



Test Report issued under the responsibility of:



TEST REPORT IEC 61347-2-13 Part 2: Particular requirements: Section Thirteen – d.c. or a.c. supplied electronic controlgear for LED modules	
Report Number.....	2171195.50
Date of issue	2014-06-16
Total number of pages.....	41
Applicant's name	Philips (China) Investment Co., Ltd.
Address	#9, Lane 888 Tianlin Road Shanghai Business Park, Shanghai, P.R. China 200233
Test specification:	
Standard	IEC 61347-2-13:2006 (First Edition) used in conjunction with IEC 61347-1:2007 (Second Edition) + A1:2010 + A2:2012
Test procedure	CB Scheme
Non-standard test method.....	N/A
Test Report Form No.....	IEC61347_2_13D
Test Report Form(s) Originator	Intertek Semko AB
Master TRF	2013-10
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Test item description	LED driver
Trade Mark.....	PHILIPS
Manufacturer	Philips (China) Investment Co., Ltd. #9, Lane 888 Tianlin Road Shanghai Business Park, Shanghai, P. R. China 200233
Model/Type reference	XITANIUM 40W 0,7A Prog 230V-J sXt
Ratings	VA-in: 49 VA; Vin: 220-240 V; In: 0,24 A; PF: 0,98; Freq: 50/60 Hz; Iout: 0,1-0,7 A; Vout: 20-77 V; Vout (Max.)=100 V; tc: 80 °C

Testing procedure and testing location:
☒ **CB Testing Laboratory:**

DEKRA Certification B.V.

Testing location/ address: Meander 1051, 6825 MJ Arnhem, The Netherlands

☐ **Associated CB Laboratory:**

Testing location/ address:

Tested by (name + signature).....: J.G.H. Gelink



Approved by (+ signature): T.H.J.M. Michels


☐ ~~Testing procedure: TMP~~

Testing location/ address:

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

Approved by (+ signature):

☐ ~~Testing procedure: WMT~~

Testing location/ address:

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

Witnessed by (+ signature).....:

Approved by (+ signature):

☐ ~~Testing procedure: SMT~~

Testing location/ address:

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

Approved by (+ signature):

Supervised by (+ signature).....:

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

Summary of testing:

Tests performed (name of test and test clause):

Full type testing according to the IEC/EN 61347-2-13 requirements.

Testing location:

DEKRA Certification B.V.
Meander 1051,
6825 MJ Arnhem,
The Netherlands

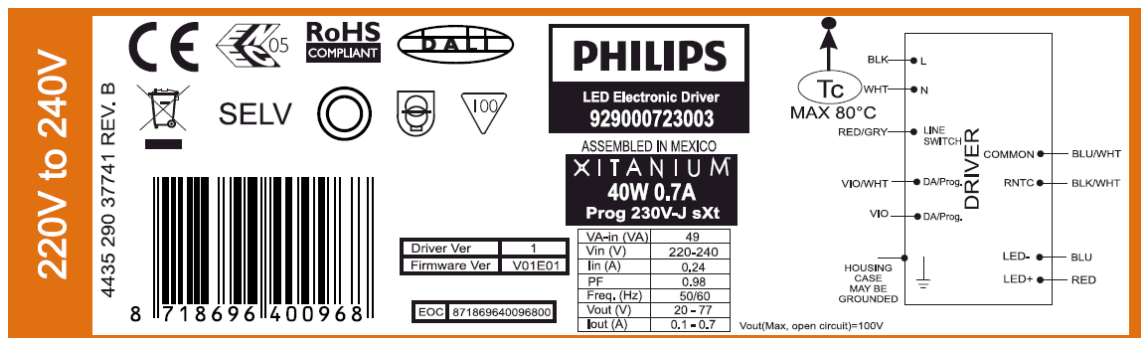
Summary of compliance with National Differences:

List of countries addressed:

- ☒ The product fulfils the requirements of
- EN 61347-1:2008+A1:2011+A2:2013
 - EN 61347-2-13:2006

Copy of marking plate

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



Test item particulars	
Classification of installation and use	Built-in
Supply Connection	Lead wire
Possible test case verdicts:	
- test case does not apply to the test object	N/A
- test object does meet the requirement	P (Pass)
- test object does not meet the requirement	F (Fail)
Testing	
Date of receipt of test item	2014-04
Date (s) of performance of tests	2014-04 ~ 2014-06
General remarks:	
<p>The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory. "(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report.</p> <p>Throughout this report a <input checked="" type="checkbox"/> comma / <input type="checkbox"/> point is used as the decimal separator.</p> <p>Clause numbers between brackets refer to clauses in IEC 61347-1 Although not listed in the report, the following standards are taken into account: - EN 61347-1:2008+A1:2011+A2:2013 - EN 61347-2-13:2006</p>	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC 60529:	
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> Not applicable
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies)	Philips Lighting Electronics, N America Av. Del Aguila Real 19451, 22570 Tijuana, Baja California, Mexico
General product information:	
<p>The XITANIUM™ drivers are designed specifically to optimally power high LEDs. The XITANIUM 40W 0,7A Prog 230V-J sXt driver provides 0,1-0,7A @ 20-76Vdc output. The constant DC current output provides the long life and optimum of high power LEDs. LED driver is completely potted with asphalt. The insulation between primary and secondary is SELV. The insulation between primary and housing is considered as double insulation.</p>	

IEC 61347-2-13			
Clause	Requirement + Test	Result - Remark	Verdict
4 (4)	GENERAL REQUIREMENTS		P
	<u>Insulation materials</u> according requirements in Annex N of IEC 61347-1	(see Annex N)	P
	<u>Compliance of independent controlgear enclosure</u> with IEC 60 598-1		N/A
	<u>Built-in magnetic ballast</u> with double or reinforced insulation comply with Annex I of IEC 61347-1		N/A
	<u>Built-in electronic controlgear</u> with double or reinforced insulation comply with Annex O of IEC 61347-1	(see Annex O)	P
	<u>SELV controlgear</u> comply with Annex L of IEC 61347-1	(see Annex L)	P
	<u>Independent SELV controlgear</u> comply with Annex I of this part 2	(see Annex I)	N/A

6 (6)	CLASSIFICATION		P
	Built-in controlgear	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	—
	Independent controlgear	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
	Integral controlgear	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
	SELV-equivalent or isolating controlgear	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	—
	Auto-wound controlgear	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
	Independent SELV controlgear.....	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—

7 (7)	MARKING		P
7.1 (7.1)	Mandatory markings		P
	a) mark of origin	PHILIPS	P
	b) model number or type reference	XITANIUM 40W 0,7A Prog 230V-J sXt	P
	c) symbol for independent controlgear, if applicable		N/A
	d) correlation between interchangeable parts and controlgear marked		N/A
	e) rated supply voltage (V)	220-240 V	P
	supply frequency (Hz)	50/60 Hz	P
	supply current (A)	0,24 A	P
	f) earthing symbol	Functional Earth	P

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Clause	Requirement + Test	Result - Remark	Verdict
	k) wiring diagram		P
	l) value of t_c	80 °C	P
	m) symbol for declared temperature	100 °C	P
	Constant voltage type:	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
	- rated output voltage (V)		N/A
	Constant current type:	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	—
	- rated output current (A)	0,1-0,7 A	P
	- rated maximum output voltage (V)	100 V	P
	- indication if for LED modules only		P
7.1 (7.2)	Marking durable and legible		P
	Rubbing 15 s water, 15 s petroleum; marking legible		P
7.2 (7.1)	Information to be provided, if applicable:		P
	h) declaration on protection against accidental contact		P
	i) cross-section of conductors (mm ²)		N/A
	j) number, type and wattage of lamp(s)	40 W	P
	- declaration of mains connected windings		N/A
	- declaration for SELV-equivalent controlgear		N/A

8 (10)	PROTECTION AGAINST ACCIDENTAL CONTACT WITH LIVE PARTS		P
- (10.1)	Controlgear protected against accidental contact with live parts		P
- (A2)	Voltage measured with 50 k Ω	(see Annex A)	P
- (A3)	Voltage > 35 V peak or > 60 V d.c. or protective impedance device	(see Annex A)	P
- (10.1)	Lacquer or enamel not used for protection or insulation		P
	Adequate mechanical strength on parts providing protection		P
- (10.2)	Capacitors > 0,5 μ F: voltage after 1 min (V): < 50 V	0,72 V	P

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Clause	Requirement + Test	Result - Remark	Verdict

