

File E343741  
Project 4789470551

June 29, 2020

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 Driver

## ELECTRICAL RATINGS:

Model No.	Input			Output, CC					
				LED Output			AUX Output		
	Voltage (Vac)	Frequency (Hz)	Max. Current (A) Max. Power (W)	Voltage (Vdc)	Max. Current (A)	Max. Power (W)	Voltage (Vdc)	Current (A)	Max. Power (W)
PTBPPW-XXXX-VV-YYYYYY-ZZZZZZ	120-277	50/60	0.28A/ 33W	28-42	0.7	29.4	-	-	-
PYBPPW-XXXX-VV-YYYYYY-ZZZZZZ							12.0	0.1	1.2
PTMPPW-XXXX-VV-YYYYYY-ZZZZZZ							-	-	-
PYMPPW-XXXX-VV-YYYYYY-ZZZZZZ							12.0	0.1	1.2

Where

"PP"- If  $P_{out} < 10W$ , "PP"=10; if  $10W \leq P_{out} \leq 15W$ , "PP"=15; if  $15W < P_{out} \leq 20W$ , "PP"=20; if  $20W < P_{out} \leq 25W$ , "PP"=25; if  $25W < P_{out} \leq 29.4W$ , "PP"=30.

"XXXX" - Denotes regulated output current in mA. Regulated output current is not greater than max output regulated current within the output voltage range.

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

"YYYYYY" - Denotes customer code for market purpose only. It could be blank, 2-6 digits, any combination of alphanumeric characters or blank.

"ZZZZZZ" - Denotes customer code for market purpose only. It could be blank, 2-6 digits, any combination of alphanumeric characters or blank.

"PTB" and "PYB" - Denotes the housing was made of plastic.

"PTM" and "PYM" - Denotes the housing was made of steel.

## 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.

## Product characteristics-

Model No.  All models	Input Type	<input checked="" type="checkbox"/> Branch Circuit (Mains) <input type="checkbox"/> Isolated Circuit <input type="checkbox"/> Class 2 (a) <input type="checkbox"/> LVLE (b1) <input type="checkbox"/> LED Class 2 (b2)	
	Output Type	<input type="checkbox"/> Non-isolated <input type="checkbox"/> with PLIMIT @ 15 W (d) <input type="checkbox"/> Isolated <input type="checkbox"/> with PLIMIT @ 15 W (d) <input checked="" type="checkbox"/> Class 2 (a) <input type="checkbox"/> LVLE (b1) <input checked="" type="checkbox"/> LED Class 2 (b2)	
	Environmental Conditions	<input checked="" type="checkbox"/> Dry <input checked="" type="checkbox"/> Damp <input type="checkbox"/> Wet	
	<input checked="" type="checkbox"/> Additionally evaluated to UL 8750 Supplements	<input type="checkbox"/> SA- SREC	<input type="checkbox"/> - Evaluation per SA 3.2 <input type="checkbox"/> - Evaluation per SA 4
		<input type="checkbox"/> SB- Type HL	
		<input type="checkbox"/> SC- Type TL	Tref max/ Measured Tref-xx/ yy ° C
		<input type="checkbox"/> SE- Class P	
		<input checked="" type="checkbox"/> SF- Wired control Circuits(c)	<input type="checkbox"/> Isolated <input checked="" type="checkbox"/> Not Isolated
		<input checked="" type="checkbox"/> SG- Temperature value @ Tc	90 ° C
		<input type="checkbox"/> SH- Phase cut dimming	
		<input type="checkbox"/> SI- Type IC LED driver	

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

b1- As defined in UL 8750, Section 8.16

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

c- Supplement SF has a future effective date: 2020-11-02

d- Refers to a circuit of 15 W maximum power limit under normal and single fault conditions, as defined in UL 8750, section 8.8 and CAN/CSA-C22.2 No. 250.13, section 9.6

(@) - The Tc point is located at Driver Housing, outside, top, above Transformer (T1)

See ILL.15 for models PTBPPW-XXXX-VV-YYYYYY-ZZZZZZ and PYBPPW-XXXX-VV-YYYYYY-ZZZZZZ

