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REPORT

on

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

ENERGY RECOVERY PRODUCTS (ZHUHAI) CO LTD

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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)	Output %	Voltage (Vdc)	Current (A)	Max. Power (W)
CDB260W-1700-210-XXXXX-YYYYY	120-277	50/60	2.8	1	114-150/ 160-210	0.85-1.7/ 0.62-1.24	260
				2	12	0.1	1.2
PDB260W-1700-210-XXXXX-YYYYY	120-277	50/60	2.8	1	114-150/ 160-210	0.85-1.7/ 0.62-1.24	260
				2	12	0.1	1.2
CDB260W-1300-280-XXXXX-YYYYY	120-277	50/60	2.8	1	152-200/ 213-280	0.65-1.3/ 0.465-0.93	260
				2	12	0.1	1.2
PDB260W-1300-280-XXXXX-YYYYY	120-277	50/60	2.8	1	152-200/ 213-280	0.65-1.3/ 0.465-0.93	260
				2	12	0.1	1.2
CDB260W-0860-400-XXXXX-YYYYY	120-277	50/60	2.8	1	228-300/ 304-400	0.43-0.86/ 0.325-0.65	260
				2	12	0.1	1.2
PDB260W-0860-400-XXXXX-YYYYY	120-277	50/60	2.8	1	228-300/ 304-400	0.43-0.86/ 0.325-0.65	260
				2	12	0.1	1.2

"XXXXXX" and "YYYYYY" may be any alpha-numeric character or blank and are for marketing purpose only.

% - Output 1: LED Output; Output 2: AUX Output

DIFFERENCES BETWEEN MODELS:

1. All products covered in this report utilize the same PWB design, enclosure constructions and input/ output connection scheme (via supply leads). The different output voltages and power levels are achieved by means of changes in component values in the circuit.
2. Models PDB260W-1700-210-XXXXX-YYYYY, PD260W-1300-280-XXXXX-YYYYY and PDB260W-0860-400-XXXXX-YYYYY are identical to CDB260W-1700-210-XXXXX-YYYYY, CDB260W-1300-280-XXXXX-YYYYY and PDB260W-0860-400-XXXXX-YYYYY except without component U202 on daughter board.

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.

CNR - 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.

These products been evaluated for the following characteristics.

Model No.	Input type	Output type CC CV	Rated for	Type HL (a)	Type TL (b)	Class P (c)
Applies to all models	Branch Circuit (Mains)	Output is Isolated	Damp	No	No	No

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

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

c- Evaluated per UL 8750 requirements for Class P 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 electronic loads. The temperature tests were performed at nominal 50 °c ambient.
2. During the temperature test of the end product, the temperature at Tc is to be monitored. The absolute value at Tc cannot exceed 90 °c. This value was calculated based on temperatures observed during testing and temperature ratings of the integral components including the electrical insulation system. See Ill. 1 for the location of the Tc point.
3. These products are intended for building in. The enclosure for these products has an opening for component J203 which is for internal programming. It is covered by a Silicone Rubber lid and shall be inaccessible. 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.
4. The Leakage Current test was conducted for these models. Based on end use requirements and the construction presented, this test may need to be performed as part of the end product evaluation.
5. These products are provided with minimum 18 AWG, stranded, rated 105 °C, 300 V minimum for input, minimum 18 AWG, stranded, rated 105°C and 600 V minimum for LED output connections and minimum 22 AWG, stranded, rated 105°C and 600 V minimum for AUX output connections. The 22 AWG for AUX output connection shall be completely enclosed in end product evaluation. Acceptability of the input lead wire being smaller than 18 AWG is to be determined as part of the end product evaluation. Acceptability of the leads relative to strain relief and secureness, is to be determined as part of the end device evaluation.
6. These products have multiple outputs. Interconnection of these outputs has not been evaluated. Acceptability of interconnection of these outputs (and the associated circuits) is to be considered as part of the end product evaluation.
7. These products are dimmable using a low voltage 0-10 V proprietary interface.

