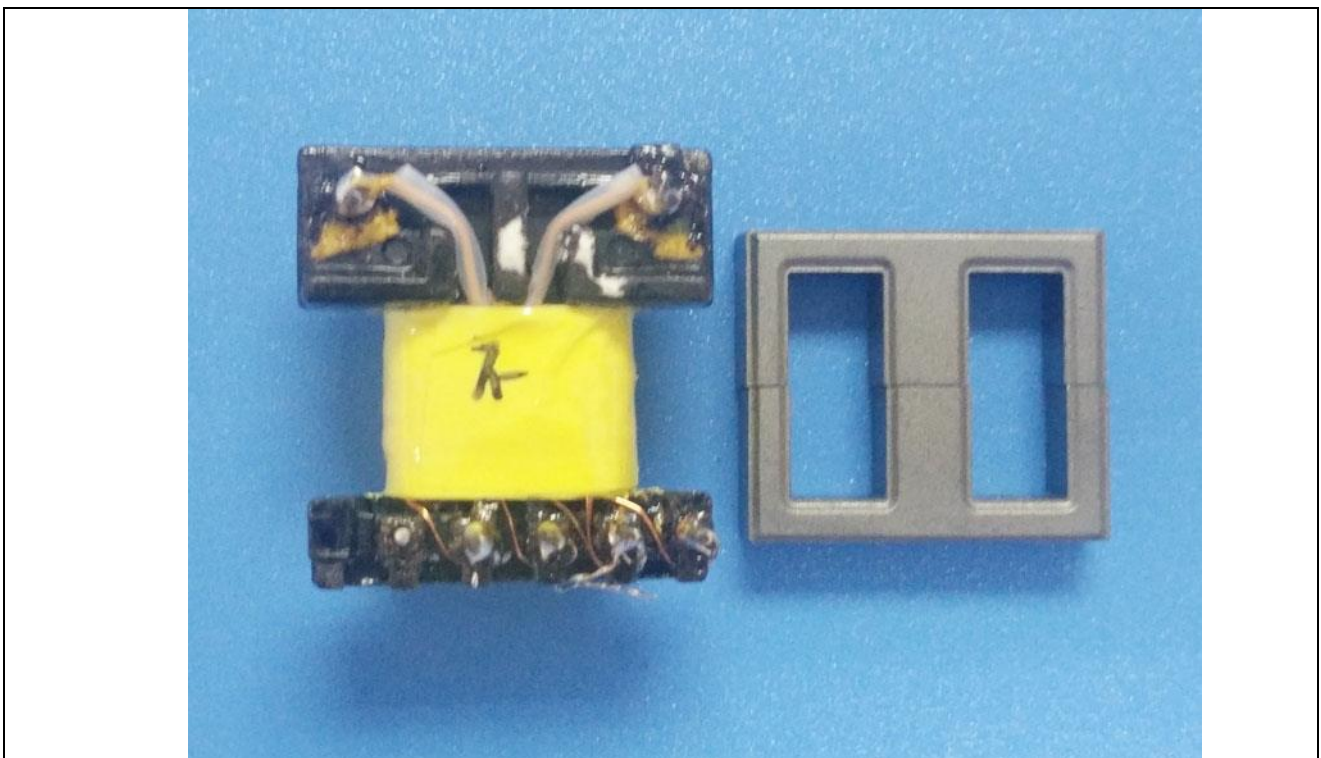
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Details of: Overall view of T1



