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REPORT

on

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

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

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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)	Voltage (Vdc)	Frequency (Hz)	Current (A)
PSDV900104U	120-277	50/60	1.2	34-42	N/A	2.3

TECHNICAL CONSIDERATIONS (NOT FOR UL FIELD REPRESENTATIVE USE):

USR - Indicates investigation to the United States Standards for Light Emitting Diode (LED) Light Equipment for Use in Lighting Products, UL 8750, First Edition. The output 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. 250.13-12, First Edition. The output has been evaluated as Low voltage Limited energy, Annex A.

Conditions of Acceptability:

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

1. This product been evaluated for the following characteristics.

Model No.	Input type	Output type	Environment	Type HL (c)	Type TL (d)
PSDV900104U	Branch Circuit (Mains)	Output type-CC Output is Class 2 (a), LVLE (b)	Damp	No	No

a- As defined in UL 8750, Clause 7.12.1

b- As defined in CAN/CSA-C22.2 No. 250.13-12, Annex A

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

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

2. Rated output loading for this product was achieved using LED loads, a variable resistance for fine adjustment, a variable resistive load and the manufacturer instruction which is comprised of DALI interface. The need for other consideration should be considered in end-use product.
3. The product has 43.2 Vdc maximum output voltage during the test. This output complies with the definition of Class 2 per the Canadian Electrical Code (CEC). This output cannot be accessible based on maximum voltage restrictions for Class 2 circuits in the Canadian Electrical Code. The output terminals of the end product should be evaluated to confirm compliance with this accessibility requirement, either based on output terminal design or base on manufacturer specifications for its restricted access areas only. The latter option will require markings on the end product as well as the installation manual.
4. The temperature tests were performed at nominal 50 °C ambient. 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 (Tc, Case surface above T01) cannot exceed (designated by manufacturer) 85 °C. (calculated value by test: 90.4 °C)
5. This product utilizes a UL Recognized OBJ2 Class 130 (B) electrical insulation system.
6. This 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.

Conditions of Acceptability (CONT'D):

7. This product is provided with minimum 18 AWG, stranded leads, rated 105 °C, 300 V minimum for input connections, minimum 24 AWG, stranded leads, rated 105 °C, 300 V minimum for output connections and minimum 24 AWG, stranded leads, rated 105 °C, 300 V minimum for DALI interface connections.
8. The LED driver is provided with an external green grounding lead that is bonded directly to the internal board via metal case by a screw. The need for bonding the dead metal enclosure shall be considered in the end product.
9. This product is dimmable using a low voltage DALI proprietary interface. This interface is a source, since the product provides the source of supply for the interface.
10. 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. 250.13-12.
11. 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.
12. The product was 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.
13. 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.
14. The Strain Relief test was not conducted in this evaluation. The need for additional testing may be considered in the end product.
15. Outer Case has not been invested for final enclosure, the suitable enclosure shall be provided in the end-use product.

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 - R/C (ZPMV2, ZPMV8), rated V-0, suitable for the solder time and temperature used by the manufacturer and having an operating temperature rating of at least 105 °C, and complied with the requirement for direct support of current carrying parts.

"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, if more than one location.
4. Optional - "Suitable for Class 2 Wiring Methods" or equivalent.
5. Optional - Date Code: see below table,

Mean	Plant	Year	Month	Date	Model Code	Serial No
Digit	2	2	1	2	3	4
Example	C1 or C2	00~99	1..9,A, B, C	01,02,..31	1~9,A~Z:	0001~9999

6. Optional - Electrical Ratings, see electrical ratings table.
7. Optional - Environmental considerations: see product characteristics table.
8. Optional - Polarity of the Input and Output Connections.
9. Optional - Temperature Measurement Point (Tc): 90.4 or less °C.

and Report

Model PSDV900104U - FIGS. 1 THRU 6

General - The general design, shape and arrangement shall be as illustrated except where variations are specifically described. FIG. 1 and FIG. 2 show external view of the LED Driver, FIG. 3 shows detailed overall view of the LED Driver, FIG. 4 and FIG. 5 show internal PWB top and bottom view of the LED Driver without thermal pad. FIG. 6 shows locations of thermal pads at bottom PWB.