- (10.3)	Controlgear providing SELV		P
	Accessible conductive parts are insulated from live parts by double or reinforced insulation in SELV controlgear		P
	No connection between output circuit and the body or protective earthing circuit		N/A
	No possibility of connection between output circuit and the body or protective earthing circuit through other conductive parts		P
	SELV outputs separated by at least basic insulation		P
	ELV conductive parts insulated as live parts		N/A
	Tests according Annex L of IEC 61347-1		P
- (10.4)	Accessible conductive parts in SELV circuits		P
	Output voltage under load ≤ 25 V r.m.s. or ≤ 60 V d.c.		N/A
	If output voltage > 25 V r.m.s. or > 60 V d.c.; No load output ≤ 35 V peak or ≤ 60 V d.c. and touch current does not exceed 0,7 mA (peak) or 2 mA d.c.:	0,576 mA	P
	One conductive part is insulated if output voltage or current exceeding the values above and withstand test voltage 500 V		N/A
	Double or reinforced insulation bridged by appropriate and at least two resistors or two Y2 capacitors or one Y1 capacitor		P
	Y1 or Y2 capacitors comply with IEC 60384-14		P
	Resistors comply with test (a) in 14.1 of IEC 60065		P
8.1	SELV-equivalent controlgear accessible parts are insulated from live parts by double or reinforced insulation according 8.6 and 13.1 in IEC 60065		N/A
8.2	Exposed terminals of SELV or SELV-equivalent controlgear if: - the rated or maximum rated output voltages ≤ 25 V r.m.s. - the no-load output voltage ≤ 30 V r.m.s. or $33 \sqrt{2}$ V peak		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Insulated terminals if convertor with rated output voltage > 25 V		N/A
	One capacitor Y1 or two capacitors Y2 complying with IEC 60384-14 of the same values used in series between SELV or SELV-equivalent output and primary circuits		P
	Other components bridging the separating transformer complying with IEC 60065, clause 14	Opto-coupler	P

9 (8)	TERMINALS		N/A
	Screw terminals according section 14 of IEC 60598-1:		N/A
	Separately approved; component list	(see Annex 1)	N/A
	Part of the controlgear	(see Annex 2)	N/A
	Screwless terminals according section 15 of IEC 60598-1:		N/A
	Separately approved; component list	(see Annex 1)	N/A
	Part of the controlgear	(see Annex 3)	N/A

10 (9)	PROVISION FOR PROTECTIVE EARTHING		P
- (9.1)	Provisions for protective earthing		N/A
	Terminal complying with clause 8		N/A
	Locked against loosening and not possible to loosen by hand		N/A
	Not possible to loosen clamping means unintentionally on screwless terminals		N/A
	Earthing via means of fixing		N/A
	Earthing terminal only used for the earthing of the control gear		N/A
	All parts of material minimizing the danger of electrolytic corrosion		N/A
	Made of brass or equivalent material		N/A
	Contact surface bare metal		N/A
- (9.2)	Provision for functional earthing		P
	Comply with clause 8 and 9.1		P

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Clause	Requirement + Test	Result - Remark	Verdict

- (9.3)	Earth contact via the track on the printed board		N/A
	Test with a current of 25 A between earthing terminal and each of the accessible metal parts; measured resistance (Ω) at ≥ 10 A according 7.2.3 of IEC 60598-1: $< 0,5 \Omega$		N/A
- (9.4)	Earthing of built-in lamp controlgear		P
	Earth by means of fixing to earthed metal of luminaire in compliance of 7.2 of IEC 60598-1		P
	Earthing terminal only for earthing the built-in controlgear		N/A
- (9.5)	Earthing via independent controlgear		N/A
- (9.5.1)	Earth connection to other equipment		N/A
	Looping or through connection, conductor min. $1,5 \text{ mm}^2$ and of copper or equivalent		N/A
	Protective earthing wires in line with 5.3.1.1 and clause 7		N/A
- (9.5.2)	Earthing of the lamp compartments powered via the independent lamp controlgear		N/A
	Test with a current of 25 A between input and output earth terminals; measured resistance (Ω) between earthing terminal and each of the accessible metal parts at ≥ 10 A according 7.2.3 of IEC 60598-1: $< 0,5 \Omega$		N/A
	Output earthing terminal marked as in 7.1 t) of IEC 61347-1		N/A

11 (11)	MOISTURE RESISTANCE AND INSULATION		P
	After storage 48 h at 91-95% relative humidity and 20-30 °C measuring of insulation resistance with d.c. 500 V ($\text{M}\Omega$):		P
	For basic insulation $\geq 2 \text{ M}\Omega$	DALI – Input: $> 100 \text{ M}\Omega$ Output – Housing: $> 100 \text{ M}\Omega$	P
	For double or reinforced insulation $\geq 4 \text{ M}\Omega$	DALI – Housing: $> 100 \text{ M}\Omega$ DALI – Output: $> 100 \text{ M}\Omega$ Input – Housing: $> 100 \text{ M}\Omega$ Input – Output: $> 100 \text{ M}\Omega$	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Between primary and secondary circuits in controlgear providing SELV, values in Annex L in IEC 61347-1		P
11 (-)	Adequate insulation between input and output terminals not bounded together in SELV-equivalent controlgear		N/A

12 (12)	ELECTRIC STRENGTH		P
	Immediately after clause 11 electric strength test for 1 min		P
	Basic insulation for SELV, test voltage 500 V		N/A
	Working voltage ≤ 50 V, test voltage 500 V		N/A
	Working voltage > 50 V ≤ 1000 V, test voltage (V):		P
	Basic insulation, $2U + 1000$ V	DALI – Input: 1500 V Output – Housing: 1500 V	P
	Supplementary insulation, $2U + 1000$ V	DALI – Housing: 1500 V DALI – Output: 1500 V	P
	Double or reinforced insulation, $4U + 2000$ V	Input – Housing: 3750 V Input – Output: 3750 V	P
	No flashover or breakdown		P
	Solid or thin sheet insulation for double or reinforced insulation fulfil the requirements in Annex N in IEC 61347-1		P
12 (-)	Windings in separating transformers in SELV-equivalent convertors according to 14.3.2 of IEC 60065		N/A

14 (14)	FAULT CONDITIONS		P
- (14)	When operated under fault conditions the controlgear:		P
	- does not emit flames or molten material		P
	- does not produce flammable gases		P
	- protection against accidental contact not impaired		P
	Thermally protected controlgear does not exceed the marked temperature value		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Fault conditions: capacitors, resistors or inductors without proof of compliance with relevant specifications have been short-circuited or disconnected	(see appended table)	P
- (14.1)	Short-circuit of creepage distances and clearances if less than specified in clause 16 in Part 1 (except between live parts and accessible metal parts)	(see appended table)	P
	Creepage distances on printed boards less than specified in clause 16 in Part 1 provided with coating according to IEC 60664-3		N/A
- (14.2)	Short-circuit or interruption of semiconductor devices	(see appended table)	P
- (14.3)	Short-circuit across insulation consisting of lacquer, enamel or textile	(see appended table)	N/A
- (14.4)	Short-circuit across electrolytic capacitors	(see appended table)	P
- (14.5)	After the tests has been carried out on three samples:		P
	The insulation resistance $\geq 1 \text{ M}\Omega$	DALI – Input: $> 100 \text{ M}\Omega$ DALI – Housing: $> 100 \text{ M}\Omega$ DALI – Output: $> 100 \text{ M}\Omega$ Input – Housing: $> 100 \text{ M}\Omega$ Input – Output: $> 100 \text{ M}\Omega$ Output – Housing: $> 100 \text{ M}\Omega$	P
	No flammable gases		P
	No accessible parts have become live		P
	During the tests, a five-layer tissue paper, where the test specimen is wrapped, does not ignite		P
- (14.6)	Relevant fault condition tests with high-power supply		—
14 (-)	Temperature declared thermally protected lamp controlgear fulfil requirements in Annex C		P

15 (-)	TRANSFORMER HEATING		P
	Windings of separating transformer in a SELV-equivalent controlgear fulfil the requirements according to 7.1 and 11.2 of IEC 60065		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

15.1 (-)	Normal operation		P
	Temperatures do not exceed the changed values of the values in column 2 of Table 3 of IEC 60065, in respect to relevant ambient temperature at t_c , under normal operation		P
15.2 (-)	Abnormal operation		P
	Temperatures do not exceed the changed values of the values in column 3 of Table 3 of IEC 60065, in respect to relevant ambient temperature at t_c , under abnormal conditions of Cl. 16 and fault conditions of Cl. 14	Opto-coupler U7 open-circuit	P
	Ambient temperature at t_c	58,2 °C	—

16 (-)	ABNORMAL CONDITIONS		P
16.1 (-)	Control gear which are of the constant voltage output type:		N/A
	a) No LED module inserted		N/A
	b) Double LED modules or equivalent load connected to the output terminals		N/A
	c) Output terminal short-circuited (20 cm and 200 cm or declared length)		N/A
	During and at the end of the tests no defect impairing safety, nor any smoke or flammable gases produced		N/A
16.2 (-)	Control gear which are of the constant current output type		P
	a) No LED module connected		P
	b) Double the LED modules or equivalent load connected in series to the output terminals		P
	c) Output terminal short-circuited (20 cm and 200 cm or declared length)		P
	Maximum output voltage not exceeded	60,1 V	P
	During and at the end of the tests no defect impairing safety, nor any smoke or flammable gases produced		P

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Clause	Requirement + Test	Result - Remark	Verdict
17 (15)	CONSTRUCTION		P
- (15.1)	Wood, cotton, silk, paper and similar fibrous material		P
	Wood, cotton, silk, paper and similar fibrous material not used as insulation		P
- (15.2)	Printed circuits		P
	Printed circuits used as internal connections complies with clause 14		P
- (15.3)	Plugs and socket-outlets used in SELV or ELV circuits		N/A
	No dangerous compatibility between output socket-outlet and a plug for socket-outlets for input circuit in relation to installation rules, voltages and frequencies		N/A
	Plugs and socket-outlets for SELV comply with IEC 60906-3 and IEC 60884-2-4		N/A
	Plugs and socket-outlets for SELV $\leq 3 \text{ A}$, $\leq 25 \text{ V}$ r.m.s. or $\leq 60 \text{ V}$ d.c. and $\leq 72 \text{ W}$ comply with IEC 60906-3 and IEC 60884-2-4 or:		N/A
	- plugs not able to enter socket-outlets of other standardised system		N/A
	- socket-outlets not admit plugs of other standardised system		N/A
	- socket-outlets without protective earth		N/A
17 (-)	Socket-outlet in the output circuit does not accept plugs complying with IEC 60083 and IEC 60906		N/A
	Not possible to engage plugs accepted by socket-outlet in the output circuit with socket-outlets complying with IEC 60083 and IEC 60906		N/A