Details of: Overall view of T1





## Attachment No. 5

Photo documentation

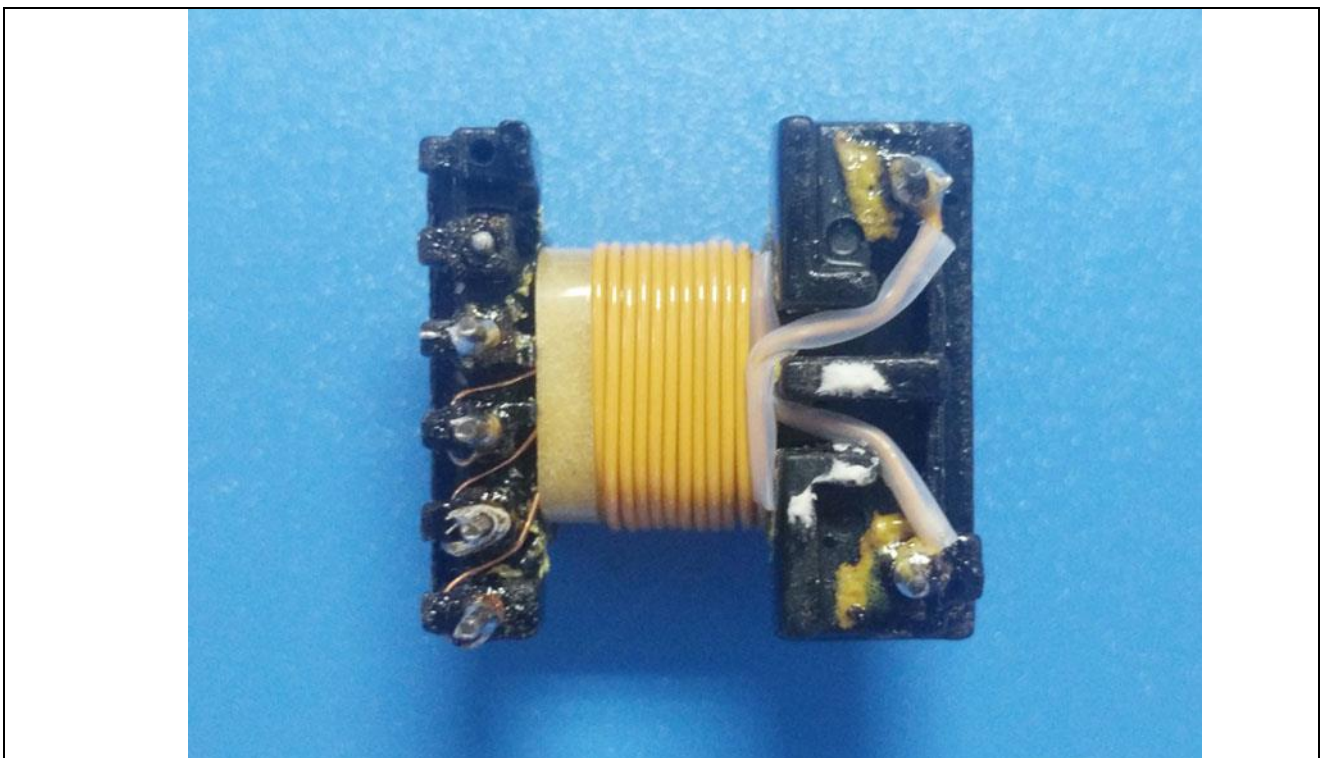
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Details of: Inside view of T1



