

*File **E480967**
*Project **4787237039**

Issued: December 24, 2014
Revised: December 14, 2015

REPORT

on

COMPONENT - Drivers for Light-emitting-diode Arrays, Modules and Controllers

***SOLUM CO LTD**
***REPUBLIC OF KOREA**

Copyright © 2014 UL LLC

UL LLC authorizes the above named company to reproduce this Report only for purposes as described in the Conclusion. The Report should be reproduced in its entirety; however to protect confidential product information, the Construction Details Descriptive pages may be excluded.

DESCRIPTION

PRODUCT COVERED:

USR, CNR- Component LED Driver, see electrical ratings table for models.

USR - United States Recognized Component
CNR - Canada Recognized Component

ELECTRICAL RATINGS:

Model No.	Input			Output		
	Voltage (Vac)	Frequency (Hz)	Current (A), Power (W)	Voltage (Vdc)	Frequency (Hz)	Current (A)
PSDV151102A	120-277	50/60	2.0 A, 200 W	CH1: 200-425, CH2: 13.2	N/A	CH1: 0.35 CH2: 0.05
PSDV151103A	120-277	50/60	2.0 A, 200 W	CH1: 120-280, CH2: 13.2	N/A	CH1: 0.53 CH2: 0.05

(a) - CH1 denotes main output intended to connect LED load,
CH2 denotes dimmer control output intended to connect dimmer control.

TECHNICAL CONSIDERATIONS (NOT FOR UL FIELD REPRESENTATIVE USE):

USR - Indicates investigation to the U.S. Standard for Light Emitting Diode (LED) Equipment for Use in Lighting Products, UL 8750, First Edition.
The CH2 output only has been evaluated as Class 2, Clause 7.12.1.

CNR - Indicates investigation to the Canadian Standard for Light Emitting Diode (LED) Equipment for Lighting Applications, CSA C22.2 No. 250.13, Second Edition.
The CH2 output only has been evaluated as extra low voltage Class 2, Clause 8.12.1.

DIFFERENCES BETWEEN MODELS:

Model PSDV151103A is identical to Model PSDV151102A except model designation, electrical ratings and other differences detailed table below;

Location	PSDV151102A	PSDV151103A
No. of primary windings(TM101)	60 turns	60 turns
No. of secondary windings(TM101)	47 turns	27 turns
DM201 and DM202	600 V, 10 A	400 V, 10 A
CM201 and CM202	500 V, 10 uF	400 V, 15 uF
RM201	0.4 ohm, 2 W	0.27 ohm, 2 W

These products been evaluated for the following characteristics.

Model No. [x] applies to all models			Product is rated	Type HL (b)	Type TL (c)
PSDV151102A, PSDV151103A	Input type- [x] Branch Circuit (Mains)	Output type- [x] CC Output is [x] Isolated for CH1 [x] Class 2 (a) for CH2	[x] Damp	[x] No	[x] No

a - As defined in UL 8750, Clause 7.12.1 and CAN/CSA-C22.2 No. 250.13, Clause 8.12.1

b - Evaluated per UL 8750 requirements for Type HL LED drivers

c - Evaluated per UL 8750 requirements for Type TL LED drivers

Conditions of Acceptability:

Use - For use only in (or with) complete equipment where the acceptability of the combination is determined by UL LLC.

1. Rated output loading for these products was achieved using resistive loads, electronic loads and LED loads. The temperature tests were performed at nominal 50 °C ambient. The need for other consideration should be considered in end-use product.
2. The products have 16.2 Vdc maximum CH2 output voltage during the test for CH2 output. This output complies with the definition of Class 2 per the Canadian Electrical Code (CEC). This product has accessible output terminals.
3. The product utilizes a UL Recognized OBJY2 Class 130 (B) electrical insulation system.
4. During the normal temperature test of the end product, the temperature at the temperature reference point (Tc) is to be monitored. The absolute value at the temperature reference point (Case surface above TM101) cannot exceed 85 °C (calculated values by test are 88.3 °C for model PSDV151102A, 88.7 °C for model PSDV151103A, these values were calculated based on temperatures observed during testing and temperature ratings of the integral components including the electrical insulation system). This value was designated by manufacturer based on calculated values by test.
5. These products are provided with minimum 18 AWG, stranded leads, rated 105 °C, 300 V minimum for input connections, **minimum 20 AWG, stranded leads, rated 105 °C, 425 V (PSDV151102A) / 300 V (PSDV151103A) minimum for output (LED) connections** and minimum 24 AWG, stranded leads, rated 105 °C, 300 V minimum for output (**Dimming**) connections. The suitability of the use shall be determined in the end-product application.
6. The LED driver is provided with an internal green grounding lead that is between the internal board bonded directly and rear metal case mechanically secured by a screw. The need for bonding the dead metal enclosure shall be considered in the end product.

