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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.

ELECTRICAL RATINGS:

| Model No. | Input | | | Output | | |
|------------------------------------|---------------|----------------|-------------|---------------|----------------|-------------|
| | Voltage (Vac) | Frequency (Hz) | Current (A) | Voltage (Vdc) | Frequency (Hz) | Current (A) |
| PSDV270571A, PSDV270571E | 110-240 | 50/60 | 0.35 | 40.0 | N/A | 0.57 |
| PSDV270571B, PSDV270571F | 110-240 | 50/60 | 0.35 | 40.0 | N/A | 0.57 |

TECHNICAL CONSIDERATIONS (NOT FOR FIELD REPRESENTATIVE'S USE):

USR - Indicates investigation to the United States Standards for Light Emitting Diode (LED) Light Equipment for Use in Lighting Products, UL 8750. 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, CAN/CSA-C22.2 No. 250.13. The output has been evaluated as LED Class 2, Annex A.

DIFFERENCES BETWEEN MODELS:

Models PSDV270571B, PSDV270571F are identical to models PSDV270571A, PSDV270571E except model designation and type of output connection. See a table below.

| Type of output connection | |
|---------------------------|--------------------------|
| Push-In Terminal Block | PSDV270571A, PSDV270571E |
| Connector | PSDV270571B, PSDV270571F |

Conditions of Acceptability:

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

1. These products been evaluated for the following characteristics.

| Model No. [x] applies to all models | | | Product is rated | Type HL (c) | Type TL (d) |
|--|--|--|---------------------|-------------|-------------|
| PSDV270571A, PSDV270571E , PSDV270571B, PSDV270571F | Input type- Branch Circuit (Mains) | Output type- CC Output is Class 2 (a), LED Class 2 (b) | Damp | No | No |

a- As defined in UL 8750, Clause 7.12.1

b- CAN/CSA-C22.2 No. 250.13, 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 these products was achieved using LEDs and a variable resistive load. The need for other consideration should be considered in end-use product.
3. Based on maximum voltage restrictions for Class 2 circuits in the Canadian Electrical Code, the output cannot be accessible. 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 (T_{ma}). The 71.4°C maximum ambient temperature was then calculated based on temperatures observed during testing and temperature ratings of the integral components including the electrical insulation system. During the normal temperature test of the end product, the temperature at the temperature reference point (T_c) is to be monitored. The absolute value at the temperature reference point (Case surface above L01) cannot exceed 85.9°C.
5. These products utilize a Class B (130) electrical insulation system.
6. These products are intended built-in applications. 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. These products are provided with push-in terminals for supply connection. These terminals are intended for use with 18 AWG stranded copper conductors with 8.5 mm ~ 9.5 mm strip length, **suitable for factory and/or field wiring and type of Use Group (UG) is B and/or D; the type of end-use application for which the specified voltage and spacing level applies. The suitability of the use shall be determined in the end-product application.** And these products are provided with push-in terminals for load connection. These terminals are intended for use with 18-22 AWG stranded copper conductors with 8.5 mm ~ 9.5 mm strip length. **The suitability of the use shall be determined in the end-product application.**
8. The product has been judged on the basis of the required spacing 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. **250.13-14.**
9. The input and output terminal are Use Group D type, its spacing is **1/16** inch through air, and 1/8 inch over surface at 51 - 300 V rating. The suitability of the use shall be determined in the end-product application.
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 input and output connections have been invested for factory wiring only, connection to supply mains shall be determined in the end product.
12. The grounding means shall be considered in each end use application.
13. The product is intended to be operated in a maximum **10 A** branch circuit. **If used on a branch circuit greater than 10 A, additional testing may be necessary and shall be considered in the end product.**
14. Outer Case have not been invested as a final enclosure. A suitable enclosure shall be provided in the end-use product.
15. **This product 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, if more than one location.

* 4. Date Code.

| Mean Digit | Plant | Year | Month | Date | Model Code | Serial No |
|------------|----------|-------|---------------|--------------|------------|-----------|
| | 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 |

5. Optional - Electrical Ratings, see electrical ratings table.
6. Optional - Output Type: **See product characteristics table.**
Product is marked Class 2 based on compliance with UL 8750, Clause 7.12.1 and CAN/CSA-C22.2 No. 250.13, Annex A.