This interface is a sink, since the interface circuit operates from an external source of supply.

The interface circuit has been evaluated for double isolation from primary (input) with spacings based on the maximum rated branch supply, 277 Vac.
8. These products are marked suitable for dry/ 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.).

Conditions of Acceptability (Cont'd):

9. No grounding leads were provided. The need and suitability of grounding connection shall be determined by end-product.

10. These products utilize a UL Recognized OBJY2 Class B (130) electrical insulation system.

11. Double insulation applies on between primary and secondary circuit. Further evaluation shall be determined in end-use application.

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 or File number
2. Model designation
3. Factory ID, when more than one factory
4. Date Code
5. Electrical Ratings- see electrical ratings table (Optional)
6. Output Type- see product characteristics table. (Optional)
7. Environmental considerations- see product characteristics table (Optional)
8. Polarity of the Input and Output Connections (Optional)
9. Maximum ambient temperature (Tma): 50 °C (Optional)
10. Temperature Measurement Point (Tc) declared by manufacturer: 90 °C (Optional)
11. "DOUBLE INSULATION", "DOUBLE INSULATED" or symbol:  (Optional)

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Model CDB260W-1700-210-XXXXX-YYYYY - FIGS. 1-4

General - The general design, shape and arrangement shall be as illustrated except where variations are specifically described. Also represents models PDB260W-1700-210-XXXXX-YYYYY, CDB260W-1300-280-XXXXX-YYYYY, PD260W-1300-280-XXXXX-YYYYY, CDB260W-0860-400-XXXXX-YYYYY and PDB260W-0860-400-XXXXX-YYYYY except as specified.

No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F) IG (I) LL
1	Housing (Metal part)	-	Various	Various	Extruded aluminum, 1.2 mm thick min. Four-part construction, top, bottom and two sides, secured together by screws. Two mounting tabs are on two sides. Provided an opening for Plastic part. See ILL. 2 (unit:mm) for detailed dimensions.	I2
2	Housing (Plastic part)	QMFZ2, CN	SABIC INNOVATIVE PLASTICS US L L C (E121562)	945(GG)	Made by PBT, Min 2.4 mm thick, 120 °C, rated V-0. Overall 36.6 by 23 mm. Located at top cover near Daughter Board II.	
3	Input Lead Wire	AVLV2, CN	Various	Various	Min. 18 AWG, rated min. 300 V, 105 °C, min. 152 mm long	
4	LED Output Lead Wire	AVLV2, CN	Various	Various	Min. 18 AWG, rated min. 600 V, 105 °C, min. 152 mm long	
5	Dimming and AUX Output Lead Wires	AVLV2, CN	Various	Various	Min. 22 AWG, rated min. 600 V, 105 °C, min. 152 mm long	
6	Grommet for Input Lead Wires	QMFZ2	Various	Various	Silica gel, rated 85°C, suitable for three conductors.	
7	Grommet for Output Lead Wires	QMFZ2	Various	Various	Same as above except suitable for six conductors.	
Main Board						
8	Printed Wiring Board	ZPMV2, CN	Various	Various	Rated min. V-1, 130 °C. Suitable for support of live parts. See ILL.3 for PWB trace layouts.	I3
9.1	Fuse (F1)	JDYX2, CN	COOPER BUSSMANN LLC (E19180)	SS-5H	Rated 300 V, 4 A, connected in series with ungrounded supply	
9.2	Alternate	JDYX, CN	Various	Various	Same as above.	
10	Insulation Sheet	QMFZ2	Various	Various	Two provided. PET film, 0.18 mm thick minimum, provided as insulation between PWB assembly and metal enclosure (top and bottom). See ILL.4 (unit:mm) for detailed dimension.	I4 F4 F5
11	Bridge Rectifier (D1)	-	Various	Various	Rated 800 V, 8 A.	
12	X Capacitor (C1)	FOWX2, CN	Various	Various	Rated 305 V min., 0.22 uF max, 110 °C min. Located across the line.	

