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REPORT

on

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

ENERGY RECOVERY PRODUCTS (ZHUHAI) CO LTD  
GUANG DONG, CHINA

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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) Power Factor	Voltage Vdc	Frequency (Hz)	Current (A) Power (W)
HX1	120	60	1.8 A, PF≥0.9	150	-	950-1000 mA, 146.3 W
SLMPPPW-X.X-VV-YYY	120-277	50/60	1.8 A, PF≥0.9	68-85	-	1.0-1.8 A, 153 W
			1.8 A, PF≥0.9	Max. 36		2.6-4.4 A, 158.4 W
VRP30W-12	120-277	50/60	0.44 A, PF≥0.9	Max. 12	-	1.75 A, 21 W

Note- For model series SLMPPPW-X.X-VV-YYY,

'PPP' denotes output power, e.g. 090 for 90 W < power ≤ 100 W;

'X.X' denotes regulated output current, e.g. 1.4 for 1.4 A;

'VV' denotes regulated output voltage, e.g. 85 for 85 V;

'YYY' may be any alpha-numeric character and is for marketing purpose only.

## 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 products been evaluated for the following characteristics.

Model No. [X] applies to all models			Product is rated	Type HL	Type TL
HX1	Input type- [X] Branch Circuit (Mains)	Output type- [X] CC	[X] Dry [X] Damp	[X] No	[X] No
SLMPPPW-X.X-VV-YYY		Output is [X] Isolated [X] Non-Class 2			
VRP30W-12		Output type- [X] CC  Output is [X] Isolated [X] Class 2 (a)			

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

## 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 load.
2. The temperature tests were performed at nominal 40 °C ambient for model HX1, 50 °C ambient for model series SLMPPPW-X.X-VV-YYY and model VRP30W-12. The need to repeat the temperature test shall be determined during the end-product investigation.
3. These products are provided with input/output connections as listed below. Acceptability of the connection scheme relative to strain relief and secureness is to be determined as part of the end device evaluation.

Model / Model series	Input/Output scheme
HX1	Leads, AVL2/8. Min. 18 AWG, stranded or solid leads. Rated min. 105 C, min. 300 V.
	Connector, ECBT2/8. Rated min. 250 V, min. 2 A. For min. 24 AWG wire.
SLMPPPW-X.X-VV-YYY	Leads, AVL2/8. Min. 18 AWG, stranded or solid leads. Rated min. 105 C, min. 300 V.
VRP30W-12	Leads, AVL2/8. Min. 18 AWG for input, min. 24 AWG for output, stranded or solid leads. Rated min. 105 C, min. 300 V.

4. These products utilize a transformer with UL Recognized OBJ2 Class 130 (B) electrical insulation system.
5. As part of temperature testing, the case temperature at Tc of model series SLMPPPW-X.X-VV-YYY and model VRP30W-12 was monitored. During the normal temperature test of the end product, the temperature at Tc is to be monitored. The absolute value at TC cannot exceed the Tc max value, noted in product characteristics table.

Model / Model series	Tc (°C)
SLMPPPW-X.X-VV-YYY	90
VRP30W-12	90

6. This product is not intended for field-wiring use.
7. The mold stress test was conducted on model series SLMPPPW-X.X-VV-YYY and VRP30W-12. The need for additional polymeric tests shall be considered in the end product.
8. Model HX1 is provided as an open-frame PCB. The need for additional insulation, barriers, spacing between the components to dead metal and other live parts shall be considered in the end product. Mounting means shall be evaluated in the end product.
9. Dielectric test for model HX1 shall be conducted in the end product.
10. The leakage current test was conducted. On model HX1, the leakage was only measured between output and ground. The need to conduct leakage current tests shall be considered in the end product.

## 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. Date Code
3. Model designation
4. Electrical Ratings - see electrical ratings table (Optional)
5. Environmental considerations
6. Polarity of the Input and Output Connections (Optional)
7. Maximum ambient temperature (Tma) (Optional)

Model / Model series	Ta (°C)
HX1	50
SLMPPPW-X.X-VV-YYY	70
VRP30W-12	50

8. Output Type- see product characteristics table (Optional)
9. Temperature Measurement Point (Tc) (Optional)

Model series	Tc (°C)
SLMPPPW-X.X-VV-YYY	90
VRP30W-12	90

## Illustrations-

Ill.	Description	Model / Model series
1	Housing Layout	SLMPPPW-X.X-VV-YYY
2		VRP30W-12
3	Printed Wiring Board and Trace Layout	HX1
4		SLMPPPW-X.X-VV-YYY
5		VRP30W-12
6	Daughter Board 1 Layout	SLMPPPW-X.X-VV-YYY
7	Daughter Board 2 Layout	
8	Daughter Board 1 Layout	VRP30W-12
9	Daughter Board 2 Layout	
10	Daughter Board 3 Layout	
11	Transformer (T1) Specification	HX1
12		SLMPPPW-X.X-VV-YYY
13		VRP30W-12
14	Insulation Liner Layout	SLMPPPW-X.X-VV-YYY
15	Heat Sink (HS1) Layout	HX1
16	Heat Sink (HS2) Layout	

