

File E343741
Project 13CA54711

October 30, 2013

REPORT

On

COMPONENT - DRIVERS FOR LIGHT-EMITTING-DIODE ARRAYS, MODULES AND CONTROLLERS

ENERGY RECOVERY PRODUCTS (ZHUHAI) CO LTD
GUANGDONG, CHINA

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DESCRIPTION

PRODUCT COVERED:

USR, CNR - Component, LED Drivers, see electrical ratings table for models.

ELECTRICAL RATINGS:

Table 1

Model	group	potting	Input (Lead: White - Black)				Output (Red- Black)		
			V ac	Hz	A	Power Factor	V dc max	mA max	W max
EBR0PPA-XXXX-30-YYY-ZZZ	I	Yes	120,120-277, 277, 230	50/60	0.27	>0.9	30	700	21
EBR0PPA-XXXX-30-YYY-ZZZ	I	no	120,120-277, 277, 230	50/60	0.27	>0.9	30	500	15
EBR0PPA-XXXX-24-YYY-ZZZ	I	Yes	120,120-277, 277, 230	50/60	0.27	>0.9	24	875	21
EBR0PPA-XXXX-24-YYY-ZZZ	I	no	120,120-277, 277, 230	50/60	0.27	>0.9	24	625	15
EBR0PPA-XXXX-32-YYY-ZZZ	I	Yes	120,120-277, 277, 230	50/60	0.27	>0.9	32	650	21
EBR0PPA-XXXX-32-YYY-ZZZ	I	no	120,120-277, 277, 230	50/60	0.27	>0.9	32	465	15
EBR0PPA-XXXX-36-YYY-ZZZ	I	Yes	120,120-277, 277, 230	50/60	0.27	>0.9	36	580	21
EBR0PPA-XXXX-36-YYY-ZZZ	I	no	120,120-277, 277, 230	50/60	0.27	>0.9	36	415	15
EBR0PPA-XXXX-37-YYY-ZZZ	I	Yes	120,120-277, 277, 230	50/60	0.27	>0.9	37	580	21
EBR0PPA-XXXX-37-YYY-ZZZ	I	no	120,120-277, 277, 230	50/60	0.27	>0.9	37	415	15
EBR0PPA-XXXX-42-YYY-ZZZ	I	Yes	120,120-277, 277, 230	50/60	0.27	>0.9	42	500	21
EBR0PPA-XXXX-42-YYY-ZZZ	I	no	120,120-277, 277, 230	50/60	0.27	>0.9	42	355	15
EBR0PPA-XXXX-48-YYY-ZZZ	I	Yes	120,120-277, 277, 230	50/60	0.27	>0.9	48	430	21
EBR0PPA-XXXX-48-YYY-ZZZ	I	no	120,120-277, 277, 230	50/60	0.27	>0.9	48	310	15
JWBR010U-XXXX-28-YYY-ZZZ	II	no	120	50/60	0.27	>0.9	28	300	7.6
EBR010U-XXXX-28-YYY-ZZZ	II	no	120	50/60	0.27	>0.9	28	300	7.6
EBR0YYU-XXXX-21-YYY-ZZZ	II	no	120	50/60	0.27	>0.9	21	530	11.1
JWBR0YYU-XXXX-21-YYY-ZZZ	II	no	120	50/60	0.27	>0.9	21	530	11.1
EBR015U-XXXX-18	I	no	120	50/60	0.27	>0.9	18	700	12.6

- "PP"=20, if $16W < P_{out} < 21W$; "PP"=15, if $11W < P_{out} < 16W$; "PP"=10, if $P_{out} < 11W$. (No component's rating changed)
- "A"=U, if AC input is 120VAC; "A"=W, if AC input is 120-277VAC; "A"=V, if AC input is 277VAC; "A"=E, if AC input is 230VAC.
- For models EBR0YYU-XXXX-21-YYY-ZZZ and JWBR0YYU-XXXX-21-YYY-ZZZ, "YY"=15 if $11W < P_{out} < 16W$; and "YY"=10, If $P_{out} < 11W$. (No component's rating changed)
- suffix "XXXX", where "X" represents 0-9, means regulated output current, which is not greater than max output regulated current within the output voltage range.
- Suffix "YYY" where "Y" represents 0-9, A-Z or blank, for market purpose only.
- Suffix "ZZZ" where "Z" represents 0-9, A-Z or blank, for market purpose only.

