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REPORT

on

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

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## DESCRIPTION

## PRODUCT COVERED:

USL, CNL- LED Driver, see electrical ratings table for models.

## ELECTRICAL RATINGS:

Model No.	Input [ ] CC [x] CV					Output [ ] CC [x] CV		
	Voltage e (Vac)	Frequ ncy (Hz)	Max. Current (A)	Max. Power (W)	PF	Max. Voltage (Vdc)	Max. Current (A)	Max. Power (W)
VLMPPW-VV- YYYYY-ZZZZZ	120- 277	50/60	0.7	70.5	>0.9	48	5	60

"PP" - Denotes output power, PP=60 if 50W<output power <=60W, PP=50 if 40W<output power <=50W, PP=40 if 30W<output power <=40W.

"VV" - Denotes maximum output voltage (in voltage) which is not greater than max output voltage range.

"YYYYY" - Denotes customer code for market purpose only. It could be blank, 2digits or 3 digits or 4 digits or 5 digits, any combination of alphanumeric characters or blank.

"ZZZZZ" - Denotes customer code for market purpose only. It could be blank, 2digits or 3 digits or 4 digits or 5 digits, any combination of alphanumeric characters or blank.

## DIFFERENCES BETWEEN MODELS:

All products covered in this report utilize the same PWB design, enclosure constructions and input/ output connection scheme (via stranded or solid leads). The different output voltages and power levels are achieved by means of changes in component values of Resistor R57 in the circuit. The detail is as below:

Component	Technical Rating
R57	SMD, 1/16W, 5.62K ohm - 27K ohm

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

USL - 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.

CNL - 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 Extra-Low-Voltage Class 2 Outputs, Clause 8.12.

These devices were additionally investigated to UL 2097, Reference Standard for Double Insulation Systems for Use in Electronic Equipment and CSA C22.2 No. 0.1, General Requirements for Double-Insulated Equipment.

These products been evaluated for the following characteristics.

				Additionally evaluated to UL 8750 Supplements noted below:						
Model No.	Input type	Output type	Rated for	[ ] SA-SREC	[X] SB-Type HL	[x] SC-Type TL	[x] SE-Class P	[ ] SF-Wired control Circuits (c)	[x] SG-Temperature value @	[ ] SH-Phase cut dimming
VLMPW-VV-YYYYY-ZZZZZ;	Branch Circuit Mains	Isolated, Class 2 (a)	[X] Dry [X] Damp [ ] Wet	[ ] - Evaluation per SA 3.2 [ ] - Evaluation per SA 4	Yes	No	Yes	No control circuit	Tref max- Tc 90 ° C	[ ] Dimmable [ ] Dimmable - dimmer model(s) xxx made by xxx

a- As defined in [x] UL 8750, Clause 7.12.1 [x] and CAN/CSA-C22.2 No. 250.13, Clause 8.12

b1- As defined in UL 8750, Section 8.14

b2- As defined in CAN/CSA-C22.2 No. 250.13, Annex A

c- Supplement SF has a future effective date: 2020-05-01

@ - The Tc point is located at Driver Housing, outside, top, above of transformer.

## 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-

	Description	Comment
x	Company name (as identified in Online directory) or File number	
X	Model designation-	
x	Factory ID, when more than one factory	
X	Date Code	
x	Class 2 outputs	See product characteristics table- 'Class 2' marked on the device.
x	Electrical Ratings	See electrical ratings table
x	Output Type	See product characteristics table
x	Environmental considerations	See product characteristics table
x	Polarity of supply connections	Applies to [x]Input, [x] Output
x	Class P LED drivers	See product characteristics table- optional marking 'Class P' on LED driver. If marking is provided, then the LED driver is marked "For Connections Use Wire Rated for at Least 90°C (194°F)" or equivalent. <b>Device marked 'Use only within an enclosure'</b>
x	Temperature Measurement Point (Tc)	See product characteristics table- Tc point location marking on device. The Tref max values may be marked on the device in the following format: 90 °C. This information may alternately appear in a specification sheet.
x		Optional- "DOUBLE INSULATION", "DOUBLE INSULATED" or symbol: 
x		"CASE MUST BE GROUNDED"