## Model HX1 - Fig. 1

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	Input Leads	AVLV2, CN	Various	Various	18 AWG min., rated 300 V, 105 C. (Not shown in figure)	
2	Output Connector (H7)	ECBT2, CN	JAPAN SOLDERLESS TERMINAL MFG CO LTD (E60389)	Series XA, SXAM-001T-P0.6	Rated min. 250 V, min. 2 A, 105 C. For min. 24 AWG wire.	
3	Printed Wiring Board	ZPMV2	Various	Various	Rated min. V-0, 130 C. Suitable for support of live parts.	(I)3
4	Fuse (F1)	JDYX, CN	Various	Various	Rated 2.5 A, 250 V, connected in series with ungrounded supply.	
		JDYX2, CN	CONQUER ELECTRONICS CO LTD (E82636)	MST		
5	Bridge Diode (D1)	-	Various	Various	Rated 600 V min., 4 A max.	
6	Varistor (MV1)	VZCA2, CN	Various	Various	SPD type 5. Minimum rated operating voltage 150 Vac min., 85 C min.	
7	X Capacitor (C6)	FOWX2, CN	Various	Various	Rated 450 V min., 100 C min., 0.22 $\mu$ F max. X1 or X2 type. Located across the line.	
8	Y Capacitor (C17)	FOWX2, CN	Various	Various	Rated 250 V min., 100 C min., 1000 pF max. Y1 type. Bridging Primary and Secondary.	
9	Opto-couplers (IC2, IC3, IC9)	FPQU2, CN	Various	Various	Rated 5000 V isolation voltage.	
10	MOSFET (Q4)	-	Various	Various	Rated 650 V min., 27 A max.	
11	MOSFET (Q8)	-	Various	Various	Rated 200 V min., 60 mA max.	
12	MOSFET (Q21)	-	Various	Various	Rated 30 V min., 20 mA max.	
13	IC (IC1)	-	Various	Various	Type MP44010HS-C537.	
14	IC (IC4)	-	Various	Various	Type AP4310.	
15	IC (IC5)	-	Various	Various	Type LM393D.	
16	IC (IC6)	-	Various	Various	Type AS321K.	
17	IC (IC8)	-	Various	Various	Type AS331K.	
18	Shunt Regulators (IC7, IC10)	-	Various	Various	Type AS431IANTR.	
19	Electrolytic Capacitor (C4)	-	Various	Various	Rated 450 V min., 105 C min., 4.7 $\mu$ F.	
20	Electrolytic Capacitor (C14)	-	Various	Various	Rated 25 V min., 105 C min., 330 $\mu$ F.	
21	Electrolytic Capacitors (C15, C38)	-	Various	Various	Rated 50 V min., 105 C min., 47 $\mu$ F.	

No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F)IG (I)LL
22	Electrolytic Capacitor (C16)	-	Various	Various	Rated 50 V min., 105 C min., 47 $\mu$ F.	
23	Electrolytic Capacitor (C19)	-	Various	Various	Rated 220 V min., 105 C min., 470 $\mu$ F.	
24	Diodes (D9, D10)	-	Various	Various	Rated 600 V min., 1 A min.	
25	Diode (D11)	-	Various	Various	Rated 400 V min., 1 A min.	
26	Diode (D12)	-	Various	Various	Rated 1000 V min., 8 A min.	
27	Zenor Diode (Z5)	-	Various	Various	Rated 300 V min., 600 W min.	
28	Resistor (R5)	-	Various	Various	Rated 1 M $\Omega$ min., 1/4 W min.	
29	Resistor (R13)				Rated 2 k $\Omega$ min., 2 W min.	
30	Resistor (R16)				Rated 0.12 $\Omega$ min., 3 W min.	
31	Resistor (R32)				Rated 10 k $\Omega$ min., 3 W min.	
32	Resistor (R33)				Rated 0.1 $\Omega$ min., 1 W min.	
33	Heat Sink (HS1)	-	Various	Various	Aluminum. Min. 2 mm thick. Screwed to D1 and Q4 by screws.	(I)15
34	Heat Sink (HS2)				Aluminum. Min. 2 mm thick. Screwed to D12 by screws.	(I)16

Winding devices - See below for details.