No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F)IG (I)LL
1	Case Body	-	Various	Various	Aluminum alloy, min. 1.2 mm thick, overall approx. 207.1 mm by 60.0 mm by 25.9 mm (L x W x H).	F1, I1
2	Top Case	-	Various	Various	Aluminum alloy, min. 1.2 mm thick, overall approx. 207.1 mm by 60.0 mm by 8.7 mm (L x W x H).	I2
3	Side Cover (Input)	-	Various	Various	Aluminum alloy, min. 1.5 mm thick overall approx. 60.0 mm by 32.0 mm by 16.0 mm (L x W x H), mechanically secured to Case Body by screws.	F2, I3
4	Side Cover (Output)	-	Various	Various	Same as above.	I4
5	Input Lead Wire	AVLV2, CN	Various	Various	Rated min. 18 AWG, 300 V, 105 °C, VW-1.	
6	Input Cord	ZJCZ, CN	Various	Various	Rated min. 18 AWG, 300 V, 105 °C, VW-1.	
7	Output Lead Wires	AVLV2, CN	Various	Various	Rated min. 24 AWG, 300 V, 105 °C, VW-1.	
8	Output Cord	ZJCZ, CN	Various	Various	Rated min. 24 AWG, 300 V, 105 °C, VW-1.	
9	Connector (CON1) for DALI	-	Various	Various	Located in Class 2 circuit.	
10	Grounding wire	AVLV2, CN	Various	Various	Rated min. 18 AWG, 300 V, 105 °C, VW-1. Green or with yellow strip, bonded directly to the internal board via metal case by a screw.	
11	Input/Outputs (LED, DALI) protector	QMFZ2	Various	Various	Silicone or Silicone rubber (SIR),, rated min. 150 °C, 1.0 mm thickness.	
12	Insulation sheet	QMFZ2	TORAY INDUSTRIES INC (E86511)	Lumirror (#)	Polyethylene Terephthalate (PET), Rated 105 °C, VIM-2, double layers, minimum 0.18 mm total thickness, fully wrap internal LED Driver against Case, see ILL. 5 for detailed dimension and shape.	I5
	Alternate	QMFZ2, CN	SKC CO LTD (E74359)	SH71S, SG00L, SR50, SR53	Same as above.	

Model PSDV900104U - FIGS. 1 THRU 6 (CONT'D)

No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F)I G (I)L L
13	Printed Wiring Board for main circuit	ZPMV2, CN	Various	Various	Rated minimum 105 °C, V-1 and suitable for direct support of live parts. Overall approx. 200.0 mm by 53.0 mm (L x W), 1.5 mm thick. For trace layout see ILL. 6 (not to scale)	F5, I6
14	Printed Wiring Board for DALI circuit	ZPMV2, CN	Various	Various	Same as above except PWB size. Overall approx. 50.0 mm by 19.5 mm (L x W), 1.6 mm thick. For trace layout see ILL. 7 (not to scale)	I7
15	Thermal PAD	QMFZ2 or QMTR2	Various	Various	Silicone or Silicone rubber (SIR), rated minimum 150 °C, V-0, overall approx. 1. 39.0 mm by 65.0 mm (L x W), min. 1.0 mm thick above heat sink #1. 2. 35.0 mm by 23.0 mm (L x W), min. 1.5 mm thick above heat sink #2. 3. 24.0 mm by 14.0 mm (L x W), min. 4.0 mm above transformer (T01). 4. 24.0 mm by 14.0 mm (L x W), min. 3.0 mm thick between CP04 and Heat sink #1. 5. 17.5 mm by 84.5 mm (L x W), min. 3.0 mm thick below PCB.(GP1) 6. 17.5 mm by 26.0 mm (L x W), min. 3.0 mm thick below PCB.(GP2) 7. 17.5 mm by 26.0 mm (L x W), min. 3.0 mm thick below PCB.(GP4) 8. 17.5 mm by 43.0 mm (L x W), min. 3.0 mm thick below PCB.(GP3)	F4, F6

16	Fuse (FP01)	JDYX2 , CN	LITTELFUSE WICKMANN WERKE (E67006)	369 +	Rated 3.15 A, 300 Vac, connected in series with ungrounded supply.	
	Alternate	JDYX2 , CN	CONQUER ELECTRONICS CO LTD (E82636)	MST	Rated 3.15 A, 300 Vac, connected in series with ungrounded supply.	
17	Varistor (VP01)	VZCA2 , CSA Certi fied	AMOTECH CO LTD (E332687)	INR14D751	Rated min. 300 Vac, intended use type 3 SPD applications.	
	Alternate	VZCA2 , CN	THINKING ELECTRONIC INDUSTRIAL CO LTD (E314979)	TVR14751	Same as above.	
18	Thermistor (NT01)	XGPU2 , CN	Various	Various	Rated min. 2.5 ohms at 25°C.	