See ILL.16 for models PTMPPW-XXXX-VV-YYYYYY-ZZZZZZ and PYMPPW-XXXX-VV-YYYYYY-ZZZZZZ

## and Report

## 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 40°C ambient.
2. During temperature testing of the end product, evaluation of the LED driver can be limited to the temperature at the Test Measurement Point Tc. The absolute value at this point cannot exceed 90°C. See Ill. 15 and 16 for the location of the Tc point.
3. These products utilize a UL Recognized OBJY2 Class F (155°C) electrical insulation system.
4. These products are intended for building in. The enclosure for these products have no openings. 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.
5. 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.
6. This products are provided lead wires for input and output connection. See table below for the description and rating for connections. Acceptability of the leads relative to strain relief and secureness, is to be determined as part of the end device evaluation.

Connection	Description and Rating
Input / LED output	min. 18 AWG, strand leads, min. 105 °C, min. 300 V
Dimming / AUX output	min. 22 AWG, strand leads, min. 105 °C, min. 300 V

7. These products have multiple outputs. Interconnection of these outputs has been evaluated. Additional evaluation may not be necessary in LED luminaire designs where 1)- the output pairs are separated/ isolated and 2)- LED driver output connections other than the intended termination pairs is not possible. In all cases, acceptability of interconnection of these outputs (and the associated circuits) is to be considered as part of the end product evaluation.
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.).
9. These products have been evaluated for use with a source of supply noted in the product characteristics table (input type) and electrical ratings noted in the electrical ratings table. Suitability of these products with other sources of supply or electrical ratings is to be determined in the end product.
10. For products with wired control circuits- These products do not have appropriate separation and spacings between the wired control circuits and the other circuits of the LED equipment. Acceptability of this design feature is to be considered as part of the end product evaluation.
11. The dielectric voltage withstand test between primary and secondary windings of a transformer T1 in 3000 V AC for 1 minute was conducted for these models additionally and it could withstand this specified potential without indication of breakdown.

## 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" 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.

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	Environmental considerations	See product characteristics table- \$
x	Input supply limitations (e.g. Class 2 input only)	See product characteristics table- \$
x	Electrical Ratings	See electrical ratings table- \$
x	Input & Output Types	See product characteristics table- \$
x	Class 2 outputs	See product characteristics table- 'Class 2' marked on the device. WARNING - Risk of Fire or Electric Shock. Do not interconnect output terminations #
x	Polarity of supply connections	Applies to [x]Input, [x] Output- \$
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. "CAUTION: More than one power supply present" or equivalent- \$, 5. Notice: This control circuit is not isolated - see installation instructions" or equivalent- \$, # 6. Device wired control circuit marked 'Class 2'
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- \$

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 PYB30W-0700-42 - FIGS. 1 - 6

General - The general design, shape and arrangement shall be as illustrated except where variations are specifically described. Also represents models PTBPPW-XXXX-VV-YYYYYY-ZZZZZZ and PYBPPW-XXXX-VV-YYYYYY-ZZZZZZ.

No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F)IG (I)LL
1	Enclosure	QMFZ2, CN	TEIJIN CHEMICALS LTD (E244324)	LN-2520 (##)	Made by V-0, 1.3 mm thick min., rated 125°C. Two-part construction, secured together by snap-fit.  See ILL.1 (unit: mm) for dimension details.	I1
2	Rubber cover on phone jack hole	QMFZ2, CN	Various	Various	Silicone Rubber, min. 1 mm thick, rated 110°C.  See ILL.2 (unit: mm) for dimensions.	I2
3	Input Lead Wires	AVLV2, CN	Various	Various	Min. 18 AWG, rated 300V, 105°C, min. 152mm long. Mechanically secured prior to soldering.	-
4	Output Lead Wires	AVLV2, CN	Various	Various	Min. 18 AWG, rated 300V, 105°C, min. 152mm long. Mechanically secured prior to soldering.	-
5	Dimming Lead Wire	AVLV2, CN	Various	Various	Min. 22 AWG, rated 300V, 105°C, min. 152mm long. Mechanically secured prior to soldering.	-
6	AUX Lead Wire for models PYBPPW-XXXX-VV-YYYYYY-ZZZZZZ	AVLV2, CN	Various	Various	Min. 22 AWG, rated 300V, 105°C, min. 152mm long. Mechanically secured prior to soldering.	-
7	Potting compound	QMFZ2, CN	DONGGUAN ZHAOSHUN SILICONE TECHNOLOGY CO LTD (E329120)	ZS-GF	Silicone (SI). Rated V-0, 150°C, grey color. Fully covered all components.	-
8	Thermal pad	QMFZ2, CN	Various	Various	Silicone Rubber, overall 23 x 14 mm, 3.0 mm thick min., min 130°C, rated. Adhered to enclosure and located between top of T1 and enclosure, for heat dissipation.	-