\*Model VLMPPW-VV-YYYYY-ZZZZZ - FIGS. 1 - 10

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	Housing (Metal part)	N/A	N/A	N/A	Extruded aluminum, 1.0 mm thick min. Four-part construction, top, bottom and two sides, secured together by screws. Two mounting tabs are on two sides.  See Ill. 1 (unit: mm) for detail dimensions.	I1
*1.1	Alternate housing (Metal part)	N/A	N/A	N/A	Aluminum, 1.0 mm thick min. Consists of two end plates secured to top cover and base assembly screws. Provided with two M4 mounting screws on top cover, spaced 47 mm apart. Two mounting screws are on top side.  Also, provided with two openings on top cover for lead wires exit, each measuring Ø 7.0 mm.  See Ill. 1, I9-I11 (unit: mm) for detail dimensions.	I9-I11
1.2	Alternate Housing (Metal part)	N/A	N/A	N/A	Aluminum, 1 mm thick min. Two-part construction, secured together by snap fit indents on top cover.  See Ill. 15, 16 (unit: mm) for detail dimensions.	I15, I16
1.3	Alternate housing (Metal part)	N/A	N/A	N/A	Aluminum, 0.6 mm thick min. Consists of two part construction secured together by snap fit indents on top cover. Provided with two #8-32 mounting screws on top cover, spaced 50.8 mm apart (from center to center). Provided with two openings for lead wires exit, each measuring Ø 7.0 mm.  See Ill.17 (unit: mm) for detail dimensions.	F10 I17
*						

No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F)IG (I)LL
2	Insulation Barrier  (For Item 1 or 1.2)	QMFZ2, CN	Various	Various	Made by PET, Min 0.18 mm thick, 105 °C. Two- part construction, top and bottom, secured together by Insulation Tape, Outer surface is fully covered with one layer of Insulation Tape. All live parts on PWB except input/output lead are covered by Insulation barrier and input/output bushing. Potting compound provided between PWB sharp solder points and the barrier to prevent the barrier from being punctured.  See Ill. 2 (unit: mm) for detail dimensions.	I2
2.1	Alternate Insulation Barrier  (For Item 1.1 or 1.3)	QMFZ2, CN	Various	Various	Same as above except: See Ill. I12-13 (unit: mm) for detail dimensions.	I12- I13
3	Insulation Tape	OANZ2	3M COMPANY ELECTRICAL MARKETS DIV (EMD) (E17385)	1350T-1 (b)	One layer provided. Polyethylene terephthalate film tape, 130 °C min, 0.05 mm thick per layer.	-
3.1	Alternate	OANZ2	JINGJIANG JINGYI ADHESIVE PRODUCT CO LTD (E246950)	JY25-A (b)	Same as above except PET film type.	
4	Copper foil	N/A	N/A	N/A	Copper, overall 47 mm length by 42.5 mm width by 0.05 mm thick. Provided a bare conductor to connect to primary grounding. Located between Insulation Barrier and Insulation type and secured Insulation type by integral tape.	-
*5	Input Lead Wire	AVLV2, CN	Various	Various	Type 10552, double <b>jacketed wire</b> , min. 18 AWG, rated min. 300 V, min. 105 °C, min. 152 mm long. Neural is in white color.	-
5.1	Alternate	AVLV2, CN	Various	Various	<b>Type 1332 with covering, No. 18 AWG, rated 300 V, 200°C, min. 152 mm long.</b>	-
6	Output Lead Wire	AVLV2, CN	Various	Various	Min. 24 AWG, rated min. 300 V, min. 105 °C, min. 152 mm long.	-
6.1	Alternate	AVLV2, CN	Various	Various	<b>Style 1332, with covering, No. 18 AWG, rated 300 V, 200°C, min. 152 mm long.</b>	-
7	Input/Output Bushing	QMFZ2	Various	Various	Silicone Rubber, min. 1.2 mm thick, rated 105°C.  See Ill. 3, I14 (unit: mm) for detail dimensions. Ill.3: For Housing item 1, 1.2 Ill.4: For Housing item 1.1, 1.3	I3, I14

No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F)IG (I)LL
8	Potting compound	QMFZ2	DONGGUAN ZHAOSHUN SILICONE NEW MATERIAL TECHNOLOGY CO LTD (E329120)	ZS-GF	Silicone (SI). Rated V-0, 150°C, grey color. All internal parts fully submerged in potting compound so that all components other than input and output leads/terminals are sealed.	-
8.1	Alternate Potting Compound	QMFZ2	Shenzhen City Jia Di New Materials Co., Ltd. (E485392)	JD-505	Silicone Rubber (SIR). Fills the case so to completely cover all electrical components and the circuit board. RTI 150 C. White or Black in colour.	-
8.2	Alternate Potting Compound	QMFZ2	GUANGDONG HAOMING ORGANIC SILICON MATERIAL CO LTD (E318202)	HM-9180	Potting Silicone Material, min. V-0, min. 150 °C. Fully filled in enclosure.	-