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, and the Standard for Information Technology Equipment - Safety - Part 1: General Requirements, UL 60950-1.

*CNR - Indicates investigation to the Canadian Standard for Light emitting Diode (LED) Equipment for Lighting Applications, CAN/CSA-C22.2 No. 250.13-, and the standard for Information Technology Equipment - Safety - Part 1: General Requirements, CAN/CSA-C22.2 No. 60950-1-07.

DIFFERENCES BETWEEN MODELS:

Models EBR010U-XXXX-28-YYY-ZZZ and JWBR010U-XXXX-28-YYY-ZZZ are same as each other except the model designation.

Models EBR0YYU-XXXX-21-YYY-ZZZ and JWBR0YYU-XXXX-21-YYY-ZZZ are same as each other except the model designation.

EBR0PPA-XXXX-37-YYY-ZZZ is identical to EBR0PPA-XXXX-36-YYY-ZZZ, except for R23 changed to 300 K ohm.

EBR0PPA-XXXX-30-YYY-ZZZ	All models are similar construction and same circuit diagram except the output ratings and some component's rating on PWB, refer details to ILL 8.
EBR0PPA-XXXX-24-YYY-ZZZ	
EBR0PPA-XXXX-32-YYY-ZZZ	
EBR0PPA-XXXX-36-YYY-ZZZ	
EBR0PPA-XXXX-37-YYY-ZZZ	
EBR0PPA-XXXX-42-YYY-ZZZ	
EBR0PPA-XXXX-48-YYY-ZZZ	
JWBR010U-XXXX-28-YYY-ZZZ	
EBR010U-XXXX-28-YYY-ZZZ	
EBR0YYU-XXXX-21-YYY-ZZZ	
JWBR0YYU-XXXX-21-YYY-ZZZ	
EBR015U-XXXX-18	

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)
EBR0PPA-XXXX-30-YYY-ZZZ EBR0PPA-XXXX-32-YYY-ZZZ EBR0PPA-XXXX-36-YYY-ZZZ EBR0PPA-XXXX-37-YYY-ZZZ EBR0PPA-XXXX-42-YYY-ZZZ EBR0PPA-XXXX-48-YYY-ZZZ JWBR010U-XXXX-28-YYY-ZZZ EBR010U-XXXX-28-YYY-ZZZ	Input type- Branch Circuit (Mains)	Output is - Constant Current LED Class 2 (b)	Dry or Damp	No
EBR0PPA-XXXX-24-YYY-ZZZ EBR0YYU-XXXX-21-YYY-ZZZ JWBR0YYU-XXXX-21-YYY-ZZZ EBR015U-XXXX-18		Output is - Constant Current Class 2 (a)		

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

b- As defined in UL 8750, Section 8.14 and CAN/CSA-C22.2 No. 250.13, Annex A

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

2. Rated output loading for these products was achieved using electronic loads.

3. The temperature tests were performed at Tc.

4. Transformer (T1) employs a UL Recognized Class B (130 °C) electrical insulation system.

5. As part of temperature testing, the case temperature at the temperature reference point- identified as Tc on the case (enclosure side near the main transformer T1, was monitored. During the normal temperature test of the end product, the temperature at the temperature reference point is to be monitored. The absolute value at the temperature reference point cannot exceed 90 °C.

6. These products are 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.

7. These products are provided with minimum 18 AWG, stranded leads, rated minimum 105 °C, 300 V minimum for input and output connections. Acceptability of the leads relative to strain relief and secureness, is to be determined as part of the end device evaluation.

8. These products are intended for factory installation only.

9. These products are not intended for field wiring used.

10. The following end-product enclosures are required - Fire, Mechanical and Electrical.


11. No mechanical test has been conducted on the units.
12. These products are dimmable using phase cut dimmers.
13. The spacing would be evaluated according to the altitude at 2000 m or below.
14. Double insulation only apply on primary and secondary circuit. Further evaluation shall be determined in end-use application.