Model PSDV900104U - FIGS. 1 THRU 6 (CONT'D)

No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F)IG (I)LL
19	X Capacitors (CF01, CF02)	FOKY2 or FOWX2, CN	Various	Various	Line-to-Neutral, rated min. 305 Vac, max. 150 nF, min. 110 °C.	
20	Bridge Diode (BD01)	-	Various	Various	Rated min. 600 V, max. 8.0 A.	
21	Film Capacitor (CP03)	-	Various	Various	Rated min. 500 V, max. 470 nF.	
22	Electrolytic Capacitor (CP04)	-	Various	Various	Rated min. 500 V, max. 47 uF, min. 105 °C.	
23	Electrolytic Capacitors (CS41, CS42)	-	Various	Various	Rated min. 63 V, min. 105 °C, max. 150 uF, located on secondary circuit.	
24	Y Capacitors (CY01, CY02)	FOWX2, CN	Various	Various	Bridging primary to secondary, rated max. 3.3 nF, min. 400 Vac, min. 125 °C. Class Y1.	
25	FET (QP01)	-	Various	Various	Rated min. 600 V, max. 13 A, located on primary circuit.	
26	FETs (QM02, QM03)	-	Various	Various	Rated min. 600 V, max. 11 A, located on primary circuit.	
27	Rectifier Diode (DP01)	-	Various	Various	Rated min. 600 V, max. 10 A, located on primary circuit.	
28	Optical Isolators (PC01, PC02) - in main circuit	FPQU2, CN	Various	Various	Rated min. 3000 Vac isolation, min. 100 °C.	
29	Heat Sink for BD01, QP01, DP01, QM02, QM03 (HS1)	-	Various	Various	Aluminum, secured to PWB by soldering for models. Overall approx. 67.6 mm by 48.5 mm by 22.0 mm(L x W x H), 1.5 mm thick minimum.	I8
30	Heat Sink for DS21, DS22 (HS2)	-	Various	Various	Aluminum, secured to PWB by soldering for models. Overall approx. 39.5 mm by 24.5 mm by 21.5 mm (L x W x H), 1.5 mm thick minimum.	I9
31	Optical Isolators (PCD01, PCD02) - in DALI circuit	FPQU2, CN	Various	Various	Rated min. 3000 Vac isolation, min. 100 °C.	

Winding devices - See below for details.

No.	Item	CCN	Manufacturer (File Number)	Part Number	Description / Technical Data	(F)I G (I)L L
1	Line Filters (LF01, LF02) - primary	-	-	-	Refer to Ill. 10 for details.	I10
1.1	Core	-	-	-	Ferrite, toroidal type, overall approx. 16.0 mm (OD) by 10.0 mm (ID) by 7.0 mm thick.	
1.2	Core Cover / Coil Separator	QMFZ2, CN	SOLVAY ENGINEERING PLASTICS GBU (E44716)	A 50H1 (r3)(f2)	Polyamide 66 (PA66), 0.40 mm thick min., rated V-0, 105 °C.	
	Alternate	QMFZ2, CN	POLYPLASTIC S CO LTD (E109088)	1140(a)(c)(n)	Polyphenylene Sulfide (PPHS), 0.24 mm thick min., rated V-0, 130 °C.	
	Alternate	QMFZ2, CN	SAMYANG CORPORATION (E121254)	1500GN-30	Polybutylene Terephthalate (PBTP), min. 0.75 mm thick min., rated V-0, 130 °C.	
1.3	Coil	OBMW2	Various	Various	Enameled copper wire, rated minimum 130 °C. Overall 0.5 mm diameter, 66 ± 3 turns, wound pin 1-3 and pin 2-4 on core.	
1.4	Insulation Tubing	YDPU2, CN	Various	Various	Rated 300 V min., 200 °C min.	
1.5	Base	QMFZ2	MOMENTIVE SPECIALTY CHEMICALS GMBH (E61040)	PF2736(a)(b)	Phenolic (PF), 0.46 mm thick min., rated V-0, 150 °C.	
	Alternate	QMFZ2	CHANG CHUN PLASTICS CO LTD (E59481)	T375HF	Phenolic Molding Compound (PMC), 0.43 mm thick min., rated V-0, 150 °C.	
	Alternate	QMFZ2	SUMITOMO BAKELITE CO LTD (E41429)	PM-9630	Phenolic (PF), 0.51 mm thick min., rated V-0, 155 °C	