No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F) IG (I) LL
13	X Capacitor (C27)	FOWX2, CN	Various	Various	Rated 400 V min., 2.2 uF max, 110°C min. Located across the line.	
14	X Capacitor (C31)	FOWX2, CN	Various	Various	Rated 400 V min., 2.2 uF max, 110 °C min.	
15	Y Capacitor (C18)	FOWX2, CN	Various	Various	Y1 type. Rated 400 V min., 110 °C min, 2.2 uF max. Bridging Primary to Secondary.	
16	NTC (RT2)	XGPU2, CN	Various	Various	Rated 2.5 ohm at 25 °C, 130 °C min.	
17	Capacitors (C9, C10)	-	Various	Various	Electrolytic type, rated 82 uF max, 350 V min., 105°C min.	
18	Capacitor (C13)	-	Various	Various	Electrolytic type, rated 18 uF max, 450 V min., 105°C min.	
19	Capacitor (C64)	-	Various	Various	Electrolytic type, rated 47 uF max, 25 V min., 105°C min.	
20	Capacitors (C60, C97)	-	Various	Various	Electrolytic type, rated 100 uF max, 25 V min., 105°C min.	
21	MOSFET (Q2)	-	Various	Various	Rated min. 650 V, 33 A. Mounted to Heat Sink (HS1).	
22	MOSFETs (Q1, Q3)	-	Various	Various	See model difference list for rating.	
23	MOSFET (Q35)	-	Various	Various	Rated min. 600 V, 2.2 A.	
24	Diode (D3)	-	Various	Various	Rated min. 1000V, 8 A. Mounted to Heat Sink (HS1).	
25	Diode (D17, D63)	-	Various	Various	See model difference list for rating.	
27	IC (IC1)	-	Various	MP44014GS-Z	Consists of 8 pins.	
28	IC (IC2)	-	Various	HR1001BGS-Z	Consists of 16 pins.	
29	Optical Isolators (IC4, IC12, IC13 , IC14)	FPQU2, CN	Various	Various	Rated 3750 V isolation voltage, min 110 °C.	
30	Heat Sink (HS1)	-	Various	Various	Aluminum, L-shaped. Soldered to PWB. See ILL.5 (unit: mm) for detailed dimension.	I5
31	Thermal Pad (For T1)	QMFZ2	Various	Various	Silicon Rubber. Applied on T1. Overall 15 mm x 15 mm, 3.0 mm thick.	F3
32	Thermal Pad (For L2)	QMFZ2	Various	Various	Same as above except 5 mm thick.	F3
33	Thermal Pad at bottom side of PWB	QMFZ2	Various	Various	Silicon Rubber. Applied on components at bottom side of PWB. See below for overall size and Fig.3 for details. Q16: Overall 14 mm by 14 mm, 0.5 mm thick. Q5, Q6: Overall 14 mm by 23 mm, 2.5 mm thick. D4, D5, D8, D10, D18, Q1, Q3: Overall 43 mm by 30 mm, 0.5 mm thick.	F3

No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F)IG (I)LL
34	Surge Protective Devices (MV1, MV2, MV3)	VZCA2, CN	Various	Various	SPD Type 5, minimum rated operating voltage 300 V ac, minimum 110 °C.	
35	Potting compound	QMFZ2	DONGGUAN ZHAOSHUN SILICONE NEW MATERIAL TECHNOLOGY CO LTD (E329120)	ZS-GF Series	Silicone (SI). Rated V-0, 150°C, grey color. Fully covered all the components and traces within Housing.	
Daughter Board I						
36	Printed Wiring Board	ZPMV2, CN	Various	Various	Rated min. V-1, 130 °C. Suitable for support of live parts. Located near LED output leads. See Ill.6 for PWB trace and layout.	I6
37	Capacitors (C36, C37, C45, C68)	-	Various	Various	Electrolytic type, rated 33 uF max, 250 V min., 105°C min.	
Daughter Board II						
38	Printed Wiring Board	ZPMV2, CN	Various	Various	Rated min. V-1, 130 °C. Suitable for support of live parts. Located near dimming and AUX output leads. See Ill.7 for PWB trace and layout.	I7
39	Capacitors (C200)	-	Various	Various	Electrolytic type, rated 270 uF max, 16 V min., 105°C min.	
40	IC (IC202)	-	Various	PIC16F1825T-E/JQ	Consists of 16 pins.	
41	IC (IC203)	FPQU2, CN	Various	Various	Rated 3750 V isolation voltage, min 110 °C.	