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7. Optional - Environmental considerations: Suitable for Dry and Damp locations only.
8. Optional - Polarity of the Input and Output Connections.
9. Optional - Maximum ambient temperature (Tma): 71.4°C or less.
10. **Optional - Temperature Measurement Point (Tc).**

Model PSDV270571A - FIG. 1 thru. FIG. 5

(Model PSDV270571A represents model PSDV270571B, **PSDV270571E**, **PSDV270571F**)

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 internal overall view of the LED Driver, FIG. 4 and FIG. 5 show internal PWB top and bottom view of the LED Driver.

| No. | Item | CCN | Manufacturer (File Number) | Part/Model Number | Description / Technical Data | (F) IG (I) LL |
|-----|---|-----------------------------|---|----------------------|---|------------------|
| 1 | Top/Sides Case | QMFZ2 | Samsung SDI Co., Ltd. (E115797) | HN-1064(+) | Polycarbonate (PC), rated 130°C, V-0, measured approx. 94.5 mm by 39.5 mm by 31.0 mm (L x W x H), 1.60 mm thick minimum. Secured together by snap-in fit. | F1 I1 |
| | Alternate | QMFZ2 | SAMYANG CORPORATION (E121254) | 3025GR(y) | Same as above except for rated 115°C. | |
| 2 | Bottom Case | QMFZ2 | Samsung SDI Co., Ltd. (E115797) | HN-1064(+) | Polycarbonate (PC), rated 130°C, V-0, measured approx. 91.3 mm by 36.3 mm by 4.35 mm (L x W x H), 1.95 mm thick minimum. Secured together by snap-in fit. | F2 I2 |
| | Alternate | QMFZ2 | SAMYANG CORPORATION (E121254) | 3025GR(y) | Same as above except for rated 115°C. | |
| 3 | Input Push-In Terminal Block (CN1) | XCFR2, CN | DEGSON ELECTRONICS CO LTD (E228872) | DG250-3.5*h | Rated min. 300 V, 7 A, 105°C, acceptable for field wiring 18 AWG, Copper conductor. | |
| 4 | Output Push-In Terminal Block (CN2) for PSDV270571A, PSDV270571E only | XCFR2, CN | DEGSON ELECTRONICS CO LTD (E228872) | DG250-3.5*h | Rated min. 300 V, 7 A, 105°C, acceptable for field wiring 18-22 AWG, Copper conductor. | |
| 4A | Output Connector (CN3) for PSDV270571B, PSDV270571F only | ECBT2, CN | Various | Various | Rated min. 250 V, min. 2 A. Located on Class 2 circuit. | |
| 5 | Printed Wiring Board | ZPMV2, CN | Various | Various | Rated min. 130°C, V-0. Measured approx. 90.0 mm by 35.2 mm (L x W), 1.6 mm thick. Suitable for support of live parts. | I3 |
| 6 | Fuse (F01) | 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 | Same as above. | |
| 7 | Capacitor (CX1) | FOKY2 or FOWX2, CN | Various | Various | Rated 150 nF, min. 275 Vac, min. 100°C. Located across the line. | |

Model PSDV270571A - FIG. 1 thru. FIG. 5 (CONT'D)

| | | | | | | |
|----|------------------------------------|--------------|--|-----------|--|--|
| 8 | Capacitor (CY1) | FOWX2, CN | Various | Various | Rated 1.0 nF, min. 400 Vac, min. 125°C. Class Y1. Located primary to secondary. | |
| 9 | Varistor (VAR1) | VZCA2, CN | Amotech Co., Ltd (E332687) | INR14D621 | Rated min. 300 Vac, intended use type 3 SPD applications. | |
| | Alternate | VZCA2, CN | Thinking Electronics Industrial Co Ltd (E314979) | TVR14621 | Rated min. 300 Vac, intended use type 3 SPD applications. | |
| 10 | Bridge Diode (BD1) | - | Various | Various | Rated min. 600 V, max. 3 A. | |
| 11 | FET (Q02) | - | Various | Various | Rated 650 V, min. 7 A max. | |
| 12 | Heat Sink for Q01, Q02 | - | Various | Various | Aluminum, measured overall 34.2 mm by 21.5 mm (L x W), 1.0 mm thick minimum. Secured to Q01, Q02 by a screw. | |
| 13 | Electrolytic Capacitor (C71) | - | Various | Various | Rated 22 uF, min. 450 V, min. 105°C. | |
| 14 | Film Capacitor (CP1) | - | Various | Various | Rated 100 nF, min. 450 V, min. 105°C. | |

Winding devices - See below for details.