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

No.	Item	CCN	Manufacturer (File Number)	Part Number	Description / Technical Data	(F)IG (I)LL
2	Line Filter (LF03) - primary	-	-	-	Refer to Ill. 11 for details.	I11
2.1	Core	-	-	-	Ferrite, toroidal type, overall approx. 8.1 mm (OD) by 4.1 mm (ID) by 3.1 mm thick.	
2.2	Coil	OBMW2	Various	Various	Enameled copper wire, rated minimum 130 °C. Overall 0.3 mm diameter, 10 ± 1 turns for pin 1-3.	
		OBJT2 or AVLV2 /CN	Various	Various	Teflon wire or triple insulated wire, rated minimum 130 °C. Overall 0.3 mm diameter, 10 ± 1 turns for pin 2-4.	
2.4	Insulation Tubing	YDPU2 , CN	Various	Various	Rated min. 300 V, 200 °C.	
2.5	Coil Base	QMFZ2	MOMENTIVE SPECIALTY CHEMICALS GMBH (E61040)	PF2736(a)(b)	Phenolic (PF), 0.46 mm thick min., rated V-0, 150 °C.	
	Alternate	QMFZ2 , CN	CHANG CHUN PLASTICS CO LTD (E59481)	T375HF	Phenolic Molding Compound (PMC), 0.43 mm thick min., rated V-0, 150 °C.	
3	PFC (LP01) - Primary circuit	-	-	-	Refer to Ill. 12 for details	I12
3.1	Core	-	-	-	Ferrite, EE type, overall 25.05 mm by 18.1 mm by 10.75 mm (L x W x H).	

3.2	Bobbin	QMFZ2	MOMENTIVE SPECIALTY CHEMICALS GMBH (E61040)	PF2736(a)(b))	Phenolic (PF), 0.46 mm thick min., rated V-0, 150 °C.	
3.3	Coil	OBMW2	Various	Various	Enameled copper wire, rated minimum 130 °C for pin 8-1.	
		OBJT2	Various	Various	Triple insulated wire, rated minimum 130 °C for pin 6-5.	
3.4	Insulation Tape	OANZ2	JINGJIANG YAHUA PRESSURE SENSITIVE GLUE CO LTD (E165111)	CT, WF	Polyethylene terephthalate film tape, rated minimum 130 °C.	
	Alternate	OANZ2	SYMBIO INC (E50292)	35660	Polyethylene terephthalate film tape, rated minimum 130 °C.	
3.5	Barrier Tape	OANZ2	Various	Various	Rated minimum 130 °C.	
3.6	Varnish	OBOR2	Various	Various	Rated minimum 130 °C.	

Winding devices - See below for details. (CON'T)

No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F)I G (I)L L
4	Drive transformer (PM01) - Primary circuit	-	-	-	Refer to Ill. 13 for details	I13
4.1	Core	-	-	-	Ferrite, EE type, overall 10.3 mm by 11.05 mm by 4.75 mm (L x W x H).	
4.2	Bobbin	QMFZ2 , CN	MOMENTIVE SPECIALTY CHEMICALS GMBH (E61040)	PF 2736(a)(b)	Phenolic (PF), rated V-0, 150 °C, 0.46 mm thick minimum.	
	Alternate	QMFZ2	SUMITOMO BAKELITE CO LTD (E41429)	PM-9820	Phenolic (PF), rated V-0, 150 °C, 0.16 mm thick minimum.	
	Alternate	QMFZ2	CHANG CHUN PLASTICS CO LTD (E59481)	T375J	Phenolic Molding Compound (PMC), rated V-0, 150 °C, 0.45 mm thick minimum.	
4.3	Coil	OBMW2	Various	Various	Enameled copper wire, rated minimum 130 °C.	
4.4	Insulation Tape	OANZ2	DUCK SUNG HITECH CO LTD (E105147)	DTS-204	Polyester film tape, rated 130 °C, Overall 0.025 mm thick per layer.	
	Alternate	OANZ2	METAL LINE CO LTD (E162848)	800, 800BT	Same as above.	