18 (16)	CREEPAGE DISTANCES AND CLEARANCES		P
- (16)	Creepage distances and clearances according to Table 3 and 4, as appropriate	(see appended table)	P
	Controlgears providing SELV comply with L.1 in Annex L		P
	Insulating lining of metallic enclosures		P
	Basic insulation on printed boards tested according to clause 14		P
	Distances subjected to both sinusoidal voltage as non-sinusoidal pulses not less than value in either Table 3 or 4		P
	Creepage distances not less than minimum clearance		P

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Clause	Requirement + Test	Result - Remark	Verdict

19 (17)	SCREWS, CURRENT-CARRYING PARTS AND CONNECTIONS		P
	Screws, current-carrying parts and connections in compliance with IEC 60598-1 (clause numbers between parentheses refer to IEC 60598-1)		P
(4.11)	Electrical connections		P
(4.11.1)	Contact pressure		P
(4.11.2)	Screws:		N/A
	- self-tapping screws		N/A
	- thread-cutting screws		N/A
(4.11.3)	Screw locking:		N/A
	- spring washer		N/A
	- rivets		N/A
(4.11.4)	Material of current-carrying parts		P
(4.11.5)	No contact to wood or mounting surface		P
(4.11.6)	Electro-mechanical contact systems		N/A
(4.12)	Mechanical connections and glands		N/A
(4.12.1)	Screws not made of soft metal		N/A
	Screws of insulating material		N/A
	Torque test: torque (Nm); part		N/A
	Torque test: torque (Nm); part		N/A
	Torque test: torque (Nm); part		N/A
(4.12.2)	Screws with diameter < 3 mm screwed into metal		N/A
(4.12.4)	Locked connections:		N/A
	- fixed arms; torque (Nm).....		N/A
	- lampholder; torque (Nm).....		N/A
	- push-button switches; torque 0,8 Nm.....		N/A
(4.12.5)	Screwed glands; force (Nm)		N/A

20 (18)	RESISTANCE TO HEAT, FIRE AND TRACKING		P
- (18.1)	Ball-pressure test:		P
	- part tested; temperature (°C)	Bobbin: 140 °C	P
	- part tested; temperature (°C)	PCB: 125 °C	P

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Clause	Requirement + Test	Result - Remark	Verdict

- (18.2)	Test of printed boards:		P
	- part tested : PCB		P
	- part tested :		N/A
- (18.3)	Glow-wire test (650°C):		P
	- part tested : Bobbin: 650 °C		P
	- part tested : PCB: 650 °C		P
	- part tested : Insulation lining: 650 °C		P
- (18.4)	Needle flame test (10 s):		P
	- part tested : Bobbin		P
- (18.5)	Tracking test:		N/A
	- part tested :		N/A
	- part tested :		N/A

21 (19)	RESISTANCE TO CORROSION		P
	- test according 4.18.1 of IEC 60598-1		N/A
	- adequate varnish on the outer surface		P

14	TABLE: tests of fault conditions		P
Part	Simulated fault		Hazard
Q1	Drain to Source short-circuit		NO
D1	short-circuit		NO
R27	short-circuit		NO
U7	open-circuit		NO
Q13	Pin3 open-circuit		NO

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Clause	Requirement + Test	Result - Remark	Verdict

18 (16)	TABLES: Creepage distances and clearances						P
Table 3	Minimum distances (mm) for a.c. (50/60 Hz) sinusoidal voltages						P
RMS working voltage (V) not exceeding	50	150	250	500	750	1000	
Creepage distances							
Required basic insulation, PTI ≥ 600	0,6	0,8	1,5	3	4	5,5	
Measured	--	--	--	--	--	--	
Required basic insulation, PTI < 600	1,2	1,6	2,5	5	8	10	
Measured	--	--	3,3	--	--	--	
Required supplementary insulation PTI ≥ 600	-	0,8	1,5	3	4	5,5	
Measured	--	--	--	--	--	--	
Required supplementary insulation PTI < 600	-	1,6	2,5	5	8	10	
Measured	--	--	--	--	--	--	
Required reinforced insulation	-	3,2	5	6	8	11	
Measured	--	--	5,44	--	--	--	
Clearances							
Required basic insulation	0,2	0,8	1,5	3	4	5,5	
Measured	--	--	3,3	--	--	--	
Required supplementary insulation	-	0,8	1,5	3	4	5,5	
Measured	--	--	--	--	--	--	
Required reinforced insulation	-	1,6	3	6	8	11	
Measured	--	--	5,44	--	--	--	
Table 4	Minimum distances (mm) for non-sinusoidal pulse voltages						N/A
Rated pulse voltage (peak kV)	2,0	2,5	3,0	4,0	5,0	6,0	8,0
Required clearances	1,0	1,5	2	3	4	5,5	8
Measured	--	--	--	--	--	--	--
Rated pulse voltage (peak kV)	10	12	15	20	25	30	40
Required clearances	11	14	18	25	33	40	60
Measured	--	--	--	--	--	--	--
Rated pulse voltage (peak kV)	50	60	80	100	-	-	-
Required clearances	75	90	130	170	-	-	-
Measured	--	--	--	--	--	--	--

IEC 61347-2-13			
Clause	Requirement + Test	Result - Remark	Verdict

A	ANNEX A - TEST TO ESTABLISH WHETHER A CONDUCTIVE PART IS A LIVE PART WHICH MAY CAUSE AN ELECTRIC SHOCK		P
A.1	Comply with A.2 or A.3		P
A.2	Voltage ≤ 35 V peak or ≤ 60 V d.c		N/A
A.3	If voltage > 35 V peak or > 60 V d.c. or protective impedance device; touch current does not exceed 0,7 mA (peak) or 2 mA d.c.	0,576 mA	P
	Comply with Annex G of IEC 60598-1		P

C	ANNEX C – PARTICULAR REQUIREMENTS FOR ELECTRONIC LAMP CONTROLGEAR WITH MEANS OF PROTECTION AGAINST OVERHEATING		P
C3	GENERAL REQUIREMENTS		P
C3.1	Thermal protection means integral with the convertor, protected against mechanical damage		P
	Renewable only by means of a tool		N/A
	If function depending on polarity, for cord-connected equipment protection means in both leads		N/A
	Thermal links comply with IEC 60691		N/A
	Electrical controls comply with IEC 60730-2-3		N/A
C3.2	No risk of fire by breaking (clause C7)		P
C5	CLASSIFICATION		P
	a) automatic resetting type		—
	b) manual resetting type		—
	c) non-renewable, non-resetting type		—
	d) renewable, non-resetting type		—
	e) other type of thermal protection; description	Inherent	P
C6	MARKING		P
C6.1	Symbol for temperature declared thermally protected ballasts	100 °C	P
C6.2	Declaration of the type of protection provided		P

IEC 61347-2-13			
Clause	Requirement + Test	Result - Remark	Verdict

C7	LIMITATION OF HEATING		P
C7.1	Preselection test:		P
	Test sample placed for at least 12 h in an oven having temperature ($t_c - 5$) K	80,0 °C	P
	No operation of the protection device		P
C7.2	Functioning of protection means:		P
	Normal operation of the sample in a test enclosure according to Annex D at an ambient temperature such that ($t_c + 0$; -5) °C is obtained	80,0 °C	P
	No operation of the protection device		P
	Introducing of the most onerous test condition determined during test of clause 14	U7 open-circuit	P
	Output of windings connected to the mains supply short-circuited, and other part of the convertor operated under normal conditions		N/A
	Increasing of the current through the windings continuously until operation of the protection means		N/A
	Continuous measuring of the highest surface temperature		P
	Ballasts according to C5 a) or C5 e) operated until stable conditions are achieved		P
	Automatic-resetting thermal protectors working 3 times		N/A
	Ballasts according to C5 b) working 6 times		N/A
	Ballasts according to C5 c) and C5) d) working once		N/A
	Highest temperature does not exceed the marked value	85,4 °C	P
	Any overshoot of 10% over the marked value within 15 min		N/A

D	ANNEX D – REQUIREMENTS FOR CARRY OUT THE HEATING TESTS OF THERMALLY PROTECTED LAMP CONTROLGEAR		P
	Tests in C7 performed in accordance with Annex D, if applicable		P