Conditions of Acceptability (CONT'D):

7. The product is intended for building in. Acceptability of the LED driver- with respect to mounting, spacing, casualty, temperature and segregation- is to be determined as part of the end device evaluation.
8. These products are dimmable using a low voltage 0-10 V interface. This interface is a source, since the product provides the source of supply for the interface.
9. The product has been judged on the basis of the required spacings as indicated in the standard for Light Emitting Diode (LED) Equipment for Use in Lighting Products, UL 8750 in addition to the standard for Insulation Coordination Including Clearances and Creepage Distances for Electrical Equipment, UL 840, and Light Emitting Diode (LED) Equipment for Lighting Applications, CSA C22.2 No. 250.13.
10. The unit employs input surge suppression protection suitable for use in Type 3 SPD application. The suitability of the use shall be determined in the end-product application.
11. The products were tested while connected to a 20 A branch circuit. If used on a branch circuit greater than 20 A, additional testing may be necessary and shall be considered in the end product.
12. The input and output connections have been invested for factory wiring only, connection to supply mains shall be determined in the end product. If the product shall be intended to use in field wiring, the suitability shall be determined in each end-use application.
13. Output wires shall be completely enclosed in the end product. It shall be considered in the end product.
14. A potting compound inside the enclosure was used to embed all internal parts and input/output leads fully. The Strain Relief test was not considered necessary in this evaluation.
15. Outer Case has not been invested for final enclosure, the suitable enclosure shall be provided in the end-use product.
16. These products are marked suitable for dry and damp locations. Additional considerations will be necessary as these LED drivers are integrated into wet rated end devices (i.e. input and output supply connection means, accessibility of the output based on maximum voltage restrictions for wet rated Class 2 circuits, acceptability of markings, etc.).

CONSTRUCTION DETAILS:

Corrosion Protection - Ferrous metal parts are protected against corrosion by plating or painting.

Soldered Connections - All soldered connections are mechanically secured before soldering.

Printed Wiring Boards - Suitable for the solder time and temperature used by the manufacturer.

"CN" indicates the component has been evaluated to Canadian requirements and the component shall have a Canadian UL certification Mark (C-UL) or UL certification Mark and CSA certification Mark when the Applicant's basic product bearing C-UL certification Mark.

Product markings-

1. Recognized company name, File number or trademark (If authorized).
2. Model designation.
3. Factory ID or code, when more than one factory.
4. Date Code: see below table,

Mean Digit	Plant	Year	Month	Date	Model Code	Serial No
Example	C1 or C2	00~99	1..9, A, B, C	01,02,..31	1~9,A~Z:	0001~9999

5. Optional - Electrical Ratings, see electrical ratings table.
6. Optional - CH2(+12V) Output: Class 2 or equivalent.
7. Optional - Environmental considerations: see product characteristics table.
8. Optional - Polarity of the Input and Output Connections.
9. Optional - Temperature Measurement Point (Tc)

Model PSDV151102A - FIGS. 1 THRU 5

Model PSDV151103A - FIG. 6

General - The general design, shape and arrangement shall be as illustrated except where variations are specifically described.