CONSTRUCTION DETAILS:

Section General - The following construction items are described in Section General.

Date Code	Trace Layouts
Abbreviations	Coil Device Verification
Internal Wiring	Corrosion Protection
Insulating Tubing and Sleeving	Tolerances
Soldered Connections	C-UL Requirements

Markings - In addition to the Section General, the following markings shall be also marked on the unit with minimum 1.6 mm lettering. Marking labels shall be rated minimum 90°C.

1. Company Name or File No. (E343741) or Trademark shown in Section General
2. Model Designation
3. The Polarity of the Input and Output Connections.
4. Date Code (Consist of:YY WW, where WW represents the week and YY represents the year.)
5. Optional - Electrical Ratings (see electrical ratings table)
6. Optional - "Dry or Damp Location only" or equivalent.
7. Optional - Maximum Case Temperature (Tc): 90 °C
8. Optional - "  " for Double insulation.

Illustrations - The following illustrations are referenced in this Report:

ILL. Number	Description
1	Printed Wiring Board Component and Trace Layouts
2	Components on PWB for group I & II Models
3	Transformer (T1) Specification (group I Models)
4	Transformer (T1) Specification (group II Models)
5	Inductor (L1) Specification
6	Inductor (L3) Specification
7	Inductor (L4) Specification
8	Component difference on PWB for group I & II Models
9	Spacing on PWB
10	Schematic circuit diagram

General - the general design, shape, and arrangement shall be as illustrated in the following figures, except where variations are specifically described.

LED DRIVER, MODEL EBR021U-700-30-YYY-ZZZ - FIGs. 1 - 5

General - The general design, shape and arrangement shall be as illustrated except where variations are specifically described. Also represents all models in group I & II unless otherwise specified.

Item No.	Object/part No.	Product Category CCN	Manufacturer/ trademark	Type/ model	Technical data	(F)IG (I)LL
1	Enclosure	QMFZ2	SABIC INNOVATIVE PLASTICS B V (E45329)	945(GG)	PC. Min. thickness 2.1 mm, rated V-0, 120 °C, overall 57.5 mm OD by 31.6 mm high. Two-parts construction, Physically secured together by tabs. Provided with two slots for Mounting.	(F) 1-3
2	Input Wire And Output Wire	AVLV2, AVLV8	Various	Various	Min. 18 AWG, rated VW-1, min. 300 V, minimum 105 °C.	--
3	Potting Compound (Refer to Table 1)	QMFZ2	TEMPO CHEMICALS CO LTD (E231717)	TS-6001	Potting Silicone Material, min. V-0, min. 130°C. Fully filled in enclosure.	--
3A	Alternate (for model in group I only)	QMFZ2	Dow Corning (Shanghai) Co. Ltd. (E251343)	CN-8760	Potting Silicone Material, min. V-0, min. 105°C, black in color. Fully filled in enclosure.	--
*						
*3B	Alternate (for model in group I only)	QMFZ2	DONGGUAN ZHAOSHUN SILICONE NEW MATERIAL TECHNOLOGY CO LTD (E329120)	ZS-GF Series	Potting Silicone Material , min. V-0, min. 150 °C, grey in color. Fully filled in enclosure.	
4	Main Printed Wiring Board	ZPMV2, ZPMV8	Various	Various	Min V-0, min 130°C. overall 50 mm OD, min 1.6 mm, thick. Physically fitted into Enclosure.	--
5	Fuse (F1)	JDYX2, JDYX8	CONQUER ELECTRONICS CO LTD	MST	(For LED driver rated 120Vac) 1 A, 250 Vac	(F) 5-6
5A	Alternate	JDYX2, JDYX8	Various	Various	(For LED driver rated 120-277Vac or 277Vac) 1 A, 300 Vac	--
5B	Alternate	Listed JDYX/7	Various	Various	(For LED driver rated 120Vac) 1 A, 250 Vac	--
5C	Alternate	Listed JDYX/7	Various	Various	(For LED driver rated 120-277Vac or 277Vac) 1 A, 300 Vac	--