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Clause	Requirement + Test	Result - Remark	Verdict
E	ANNEX E – USE OF CONSTANT S OTHER THAN 4500 IN t_w TESTS		N/A
	Comply with tests according Annex E		N/A
F	ANNEX F - DRAUGHT-PROOF ENCLOSURE		N/A
	Draught-proof enclosure in accordance with the description		N/A
	Dimensions of the enclosure		N/A
	Other design; description		N/A
H	ANNEX H - TESTS		P
	All tests performed in accordance with the advice given in Annex H, if applicable		P
I	ANNEX I: PARTICULAR ADDITIONAL REQUIREMENTS FOR INDEPENDENT SELV D.C. OR A.C. SUPPLIED ELECTRONIC CONTROLGEAR FOR LED MODULES		N/A
I.3	Classification		N/A
I.3.1	Class I	Yes <input type="checkbox"/> No <input type="checkbox"/>	—
	Class II	Yes <input type="checkbox"/> No <input type="checkbox"/>	—
I.3.2	a) non-inherently short circuit proof controlgear	Yes <input type="checkbox"/> No <input type="checkbox"/>	—
	b) non-inherently open circuit proof controlgear	Yes <input type="checkbox"/> No <input type="checkbox"/>	—
	c) inherently short circuit proof controlgear	Yes <input type="checkbox"/> No <input type="checkbox"/>	—
	d) inherently open circuit proof controlgear	Yes <input type="checkbox"/> No <input type="checkbox"/>	—
	e) fail safe controlgear	Yes <input type="checkbox"/> No <input type="checkbox"/>	—
	f) non-short-circuit proof controlgear	Yes <input type="checkbox"/> No <input type="checkbox"/>	—
	g) non-open-circuit proof controlgear	Yes <input type="checkbox"/> No <input type="checkbox"/>	—
I.4	Marking		N/A
	Adequate symbols are used		N/A
I.5	Protection against electric shock		N/A
I.5.1	No connection between output winding and body		N/A
	No connection between output winding and protective earthing circuit		N/A
I.5.2	Input and output circuits electrically separated from each other		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
I.5.2.1	Insulation between input and output winding of the HF-transformer consists of double or reinforced insulation		N/A
	Class II: insulation between input/output and body consists of double or reinforced insulation		N/A
	Class I: insulation between input and body consists of basic and between output and body supplementary insulation		N/A
I.5.2.2	Insulation between input and output winding via the core consists of double or reinforced insulation		N/A
	Insulation between cord and windings of the HD-transformer consists of basic insulation		N/A
I.5.2.3	Serrated tape, additional layer		N/A
I.5.2.4	Class I controlgear for fixed connection provided with basic insulation plus protective screening comply with the following conditions:		N/A
	a) Insulation between the input winding and the protective screen complies with the requirements for basic insulation		N/A
	b) Insulation between the protective screen and the output winding complies with the requirements for basic insulation		N/A
	c) Metal screen consists of a metal foil or of a wire		N/A
	d) Metal screen so arranged that both edges cannot simultaneously touch a magnetic core		N/A
	e) Metal screen and its lead-out wire have a cross-section sufficient to ensure that an overload device will open the circuit before the screen is destroyed		N/A
	f) Lead-out wire sufficiently fixed to the metal screen		N/A
I.5.2.5	Last turn of each winding of the transformer retained by positive means		N/A
	Impregnated winding		N/A
	Winding held together by means of insulating material		N/A

IEC 61347-2-13			
Clause	Requirement + Test	Result - Remark	Verdict
I.5.3	Components bridging between input and output circuit		N/A
I.5.3.1	Used capacitors and resistors comply with 8.2		N/A
I.5.3.2	Used opto-couplers comply with 2.10.5.2 of IEC 60950-1 or 0,4 mm and test in I.8		N/A
I.6	Heating		N/A
I.6.1	No excessive temperatures in normal use		N/A
	Used material classified as Class		—
	Stated value of t_a		—
I.6.2	Temperature rises (Upri: 1.06 time supply rated voltage)		N/A
	Determined temperature rises in windings: - Primary (K) - Limit max (K) - Secondary (K) - Limit max (K)		N/A
	After the test:		N/A
	- no connections have worked loose		N/A
	- no reduction of creepage distances and clearances		N/A
	- no flow of sealing compound		N/A
	- no operation of protecting devices		N/A
	- electric strength test between input and output windings		N/A
I.6.3	Cycling test (10 cycles):		N/A
I.6.3.1	- heat run at (K)		N/A
I.6.3.2	- moisture treatment 48 h		N/A
I.6.3.3	- vibration test 1 h; 1,5 g		N/A
I.6.3.4	After the tests:		N/A
	- insulation resistance $\geq 2, 4$ or $5 \text{ M}\Omega$		N/A
	- dielectric strength test for 2 min. at 35 % of specified value in table I.6		N/A
	- Current or the ohmic component does not deviates by more than 30 %		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

I.7	Short-circuit and overload protection		N/A
I.7.1	Upri: 1.06 times rated voltage or 0.94 and 1.06 times rated supply voltage (V)	:	N/A
I.7.2 I.7.3 I.7.4	Determined temperature rise in windings and on other parts:		N/A
	- test according to Clause	:	N/A
	- Primary winding (K)	:	N/A
	- Limit max (K)	:	N/A
	- Secondary winding (K)	:	N/A
	- Limit max (K)	:	N/A
	- External enclosure ≤ 80 (K)	:	N/A
	- Rubber insulation of wiring ≤ 60 (K)	:	N/A
	- PVC insulation of wiring ≤ 60 (K)	:	N/A
	- Supports ≤ 80 (K)	:	N/A
I.7.5	Fail-safe convertors		N/A
I.7.5.1	- Upri: 1.06 times rated supply voltage	V:	—
	- Isec: 1.5 times rated output current	A:	—
	- time until steady-state conditions t1 (h)	:	—
	- time until failure t2 (h): $\leq t1$; ≤ 5 h	:	N/A
I.7.5.2	During the test:		N/A
	- no flames, molten material, etc.		N/A
	- temperature rise of enclosure ≤ 150 K		N/A
	- temperature rise of plywood support ≤ 100 K		N/A
	After the test:		N/A
	- electric strength (test voltage; 35 % of specified value); no flashover or breakdown for primary-to-secondary and for primary-to-body		N/A
	- live parts not accessible by test finger through holes of enclosure		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

I.8	Insulation resistance and electric strength		N/A
I.8.1	Conditioned 48 h between 91 % and 95 %		N/A
I.8.2	Adequate insulation (500 V d.c. for 1 min) between:		N/A
	Live parts and the body -for basic insulation not less than 2 MΩ		N/A
	Live parts and the body -for reinforced insulation not less than 4 MΩ		N/A
	Input- and output circuits not less than 5 MΩ		N/A
	Metal parts of class II convertors which are separated from live parts by basic insulation only and the body not less than 5 MΩ		N/A
	Metal foil in contact with the inner and outer surfaces of enclosures of insulating material not less than 2 MΩ		N/A
I.8.3	Electric strength test:		N/A
	1) Between live parts of input circuits and live parts of output circuits		N/A
	2) Over basic or supplementary insulation between:		N/A
	a) live parts which are or may become of different polarity		N/A
	b) live parts and body if intended to be connected to protective earth		N/A
	c) accessible metal parts and a metal rod of the same diameter as the flexible cable or cord		N/A
	d) live parts and an intermediate metal part		N/A
	e) intermediate metal parts and the body		N/A
	3) Over reinforced insulation between the body and live parts		N/A
	No flashover or breakdown occurred		N/A
I.9	Construction		N/A
I.9.1	Comply with all requirements		N/A
I.9.2	The distance between input and output terminals shall not be less than 25 mm		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

I.10	Components		N/A
I.10.1	Socket-outlets in the output circuit does not accept plugs complying with IEC 60083 and IEC 60906-1		N/A
I.10.2	Self-resetting protective devices shall not be used unless it is certain that there will be no hazards		N/A
	Compliance is checked by connecting the convertor for 48 h at 1.06 times the rated voltage with the output short-circuited		N/A
I.11	Creepage distances and clearances		N/A
	1. Insulation between input and output circuits:		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
	2. Insulation between adjacent <u>input</u> circuits: measured values \geq specified values (mm) :		N/A
	2. Insulation between adjacent <u>output</u> circuits: measured values \geq specified values (mm) :		N/A
	3. 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
	4. Basic or supplementary insulation:		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
	d) measured values \geq specified values (mm) :		N/A
	e) measured values \geq specified values (mm) :		N/A
	5. Reinforced insulation: measured values \geq specified values (mm) :		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

	6. Distance through insulation:		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
	d) measured values \geq specified values (mm)		N/A

L	ANNEX L: PARTICULAR ADDITIONAL REQUIREMENTS FOR CONTROLGEARS PROVIDING SELV (IEC 61347-1)		P
L.3	Classification		P
	Class I	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
	Class II	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	—
	Class III	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
	non-inherently short circuit proof controlgear	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
	inherently short circuit proof controlgear	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	—
	fail safe controlgear	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
	non-short-circuit proof controlgear	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
L.4	Marking		P
	Adequate symbols are used		P
L.5	Protection against electric shock		P
	Comply with 9.2 of IEC 61558-1		P
L.6	Heating		P
	No excessive temperatures in normal use		P
	Value if capacitor t_c marked	--	—
	Winding insulation classified as Class	115 °C	—
	Comply with tests of clause 14 of IEC 61558-1 with adjustments		P
L.7	Short-circuit and overload protection		P
	Comply with tests of clause 15 of IEC 61558-1 with adjustments		P
L.8	Insulation resistance and electric strength		P
L.8.1	Conditioned 48 h between 91 % and 95 %		P
L.8.2	Insulation resistance		P