Small Board 1 (input)						
No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F) IG (I) LL
9	Printed Wiring Board	ZPMV2, CN	Various	Various	Rated min. V-1, 130°C. Measured 23.5 mm length by 23.7 mm and 21.0 mm width by 1.0 mm thick. Suitable for support of live parts. Soldered to main PWB.  See ILL.3 for PWB trace layout.	I3
10	Fuse (F1)	JDYX2, CN	DONGGUAN REOMAX ELECTRONICS TECHNOLOGY CO LTD (E340427)	SST	Rated 300 Vac, 2 A, connected in series with ungrounded supply	-
10.1	Alternate	JDYX, CN	Various	Various	Same as above	-
11	X Capacitor (C149)	FOWX2, CN	Various	Various	Class X2, Rated 310 Vac min., 0.1 µF max, 110°C min. Located across the line.	-
12	Varistor (MV2)	VZCA2, CN	Various	Various	SPD type 5, minimum rated operating voltage 510 Vac, min. 125°C.	-

Main board						
13	Printed Wiring Board	ZPMV2, CN	Various	Various	Rated min. V-1, 130°C. Measured 63.6 mm length by 33.7 mm width by 1.5 mm thick. Suitable for support of live parts.  See ILL.4 for PWB trace layout.	I4
14	Varistor(MV1)	VZCA2, CN	Various	Various	SPD type 5, minimum rated operating voltage 510 Vac, min. 125°C.	-
15	Capacitor(C1)	-	Various	Various	Electrolytic type, rated 47 µF, 160 V min., 105°C min.	-
16	Capacitor(C2)	-	Various	Various	Rated 0.022 µF, 450 V min., 105°C min.	-
17	Capacitor(C3)	-	Various	Various	Rated 0.22 µF, 450 V min., 105°C min.	-
18	Capacitor(C7)	-	Various	Various	Electrolytic type, rated 47 µF, 160 V min., 105°C min.	-
19	Capacitor(C122)	-	Various	Various	Rated 0.22 µF, 450 V min., 105°C min.	-
20	Bridge Rectifier(D1)	-	Various	Various	Rated min. 1000 V, min. 2 A	-
21	Diode(D3)	-	Various	Various	Rated min. 600 V, min. 3 A	-
22	Zener diode(Z12)	-	Various	Various	Rated 12 V, 0.05 A, 0.5 W	-
23	IC5	-	Various	LTV-3063	Consist of 4 pins	-
24	Optical isolator(IC17)	FPQU2, CN	Various	Various	Rated 3750 V isolation voltage, min 110 °C. Bridging Primary to Secondary.	-
25	Optical isolator (IC22)	FPQU2, CN	Various	Various	Rated 3750 V isolation voltage, min 110 °C. Bridging dimming to Secondary.	-
	Optical isolator(IC24)	FPQU2, CN	Various	Various	Rated 3750 V isolation voltage, min 110 °C. Bridging Primary to Secondary.	-
26	IC23	-	Various	CDM10VD	Consist of 6 pins, SOT-23-6	-
27	MOSFET(Q1)	-	Various	Various	Rated 650 V, 7 A	-
28	MOSFET(Q2)	-	Various	Various	Rated 650 V, 5 A	-
29	MOSFET(Q11)	-	Various	Various	Rated 600 V, 51 mA	-
30	Transistor(Q13)	-	Various	Various	Rated 40 V, 600 mA	-
31	Y Capacitor (C159)	FOWX2, CN	Various	Various	Class Y1, Rated 5K V min., 125°C min, 4700 pF max. Bridging Primary to Secondary.	-
32	Y Capacitor (C10)	FOWX2, CN	Various	Various	Class Y1, Rated 5K V min., 125°C min, 1000 pF max. Bridging Primary to Secondary.	-