| No. | Item | CCN | Manufacturer (File Number) | Part Number | Rating | (F) IG (I) LL |
|-----|----------------------|-----------------------------|--|---------------------|--|------------------|
| 1 | Line Filter (LX1) | - | - | - | Refer to Ill. 4 for details. | I4 |
| 1.1 | Core | - | Various | Various | Ferrite, toroidal type, overall 8.1 mm by 4.1 mm by 3.1 mm (OD x ID x H). | |
| 1.2 | Coil | OBMW2 | Various | Various | Enameled copper wire, rated min. 130°C. | |
| | Coil | OBJT2 or AVLV2/ CN | Various | Various | Insulated winding wire, rated min. 130°C. | |
| 1.3 | Base | QMFZ2, CN | CHANG CHUN PLASTICS CO LTD (E59481) | T375HF | Phenolic, rated min. 150°C, 0.43 mm. | |
| | Alternate | QMFZ2 | MOMENTIVE SPECIALTY CHEMICALS GMBH (E59481) | PF2736(a) (b) | Phenolic, rated min. 150°C, 0.46 mm thick. | |
| 1.4 | Tube | YDPU2, CN | Various | Various | Rated VW-1, 200°C, 150 V, used to beginning and end points of an Insulated winding wire. | |
| 2 | Line Filter (LX2) | - | - | - | Refer to Ill. 5 for details. | I5 |
| 2.1 | Core | - | Various | Various | Ferrite, toroidal type, overall 13.0 mm by 7.0 mm by 5.0 mm (OD x ID x H). | |
| 2.2 | Coil | OBMW2 | Various | Various | Enameled copper wire, two provided, each rated min. 130°C. | |
| 2.3 | Coil Separator | QMFZ2, CN | SOLVAY ENGINEERING PLASTICS GBU (E44716) | A 50H1 (r3) (f2) | Polyamide 66 (PA66), 0.40 mm thick min., rated V-0, RTI (Elec.) 130°C. | |
| | Alternate | QMFZ2, CN | TORAY INDUSTRIES INC (E41497) | L304T40 | Liquid Crystal Polymer (LCP), 0.38 mm thick min., RTI 130°C. | |
| | Alternate | QMFZ2, CN | SAMSUNG FINE CHEMICALS CO LTD (E309188) | KB40BM | Liquid Crystal Polymer (LCP), 0.29 mm thick min., RTI 130°C. | |
| 2.4 | Base | QMFZ2, CN | CHANG CHUN PLASTICS CO LTD (E59481) | T375HF | Phenolic, rated min. 150°C, 0.43 mm. | |
| | Alternate | QMFZ2 | MOMENTIVE SPECIALTY CHEMICALS GMBH (E59481) | PF2736(a) (b) | Phenolic, rated min. 150°C, 0.46 mm thick. | |

Winding devices - See below for details.

| No. | Item | CCN | Manufacturer (File Number) | Part Number | Rating | (F) IG (I) LL |
|-----|---------------------|--------------|--|---------------|--|------------------|
| 3 | Choke Coil (LF1) | - | - | - | Refer to Ill. 6 for details. | I6 |
| 3.1 | Core | - | Various | Various | Ferrite, drum type, measured overall 8.1 mm by 11.0 mm (diameter x height). | |
| 3.2 | Coil | OBMW2 | Various | Various | Enameled copper wire, rated min. 130°C. | |
| 3.3 | Base | QMFZ2, CN | CHANG CHUN PLASTICS CO LTD (E59481) | T375HF | Phenolic, rated min. 150°C, 0.43 mm. | |
| | Alternate | QMFZ2 | MOMENTIVE SPECIALTY CHEMICALS GMBH (E59481) | PF2736(a) (b) | Phenolic, rated min. 150°C, 0.46 mm thick. | |
| 3.4 | Tube | YDFU2, CN | Various | Various | Rated VW-1, Max. 125°C, 600 V, intended to wrap round a body. | |
| 4 | PFC Coil (L01) | - | - | - | Refer to Ill. 7 for details. | I7 |
| 4.1 | Core | - | Various | Various | Ferrite, EE type, measured overall 14.0 mm by 14.0 mm by 7.0 mm (L x H x W). | |
| 4.2 | Coil | OBMW2 | Various | Various | Enameled copper wire, rated min. 130°C. | |
| | Coil | OBJT2 | Various | Various | Insulated winding wire, rated min. 130°C. | |
| 4.3 | Bobbin | QMFZ2 | MOMENTIVE SPECIALTY CHEMICALS GMBH (E59481) | PF2736(a) (b) | Phenolic, rated min. 150°C, 0.46 mm thick. | |
| | Alternate | QMFZ2 | SUMITOMO BAKELITE CO LTD (E41429) | PM-9820 | Phenolic, rated min. 150°C, 0.51 mm thick. | |
| 4.4 | Insulation Tape | OANZ2 | Various | Various | Polyethylene terephthalate film tape, rated min. 130°C. | |
| 4.5 | Varnish | OBOR2 | Various | Various | Rated min. 130°C. | |