IEC 61347-2-13			
Clause	Requirement + Test	Result - Remark	Verdict
	Between input- and output circuits not less than 5 MΩ	Input – Output: > 100 MΩ	P
	Between metal parts of class II convertors which are separated from live parts by basic insulation only and the body not less than 5 MΩ		N/A
	Between metal foil in contact with the inner and outer surfaces of enclosures of insulating material not less than 2 MΩ		N/A
L.8.3	Electric strength		P
	1) Between live parts of input circuits and live parts of output circuits	Input – Output: 3000 V	P
	2) Over basic or supplementary insulation between:		N/A
	a) live parts having different polarity		N/A
	b) live parts and body if intended to be connected to protective earth		N/A
	c) accessible metal parts and a metal rod of the same diameter as the flexible cable or cord		N/A
	d) live parts and an intermediate metal part		N/A
	e) intermediate metal parts and the body		N/A
	f) each input circuit and all other input circuits		N/A
	3) Over reinforced insulation between the body and live parts	Input – Housing: 3000 V	P
L.9	Construction		P
L.9.1	Transformer comply with 19.12 of IEC 61558-1 and 19 of IEC 61558-2-6		P
	HF transformer comply with 19 of IEC 61558-2-16		P
L.10	Components		N/A
	Protective devices comply with 20.6 – 20.11 of IEC 61558-1		N/A
L.11	Creepage distances and clearances		P
	1. Insulation between input and output circuits, basic insulation:		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

IEC 61347-2-13			
Clause	Requirement + Test	Result - Remark	Verdict

	2. Insulation between input and output circuits, double or reinforced insulation:		P
	a) measured values \geq specified values (mm):	6,7 (> 5,0)	P
	b) measured values \geq specified values (mm):		N/A
	c) measured values \geq specified values (mm):	0,2 (> 0,25*2/3)	P
	3. Insulation between adjacent <u>input</u> circuits		N/A
	- measured values \geq specified values (mm):		N/A
	3. Insulation between adjacent <u>output</u> circuits		N/A
	- measured values \geq specified values (mm):		N/A
	4. Insulation between terminals for external connection:		N/A
	- measured values \geq specified values (mm):		N/A
	5. Basic or supplementary insulation:		P
	a) measured values \geq specified values (mm):	3,3 (> 2,6)	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):	5 (> 2,6)	N/A
	e) measured values \geq specified values (mm):		N/A
	6. Reinforced insulation or insulation:		P
	Between body and output circuit: measured values \geq specified values (mm):	5,44 (> 5,0)	P
	Between body and output circuit if provision against transient voltages: measured values \geq specified values (mm):		N/A
	7. Distance through insulation:		P
	a) measured values \geq specified values (mm):		N/A
	b) measured values \geq specified values (mm):	DTI between PRI winding and TWI winding on SEC: 0,2 (> 0,17*2/3) DTI between metal core and MOSFET: 0,15 (0,17*2/3)	P
	c) measured values \geq specified values (mm):		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
N	ANNEX N: REQUIREMENTS FOR INSULATION MATERIALS USED FOR DOUBLE OR REINFORCED INSULATION (IEC 61347-1)		P
N.4	General requirements		P
N.4.1	Material comply with IEC 60085 and IEC 60216 series		P
N.4.2	Solid insulation		P
	Electric strength test at least 5 kV or 1,35 x test voltage in Table N.1		N/A
	If not classified according IEC 60085 and IEC 60216 series: Electric strength test increased 10 % of 5,5 kV or 1,5 x test voltage in Table N.1		P
N.4.3	Thin sheet insulation		N/A
N.4.3.1	Thickness and composition of thin sheet insulation		N/A
	- Inside the ballast and not subjected to handling or abrasion during the production and during maintenance		N/A
	- Non-separated layers: Min. 3 layers and fulfil mandrel test of 150N		N/A
	- Separated layers: Min. 2 layers and each layer fulfil mandrel test of 50N		N/A
	- Separated layers (alternative): Min. 3 layers and 2/3 of the layers fulfil mandrel test of 100N		N/A
N.4.3.2	Mandrel test (electric strength test during mechanical stress)		N/A
	Electric strength test after mandrel test:		N/A
	- Non-separated layers: min. 5 kV or 1,35 x test voltage in Table N.1		N/A
	- 2/3 of min. 3 separated layers: min. 5 kV or 1,25 x test voltage in Table N.1		N/A
	- one of 2 separated layers: min. 5 kV or 1,25 x test voltage in Table N.1		N/A
	No flashover or breakdown occurred		N/A
O	ANNEX O: ADDITIONAL REQUIREMENTS FOR BUILT-IN ELECTRONIC CONTROLGEAR WITH DOUBLE OR REINFORCED INSULATION (IEC 61347-1)		P
O.6	Marking		P
	Marking according clause 7 (7)	See clause 7	P
	Special symbol		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Meaning of the special symbol explained in catalogue		P
O.7	Protection against accidental contact with live parts		P
	Requirements of clause 8 (10)	See clause 8	P
	Test finger not possible to make contact with basic insulated metal parts		P
O.8	Terminals		N/A
	Clause 9 (8)	See clause 9	N/A
O.9	Provision for earthing		P
	Functional earthing terminals comply with clause 9 of part 1		P
	No protective earthing terminal		P
O.10	Moisture resistance and insulation		P
	Clause 11 (11)	See clause 11	P
O.11	Electric strength		P
	Clause 12 (12)	See clause 12	P
O.13	Fault conditions		P
	Clause 14 (14)	See clause 14	P
	End of test, between live part and accessible metal parts or external parts of insulating material in contact with the supporting surface comply with dielectric strength test reduced to 35 % of values according Table 1 in part 1		P
	Insulation resistance according to O.10 between live part and accessible metal parts or external parts of insulating material in contact with the supporting surface not less than 4 MΩ		P
O.14	Construction		P
	Clause 17 (15)	See clause 17	P
	Accessible metal parts insulated from live parts by double or reinforced insulation		P
	Live part insulated from supporting surface in contact with external faces by double or reinforced insulation		P

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Clause	Requirement + Test	Result - Remark	Verdict

O.15	Creepage distances and clearances		P
	Clause 18 (16)	See clause 18	P
	Comply with corresponding values for luminaries in IEC 60598-1		P
O.16	Screws, current-carrying parts and connections		P
	Clause 19 (17)	See clause 19	P
O.17	Resistance to heat and fire		P
	Clause 20 (18)	See clause 20	P
O.18	Resistance to corrosion		P
	Clause 21 (19)	See clause 21	P

IEC 61347-2-13			
Clause	Requirement + Test	Result - Remark	Verdict

	ANNEX 1: components	P
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object/part No.	code	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity
Fuse	B	Littlefuse	382	6,3A 250VAC	EN 60127-1 EN 60127-3	VDE 40018250
Lead wire	C	Amer Line	AWG 18	600V; 90°C; Φ=1,02mm	IEC 61347-2-13	Tested in appliance
PCB	C	Liang Dar	FR4	94V-0; 130°C	IEC 61347-2-13	Tested in appliance
X capacitor	B	FARA	MKP62 X2	100nF; 110°C; 305V	EN 60384-14	VDE 40000358
Y capacitor	B	MURATA	KY Y2	4,7nF; 125°C; 300V	EN 60384-14	VDE 40006273
Y capacitor	B	MURATA	KX Y1	470pF; 125°C; 300V	EN 60384-14	VDE 40002831
Y capacitor	B	MURATA	KX Y1	1nF; 125°C; 300V	EN 60384-14	VDE 40002831
Y capacitor	B	MURATA	KX Y1	3,3nF; 125°C; 300V	EN 60384-14	VDE 40002831
Housing	C	IMAI Metal	--	Soft Cold Rolled Steel; Thick=0,533mm	IEC 61347-2-13	Tested in appliance
Insulation lining	C	WS Hampshire	Mylar	0,25mm; 3000V	IEC 61347-2-13	Tested in appliance
Opto-coupler	B	VISHAY	VO617A	400mA; 700mW; 175°C DTI: ≥ 0,4mm	EN 60747-5-5	VDE 40033345
Varistor	B	EPCOS	S07K320	320V	IEC 61051-1 IEC 61051-2	VDE 40027582
Varistor	B	EPCOS	S07K420	420V	IEC 61051-1 IEC 61051-2	VDE 40027582
Varistor	B	EPCOS	Q14K320	320V	IEC 61051-1 IEC 61051-2	VDE 40027582

IEC 61347-2-13						
Clause	Requirement + Test			Result - Remark		Verdict
Transformer	C	MeiXing	EF25/11	2,50mH Core: EF25/11 Wire: WM82 180°C Bobbin: EF25-11 115°C Tape: CT-280 130°C Triple Wire: TEX-E 130°C	IEC61347-2-13	Tested in appliance

The codes above have the following meaning:

