

File E343741
Project 4789055971

November 19, 2019

REPORT

on

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

ENERGY RECOVERY PRODUCTS (ZHUHAI) CO LTD
ZHUHAI, GUANGDONG 519060, CHINA

Copyright © 2019 UL LLC

UL LLC authorizes the above named company to reproduce this Report only for purposes as described in the Conclusion, provided it is reproduced in its entirety.

DESCRIPTION

PRODUCT COVERED:

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

ELECTRICAL RATINGS:

Model No.	Input [] CC [X] CV					Output [X] CC [] CV		
	Voltage (Vac)	Frequency (Hz)	Max. Current (A)	Max. Power (W)	PF	Voltage (Vdc)	Current (A)	Max. Power (W)
DALPPW-XXXX-VV-T (NOTE)	120-277	50/60	0.5	60	>0.9	28-42	0.6-1.2	50.4
DALPPA-XXXX-VV-YYYY	120-277	50/60	0.5	60	>0.9	28-42	0.6-1.2	50.4
DALPPA-XXXX-VV-YYYY	120-277	50/60	0.5	60	>0.9	43-56	0.2-0.85	47.6

Where PP=30 if output power \leq 25.2 W, PP=50 if 25.2 W < output Power \leq 50.4 W. **(NOTE)** "XXXX" represents output current, should be 0.6-1.2 A. For example, 1200 means 1.2 A. **(NOTE)**

"VV" represents output voltage, should be 28-42 V. **(NOTE)**

NOTE - (Obsolete after production dated 2020-01-15, and represented by Nomenclature Table I)

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.

CNL - Indicates investigation to the Canadian Standard for Light emitting Diode (LED) Equipment for Lighting Applications, CAN/CSA-C22.2 No. 250.13.

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.

Product characteristics-

Model No. [x] applies to all models- see electrical ratings	Input Type	[X] Branch Circuit (Mains) [] Isolated Circuit [] Class 2 (a) [] LVLE (b1) [] LED Class 2 (b2)		
	Output Type	[] Non-isolated [] with PLIMIT @ 15 W (d) [] Isolated [] with PLIMIT @ 15 W (d) [X] Class 2 (a) [] LVLE (b1) [X] LED Class 2 (b2)		
	Environmental Conditions	[] Dry [X] Damp [] Wet		
	[X] Additionally evaluated to UL 8750 Supplements	[] SA- SREC	[]- Evaluation per SA 3.2	[]- Evaluation per SA 4
		[] SB- Type HL	--	
		[] SC- Type TL	Tref max/ Measured Tref- xx/ yy ° C	
		[X] SE- Class P	Yes	
		[X] SF- Wired control Circuits (c)	[X] Isolated []- Not Isolated	
		[X] SG- Temperature value @ Tc (\$)	90°C	
		[] SH- Phase cut dimming	--	
[] SI- Type IC LED driver		--		

a- As defined in [X] UL 8750, Clause 7.12.1 [] 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

d- refers to a circuit of 15 W maximum power limit under normal and single fault conditions, as measured in accordance with UL 8750, 8.8 and CAN/CSA-C22.2 No. 250.13.

(\$) - The Tc point is located at Driver Housing, outside as shown in ILL. 1.

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.

Electrical Tubing - R/C (YDPU2, YDPU8), rated 300 V, 125°C **minimum**.

"CN" under the CCN column in the component description tables indicates that the component meets applicable Canadian requirements for the component. Such components will either have a UL certification Mark for Canada (C-UL) or a CSA certification Mark. "CN" is always noted in conjunction with the CCN indicating UL Certification per applicable US requirements for the component.