(CONT'D)

Item No.	Object/part No.	Product Category CCN	Manufacturer/trademark	Type/model	Technical data	(F)IG (I)LL
6	Varistor (MV1)	VZCA2/8	Various	Various	(For LED driver rated 120-277Vac or 277Vac) Min. 320 Vac. Located across the line.	--
6A	Alternate	VZCA2/8	Various	Various	(For LED driver rated 120Vac) Min. 150 Vac. Located across the line.	--
7	Across-the-line Capacitor (C2)	FOWX2/8 or FOKY2/8	Various	Various	(For LED driver rated 120-277Vac or 277Vac) Max. 0.1uF, Min. 305 V, min. 100 degree C, Class X2. Located across the line.	-
7A	Alternate	FOWX2/8 or FOKY2/8	Various	Various	(For LED driver rated 120Vac) Max. 0.1uF, Min. 250 V, min. 100 degree C, Class X2 Located across the line.	-
8	Antenna-Coupling Capacitor (C22)	FOWX2/8 or FOKY2/8	Various	Various	(For LED driver rated 120-277Vac or 277Vac) Class Y1. Min. 400 V, max. 3300 pF, min. 85 degree C. Bridging between Primary and secondary.	--
8A	Alternate	FOWX2/8 or FOKY2/8	Various	Various	(For LED driver rated 120Vac) Class Y1. Min. 250 V, max. 3300 pF, min. 85 degree C. Bridging between Primary and secondary.	--

(CONT'D)

Item No.	Object/part No.	Product Category CCN	Manufacturer/ trademark	Type/ model	Technical data	(F)IG (I)LL
9	Optical Isolators (IC2) [PRI - SEC]	FPQU2/8	Various	Various	Isolation voltage 3750Vac, minimum 115°C operating temperature.	--
10	Resistor - R6	--	Various	Various	Rated 1W, 1K ohm.	--
11	Bridge rectifier - D1	--	Various	Various	Rated 800V, 0.8A	--
12	Capacitor - C6	--	Various	Various	(For LED driver rated 120Vac) Rated 0.018uF, 250V	--
12A	Alternate	--	Various	Various	(For LED driver rated 120-277Vac or 277Vac) Rated 0.033uF, 277V	--
13	Capacitor C8	--	Various	Various	(For LED driver rated 120Vac) Rated 0.018uF, 250V, min 105C.	--
13A	Alternate	--	Various	Various	(For LED driver rated 120-277Vac or 277Vac) Rated 0.033uF, 450V, min 105C.	--
14	Q1	--	Various	Various	Rated 1A, 600V	--
15	Q2	--	Various	Various	Rated 50V,100mA	--
16	Q3	--	Various	Various	(For LED driver rated 120Vac) Rated 600V,2.2A.	--
*16A	Alternate	--	Various	Various	(For LED driver rated 120-277Vac or 277Vac) Rated 600V , 2.5A.	--

Winding devices - See below for details.

Item No.	Object/part No.	Product Category CCN	Manufacturer/trademark	Type/model	Technical data	(F)IG (I)LL
17	Q4	--	Various	Various	Rated 80V,500mA	--
18	IC1	--	Various	Various	MP44010HS-C537	--
19	Diode -D8	--	Various	Various	Rated 1A, 600V	--
20	Diode -D9	--	Various	Various	Rated 1A, 400V	--
21	Diode -D5	--	Various	Various	Rated 3A, 400V	--
22	Capacitor C13	--	Various	Various	Rated 680uF,50V	--
23	Line Filter (L1, L3, L4)	--	--	--	L1: Refer to Ill. 5 for details L3: Refer to Ill. 6 for details L4: Refer to Ill. 7 for details	--
23.1	Core	--	--	--	Ferrite	--
23.2	Coil	--	Various	Various	Enamel copper wire, min.130°C L1: Coil diameter 0.12 mm, 285.5 turns. L3: Coil diameter 0.12mm, 300 turns. L4: Coil diameter 0.6mm, 7 turns.	--
23.3	Tubing (for L1, L3 only)	YDPU2	Various	Various	Rated min. 200 degree C, 300Vac.	--
23.4	Components on PWB	--	--	--	Refer to ILL. 2 for details.	--