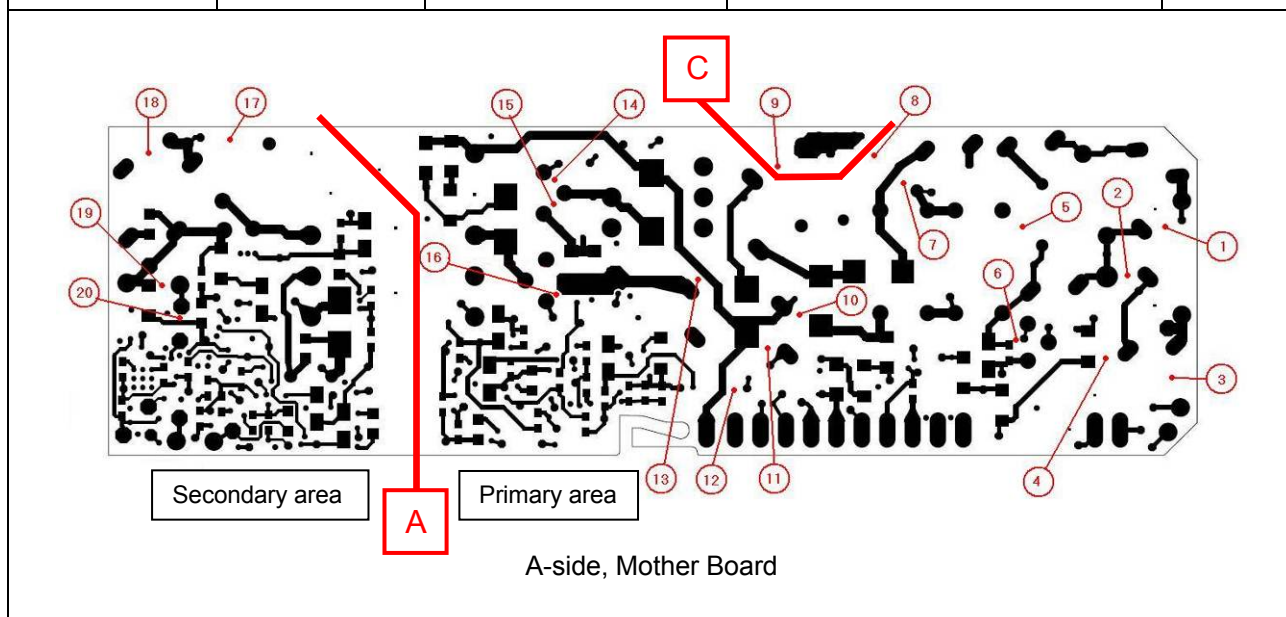
- A - The component is replaceable with another one, also certified, with equivalent characteristics
- B - The component is replaceable if authorised by the test house
- C - Integrated component tested together with the appliance
- D - Alternative component

	ANNEX 2: screw terminals (part of the luminaire)	N/A
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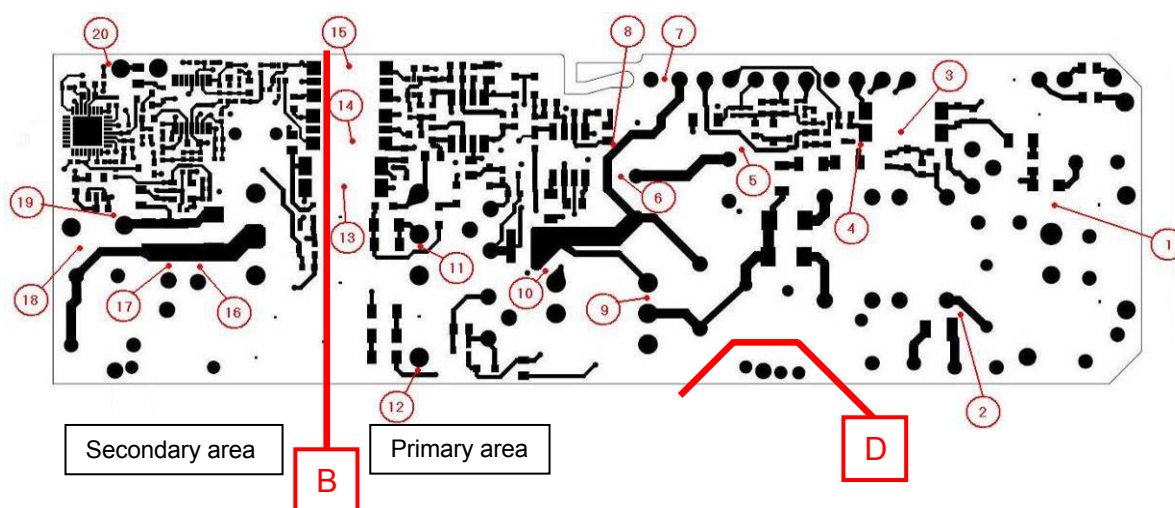
	ANNEX 3: screwless terminals (part of the luminaire)	N/A
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APPENDIX 1: Creepage distances and clearances

Point in circuit	Peak voltage (V)	Measured Distance (mm)	Distance according to IEC 61347 (mm)	Allowed
1	340	3,3	1,1	Pass
2	340	2,4	1,1	Pass
3	300	5,3	1,0	Pass
4	340	2,4	1,1	Pass
5	340	4,7	1,1	Pass
6	1	1,0	0,5	Pass
7	12	2,2	0,5	Pass
8	320	5,3	1,1	Pass
9	320	5,2	1,1	Pass
10	424	2,2	1,3	Pass
11	224	2,4	0,8	Pass
12	360	1,9	1,2	Pass
13	432	1,4	1,3	Pass
14	15	1,5	0,5	Pass
15	440	1,5	1,3	Pass
16	14	1,0	0,5	Pass
17	312	7,0	1,0	Pass
18	17	4,3	0,5	Pass
19	28	1,9	0,5	Pass
20	28	0,7	0,5	Pass
A	250 (RMS)	6,7	5,0	Pass
C	250 (RMS)	6,2	5,0	Pass

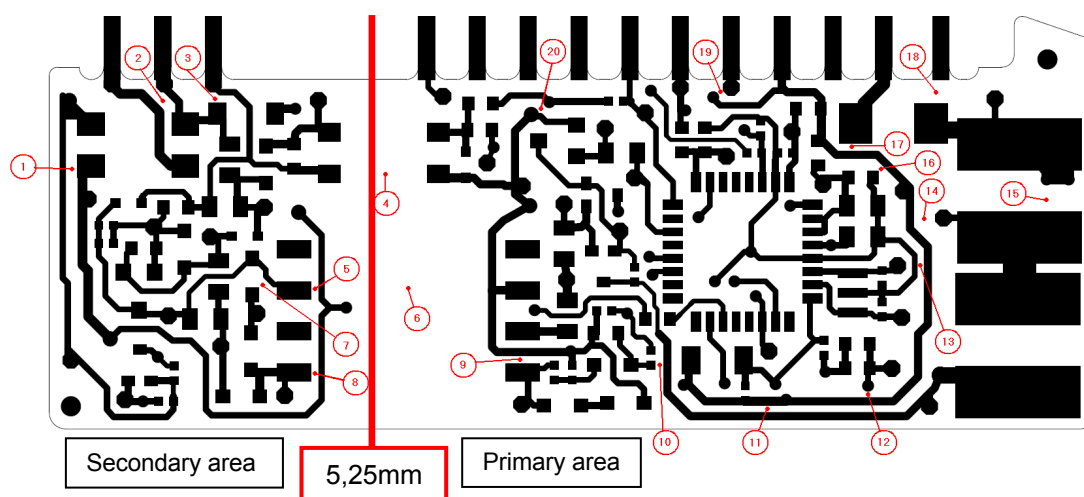


Point in circuit	Peak voltage (V)	Measured Distance (mm)	Distance according to IEC 61347 (mm)	Allowed
1	336	4,0	1,1	Pass
2	1	1,3	0,5	Pass
3	336	7,8	1,1	Pass
4	13	0,9	0,5	Pass
5	208	2,0	0,8	Pass
6	220	2,2	0,8	Pass
7	425	1,5	1,3	Pass
8	10	0,25	0,5	Pass
9	336	1,4	1,1	Pass
10	35	1,4	0,5	Pass
11	33	0,6	0,5	Pass
12	1	0,6	0,5	Pass
13	220	7,0	0,8	Pass
14	220	7,0	0,8	Pass
15	220	7,0	0,8	Pass
16	29	1,5	0,5	Pass
17	29	1,4	0,5	Pass
18	29	2,9	0,5	Pass
19	1	1,1	0,5	Pass
20	6	0,6	0,5	Pass
B	250 (RMS)	7,0	5,0	Pass
D	250 (RMS)	5,5	5,0	Pass