Small Board 2 (output)						
33	Printed Wiring Board	ZPMV2, CN	Various	Various	Rated min. V-1, 130°C. Measured 44.8 mm length by 23 mm and 20 mm width by 1 mm thick. Suitable for support of live parts. Soldered to main PWB.  See ILL.5 for PWB trace layout.	I5
34	Phone Jack(J1)	QMFZ2	Various	Various	Located in Class 2 circuit. Soldered to PWB. Rated 110 °C min, measure 1.1 mm thick min. Located in the circuit without risk of fire or risk of shock. Soldered on Small PWB  See ILL.6 for dimension in details	I6
35	Capacitors (C34)	-	Various	Various	Rated 0.15 µF, 250 V min., 105°C min.	-
36	IC2	-	Various	STM32L011F4U7	Consist of 20 pins	-
37	IC13	-	Various	AP2210	Consist of 3 pins, SOT-23	-
38	Optical Isolator(IC24)	FPQU2, CN	Various	Various	Rated 3750 V isolation voltage, min 110 °C. Bridging Primary to Secondary.	-
39	Thermistor (RT1)	XGPU2, CN	THINKING ELECTRONIC INDUSTRIAL CO. LTD (E138827)	SCK-054	Rated 240 Vac, 4 A, 170 °C max.	-
40	Other components	-	-	-	See ILL.7 for details.	I7

Winding devices - See below for details.

No.	Item	CCN	Manufacturer (File Number)	Part Number	Rating	(F) IG (I) LL
1	Inductor (L1)	-	-	-	Rated 50 mH	-
1.1	Core	N/A	Various	Various	Ferrite. 13.0 mm by 12.0 mm by 3.5 mm overall.	-
1.2	Coil (N1, N2)	OBMW2	Various	Various	Enamel copper wire, 105°C min. 0.2 mm OD, 117 turns	-
1.3	Bobbin	QMFZ2	Various	Various	Phenolic, 0.75 mm thick minimum, rated 94V-0, min. 110°C.	-
1.4	Insulation Tape	OANZ2	Various	Various	PET film, 130°C min, 0.05 mm thick per layer. 1 layer provided to cover outer surface of L1	-
2	Inductor (L2)	-	-	-	Rated 700 µH	-
2.1	Core	-	Various	Various	Ferrite. 16.5 mm by 11.5 mm by 15.5 mm overall.	-
2.2	Primary Windings (N1,N2,N4)	OBMW2	Various	Various	ANSI type, MW 75, Enamel copper wire, rated min. 130°C N1: 0.1 mm dia. x 50.5 T x 1P N2: 0.12 mm dia. x 7 T x 1P N4: 0.1 mm dia. x 26.5 T x 1P	-
2.3	Secondary Windings (N3)	OBMW2	Various	Various	ANSI type, MW 75, Enamel copper wire, rated min. 130°C N3: 0.12 mm dia. x 15 T x 1P	-
2.4	Bobbin	QMFZ2	Various	Various	Phenolic, 0.75 mm thick minimum, rated 94V-0, min. 110°C.	-
2.5	Insulation Tape	OANZ2	Various	Various	PET film, 105°C min, 0.05 mm thick per layer. One layer provided. Fully covered Core and Coil.	-
3	Inductor (L3)	-	-	-	Rated 47 µH	-
3.1	Core	-	Various	Various	Ferrite. Overall 5 mm OD by 5 mm ID by 4.1 mm thick.	-
3.3	Bobbin	QMFZ2	Various	Various	Phenolic, 0.75 mm thick minimum, rated 94V-0, min. 110°C.	-
4	Inductor (L4)	-	-	-	Rated 1.34 mH	-
4.1	Core	-	Various	Various	Ferrite. 11.2 mm by 5.8 2mm by 4.04 mm overall.	-
4.2	Coil	OBMW2	Various	Various	Enamel copper wire, 105°C min. 0.25 mm OD, 170 turns.	-
4.3	Insulation Tape	OANZ2	Various	Various	PET film, 105°C min, 0.05 mm thick per layer. Fully covered with outer surface of Coil and Core.	-
5	Inductor (L5)	-	-	-	Rated 7.26 µH	-
5.1	Core	N/A	Various	Various	Ferrite. Overall 8 mm x 4 mm x 4 mm	-
5.2	Coil (N1,N2)	OBMW2	Various	Various	Enamel copper wire, 130°C min. Ø0.3 mm, 6 turns	-