Details of: Inside view of T1



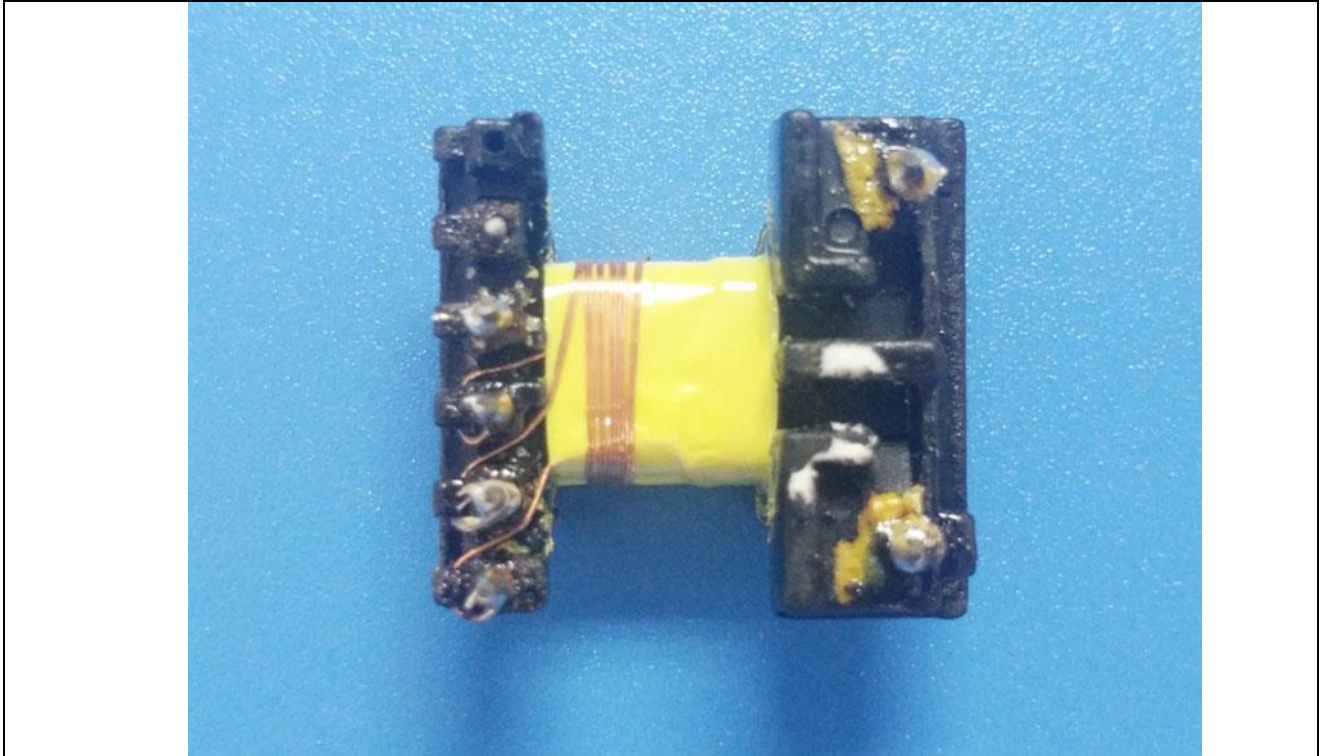
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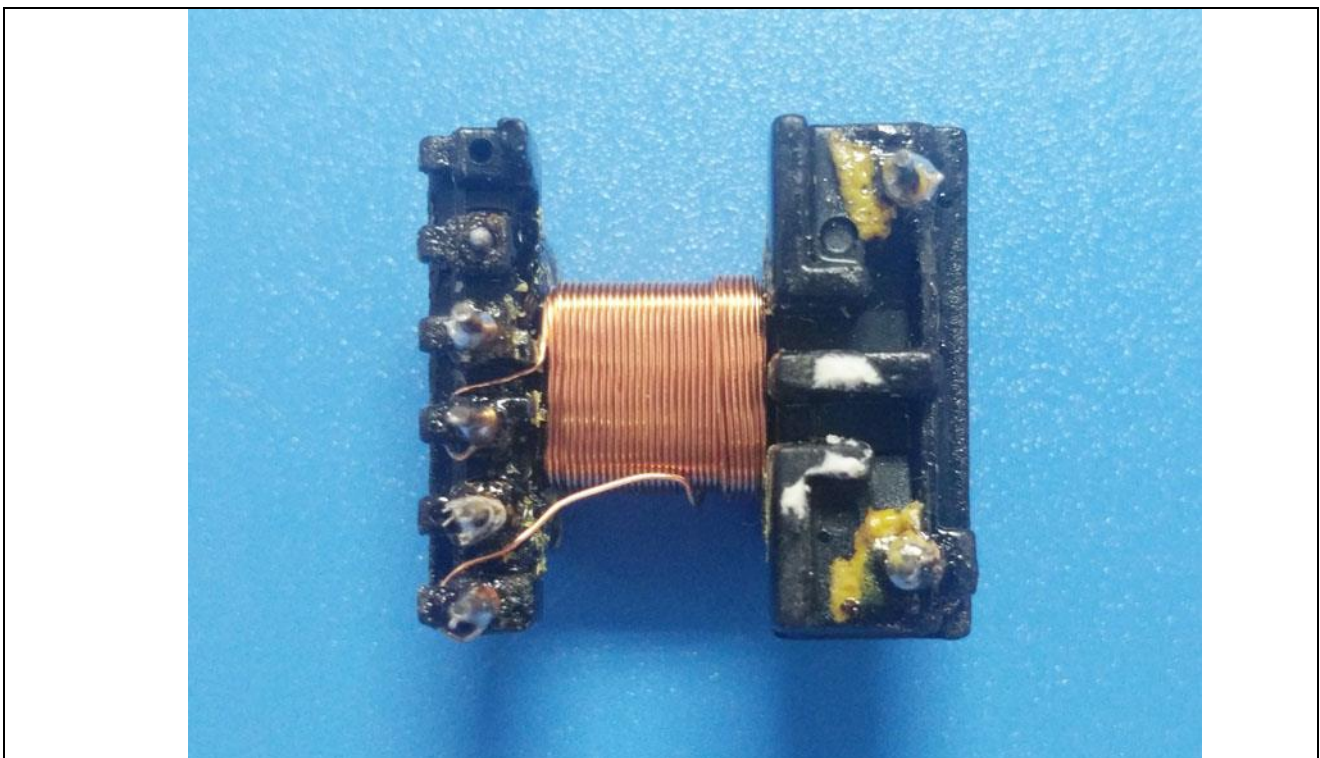
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Details of: Inside view of T1