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

Item No.	Object/part No.	Product Category CCN	Manufacturer/ trademark	Type/ model	Technical data	(F)IG (I)LL
24	Transformer (T1) for group I models only	--	MAO HSIN ELECTRONIC CO LTD (E182305)	6900-01087 or 6900-01087-x, where x=1,2,3,4,5	Refer to Ill. 3 for details.	(F)6-7
24A	Alternate	--	SHENZHENSHI XINDAHUI ELECTRONICS CO LTD (E348674)	6900-01087 or 6900-01087-x, where x=1,2,3,4,5	Refer to Ill. 3 for details.	--
24B	Alternate	--	DONGGUAN ZHONGKAI ELECTRONIC CO LTD (E349803)	6900-01087 or 6900-01087-x, where x=1,2,3,4,5	Refer to Ill. 3 for details.	--
24.1	Electrical insulation system	OBJY2	MAO HSIN ELECTRONIC CO LTD (E182305)	GH-130, table IV	Rated 130 °C (Class B)	--
24.1A	Alternate	OBJY2	SHENZHENSHI XINDAHUI ELECTRONICS CO LTD (E348674)	CCP-130-1, Table I	Rated 130 °C (Class B)	--
24.1B	Alternate	OBJY2	DONGGUAN ZHONGKAI ELECTRONIC CO LTD (E349803)	TAI HU 130-TM, Table II	Rated 130 °C (Class B)	--
24.2	Core	--	--	--	Ferrite.	--
24.3	Bobbin (For mechanical support only)	QMFZ2	SUMITOMO BAKELITE CO LTD (E41429)	PM-9820	(For EIS "GH-130", table IV and "130-TM, Table II" only) Min. 1.5 mm thick. Rated min. V-0, min. 150 degree C, black or brown in color.	--
24.3A	Alternate	QMFZ2	CHANG CHUN PLASTICS CO LTD (E59481)	T200NA	(For EIS "CCP-130-1, Table I" only) Min. 1.5 mm thick. Rated min. V-0, min. 150 degree C, black or brown in color.	--
24.4	Primary Windings	OBMW2	Various		MW28. Polyurethane basecoat with Polyamide topcoat. Rated min. 130 degree C. See ILL. 3 for diameter and turns. Insulated from the Potting by Tape.	--

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

Item No.	Object/part No.	Product Category CCN	Manufacturer/ trademark	Type/ model	Technical data	(F)IG (I)LL
24.5	Triple wire (Secondary Winding)	OBJT2	GREAT LEOFLON INDUSTRIAL CO LTD (E211989)	TRW (B)	(For EIS "GH-130", table IV only) Rated min. 130 degree C. See ILL. 3 for diameter and turns	--
24.5A	Alternate	OBJT2	FURUKAWA ELECTRIC CO LTD (E206440)	TEX-B	(For EIS "CCP-130-1, Table I" only) Rated min. 130 degree C. See ILL. 3 for diameter and turns	--
24.5B	Alternate	OBJT2	COSMOLINK CO LTD (E213764)	TIW-M	(For EIS "130-TM, Table II" only) Rated min. 130 degree C. See ILL. 3 for diameter and turns	--
24.6	Tape	OANZ2	3M COMPANY ELECTRICAL MARKETS DIV (EMD) (E17385)	1350T-1	PET, Rated min. 130 degree C, 0.05 mm for each layer, refer to ILL.3 for no. of layers.	--
24.7	Varnish	OBOR2	JOHN C DOLPH CO (E317427)	BC-359	(For EIS "GH-130", table IV & "CCP-130-1, table I" only) Min. rated 155°C.	--
24.7A	Varnish	OBOR2	SUZHOU TAIHU ELECTRIC ADVANCED MATERIAL CO LTD (E228349)	T-4260(A)	(For EIS "130-TM, Table II" only) Min. rated 155°C.	--
24.8	Primary Crossover Lead Insulation	OANZ2	--	--	One layer of Tape. specified in Item 24.6	--