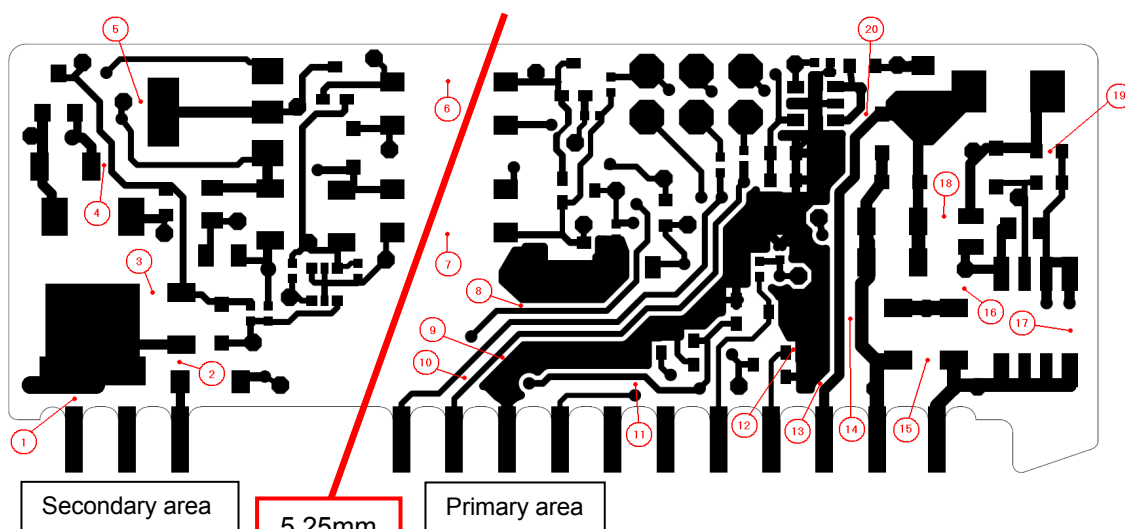
B-side, Mother Board

Point in circuit	Peak voltage (V)	Measured Distance (mm)	Distance according to IEC 61347 (mm)	Allowed
1	5	0,65	0,5	Pass
2	2	0,4	0,5	Pass
3	15	0,35	0,5	Pass
4	250(RMS)	5,25	5,0	Pass
5	15	0,45	0,5	Pass
6	250(RMS)	8,25	5,0	Pass
7	18	0,67	0,5	Pass
8	13	0,4	0,5	Pass
9	18	0,4	0,5	Pass
10	8	0,5	0,5	Pass
11	20	0,35	0,5	Pass
12	16	0,35	0,5	Pass
13	5	0,4	0,5	Pass
14	350	1,3	1,1	Pass
15	275	1,6	0,9	Pass
16	5	0,4	0,5	Pass
17	5	0,4	0,5	Pass
18	485	1,5	1,5	Pass
19	Shuts off	0,4	0,5	Pass
20	5	0,55	0,5	Pass



A-side, Daughter Board

Point in circuit	Peak voltage (V)	Measured Distance (mm)	Distance according to IEC 61347 (mm)	Allowed
1	2	0,8	0,5	Pass
2	15	1,0	0,5	Pass
3	2	1,6	0,5	Pass
4	2	0,4	0,5	Pass
5	2	0,9	0,5	Pass
6	250(RMS)	5,25	5,0	Pass
7	250(RMS)	5,25	5,0	Pass
8	5	0,25	0,5	Pass
9	4	0,28	0,5	Pass
10	4	0,53	0,5	Pass
11	2	0,55	0,5	Pass
12	4	0,25	0,5	Pass
13	22	0,25	0,5	Pass
14	22	0,6	0,5	Pass
15	475	1,6	1,4	Pass
16	390	1,25	1,2	Pass
17	485	2,6	1,5	Pass
18	485	1,8	1,5	Pass
19	22	0,8	0,5	Pass
20	16	0,44	0,5	Pass