NOMENCLATURE:

TABLE I

Series:	<u>DAL</u>	-	PP	A	-	<u>XXXX</u>	-	<u>VV</u>	-	<u>YYYYY</u>
Group:	1	-	2	3	-	4	-	5	-	6

Group	Description
1	Basic series name, DAL
2	Represent power, PP can be 10 if output power < 11W can be 15 if 11 W < output Power < 15 W can be 20 if 15 W < output Power < 20 W can be 30 if 20 W < output Power < 30 W can be 40 if 30 W < output Power < 40 W can be 50 if 40 W < output Power < 50.4 W
3	"A" - Denotes input voltage code. If input rated 120Vac, "A"=U; If input rated 120-277Vac, "A"=W; If input rated 277Vac, "A"=V; If input rated 220-240Vac, "A"=E
4	Represent output current, should be 0.2-0.85, 0.6-1.2A e.g. 1200 represent 1.2A
5	VV represents output voltage, can be 28-42V, or 43-56V
6	"YYYYY" - Denotes customer code for market purpose only. It could be blank, 0 to 5 digits, any combination of alphanumeric characters or blank.

Product markings & information in specification sheet or installation instructions;

	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	LED 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	Push-in terminals	The installation instructions contain the following information: a) For releasing the wire from the terminal connection, b) The intended wire size(s), c) The terminal is intended for just solid wire only, d) The length to strip the insulation from conductors, and The terminal relationship to the internal circuitry.
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. [X] Device marked 'Use only within an enclosure'
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	Double Insulation	Optional - "DOUBLE INSULATION", "DOUBLE INSULATED" or symbol: 
X	Grounding	"CASE MUST BE GROUNDED"
X	Wired Control Circuits	See product characteristics table- 1. Identification of the terminals or lead wires for control circuits - § 2. Identification of the intended industry or proprietary protocols- § 3. Installation instructions 4. Device wired control circuit marked 'Class 2'

x- Denotes applicable product markings

§- For Components (built-in products) this information may be provided on the product, or on an instruction sheet or the like.

#- For products with the UL Mark for Canada, this marking is also provided in French.

MODEL DAL50W-1200-42-T - FIGS. 1 THRU 9
(REPRESENTS MODEL **DALPPW-XXXX-VV-T, DALPPA-XXXX-VV-YYYYY**)

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	Enclosure	--	--	--	Extruded aluminum, 1 mm thick min. Two-part construction - base and cover, secured together by snap fit.	I2, I3
2	Back Cover	QMFZ2	SABIC INNOVATIVE PLASTICS US L L C (E121562)	NH7010HF	PPHOX, rated 5VA, 105°C, 2 mm thick minimum (CTI:3, HWI:2, HAI:1). Secured to cover of Enclosure by snap fit.	I4
3	Insulation Barrier	QMFZ2	Various	Various	PET, 0.18 mm thick minimum, rated 105°C. Two-part construction, base and cover, secured together by Insulation Tape. Outer surface is fully covered with one layer of Insulation Tape. All live parts on PWB except Input Terminals and Output/Dimmer Terminals, are fully covered by Insulation barrier. Provided with Potting compound between PWB sharp solder points and the barrier to prevent the barrier from being punctured.	I5, I6
4	Insulation Tape	OANZ2	3M COMPANY ELECTRICAL MARKETS DIV (EMD) (E17385)	1350T-1 (b)	One layer provided, PET film tape, rated 130°C minimum, 0.05 mm thick per layer. Outer wrapped with one layer on Insulation Barrier.	
5	Input Terminals (J1)	XCFR2/ 8	DONGGUANSHI CHANGHE ELECTRONICS CO LTD (E256644)	CS200-00-350- 01P-03 or CS200-00-350- 01P-09	Push-in type. Two provided, each 1 pole, rated 300 V, 5 A, 105°C, suitable for field wiring 16-24 AWG copper solid/stranded wires. Blue color for grounded or neutral supply conductor and brown color for ungrounded supply conductor. Maintained minimum 3.2 mm through air and 6.4 mm over surface spacing between terminals of opposite polarity, and between terminals and metal enclosure.	
6	Output/Dimmer Terminals (J2, J3)	XCFR2/ 8	Various	Various	Located in the LVLE circuit. Push-in type. Four provided. Rated min. 100 V, 2 A, 105°C, acceptable for field wiring 16-24 AWG, Copper conductor.	