No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F)IG (I)LL
1	Case Body	-	-	-	Aluminum alloy, min. 1.5 mm thick, overall measured 207.0 mm by 60.0 mm by 32.0 mm (L x W x H).	F1,F2 ,I1
2	Side Cover (Input)	-	-	-	Aluminum alloy, min. 1.5 mm thick overall measured 60.0 mm by 32.0 mm by 16.0 mm (L x W x H), mechanically secured to Case Body by screws.	F1,I2
3	Side Cover (Output)	-	-	-	Same as above.	F2,I3
4	Input Lead Wire	AVLV2, CN	Various	Various	Min. 18 AWG, rated min. 300 V, 105 °C.	
5	Output Lead Wire (LED) - for model PSDV151103A	AVLV2, CN	Various	Various	Min. 20 AWG, rated min. 300 V, 105 °C.	
5A	Output Lead Wire (LED) - for model PSDV151102A	AVLV2, CN	Various	Various	Min. 20 AWG, rated min. 425 V, 105 °C.	
6	Output Lead Wire (Dimming)	AVLV2, CN	Various	Various	Min. 24 AWG, rated min. 300 V, 105 °C.	
7	Connector (Output Lead wire for dimming control, CON1)	ECBT2, CN	JOWLE TECHNOLOGY CO LTD (E144544)	B2513	Wire to board connector, rated Min. 95 °C	
8	Grounding wire	AVLV2, CN	Various	Various	Min. 18 AWG, rated min. 300 V, 105 °C. Green or with yellow strip, between the internal board bonded directly and rear metal case mechanically secured by a screw.	
9	Input/Output/D imming Grommet	QMFZ2	Various	Various	Rated min. 150 °C, 2.0 mm thickness.	
10	Insulation sheet	QMFZ2	TORAY INDUSTRIES INC (E86511)	Lumirror (#)	Polyethylene Terephthalate (PET), Rated 105 °C, VTM-2, double layers, minimum 0.18 mm total thickness, fully wrap internal LED Driver against Case, see ILL 4 for detailed dimension and shape.	F3, I4
	Alternate	QMFZ2	SKC CO LTD (E74359)	SH71S, SG00L, SR50, SR53	Same as above.	
11	Potting Compound	QMFZ2	DOW CORNING CORP (E40195)	170#	Silicone (RTV), RTI 105 °C, furnished as two liquid components. Completely surrounds circuit board in Case.	

Model PSDV151102A - FIGS. 1 THRU 5

Model PSDV151103A - FIG. 6 (CONT'D)

No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F)IG (I)LL
12	Printed Wiring Board	ZPMV2, CN	Various	Various	Rated minimum 130 °C, V-0. Measured approx. 200.0 mm by 53.0 mm (L x W), 1.6 mm thick. Suitable for support of live parts.	F4, F5, I5
13	Fuse (FS101)	JDYX2, CN	LITTELFUSE WICKMANN WERKE (E67006)	369 +	Rated 5.0 A, 300 Vac, connected in series with ungrounded supply.	
14	Varistor (VX101S)	VZCA2, CN	AMOTECH CO LTD (E332687)	INR14D751	SPD Type 4 for use in Type 3 applications, minimum voltage rating 460 Vac.	
15	X Capacitors (CX101S, CX102S)	FOWX2 or FOKY2, CN	Various	Various	Line-to-Neutral, rated min. 305 Vac, max. 330 nF, min. 110 °C.	
16	Thermistor (NT101S)	XGPU2, CN	Various	Various	Rated 2.5 ohm at 25 °C.	
17	Capacitor (CP171)	-	Various	Various	Rated min. 500 V, min. 105 °C, 680 nF max, located on primary circuit.	
18	Electrolytic Capacitor (CP151)	-	Various	Various	Rated min. 500 V, min. 105 °C, 100 uF max, located on primary circuit.	
19	Bridge Diode (BD101)	-	Various	Various	Rated min. 600 V, max. 25 A.	
20	FET (QP101)	-	Various	Various	Rated min. 600 V, max. 15 A, located on primary circuit.	
21	FETs (QM102, QM103)	-	Various	Various	Rated min. 600 V, max. 7.5 A, located on primary circuit.	
22	Rectifier Diode (DP172)	-	Various	Various	Rated min. 600 V, max. 7.0 A, located on primary circuit.	
23	Capacitor (CM104)	-	Various	Various	Rated min. 2000 Vac, min. 110 °C, 3.3 nF max, located on primary circuit.	
24	Diodes (DM201, DM202) for model PSDV151102A	-	Various	Various	Rated min. 600 V, max. 10 A, located on secondary circuit.	
24A	Diodes (DM201, DM202) for model PSDV151103A	-	Various	Various	Rated min. 400 V, max. 10 A, located on secondary circuit.	