Model Different list:

Components	Models CDB260W-1700-210-XXXXX-YYYYY, PDB260W-1700-210-XXXXX-YYYYY, CDB260W-1300-280-XXXXX-YYYYY, PD260W-1300-280-XXXXX-YYYYY	Models CDB260W-0860-400-XXXXX-YYYYY and PDB260W-0860-400-XXXXX-YYYYY
D8	400 V, 3 A	600 V, 3 A
D63	300 V, 20 A	600 V, 10 A
D5	400 V, 3 A	600 V, 3 A
D18	200 V, 3 A	400 V, 3 A
D17	200 V, 20 A	600 V, 10 A
D10	200 V, 3 A	400 V, 3 A
Q1, Q3	17 A, 250 V, 0.14 ohm	15 A, 650 V, 0.198 Ohm

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Winding devices - See below for details.

No.	Item	CCN	Manufacturer (File Number)	Part Number	Rating	(F) IG (I) LL
1	Ring Coil (L1)	-	-	-	-	
1.1	Core	-	Various	Various	Ferrite. Overall 22 mm OD by 14 mm ID by 9 mm thick.	
1.2	Coil (N1, N2)	OBMW2	Various	Various	Enamel copper wire, 130 °C min. 0.7 mm OD, 60 turns.	
1.3	Barrier	ZPMV2	Various	Various	Minimum V-2, min. 105°C. Provided with minimum 0.5 mm thick to separate the windings.	
2	Ring Coil (L4)	-	-	-	-	
2.1	Core	-	Various	Various	Ferrite. Overall 14 mm OD by 9 mm ID by 5 mm thick.	
2.2	Coil (N1)	OBMW2	Various	Various	Enamel copper wire, 130 °C min. 0.6mm OD, 13 turns.	
2.3	Coil (N2)	OBJT2	Various	Various	Insulated Winding Wire, 130 °C min. 0.6mm OD, 13 turns.	
3	Inductor (L2)	-	-	-	Refer to Ill. 8 for details	I8
3.1	Core	-	Various	Various	Ferrite. 30.8 by 32.4 by 21.8 mm overall.	
3.2	Bobbin	QMFZ2	Various	Various	Phenolic, 0.71 mm thick minimum, rated V-0, 150 °C.	
3.3	Coil	OBMW2	Various	Various	Enamel copper wire, 130 °C min.,	
3.4	Tape	OANZ2	Various	Various	Polyethylene terephthalate film tape, 0.05 mm thick per layer. 1 layer provided to N1, N2 winding. 2 layers provided to N3 winding.	
4	Transformer (T1)	-	-	-	Refer to Ill. 9 for details	I9
-	Electrical insulation system	OBJY2	MAO HSIN ELECTRONIC CO LTD (E182305)	GH-130	Rated 130°C (Class B). Table IV.	
4.1	Core	-	Various	Various	Ferrite, 30.7 by 32 by 22.3 mm overall. Fully wrapped by 1 layer of Tape (Item 4.5) to maintain minimum 25.4 mm spacing between Core and secondary components.	
4.2	Bobbin	QMFZ2	SUMITOMO BAKELITE CO LTD (E41429)	PM-9820	For mechanical support only. Phenolic, 0.71 mm thick minimum, rated V-0, 150 C.	
4.3	Primary Windings (N1, N2)	OBJT2	GREAT LEOFLO INDUSTRIAL CO LTD (E211989)	TRW(B) *	Insulated Winding Wire, 130°C min.	
4.4	Secondary Windings (N3, N4, N5, N6)	OBMW2	Various	Various	ANSI type MW28/75/79/80/82/83, 130 °C min.	
4.5	Tape	OANZ2	3M COMPANY ELECTRICAL MARKETS DIV (EMD) (E17385)	1350T-1 (b)	Polyethylene terephthalate film tape, 0.05 mm thick per layer. 1 layer provided to N1-N4 windings. 2 layers provided to N5 and N6 winding.	