No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F) IG (I) LL
Main Board						
9	Printed Wiring Board	ZPMV2, CN	Various	Various	Rated min. V-1, 130 °C. Measured 123 mm length by 15.3 mm width by 1.0 mm thick. Suitable for support of live parts. See ILL.4 for PWB trace layouts.	I4
10	Fuse (F1)	JDYX2, CN	CONQUER ELECTRONICS CO LTD (E82636)	MST	Rated 300 Vac, 1.6 A, connected in series with ungrounded supply	-
10.1	Alternate	JDYX, CN	Various	Various	Same as above.	-
11	X Capacitor (C1)	FOWX2, CN	Various	Various	Rated 310 Vac min., 0.15 uF max, 110 °C min. Located across the line.	-
12	Surge Protective Devices (MV1)	VZCA2, CN	Various	Various	SPD 5, minimum rated operating voltage 320 Vac, minimum 320 V MCOV, minimum 0.5 KA In, maximum 1090 Vpeak MLV, temperature rating 125 °C.	-
13	Y Capacitor (C29)	FOWX2, CN	Various	Various	Y2 type. Rated 400 V min., 110 °C min, 1 nF max. Bridging Primary to Secondary.	-
14	Optical Isolators (IC4)	FPQU2, CN	Various	Various	Rated 3750 V isolation voltage, min 110 °C. Bridging Primary to Secondary.	-
15	Capacitors (C9)	N/A	Various	Various	Electrolytic type, rated 15 uF, 450 V min., 105°C min.	-
16	Capacitors (C35)	N/A	Various	Various	Electrolytic type, rated 470 uF, 16 V min., 105°C min.	-
17	Thermistor (RT2 /RT3)	XGPU2, CN	Thinking Electronic Industrial Co., Ltd(E138827)	SCK-103	Rated 10ohm, 3A, max. surface temperature 170°C	-
Control Board						
18	Printed Wiring Board	ZPMV2, CN	Various	Various	Rated min. V-1, 130 °C. Measured 123 mm length by 15 mm width by 1 mm thick. Suitable for support of live parts. Soldered on Main Board. See ILL.5 for PWB trace layouts.	I5
19	Thermistor (RT1 )	XGPU2, CN	Thinking Electronic Industrial Co., Ltd(E138827)	TPM1S103P120	SMD, 10K ohm, Tmoa: 135°C.	-
20	Other components	N/A	N/A	N/A	See ILL.6 and model difference for details.	I6

## Model Different list:

Components	Model VLMPPW-VV-YYYY-ZZZZ (When suffix VV <= 12)	Model VLMPPW-VV-YYYY-ZZZZ (When 12< suffix VV <=24)	Model VLMPPW-VV-YYYY-ZZZZ (When 24< suffix VV <=48)
C35	CAP,AE,470uF,16V,8X8,POLY	CAP,AE,180uF,35V,8X11.5,105C,20%,9KHz	CAP,AE,82uF,63V,8X11.5,105C,20%,8KHz
C2	CAP,MPY,0.1uF,450V,10% , 9.8L X 10.8H X 4.5W X7.5P	CAP,MPY,0.1uF,450V,10% , 9.8L X 10.8H X 4.5W X7.5P	CAP,MPY,0.1uF,450V,5%,10.3L X8.4HX5.8WX7.5P
L7	INDUCTOR, COMM-MODE, 5.1uH, K081	INDUCTOR, COMM-MODE, 6.3uH, TN80L	INDUCTOR, COMM-MODE, 20.5uH, K081
L11	/	/	INDUCTOR, BEAD,43/B,OD3.5mmX ID1.3mmXL3.25mm, 0.55mm TIW with 2pcs BEAD
R57	SMD, 1/16W, 5.62K ohm - 27K ohm		

Winding devices - See below for details.