Model PSDV151102A - FIGS. 1 THRU 5

Model PSDV151103A - FIG. 6 (CONT'D)

No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F)IG (I)LL
25	Electrolytic Capacitors (CM201, CM202) for model PSDV151102A	-	Various	Various	Rated 10 uF, min. 500 V, min. 105 °C, located on secondary circuit.	
25A	Electrolytic Capacitors (CM201, CM202) for model PSDV151103A	-	Various	Various	Rated 15 uF, min. 400 V, min. 105 °C, located on secondary circuit.	
26	Heat Sink for DP172, QP101	-	Various	Various	Aluminum, secured to PWB by soldering for models. Measured overall 52.0 mm by 51.0 mm by 19.0 mm (L x W x H), 2.0 mm thick minimum.	
27	Y Capacitor (CY106S)	FOWX2, CN	Various	Various	Bridging primary to secondary, rated 3.3 nF, min. 400 Vac, min. 125 °C. Class Y1.	
28	Y Capacitor (CY201S)	FOWX2, CN	Various	Various	Located secondary to Ground, rated 3.3 nF, min. 400 Vac, min. 125 °C. Class Y1.	
29	Optical Isolators (PC101S, PC102S)	FPQU2, CN	Various	Various	Rated min. 3000 Vac isolation, 110 °C max. operating temperature.	

Winding devices - See below for details.

No.	Item	CCN	Manufacturer (File Number)	Part Number	Description / Technical Data	(F)IG (I)LL
1	Line Filter (LX101S) - primary	-	-	-	Refer to Ill. 6 for details.	I6
1.1	Core	-	-	-	Ferrite, toroidal type, overall approx. 16.0 mm (OD) by 10.0 mm (ID) by 7.0 mm thick.	
1.2	Coil	OBMW2	Various	Various	Two provided, enameled copper wire, each rated minimum 130 °C.	
1.3	Core Cover	QMFZ2	Various	Various	Rated minimum 105 °C, minimum 0.4 mm thick.	
1.4	Coil Separator	QMFZ2	Various	Various	Rated minimum 105 °C, minimum 0.75 mm thick.	
1.5	Base	QMFZ2	MOMENTIVE SPECIALTY CHEMICALS GMBH (E61040)	PF2736(a)(b)	Phenolic (PF), 0.46 mm thick minimum, rated V-0, 150 °C.	
	Alternate	QMFZ2	CHANG CHUN PLASTICS CO LTD (E59481)	T375HF	Phenolic Molding Compound (PMC), 0.43 mm thick minimum, rated V-0, 150 °C.	
1.6	Tube	YDPU2	Various	Various	Rated minimum 200 °C, minimum 300 V, VW-1, located at pins #3 and #4.	
2	Line Filter (LX102S) - primary	-	-	-	Refer to Ill. 7 for details.	I7
2.1	Core	-	-	-	Ferrite, toroidal type, overall 16.0 mm by 10.0 mm by 7.0 mm (OD x ID x H).	
2.2	Coil	OBMW2	Various	Various	Two provided, enameled copper wire, each rated minimum 130 °C.	
2.3	Core Cover	QMFZ2	Various	Various	Rated minimum 105 °C, minimum 0.4 mm thick.	
2.4	Coil Separator	QMFZ2	Various	Various	Rated minimum 105 °C, minimum 0.75 mm thick.	
2.5	Base	QMFZ2	MOMENTIVE SPECIALTY CHEMICALS GMBH (E61040)	PF2736(a)(b)	Phenolic (PF), 0.46 mm thick minimum, rated V-0, 150 °C.	
	Alternate	QMFZ2	CHANG CHUN PLASTICS CO LTD (E59481)	T375HF	Phenolic Molding Compound (PMC), 0.43 mm thick minimum, rated V-0, 150 °C.	
	Alternate	QMFZ2	SUMITOMO BAKELITE CO LTD (E41429)	PM-9630	Phenolic (PF), 0.51 mm thick minimum, rated V-0, 155 °C.	
2.6	Tube	YDPU2	Various	Various	Rated minimum 200 °C, minimum 300 V, VW-1, located at pins #3 and #4.	

and Report

Winding devices - See below for details. (CONT'D)