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Winding devices (Cont'd):

No.	Item	CCN	Manufacturer (File Number)	Part Number	Rating	(F) IG (I) LL
4.6	Primary Crossover Lead Insulation	OANZ2	3M COMPANY ELECTRICAL MARKETS DIV (EMD) (E17385)	1350T-1 (b)	Two layers tape.	
4.7	Varnish	OBOR2	John C Dolph Co (E317427)	BC-359	Rated minimum 130 °C.	
4.8	Tubing	YDPU2, CN	HAMBURG INDUSTRIES CO LTD (E255394)	H-2(CB)	Rated 300 V, 125 °C. Provided at leads out.	
5	Transformer (T2)	-	-	-	Refer to Ill. 10 for details	I10
-	Electrical insulation system	OBJY2	MAO HSIN ELECTRONIC CO LTD (E182305)	GH-130	Rated 130°C (Class B). Table IV.	
5.1	Core	-	Various	Various	Ferrite, 13.6 by 13.6 by 4.5 mm overall.	
5.2	Bobbin	QMFZ2	SUMITOMO BAKELITE CO LTD (E41429)	PM-9820	For mechanical support only. Phenolic, 0.71 mm thick minimum, rated V-0, 150 C.	
5.3	Primary Windings (N1, N2, N5)	OBMW2	Various	Various	ANSI type MW28/75/79/80/82/83, 130 °C min.	
5.4	Secondary Windings (N3, N4)	OBJT2	GREAT LEOPLON INDUSTRIAL CO LTD (E211989)	TRW(B)*	Insulated Winding Wire, 130°C min.	
5.5	Tape	OANZ2	3M COMPANY ELECTRICAL MARKETS DIV (EMD) (E17385)	1350T-1 (b)	Polyethylene terephthalate film tape, 0.05 mm thick per layer. 1 layer provided to N1-N4 windings. 2 layers provided to N5.	
5.6	Primary Crossover Lead Insulation	OANZ2	3M COMPANY ELECTRICAL MARKETS DIV (EMD) (E17385)	1350T-1 (b)	Two layers tape.	
5.7	Varnish	OBOR2	John C Dolph Co (E317427)	BC-359	Rated minimum 130 °C.	

Inductor (L2)				
Winding	Pin	Diameter, mm x strand		Number of Turns
N1	6-5	0.1 x 1		40
N2	3-1	0.15 x 1		13
N3	5-2	0.15 x 1		28
Transformer (T1)				
Winding	Location	Pin	Diameter, mm x strand	Number of Turns
N1	PRI	2-1	0.35 x 2	64
N2	PRI	4-3	0.2 x 1	4
N3	SEC	12-13	0.1 x 30	33
N4	SEC	10-11	0.1 x 30	45
N5	SEC	16-15	0.25 x 1	3
N6	SEC	9-14	0.25 x 1	3
Transformer (T2)				
N1	PRI	2-3	0.14 x 1	41
N2	PRI	1-10	0.18 x 1	16
N3	SEC	A-B	0.2 x 1	12
N4	SEC	C-D	0.2 x 1	14
N5	PRI	3-9	0.14 x 1	41