No.	Item	CCN	Manufacturer (File Number)	Part Number	Rating	(F) IG (I) LL
1	Ring Coil (L1)	N/A	N/A	N/A	Rated 28 mH.	-
1.1	Core	N/A	Various	Various	Ferrite. Overall 14 mm OD by 8 mm ID by 4 mm thick.	-
1.2	Coil (N1, N2)	OBMW2	Various	Various	Enamel copper wire, 130 °C min. 0.25 mm OD, 80 turns.	-
1.3	Barrier	ZPMV2	Various	Various	Minimum V-2, min. 105°C. Provided with minimum 0.8 mm thick to separate the windings.	-
1.4	Insulation Tape	OANZ2	Various	Various	Polyethylene terephthalate film tape, 130 °C min, 0.05 mm thick per layer. 1 layer provided to cover outer surface.	-
2	Ring Coil (L4)	N/A	N/A	N/A	Rated 8 uH.	-
2.1	Core	-	Various	Various	Ferrite. Overall 6 mm OD by 3 mm ID by 3 mm thick.	-
2.2	Coil (N1)	OBMW2	Various	Various	Enamel copper wire, 130 °C min. 0.3 mm OD, 6 turns.	-
2.3	Coil (N2)	OBJT2	Various	Various	Triple insulation wire, 130°C min. 0.3 mm OD, 6 turns.	-
3	Inductor (L2)	N/A	N/A	N/A	Rated 889.4 uH.	
3.1	Core	N/A	Various	Various	Ferrite. Overall 11.2 mm OD by 6.35 mm ID by 3.96 mm thick.	-
3.2	Coil (N1)	OBMW2	Various	Various	Enamel copper wire, 130 °C min. 0.29 mm OD, 110 turns.	-
3.3	Insulation Tape	OANZ2	Various	Various	Polyethylene terephthalate film tape, 130 °C min, 0.05 mm thick per layer. 1 layer provided to cover outer surface.	-
4	PFC Inductor (L3)	N/A	N/A	N/A	Rated 550 uH. Refer to Ill. 7 for details	I7
4.1	Core	N/A	Various	Various	Ferrite. 16.4 mm by 11.2 mm by 5.8 mm overall.	-
4.2	Bobbin	QMFZ2	Various	Various	Phenolic, 0.71 mm thick minimum, rated V-0, 150 °C.	-
4.3	Coil (N1, N2)	OBMW2	Various	Various	Enamel copper wire, 130 °C min.,	-
4.4	Tape	OANZ2	Various	Various	Polyethylene terephthalate film tape, 130 °C min, 0.05 mm thick per layer. Fully covered with outer surface of Coil and Core.	-

## Winding devices (Cont'd):

No.	Item	CCN	Manufacturer (File Number)	Part Number	Rating	(F) IG (I) LL
5	Transformer (T1)	N/A	N/A	N/A	Refer to Ill. 8 for details	I8
-	Electrical insulation system	OBJY2	MAO HSIN ELECTRONIC CO LTD (E182305)	GH-130	Rated 130°C (Class B).	-
5.1	Core	N/A	Various	Various	Ferrite, 16.4 mm by 11.2 mm by 5.8 mm overall. Fully wrapped by 2 layer of Tape (Item 5.4) to maintain spacing between Core and secondary winding.	-
5.2	Bobbin	QMFZ2	SUMITOMO BAKELITE CO LTD (E41429)	SUMIKON PM- 9820	Phenolic, 0.71 mm thick minimum, rated V-0, 150 C. Three-flange type.	-
5.3	Windings (N1, N2, N3A, N3B, N4, N5, N6)	OBMW2	Various	Various	ANSI type MW28/75/79/80/82/83, 130 °C min. Provided 2 layer of Tape (Item 5.4) with a continuous enough wide bent up edge to maintain spacing between primary and secondary winding.	-
5.4	Tape	OANZ2	3M COMPANY ELECTRICAL MARKETS DIV (EMD) (E17385)	1350T-1 (b)	Polyethylene terephthalate film tape, 130 °C min, 0.05 mm thick per layer.	-
5.5	Varnish	OBOR2	JOHN C DOLPH CO (E317427)	BC-370	Rated minimum 130 °C.	-
6	Ring Coil (L7) (For 24< suffix VV <=48)	N/A	N/A	N/A	Rated 20.5 uH.	-
6.1	Core	N/A	Various	Various	Ferrite. Overall 8 mm OD by 4 mm ID by 4 mm thick.	-
6.2	Coil (N1)	OBMW2	Various	Various	Enamel copper wire, 130 °C min. 0.5 mm OD, 8 turns.	-
6.3	Coil (N2)	OBJT2	Various	Various	Triple insulation wire, 130°C min. 0.5 mm OD, 8 turns.	-
7	Ring Coil (L7) (For 12< suffix VV <=24)	N/A	N/A	N/A	Rated 6.3 uH.	-
7.1	Core	N/A	Various	Various	Ferrite. Overall 8 mm OD by 4 mm ID by 4 mm thick.	-
7.2	Coil (N1)	OBMW2	Various	Various	Enamel copper wire, 130 °C min. 0.5 mm OD, 5 turns.	-
7.3	Coil (N2)	OBJT2	Various	Various	Triple insulation wire, 130°C min. 0.5 mm OD, 5 turns.	-

## Winding devices (Cont'd):

No.	Item	CCN	Manufacturer (File Number)	Part Number	Rating	(F)IG (I)LL
8	Ring Coil (L7) (For suffix VV ≤ 12)	N/A	N/A	N/A	Rated 5.1 uH.	-
8.1	Core	N/A	Various	Various	Ferrite. Overall 8 mm OD by 4 mm ID by 4 mm thick.	-
8.2	Coil (N1)	OBMW2	Various	Various	Enamel copper wire, 130 °C min. 0.6 mm OD, 4 turns.	-
8.3	Coil (N2)	OBJT2	Various	Various	Triple insulation wire, 130°C min. 0.6 mm OD, 4 turns.	-