## Winding devices (Cont'd):

No.	Item	CCN	Manufacturer (File Number)	Part Number	Rating	(F) IG (I) LL
6	Transformer (T1)	-	-	-	Refer to Ill.8 for details	I8
-	Electrical insulation system	OBJY2	ENERGY RECOVERY PRODUCTS (ZHUHAI) CO LTD (E472467)	ERP-155	Rated 155°C (Class F), Table II	-
6.1	Core	-	Various	Various	Ferrite, 16.5 mm by 11.5 mm by 15.5 mm overall. Fully wrapped by 1 layer of Tape to maintain spacing between Core and secondary winding	-
6.2	Bobbin	QMFZ2	SUMITOMO BAKELITE CO LTD (E41429)	Sumikon PM- 9630	Phenolic, 0.51 mm thick minimum, rated V-0, 150°C. 3-flange type.	-
6.3	Primary Windings (N1,N2,N3)	OBMW2	Various	Various	ANSI type MW30/35/36/37/38/73/74/76/79/80/82/83/85; Enamel copper wire, rated min. 130°C N1: 0.2 mm dia. x 99 T x 1P N2: 0.12 mm dia. x 10 T x 1P N3: 0.12 mm dia. x 20 T x 1P	-
6.4	Secondary Windings (N5,N6,N7)	OBMW2	Various	Various	ANSI type MW30/35/36/37/38/73/74/76/79/80/82/83/85; Enamel copper wire, rated min. 130°C N1: 0.12 mm dia. x 10 T x 1P N2: 0.12 mm dia. x 10 T x 1P N3: 0.12 mm dia. x 15 T x 1P	-
6.5	Insulation tape	OANZ2	3M COMPANY ELECTRICAL MARKETS DIV (EMD) (E17385)	1350F-1 (b)	PET film, 105°C min, 0.025 mm thick per layer.	-
6.6	Varnish	OBOR2	SUZHOU TAIHU ELECTRIC ADVANCED MATERIAL CO LTD (E228349)	T-4260 (a)	Rated minimum 130°C.	-
6.7	Tubing	YDPU2 ,CN	GREAT HOLDING INDUSTRIAL CO LTD (E156256)	TFT	Rated min. 300 V, 200 C, min. Provided at leads out	-

## Model PYM30W-0700-42 - FIGS. 7 - 14

General - The general design, shape and arrangement shall be as illustrated except where variations are specifically described. Also represents models PTMPPW-XXXX-VV-YYYYYY-ZZZZZZ and PYMPPW-XXXX-VV-YYYYYY-ZZZZZZ