Details of: Inside view of T1





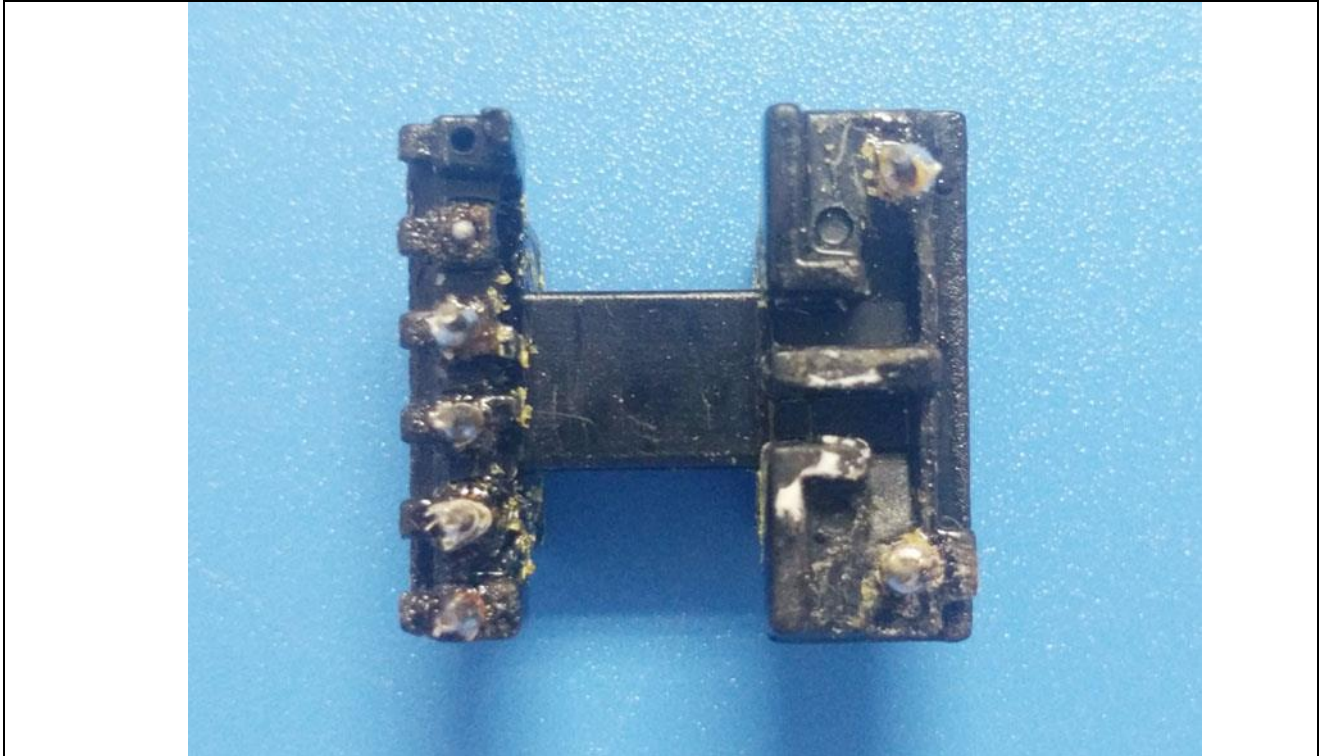
## Attachment No. 5

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Details of: Inside view of T1



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