	Alternate	OANZ2	JINGJIANG YAHUA PRESSURE SENSITIVE GLUE CO LTD (E165111)	CT, PZ	Same as above.	
4.5	Varnish	OBOR2	Various	Various	Rated minimum 130 °C.	
5	Choke coil (LS03) - Secondary circuit	-	-	-	Refer to Ill. 14 for details	I14
5.1	Core	-	-	-	Ferrite, toroidal type, overall 10.0 mm (OD) by 6.0 mm (ID) by 4.0 mm thick.	
5.2	Coil	OBMW2	Various	Various	Enameled copper wire, rated minimum 130 °C. Overall 0.5 mm diameter, 16 ± 1 turns for pin 1-3.	
		OBJT2 or AVLV2 /CN	Various	Various	Teflon wire or triple insulated wire, rated minimum 130 °C. Overall 0.5 mm diameter, 16 ± 1 turns for pin 2-4.	
5.3	Coil Base	QMFZ2	Various	Various	Rated min. 150 °C.	
5.4	Insulation Tubing	YDPU2 , CN	Various	Various	Rated min. 300 V, min. 200 °C.	

Winding devices - See below for details. (CON'T)

No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F)IG (I)LL
6	Transformer (T01)- isolated primary to secondary for main circuit	-	-	-	Refer to Ill. 15 and 16 for detailed construction and insulation system (Class 130 (B) information).	
6.1	Electrical insulation system	OBJY2	CLOVER HI-TECH CO LTD (E167514)	SC-05B	Rated Class 130 (Class B).	I15
	Alternate	OBJY2	YAO SHENG ELECTRONIC CO LTD (E173643)	YCI-130	Same as above.	I16
6.2	Core	-	-	-	Ferrite, EE type, overall approx. 23.3 mm by 18.2 mm by 13.8 mm (L x W x H).	
6.3	Bobbin	QMFZ2	SUMITOMO BAKELITE CO LTD (E41429)	PM-9820	Phenolic (PF), rated 150 °C, 0.65 mm thick minimum.	
6.4	Coil	OBMW2	Belong to electrical insulation system	Belong to electrical insulation system	Enameled copper wire, rated minimum 130 °C.	
6.5	Insulation Tape/Core Fixing Tape	OANZ2	JINGJIANG YAHUA PRESSURE SENSITIVE GLUE CO LTD (E165111)	CT, PZ	Polyethylene terephthalate film tape, rated minimum 0.025 mm thick per layer, minimum 130 °C, min. 2 layers provided.	
	Alternate	OANZ2	SYMBIO INC (E50292)	35660	Same as above.	
6.6	Varnish	OBOR2	Belong to electrical insulation system	Belong to electrical insulation system	Rated minimum 130 °C.	

Winding devices - See below for details. (CON'T)

No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F)I G (I)L L
7	Transformer (T02)-isolated primary to secondary for DALI circuit	-	-	-	Refer to Ill. 17 and 18 for detailed construction and insulation system (Class 130 (B) information).	
7.1	Electrical insulation system	OBJY2	LI SHIN INTERNATIONAL ENTERPRISE CORP (E140167)	LSE-B10	Rated Class 130 (Class B).	I17
	Alternate	OBJY2	SHENZHEN KWANG SUNG ELECTRONICS CO LTD (E305918)	KSE-01BB, KSE-01B	Same as above.	I18
7.2	Core	-	-	-	Ferrite, EFD type, overall approx. 16.6 mm by 15.6 mm by 4.8 mm (L x W x H).	
7.3	Bobbin	QMFZ2	SUMITOMO BAKELITE CO LTD (E41429)	PM-9820	Phenolic (PF), rated 150 °C, 0.65 mm thick minimum.	
7.4	Coil	OBMW2	Belong to electrical insulation system	Belong to electrical insulation system	Enameled copper wire, rated minimum 130 °C for pin 5-3, pin 3-4 and pin 1-2.	

		OBJT2	Belong to electrical insulation system	Belong to electrical insulation system	Triple insulated wire, rated minimum 130 °C for pin 7-6.	
7.5	Insulation Tape/ Core fixing tape	OANZ2	JINGJIANG YAHUA PRESSURE SENSITIVE GLUE CO LTD (E165111)	CT	Polyethylene terephthalate film tape, Min. 0.025 mm thick, min. 130 °C, min. 2 layers provided.	
	Alternate	OANZ2	SYMBIO INC (E50292)	35660	Same as above.	
	Alternate	OANZ2	DONGGUAN SHIN YAHUA ELECTRONIC MATERIAL CO LTD (E324093)	CT	Same as above.	
7.6	Varnish	OBOR2	Belong to electrical insulation system	Belong to electrical insulation system	Rated minimum 130 °C.	