No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F)IG (I)LL
1	Enclosure	QMFZ2, CN	-	-	Extruded aluminum, 0.6 mm thick min. Two-part construction- top cover and base secured together by snap fit.  See ILLs. 9 for dimensions.	I9
2	Bushing on input/output/d imming/AUX lead wires	QMFZ2, CN	Various	Various	Silicone Rubber, min. 4 mm thick, rated 110°C.  See I11.10 (unit: mm) for dimensions.	I10
3	Rubber cover on phone jack hole	QMFZ2, CN	Various	Various	Silicone Rubber, min. 1 mm thick, rated 110°C.  See I11.2 (unit: mm) for dimensions.	I2
4	Input Lead Wires	AVLV2, CN	Various	Various	Min. 18 AWG, rated 300V, 105°C, min. 152mm long. Mechanically secured prior to soldering.	-
5	Output Lead Wires	AVLV2, CN	Various	Various	Min. 18 AWG, rated 300V, 105°C, min. 152mm long. Mechanically secured prior to soldering.	-
6	Dimming Lead Wire	AVLV2, CN	Various	Various	Min. 22 AWG, rated 300V, 105°C, min. 152mm long. Mechanically secured prior to soldering.	-
7	AUX Lead Wire for models PYMPPW-XXXX- VV-YYYYYY- ZZZZZZ	AVLV2, CN	Various	Various	Min. 22 AWG, rated 300V, 105°C, min. 152mm long. Mechanically secured prior to soldering.	-
8	Insulating Barrier (Insulating sheet)	QMFZ2, CN	Various	Various	PET film, min. 125°C, min. 0.2 mm thick. One provided between PWB and Housing.  All live parts on PWB except Input Lead Wires, Output/Dimmer/AUX Lead Wires, are fully covered by Insulation Sheet.  See I11.11 (unit: mm) for detail dimensions.	I11
9	Potting compound	QMFZ2, CN	DONGGUAN ZHAOSHUN SILICONE TECHNOLOGY CO LTD (E329120)	ZS-GF	Silicone (SI). Rated V-0, 150°C, grey color. Fully covered all components.	-
10	Thermal pad	QMFZ2, CN	Various	Various	Silicone Rubber, overall 23 x 14 mm, 3.0 mm thick min., min 130°C, rated. Adhered to Insulating sheet and located between top of T1 and insulation sheet, for heat dissipation.	-

Main Board						
No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F) IG (I) LL
11	Printed Wiring Board	ZPMV2, CN	Various	Various	Rated min. V-1, 130°C. Measured 81.1 mm length by 33.8 mm width by 1.5 mm thick. Suitable for support of live parts.  See ILL.12 for PWB trace layout.	I12
12	Fuse (F1)	JDYX2, CN	DONGGUAN REOMAX ELECTRONICS TECHNOLOGY CO LTD (E340427)	SST	Rated 300 Vac, 2 A, connected in series with ungrounded supply	-
12.1	Alternate	JDYX, CN	Various	Various	Same as above	-
13	X Capacitor (C149)	FOWX2, CN	Various	Various	Class X2, Rated 310 Vac min., 0.1 $\mu$ F max, 110°C min. Located across the line.	-
14	Varistor (MV2)	VZCA2, CN	Various	Various	SPD type 5, minimum rated operating voltage 510 Vac, min. 125°C.	-
15	Varistor (MV1)	VZCA2, CN	Various	Various	SPD type 5, minimum rated operating voltage 510 Vac, min. 125°C.	-
16	Capacitor (C1)	-	Various	Various	Electrolytic type, rated 47 $\mu$ F, 160 V min., 105°C min.	-
17	Capacitor (C2)	-	Various	Various	Rated 0.022 $\mu$ F, 450 V min., 105°C min.	-
18	Capacitor (C3)	-	Various	Various	Rated 0.22 $\mu$ F, 450 V min., 105°C min.	-
19	Capacitor (C7)	-	Various	Various	Electrolytic type, rated 47 $\mu$ F, 160 V min., 105°C min.	-
20	Y Capacitor (C10)	FOWX2, CN	Various	Various	Class Y1, Rated 5K V min., 125°C min, 1000 pF max. Bridging Primary to Secondary.	-
21	Capacitor (C122)	-	Various	Various	Rated 0.22 $\mu$ F, 450 V min., 105°C min.	-
22	Y Capacitor (C159)	FOWX2, CN	Various	Various	Class Y1, Rated 5K V min., 125°C min, 4700 pF max. Bridging Primary to Secondary.	-
23	Bridge Rectifier (D1)	-	Various	Various	Rated min. 1000 V, min. 2 A	-
24	Zener diode (Z12)	-	Various	Various	Rated 12 V, 0.05 A, 0.5 W	-
25	IC5	-	Various	LTV-3063	Consist of 4 pins	-
26	IC8	-	Various	MP44014GS-Z	Consist of 8 pins	-