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

Item No.	Object/part No.	Product Category CCN	Manufacturer/ trademark	Type/ model	Technical data	(F)IG (I)LL
*25	Transformer (T1) for group II models only	--	MAO HSIN ELECTRONIC CO LTD (E182305)	6900-01264 or 6900-01264-x, where x=1,2,3,4,5	Refer to Ill. 4 for details.	(F)6-7
25A	Alternate	--	SHENZHENSHI XINDAHUI ELECTRONICS CO LTD (E348674)	6900-01264 or 6900-01264-x, where x=1,2,3,4,5	Refer to Ill. 4 for details.	--
25B	Alternate	--	DONGGUAN ZHONGKAI ELECTRONIC CO LTD (E349803)	6900-01264 or 6900-01264-x, where x=1,2,3,4,5	Refer to Ill. 4 for details.	--
25.1	Electrical insulation system	OBJY2	MAO HSIN ELECTRONIC CO LTD (E182305)	GH-130, table IV	Rated 130 °C (Class B)	--
25.1A	Alternate	OBJY2	SHENZHENSHI XINDAHUI ELECTRONICS CO LTD (E348674)	CCP-130-1, Table I	Rated 130 °C (Class B)	--
25.1B	Alternate	OBJY2	DONGGUAN ZHONGKAI ELECTRONIC CO LTD (E349803)	TAI HU 130-TM, Table II	Rated 130 °C (Class B)	--
25.2	Core	--	--	--	Ferrite.	--
25.3	Bobbin	QMFZ2	SUMITOMO BAKELITE CO LTD (E41429)	PM-9820	(For EIS "GH-130", table IV and "130-TM, Table II" only) Min. 1.5 mm thick. Rated min. V-0, min. 150 degree C, black or brown in color.	--
25.3A	Alternate	QMFZ2	CHANG CHUN PLASTICS CO LTD (E59481)	T200NA	(For EIS "CCP-130-1, Table I" only) Min. 1.5 mm thick. Rated min. V-0, min. 150 degree C, black or brown in color.	--
25.4	Primary Windings	OBMW2	Various	MW 28	Polyurethane basecoat with Polyamide topcoat. Rated min. 130 degree C. See ILL. 4 for diameter and turns. Insulated from the Potting by Tape.	--

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

Item No.	Object/part No.	Product Category CCN	Manufacturer/ trademark	Type/ model	Technical data	(F)IG (I)LL
25.5	Triple wire (Secondary Winding)	OBJT2	GREAT LEOFLON INDUSTRIAL CO LTD (E211989)	TRW (B)	(For EIS "GH-130", table IV only) Rated min. 130 degree C. See ILL. 4 for diameter and turns	--
25.5A	Alternate	OBJT2	FURUKAWA ELECTRIC CO LTD (E206440)	TEX-B	(For EIS "CCP-130-1, Table I" only) Rated min. 130 degree C. See ILL. 4 for diameter and turns	--
25.5B	Alternate	OBJT2	COSMOLINK CO LTD (E213764)	TIW-M	(For EIS "130-TM, Table II" only) Rated min. 130 degree C. See ILL. 4 for diameter and turns	--
25.6	Tape	OANZ2	3M COMPANY ELECTRICAL MARKETS DIV (EMD) (E17385)	1350T-1	PET, Rated min. 130 degree C, 0.05 mm for each layer, refer to ILL.4 for no. of layers.	--
25.7	Varnish	OBOR2	JOHN C DOLPH CO (E317427)	BC-359	(For EIS "GH-130" & "CCP-130-1, table I" only) Min. rated 155°C.	--
25.7A	Varnish	OBOR2	SUZHOU TAIHU ELECTRIC ADVANCED MATERIAL CO LTD (E228349)	T-4260(A)	(For EIS "130-TM, Table II" only) Min. rated 155°C.	--
25.8	Primary Crossover Lead Insulation	OANZ2	--	--	One layer of Tape. specified in Item 25.6	--