No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F)IG (I)LL
7	Potting Compound	QMFZ2	DONGGUAN ZHAOSHUN SILICONE TECHNOLOGY CO LTD (E329120)	ZS-GF	Silicone (SI), rated V-0, 150°C. Fully covered all components including the solder side except Input Terminals and Output/Dimmer Terminals.	--
Main Board						
8	Printed Wiring Board	ZPMV2/8	Various	Various	Rated V-1 minimum, 130°C minimum, suitable for direct support of live parts. 1.4 mm thick minimum, overall 25.4 mm by 128.5 mm. The foil pattern of Printed Wiring Board shall not be changed from that shown in ILL. 7.	I7
9	Fuse (F1)	JDYX2/8	CONQUER ELECTRONICS CO LTD (E82636)	MST	Rated 300 Vac, 1.6 A, connected in series with ungrounded supply.	
--	Alternate Fuse (F1)	JDYX/7	Various	Various	Same as above.	
10	Thermistor (RT3)	XGPU2/8	THINKING ELECTRONIC INDUSTRIAL CO LTD (E138827)	SCK-103	Rated 10 ohm at 25°C, 3 A maximum, maximum surface temperature of 170°C.	
11	Thermistor (RT1)	XGPU2/8	THINKING ELECTRONIC INDUSTRIAL CO LTD (E138827)	TSM1A103	NTC type, 10 kohm at 25°C, maximum operating ambient of 125°C.	
12	X Capacitor (C1)	FOWX2/8	Various	Various	Class X2, rated 0.15 µF maximum, 310 V minimum, 105°C minimum, connected across-the-line.	
13	Surge Protective Devices (MV1)	VZCA2/8	Various	Various	SPD Type 5, minimum voltage rating 320 Vac, minimum temperature rating 105°C ambient. Terminals are fully covered by Electrical Tubing.	
14	Y Capacitor (C18)	FOWX2/8	Various	Various	Class Y2, rated 2200 pF maximum, 400 V minimum, 105°C minimum. Bridging primary to secondary. Body is fully covered by Electrical Tubing and further wrapped with 2 layers of Insulation Tape.	
15	Optical Isolators (IC27)	FPQU2/8	Various	Various	Rated 3750 V isolation voltage, 110°C minimum. Bridging primary to secondary.	
16	Electrolytic Capacitors (C36)	--	--	--	Rated 100 µF, 50 V, 105°C, body is wrapped with 2 layers of Insulation Tape.	

No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F)IG (I)LL
17	Bridge Rectifier (D3)	--	--	--	Rated 2 A, 2000 V.	
18	Bridge Rectifier (D88)	--	--	--	Rated 0.8 A, 800 V.	
Main Board (Cont'd)						
19	IC (IC1)	--	--	--	Type MP44014GS-Z, BM PFC controller, SO8.	
20	IC (IC26)	--	--	--	Type AS331K, SOT23-5.	
21	Transistor (Q1)	--	--	--	Rated 11 A, 700 V.	
22	Transistor (Q2)	--	--	--	Rated 115 mA, 60 V, SOT323.	
23	Power MOSFT (Q14)	--	--	--	Rated 70 A, 60 V.	
24	Transistor (Q15)	--	--	--	Rated 7.6 A, 30 V, SOT23.	
25	Diode (D2)	--	--	--	Rated 0.2 A, 70 V, SOT323.	
26	Diode (D8)	--	--	--	Rated 3 A, 150 V.	
27	Diode (D41)	--	--	--	Rated 1 A, 400 V, SOD123.	
28	Capacitor (C26)	--	--	--	Rated 4.7 μ F, 16 V.	
Small Board						
29	Printed Wiring Board	ZPMV2, CN	Various	Various	Rated V-1 minimum, 130°C minimum, suitable for direct support of live parts. 0.9 mm thick minimum, overall 13.8 mm by 84.4 mm. The foil pattern of Printed Wiring Board shall not be changed from that shown in ILL. 8.	I8
30	Optical Isolators (IC4, IC12, IC20, IC21, IC24)	FPQU2, CN	Various	Various	Five provided, each rated 3750 V isolation voltage, 110°C minimum. Bridging primary to secondary.	
31	Electrolytic Capacitors (C9, C14)	--	--	--	Two provided each rated 15 μ F, 350 V minimum, 105°C minimum.	
32	Electrolytic Capacitors (C22)	--	--	--	Rated 270 μ F, 16 V minimum, 105°C minimum, body is wrapped with one layers of Insulation Tape.	
33	IC (IC2)	--	--	--	Type HR1001B-C, SO16.	
34	Diode (D18)	--	--	--	Rated 2 A, 800 V.	