No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F) IG (I) LL
27	Optical isolator(IC17)	FPQU2, CN	Various	Various	Rated 3750 V isolation voltage, min 110 °C. Bridging Primary to Secondary.	-
28	Optical isolator (IC22)	FPQU2, CN	Various	Various	Rated 3750 V isolation voltage, min 110 °C. Bridging Dimming to Secondary.	-
	Optical isolator(IC24)	FPQU2, CN	Various	Various	Rated 3750 V isolation voltage, min 110 °C. Bridging Primary to Secondary.	
29	IC23	-	Various	CDM10VD	Consist of 6 pins, SOT-23-6	-
30	MOSFET(Q1)	-	Various	Various	Rated 650 V, 7 A	-
31	MOSFET(Q11)	-	Various	Various	Rated 600 V, 51 mA	-
32	Transistor(Q13 )	-	Various	Various	Rated 40 V, 600 mA	-

Small Board						
33	Printed Wiring Board	ZPMV2, CN	Various	Various	Rated min. V-1, 130°C. Measured 44.8 mm length by 23 mm and 20 mm width by 1 mm thick. Suitable for support of live parts. Soldered to main PWB.  See ILL.13 for PWB trace layout.	I13
34	Phone Jack(J1)	QMFZ2	Various	Various	Located in Class 2 circuit. Soldered to PWB. Rated 110 °C min, measure 1.1 mm thick min. Located in the circuit without risk of fire or risk of shock. Soldered on Small PWB  See ILL.6 for dimension in details	I6
35	Capacitors (C34)	-	Various	Various	Rated 0.15 µF, 250 V min., 105°C min.	-
36	IC2	-	Various	STM32L011F 4U7	Consist of 20 pins	-
37	IC13	-	Various	AP2210	Consist of 3 pins, SOT-23	-
38	Optical Isolator (IC24)	FPQU2, CN	Various	Various	Rated 3750 V isolation voltage, min 110 °C. Bridging Primary to Secondary.	-
39	Diode (D14)	-	Various	Various	Rated min. 200 V, min. 5 A	-
40	Thermistor (RT1)	XGPU2, CN	THINKING ELECTRONIC INDUSTRIAL CO. LTD (E138827)	SCK-054	Rated 240 Vac, 4 A, 170 °C max.	-
41	Other components	-	-	-	See ILL.14 for details.	I14

Winding devices - See below for details.