B-side, Daughter Board

APPENDIX 2: Fault Conditions

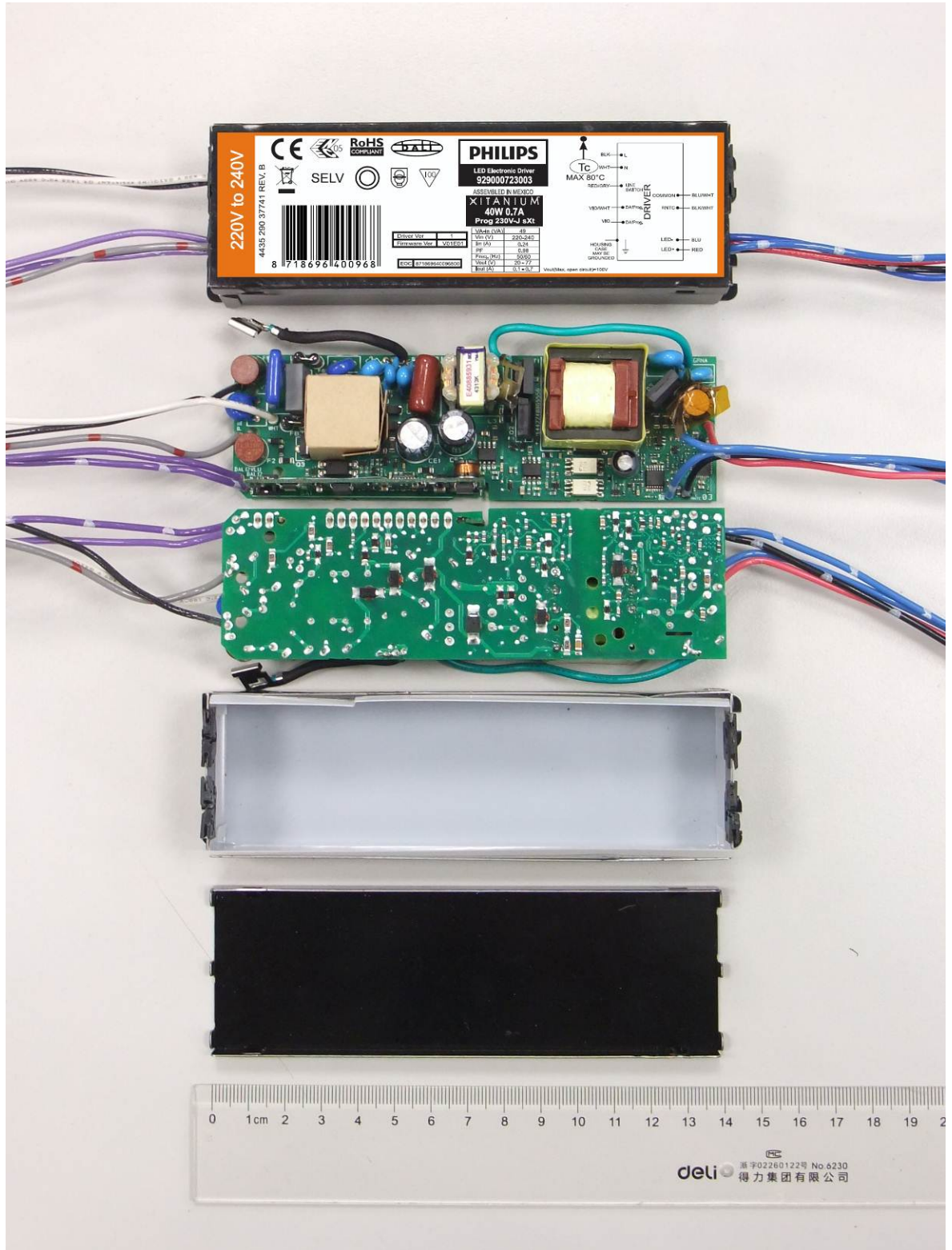
Fault conditions mother board

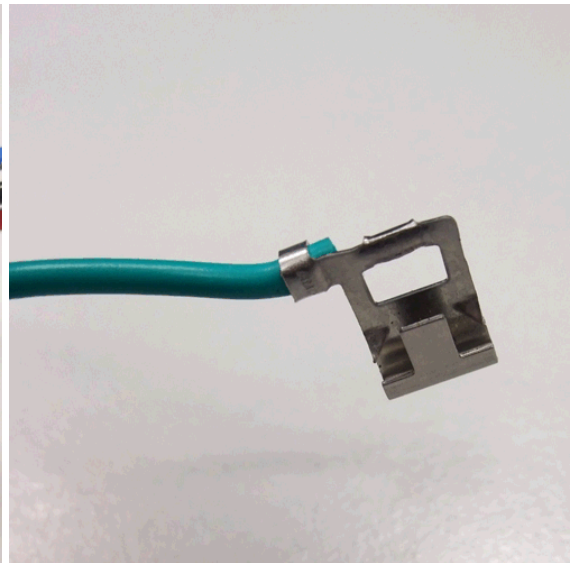
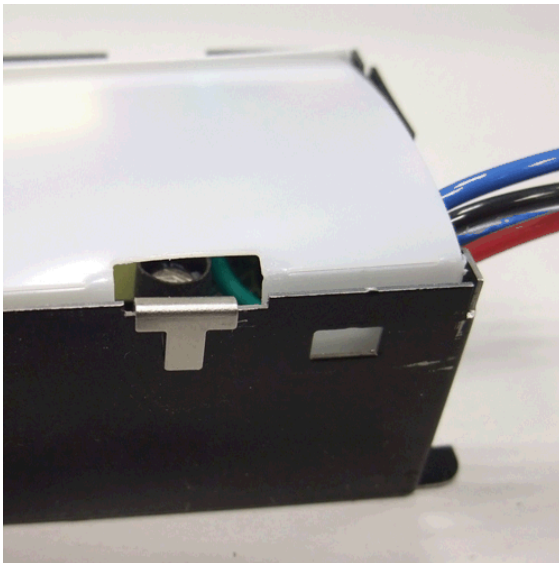
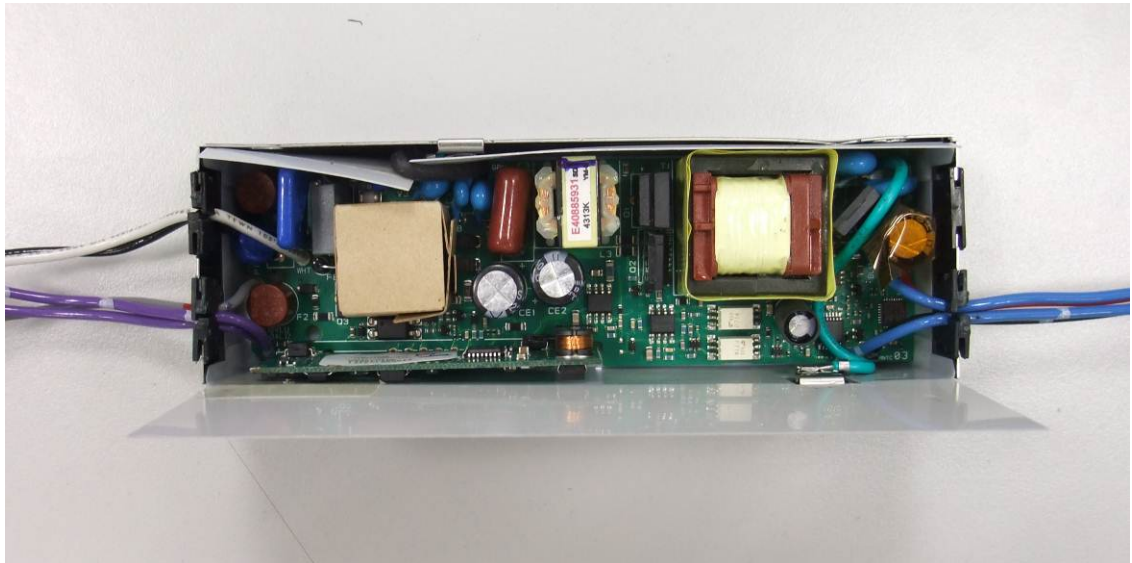
Fault	Result: Fault Implemented at Turn on	Result: Fault Implemented When Unit is Powered
R2 Short	Unit continues to operate; Power factor reduced; Unit recovers after the fault removed	Unit continues to operate; Power factor reduced; Unit recovers after the fault removed
DB1 Short	Unit failed instantly. No input and output; Fuse and L8 open	Unit failed instantly. No input and output; L7 and L8 open
D1 Short	Unit continues to operate; Power factor reduced; Unit recovers after the fault removed	Unit continues to operate; Power factor reduced; Unit recovers after the fault removed
Q1 Drain to Source Short	Unit failed instantly. Fuse Opened; R37, R37B, R23, L8 open; U3 damaged	Unit failed instantly. Fuse Opened; R37, R37B, R23, L8 open; U3 damaged
Q2 Drain to Source Short	Unit failed instantly. L7 and L8 open, R46, R46B, R42, open; U5 damaged	Unit failed instantly. L7 and L8 open, R46, R46B, R42, open; U5 damaged
Q3 Drain to Source Short	Unit continues to operate; Input power 45 W	Unit continues to operate; Input power 45 W
Q3 Drain Open	Unit continues to operate; Input power 45 W	Unit continues to operate; Input power 45 W
R27 Short	Output was at 76 V. input power 72 W. Unit recovers when fault is removed	Output was at 76 V. input power 73 W. Unit recovers when fault is removed
U3 Pin 2 Short to GND	Unit continues to operate; Input power 52 W; Power factor reduced; Unit recovers when fault is removed	Unit continues to operate; Input power 52 W; Power factor reduced; Unit recovers when fault is removed
D2 Short	Unit failed instantly. R37, R37B, R23, L8 open; U3 damaged; Q1 Short;	Unit failed instantly. R37, R37B, R23, L8 open; U3 damaged; Q1 Short;
C46 Short	D9 on daughter board short; 2 W input and no output	D9 on daughter board short; 2 W input and no output
U7 Open	Unit continues to operate; Input power 63 W; Power factor reduced; Unit recovers when fault is removed	Unit continues to operate; Input power 63 W; Power factor reduced; Unit recovers when fault is removed
Q13 Open at Pin 3	Unit goes to the minimum dimming; Unit recovers when the fault removed	Unit goes to the minimum dimming; Unit recovers when the fault removed
U5 Pin 1 short to GND	2 W input and no output; Unit recovers when the fault removed	2 W input and no output; Unit recovers when the fault removed
P3.3 V and GND short	1.5 W input and no output; the driver recovers when the fault is removed	1.5 W input and no output; the driver recovers when the fault is removed

Fault conditions daughter board

Fault	Result: Fault Implemented at Turn on	Result: Fault Implemented When Unit is Powered
P3.3V to Vdd short	U700 on the daughter board failed; no output	U700 on the daughter failed; no output
Dimming Wires Short	Output goes to minimum dimming level	Output goes to minimum dimming level
Dali Wires Short	Lost Dali communication and the driver recovers when the fault is removed	Lost Dali communication and the driver recovers when the fault is removed
Dali Minus short to Pin 7 to T2	The output current drops from 700mA to 236mA; the driver recovers when the fault is removed	The output current drops from 700mA to 236mA; the driver recovers when the fault is removed
Dali Minus short to Pin 5 to T2	The output current drops from 700mA to 70mA; the driver recovers when the fault is removed	The output current drops from 700mA to 70mA; the driver recovers when the fault is removed
Pin 2 and Pin 4 of T2 Short	The output current drops from 700mA to 70mA; the driver recovers when the fault is removed	The output current drops from 700mA to 70mA; the driver recovers when the fault is removed
P3.3 V and Pin 1 of U3 Short	U700 on the daughter board failed; no output	U700 on the daughter board failed; no output
P3.3 V and GND short	1.5W input and no output; the driver recovers when the fault is removed	1.5W input and no output; the driver recovers when the fault is removed
P3.3 V and Vb short	0.77W input and no output; the driver recovers when the fault is removed	0.77W input and no output; the driver recovers when the fault is removed
Dali Minus and Collector of Q8 Short	Lost Dali communication and the driver recovers when the fault is removed	Lost Dali communication and the driver recovers when the fault is removed
DV_OR and GND Short	Driver shut down and output goes to zero; the driver recovers when the fault is removed	Driver shut down and output goes to zero; the driver recovers when the fault is removed
GND and TX-P short	Driver goes to minimum dimming level; the driver recovers when the fault is removed	Driver goes to minimum dimming level; the driver recovers when the fault is removed
Vdd and GDN short	D9 on daughter board short; 2W input and no output	D9 on daughter board short; 2W input and no output
Vdd and pin 1 of U3 short	The Driver works properly	The Driver works properly

Appendix 4: Photographs

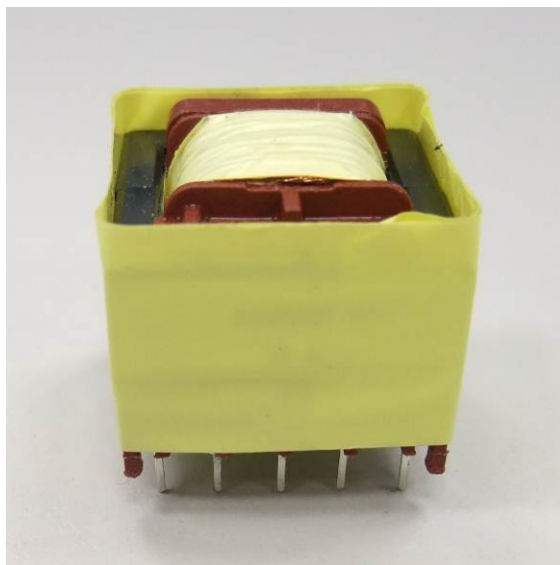
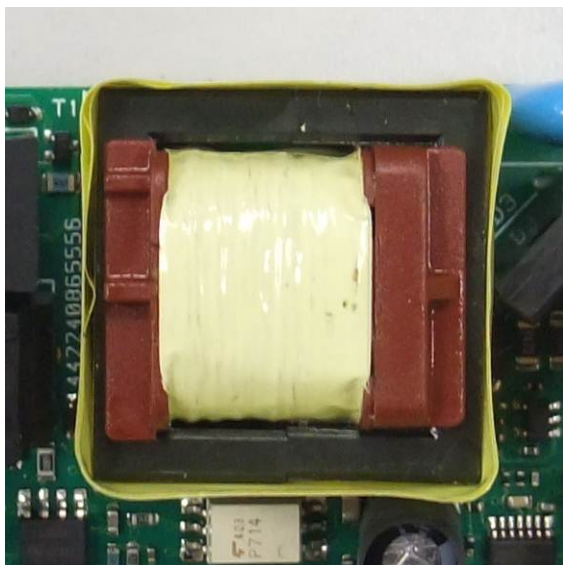




Earthing

Appendix 5: Transformer

2,5mH EF25/11



Transformer voltage table:

Transformer		Secondary Side Pin		
Voltage (RMS) (V)		6	7	8
Primary Side Pin	1	319,0	318,1	333,7
	2	344,8	342,7	321,5
	3	413,3	403,4	357,3
	4	153,2	157,0	182,1
	5	160,6	157,3	168,4

Table	Max Voltage	Measured Clearances/ Creepage	Necessary Clearances/Creepage	Results
Pin 3-6	413V rms	cr = 9,0 mm	cr \geq 8,4 mm	P
Pin 3-6	413V rms	cl = 6,6 mm	cl \geq 6,5 mm	P

Conclusion: Transformer provides reinforced insulation.