Winding devices - See below for details.

| No. | Item | CCN | Manufacturer (File Number) | Part Number | Rating | (F) IG (I) LL |
|-----|--------------------------------|-----------------------------|--|---------------|--|------------------|
| 5 | Secondary Line Filter (LX3) | - | - | - | Refer to Ill. 8 for details. | I8 |
| 5.1 | Core | - | Various | Various | Ferrite, toroidal type, overall 8.0 mm by 4.0 mm by 3.0 mm (OD x ID x H). | |
| 5.2 | Coil | OBMW2 | Various | Various | Enameled copper wire, rated min. 130°C. | |
| | Coil | OBJT2 or AVLV2/ CN | Various | Various | Insulated winding wire, rated min. 130°C. | |
| 5.3 | Base | QMFZ2, CN | CHANG CHUN PLASTICS CO LTD (E59481) | T375HF | Phenolic (PF), rated 150°C, minimum 0.43 mm. | |
| | Alternate | QMFZ2 | MOMENTIVE SPECIALTY CHEMICALS GMBH (E59481) | PF2736(a) (b) | Phenolic (PF), rated 150°C, minimum 0.46 mm thick. | |
| | Alternate | QMFZ2 | SUMITOMO BAKELITE CO LTD (E41429) | PM-9820 | Phenolic (PF), rated 150°C, minimum 0.51 mm thick. | |
| 5.4 | Tube | YDFU2, CN | Various | Various | Rated VW-1, 200°C, 150 V, used to beginning and end points of an Insulated winding wire. | |

Winding devices - See below for details.

| No. | Item | CCN | Manufacturer (File Number) | Part Number | Rating | (F) IG (I) LL |
|-----|----------------------------------|-------|--|--|--|------------------|
| 6 | Transformer (T01) | - | - | - | Refer to Ills. 9 and 10 for details and refer to insulation system for detailed materials. | |
| | Electrical insulation system | OBJY2 | JINLONG MACHINERY & ELECTRONICS CO LTD (E342835) | JLS.02 | Rated Class 130 (B) electrical insulation system. | I9 |
| | Electrical insulation system | OBJY2 | YAO SHENG ELECTRONIC CO LTD (E173643) | YCI-130 | Rated Class 130 (B) electrical insulation system. | I10 |
| 6.1 | Core | - | Various | Various | Ferrite, EE type, approx. 23.0 mm by 18.0 mm by 8.2 mm (L X W X H). | |
| 6.2 | Bobbin | QMFZ2 | SUMITOMO BAKELITE CO LTD (E41429) | PM-9820 | Phenolic (PF), rated 150°C, minimum 0.65 mm thick. | |
| 6.3 | Coil | OBMW2 | Belong to electrical insulation system | Belong to electrical insulation system | Enamel copper wire, minimum 130°C. See as below table. | |
| | Alternate | OBJT2 | Belong to electrical insulation system | Belong to electrical insulation system | Triple insulated winding wire, minimum 130°C. See as below table. | |
| 6.4 | Insulation Tape/Core fixing tape | OANZ2 | JINGJIANG YAHUA PRESSURE SENSITIVE GLUE CO LTD (E165111) | CT | Polyethylene terephthalate film tape, 0.025 mm thick. Rated min. 130°C. | |
| | Alternate | OANZ2 | SYMBIO INC (E50292) | 35660 | Polyethylene terephthalate film tape, 0.025 mm thick. Rated min. 130°C. | |
| 6.5 | Varnish | OBOR2 | Belong to electrical insulation system | Belong to electrical insulation system | Rated min. 130°C. | |

Transformer (T01) winding information -

| Location | No. of Turns | UL File Number (s) | Type | Triple Insulated Winding wire |
|---------------------|--------------|--------------------|---|-------------------------------|
| W1 (Primary. 1-3) | 29 | E197768 | TYPU-130 (UEW/QA-B) or TYTUN-B130 (UEWNY/Q (A/X) -B, F) | N |
| | | E234896 | UEW | |
| | | E245514 | TYPU-130 (UEW/QA-B) | |
| W2 (Primary. 4-5) | 9 | E242198 | STW-B | Y |
| W3 (Secondary. 7-6) | 22 | E242198 | STW-B | Y |
| W4 (Primary. 3-2) | 28 | E197768 | TYPU-130 (UEW/QA-B) or TYTUN-B130 (UEWNY/Q (A/X) -B, F) | N |
| | | E234896 | UEW | |
| | | E245514 | TYPU-130 (UEW/QA-B) | |