No.	Item	CCN	Manufacturer (File Number)	Part Number	Rating	(F) IG (I) LL
1	Inductor (L1)	-	-	-	Rated 50 mH	-
1.1	Core	N/A	Various	Various	Ferrite. Overall 13 mm OD by 12 mm ID by 3.5 mm thick	-
1.2	Coil (N1, N2)	OBMW2	Various	Various	Enamel copper wire, 105°C min. 0.2 mm OD, 117 turns	-
1.3	Bobbin	QMFZ2	Various	Various	Phenolic, 0.75 mm thick minimum, rated 94V-0, min. 110°C.	-
1.4	Insulation Tape	OANZ2	Various	Various	PET film, 130°C min, 0.05 mm thick per layer. 1 layer provided to cover outer surface of L1	-
2	Transformer (L2)	-	-	-	Rated 700 µH	-
2.1	Core	-	Various	Various	Ferrite. Overall 16.5 mm OD by 11.5 mm ID by 15.5 mm thick	-
2.2	Primary Windings (N1,N2,N4)	OBMW2	Various	Various	ANSI type, MW 75, Enamel copper wire, rated min. 130°C N1: 0.1 mm dia. x 50.5 T x 1P N2: 0.12 mm dia. x 7 T x 1P N4: 0.1 mm dia. x 26.5 T x 1P	-
2.3	Secondary Windings (N3)	OBMW2	Various	Various	ANSI type, MW 75, Enamel copper wire, rated min. 130°C N3: 0.12 mm dia. x 15 T x 1P	-
2.4	Bobbin	QMFZ2	Various	Various	Phenolic, 0.75 mm thick minimum, rated 94V-0, min. 110°C.	-
2.5	Insulation Tape	OANZ2	Various	Various	PET film, 105°C min, 0.05 mm thick per layer. One layer provided. Fully covered Core and Coil.	-
3	Inductor (L3)	-	-	-	Rated 47 µH	-
3.1	Core	-	Various	Various	Ferrite. Overall 5 mm OD by 5 mm ID by 4.1 mm thick.	-
3.3	Bobbin	QMFZ2	Various	Various	Phenolic, 0.75 mm thick minimum, rated 94V-0, min. 110°C.	-
4	Inductor (L4)	-	-	-	Rated 1.34 mH	-
4.1	Core	-	Various	Various	Ferrite. 11.2 mm by 5.82 mm by 4.04 mm overall.	-
4.2	Coil	OBMW2	Various	Various	Enamel copper wire, 105°C min. 0.25 mm OD, 170 turns.	-
4.3	Insulation Tape	OANZ2	Various	Various	PET film, 105°C min, 0.05 mm thick per layer. Fully covered with outer surface of Coil and Core.	-
5	Inductor (L5)	-	-	-	Rated 7.26 µH	-
5.1	Core	N/A	Various	Various	Ferrite. Overall 8mm x 4mm x 4mm	-
5.2	Coil (N1,N2)	OBMW2	Various	Various	Enamel copper wire, 130°C min. Ø0.3 mm, 6 turns	-



## Winding devices (Cont'd):

No.	Item	CCN	Manufacturer (File Number)	Part Number	Rating	(F)IG (I)LL
6	Transformer (T1)	-	-	-	Refer to Ill.8 for details	I8
-	Electrical insulation system	OBJY2	ENERGY RECOVERY PRODUCTS (ZHUHAI) CO LTD (E472467)	ERP-155	Rated 155°C (Class F), Table II	-
6.1	Core	-	Various	Various	Ferrite, 16.5 mm by 11.5 mm by 15.5 mm overall. Fully wrapped by 1 layer of Tape to maintain spacing between Core and secondary winding	-
6.2	Bobbin	QMFZ2	SUMITOMO BAKELITE CO LTD (E41429)	Sumikon PM- 9630	Phenolic, 0.51 mm thick minimum, rated V-0, 150°C. 3-flange type.	-
6.3	Primary Windings (N1,N2,N3)	OBMW2	Various	Various	ANSI type MW30/35/36/37/38/73/74/76/79/80/82/83/85; Enamel copper wire, rated min. 130°C N1: 0.2 mm dia. x 99 T x 1P N2: 0.12 mm dia. x 10 T x 1P N3: 0.12 mm dia. x 20 T x 1P	-
6.4	Secondary Windings (N5,N6,N7)	OBMW2	Various	Various	ANSI type MW30/35/36/37/38/73/74/76/79/80/82/83/85; Enamel copper wire, rated min. 130°C N1: 0.12 mm dia. x 10 T x 1P N2: 0.12 mm dia. x 10 T x 1P N3: 0.12 mm dia. x 15 T x 1P	-
6.5	Insulation tape	OANZ2	3M COMPANY ELECTRICAL MARKETS DIV (EMD) (E17385)	1350F-1 (b)	PET film, 105°C min, 0.025mm thick per layer.	-
6.6	Varnish	OBOR2	SUZHOU TAIHU ELECTRIC ADVANCED MATERIAL CO LTD (E228349)	T-4260 (a)	Rated minimum 130°C.	-
6.7	Tubing	YDPU2 ,CN	GREAT HOLDING INDUSTRIAL CO LTD (E156256)	TFT	Rated min. 300 V, 200 C, min. Provided at leads out	-