No.	Item	CCN	Manufacturer (File Number)	Part Number	Description / Technical Data	(F)IG (I)LL
3	Choke coil (LQ01) - Primary	-	-	-	Refer to Ill. 8 for details	I8
3.1	Core	-	-	-	Ferrite, drum type, measured overall 6.5 mm by 3.1 mm by 7.5 mm (OD x ID x H).	
3.2	Coil	OBMW2	Various	Various	Enameled copper wire, rated min. 130 °C.	
3.3	Base	QMFZ2	MOMENTIVE SPECIALTY CHEMICALS GMBH (E61040)	PF2736(a)(b)	Phenolic (PF), 0.46 mm thick minimum, rated V-0, 150 °C.	
	Alternate	QMFZ2	CHANG CHUN PLASTICS CO LTD (E59481)	T375HF	Phenolic Molding Compound (PMC), 0.43 mm thick minimum, rated V-0, 150 °C.	
3.4	Tube	YDPU2	Various	Various	Rated minimum 125 °C, minimum 600 V, VW-1, intended to wrap around a body.	
4	Line filters (L01 - secondary, LX103S - primary)	-	-	-	Refer to Ill. 9 for details.	I9
4.1	Core	-	-	-	Ferrite, toroidal type, overall 8.1 mm by 4.1 mm by 3.1 mm (OD x ID x H).	
4.2	Coil	OBMW2 and OBJY2 or AVLV2	Various	Various	Two provided, one is enameled copper wire and another is triple insulated wire or teflon wire, each rated minimum 130 °C.	
4.3	Base	QMFZ2	MOMENTIVE SPECIALTY CHEMICALS GMBH (E61040)	PF2736(a)(b)	Phenolic (PF), 0.81 mm thick minimum, rated V-0, 150 °C.	
	Alternate	QMFZ2	CHANG CHUN PLASTICS CO LTD (E59481)	T375HF	Phenolic Molding Compound (PMC), 0.43 mm thick minimum, rated V-0, 150 °C.	
4.4	Tube	YDPU2	Various	Various	Rated minimum 200 °C, 300 V, VW-1, located at pins #2 and #4.	

Winding devices - See below for details. (CONT'D)

No.	Item	CCN	Manufacturer (File Number)	Part Number	Description / Technical Data	(F)IG (I)LL
5	Choke coil (L02) - secondary	-	-	-	Refer to Ill. 10 for details.	I10
5.1	Core	-	-	-	Ferrite, drum type, measured overall 6.5 mm by 3.1 mm by 7.5 mm (OD x ID x H).	
5.2	Coil	OBMW2	Various	Various	Enameled copper wire, rated min. 130 °C.	
5.3	Base	QMFZ2	Various	Various	Phenolic, 0.46 mm thick minimum, rated V-0, 150 °C.	
5.4	Tube	YDPU2	Various	Various	Rated minimum 125 °C, minimum 600 V, VW-1, intended to wrap around a body.	
6	PFC (LP01) - primary	-	-	-	Refer to Ill. 11 for details.	I11
6.1	Core	-	-	-	Ferrite, EE type, overall approx. 26.5 x mm by 9.75 mm by 19.0 mm (L x W x H).	
6.2	Coil	OBMW2 and OBJT2	Various	Various	Two provided, one is enameled copper wire and another is triple insulated wire, each rated minimum 130 °C.	
6.3	Bobbin	QMFZ2	MOMENTIVE SPECIALTY CHEMICALS GMBH (E61040)	PF2736(a)(b)	Phenolic (PF), 0.46 mm thick minimum, rated V-0, 150 °C.	
	Alternate	QMFZ2	SUMITOMO BAKELITE CO LTD (E41429)	PM-9820	Phenolic (PF), 0.51 mm thick minimum, rated V-0, 150 °C.	
6.4	Insulation Tape / Core Fixing Tape	OANZ2	Various	Various	Polyethylene terephthalate film tape, min. 0.025 mm thick per layer rated min. 130 °C.	
6.5	Barrier Tape	OANZ2	Various	Various	Rated minimum 130 °C.	
6.6	Varnish	OBOR2	Various	Various	Rated minimum 130 °C.	

Winding devices - See below for details. (CONT'D)