No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F)IG (I)LL
Small Board (Cont'd)						
35	Antenna PWB (L8)	--	--	--	<p>Located in the LVLE circuit. Rated V-1 minimum, 130°C minimum, suitable for direct support of live parts. 0.5 mm thick minimum, overall 11.4 mm by 19 mm.</p> <p>Fully wrapped by 2 layers of Insulation Tape. Located on top of Insulation Barrier and secured in place by means of one layer of Insulation Tape.</p> <p>The foil pattern of Printed Wiring Board shall not be changed from that shown in ILL. 9.</p>	I9
36	Antenna Lead Wires	AVLV2/ 8	Various	Various	<p>Located in the LVLE circuit.</p> <p>No. 28 AWG, rated 30 V, 105°C, minimum. Electrically connected to Small Board at one end and Antenna PWB at other end by soldering and further covered by epoxy, silicone rubber, or potting.</p>	

Winding Devices - See below for details.

No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F)IG (I)LL
1	Ring Coil (L5)	--	--	--	Rated 8 μ H.	I10
1.1	Core for L5	--	--	--	Ferrite, overall 6 mm OD by 6 mm ID by 6 mm high.	--
1.2	Coil (L1, L2) for L5	OBJT2	Various	Various	Triple insulation wire, rated 130°C minimum. 0.3 mm diameter, 6 turns.	--
2	Inductor (L1)	--	--	--	Rated 68 mH. Two-flange type.	I11
2.1	Core for L1	--	--	--	Ferrite, overall 18.3 mm by 14.5 mm by 9 mm (LxWxH).	--
2.2	Coil for L1	OBMW2	Various	Various	Enameled copper wire, rated 130°C minimum. Each 0.23 mm diameter, 160 turns.	--
2.3	Bobbin for L1	QMFZ2	Various	Various	Phenolic, 0.75 mm thick minimum, rated 150°C.	--

Winding Devices (Cont'd) - See below for details.

No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F)IG (I)LL
3	Ring Coil (L3)	--	--	--	Rated 447.7 μ H.	I12
3.1	Core for L3	--	--	--	Ferrite, overall 11.2 mm OD by 5.82 mm ID by 4.04 mm high. Fully wrapped around by one layer of Insulation Tape.	--
3.2	Coil for L3	OBMW2	Various	Various	Enameled copper wire, rated 130°C minimum. 0.29 mm diameter, 110 turns.	--
3.3	Insulation Tape for L3	OANZ2	Various	Various	Polyester film tape, rated 130°C minimum, 0.025 mm thick per layer.	--
4	PFC Inductor (L2)	--	--	--	Rated 0.9 mH.	I13
4.1	Core for L2	--	--	--	Ferrite, overall 16.5 mm by 10.9 mm by 12.3 mm (LxWxH). Outer wrapped by 2 layers of Insulation Tape.	--
4.2	Coil (N1, N2) for L2	OBMW2	Various	Various	Enameled copper wire, rated 130°C minimum. N1(1-4): 0.1 mm diameter, 6P, 100 turns. N2(2-3): 0.12 mm diameter, 1P, 20 turns. Outer wrapped by 2 layers of Insulation Tape, and also provided with 1 layers of Insulation Tape between coils.	--
4.3	Bobbin for L2	QMFZ2	Various	Various	Phenolic, 0.75 mm thick minimum, rated 150°C.	--
4.4	Insulation Tape for L2	OANZ2	Various	Various	Polyester film tape, rated 130°C minimum, 0.025 mm thick per layer.	--
5	Ring Coil (L7)	--	--	--	Rated 3.8 μ H.	I14
5.1	Core for L7	--	--	--	Ferrite, overall 8 mm OD by 4 mm ID by 4 mm high.	--
5.2	Coil for L7	OBMW2	Various	Various	Enameled copper wire, rated 130°C minimum. 0.5 mm diameter, 1P, 4 turns.	--
5.3	Coil for L7	OBJT2	Various	Various	Triple insulation wire, rated 130°C minimum. 0.5 mm diameter, 1P, 4 turns.	--

Winding Devices (Cont'd) - See below for details.

No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F)IG (I)LL
6	Transformer (T1)	--	--	--	Manufactured by ENERGY RECOVERY PRODUCTS (ZHUHAI) CO LTD (E472467). See ILL. 15 for construction details. Outer wrapped with 2 layers of Insulation Tape so that the core and coils are not in contact with Potting Compound.	I15
6.1	Electrical Insulation System for T1	OBJY2	ENERGY RECOVERY PRODUCTS (ZHUHAI) CO LTD (E472467)	ERP-130	Class 130(B) . Table IX .	--
6.2	Core for T1	--	--	--	Ferrite, overall 17.1 mm by 11.5 mm by 12.7 mm. Fully wrapped by 2 layer of Tape (Item 6.6) to maintain spacing between Core and Secondary Coil. See FIG. 8 for construction details.	--
6.3	Primary Coil (N1, N2A, N2B) for T1	OBMW2	Various	Various	ANSI Type MW79/80/82/83, rated 155°C. Provided with 2 layers of Insulation Tape (Item 6.6) with a continuous 0.8 mm minimum wide bent up edge to maintain spacing between primary and secondary winding.	--
6.4	Secondary Coil (N3A, N3B, N4, N5, N6, N7) for T1	OBMW2	Various	Various	ANSI Type MW79/80/82/83, rated 155°C. Provided with 2 layers of Insulation Tape (Item 6.6) with a continuous 0.8 mm minimum wide bent up edge to maintain spacing between primary and secondary winding.	--
6.5	Bobbin for T1	QMFZ2	SUMITOMO BAKELITE CO LTD (E41429)	Sumikon PM- 9630	Three-flange type. Phenolic, 0.71 mm thick minimum, rated 155°C.	--
6.6	Insulation Tape for T1	OANZ2	3M COMPANY ELECTRICAL MARKETS DIV (EMD) (E17385)	1350F-1 (b)	Polyester film tape, rated 130°C minimum, 0.025 mm thick per layer. Minimum 2 layers.	--
6.7	Varnish for T1	OBOR2	SUZHOU TAIHU ELECTRIC ADVANCED MATERIAL CO LTD (E228349)	T-4260(a)	Rated minimum 130°C. For ANSI type MW28/80/76.	--
6.8	Electrical Tubing for T1	YDPU2/ 8	GREAT HOLDING INDUSTRIAL CO LTD (E156256)	TFT	Rated 300 V, 200°C. For Leads out at D-E only.	

Winding Devices (Cont'd) - See below for details.

No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F)IG (I)LL
6.9	Primary Crossover Lead Insulation	OANZ2	3M COMPANY ELECTRICAL MARKETS DIV (EMD) (E17385)	1350F-1 (b)	Polyester film tape, rated 130°C minimum, 0.025 mm thick per layer. Minimum 2 layers.	--

MODEL DAL50A-XXXX-56-YYYYY - FIGS. 1 THRU 9

General - Model DAL50A-XXXX-56-YYYYY is identical to DAL50W-1200-42-T except the following items. Representing models in series DALPPA-XXXX-VV-YYYYY.

Components	DAL50W-1200-42-T	DALPPWA-XXXX-56-YYYYY
C36	100uF,50V	100uF,63V
R242	0402,15.4k	0402,27K
R14	1206,0.24-OHM,1/2W	1206,0.3-OHM, 1/2W
R59	0805,3.3M, 400V	1206,5.6M, 500V
R60	0805,3.3M, 400V	0805,1M
R4	0402,33.2K	0402,28.7K
R219	0402,82.5K	0402,88.7K
C90	47pF,1KV	33pF,1000V
R42	0402,90.9K	0402,120K
R28	0402,3.09K	0402,2.67K
R80	0603,102K	0603,100K,1/10W
R185	0603,5.6K	0603,4.53K
C105	N/A	2200pF,50V