No.	Item	CCN	Manufacturer (File Number)	Part Number	Description / Technical Data	(F)IG (I)LL
7	Transformer (PM101) - primary	-	-	-	Refer to Ill. 12 for details.	I12
7.1	Core	-	-	-	Ferrite, EE type, overall approx. 10.30 mm by 11.05 mm by 4.75 mm (L x W x H).	
7.2	Coil	OBMW2	Various	Various	Three provided, enameled copper wire, rated minimum 130 °C.	
7.3	Tube	YDPU2	Various	Various	Not heat-shrinkable polytetrafluoroethylene (PTFE), rated minimum 200 °C, minimum 150 V, VW-1, located at pin #3.	
	Alternate	QMFZ2	Various	Various	Polytetrafluoroethylene (PTFE), rated minimum 180 °C, located at pin #3.	
7.4	Bobbin	QMFZ2	MOMENTIVE SPECIALTY CHEMICALS GMBH (E61040)	PF2736(a)(b)	Phenolic (PF), 0.46 mm thick minimum, rated V-0, 150 °C.	
	Alternate	QMFZ2	SUMITOMO BAKELITE CO LTD (E41429)	PM-9820	Phenolic (PF), 0.51 mm thick minimum, rated V-0, 150 °C.	
	Alternate	QMFZ2	CHANG CHUN PLASTICS CO LTD (E59481)	T375J	Phenolic Molding Compound (PMC), 0.45 mm thick minimum, rated V-0, 150 °C.	
7.5	Insulation Tape / Core Fixing Tape	OANZ2	Various	Various	Rated minimum 130 °C.	
7.6	Varnish	OBOR2	Various	Various	Rated minimum 130 °C.	

and Report

Winding devices - See below for details. (CONT'D)

No.	Item	CCN	Manufacturer (File Number)	Part Number	Description / Technical Data	(F)IG (I)LL
8	Transformer (TM101)- isolated primary to secondary for model PSDV151102A	-	-	-	Refer to Ills. 13 and 14 for detailed construction and insulation system (Class 130 (B) information).	
	Electrical insulation system	OBJY2	LITE-ON TECHNOLOGY CORP (E140167)	LSE-B11	Rated Class 130 (Class B).	I13
	Alternate	OBJY2	CLOVER HI-TECH CO LTD (E167514)	SC-04B	Same as above.	I14
8.1	Core	-	-	-	Ferrite, EER type, overall approx. 35.3 mm by 20.0 mm by 11.3 mm (L x W x H).	
8.2	Coil	OBMW2	Belong to electrical insulation system	Belong to electrical insulation system	Enameled copper wire, rated min. 130 °C, windings separated from each other by bobbin.	
8.3	Bobbin	QMFZ2	Belong to electrical insulation system	Belong to electrical insulation system	Phenolic (PF), minimum 0.65 mm thick.	
8.4	Cap	QMFZ2	Belong to electrical insulation system	Belong to electrical insulation system	Polybutylene Terephthalate (PBT), rated minimum 130 °C, minimum 0.75 mm thick.	
8.5	Core fixing tape	OANZ2	Belong to electrical insulation system	Belong to electrical insulation system	Rated minimum 130 °C.	
8.6	Varnish	OBOR2	Belong to electrical insulation system	Belong to electrical insulation system	Rated minimum 130 °C.	

Winding devices - See below for details. (CONT'D)

No.	Item	CCN	Manufacturer (File Number)	Part Number	Description / Technical Data	(F)IG (I)LL
8A	Transformer (TM101)- isolated primary to secondary for model PSDV151103A	-	-	-	Refer to Ills. 15 and 16 for detailed construction and insulation system (Class 130 (B) information).	
	Electrical insulation system	OBJY2	LITE-ON TECHNOLOGY CORP (E140167)	LSE-B11	Rated Class 130 (Class B).	I15
	Alternate	OBJY2	CLOVER HI-TECH CO LTD (E167514)	SC-04B	Same as above.	I16
8.1A	Core	-	-	-	Ferrite, EER type, overall approx. 35.3 mm by 20.0 mm by 11.3 mm (L x W x H).	
8.2A	Coil	OBMW2	Belong to electrical insulation system	Belong to electrical insulation system	Enameled copper wire, rated min. 130 °C, windings separated from each other by bobbin.	
8.3A	Bobbin	QMFZ2	Belong to electrical insulation system	Belong to electrical insulation system	Phenolic (PF), minimum 0.65 mm thick.	
8.4A	Cap	QMFZ2	Belong to electrical insulation system	Belong to electrical insulation system	Polybutylene Terephthalate (PBT), rated minimum 130 °C, minimum 0.75 mm thick.	
8.5A	Core fixing tape	OANZ2	Belong to electrical insulation system	Belong to electrical insulation system	Rated minimum 130 °C.	
8.6A	Varnish	OBOR2	Belong to electrical insulation system	Belong to electrical insulation system	Rated minimum 130 °C.	