No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F)IG (I)LL	
1	Inductor (L1)	-	-	-	-		
1.1	Core	-	-	-	Ferrite. 14 mm OD by 8 mm ID by 4 mm Thickness.		
1.2	Coil (N1)	OBMW2	Various	Various	Enamel copper wire, 130 C min., 0.4 mm in diameter, 40 turns each.		
1.3	Coil (N2)						
1.4	Tape	OANZ2					
2	Inductor (L3)	-	-	-	-		
2.1	Core	-	-	-	Ferrite. 14 mm OD by 8 mm ID by 4 mm Thickness.		
2.2	Coil (N1)	OBMW2	Various	Various	Enamel copper wire, 130 C min., 0.4 mm in diameter, 40 turns.		
2.3	Coil (N2)	OBJT2					Triple insulation wire, 130 C min., 0.40 mm in diameter, 4 turns.
2.4	Tape	OANZ2					Fully wrapping up the body.
3	Inductor (L4)	-	-	-	-		
3.1	Core	-	-	-	Ferrite. 14 mm OD by 19 mm Height.		
3.2	Coil (N1)	OBMW2	Various	Various	Enamel copper wire, 130 C min., 0.55 mm in diameter, 128.5 turns each.		
4	Inductor (L6)	-	-	-	-		
4.1	Core	-	-	-	Ferrite. 10 mm OD by 5 mm ID by 5 mm Thickness.		
4.2	Coil (N1)	OBMW2	Various	Various	Enamel copper wire, 130 C min., 0.50 mm in diameter, 8 turns each.		
4.3	Coil (N2)						
5	Transformer (T1)	-	-	-	-	(I)11	
5.1	Electrical Insulation System	OBJY2	MAO HSIN ELECTRONIC CO LTD (E182305)	GH-130 (Table IV)	Class 130 (B).		
5.2	Core	-	-	-	Ferrite. Overall 34.5 mm Length by 34.0 mm Width by 31.0 mm Height.		
5.3	Bobbin	QMFZ2, CN	SUMITOMO BAKELITE CO LTD (E41429)	PM-9820	Phenolic. 0.65 mm thick min., rated V-0, 150 C min. For mechanical support only.		
5.4	Primary Windings	OBMW2	Various	Various	ANSI Type MW28.		
5.5	Secondary Windings	OBJT2	GREAT LEOFLON INDUSTRY CO LTD (E211989)	TRW(B)	Triple insulation wire. Rated 130 C, 1.41 kV peak for ITE.		
5.6	Insulating Tape	OANZ2	3M COMPANY ELECTRICAL MARKETS DIV (EMD) (E17385)	1350T-1	PET. Rated 130 C min., 0.05 mm per layer, 2 layers provided between windings.		
5.7	Primary Crossover Lead Insulation				2 layers of Insulating Tape (5.6).		
5.8	Bent-up Tape				2 layers of Insulating Tape (5.6), so as to provide min. 12.7 mm over surface spacing between Secondary Pin to Core.		
5.9	Varnish	OBOR2	JOHN C DOLPH CO (E317427)	BC-359	Rated 130 C min.		

## Model series SLMPPPW-X.X-VV-YYY - Fig. 2

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	-	Various	Various	Aluminum. Min. 1.30 mm thick. Four-part construction (including Housing Cover), secured together by screws.	(I)1
2	Housing Cover	QMFZ2, CN	SABIC JAPAN L L C (E207780)  SABIC INNOVATIVE PLASTICS US L L C (E121562)	945	PC, rated V-0, 120 C. Min. 1.8 mm thick.	
3	Input Leads	AVLV2, CN	Various	Various	18 AWG min., rated 300 V, 105 C.	
4	Output Leads				18 AWG min., rated 300 V, 105 C. Red-Black: 2 Leads, LED output Yellow-Blue: 2 Leads, Auxiliary output	
5	Dimming Leads				18 AWG min., rated 300 V, 105 C.	
6	Printed Wiring Board	ZPMV2	Various	Various	Rated min. V-0, 130 C. Suitable for support of live parts.	(I)4
7	Daughter Board 1					(I)6
8	Daughter Board 2					(I)7
9	Fuse (F1)	JDYX, CN	Various	Various	Rated 2.5 A, min. 250 V, connected in series with ungrounded supply.	
		JDYX2, CN	CONQUER ELECTRONICS CO LTD (E82636)	MST		
10	Varistor (MV1)	VZCA2, CN	Various	Various	SPD type 5. Minimum rated operating voltage 320 Vac min., 85 C min.	
11	X Capacitor (C6)	FOWX2, CN	Various	Various	Rated 450 V min., 100 C min., 0.22 $\mu$ F max. X1 or X2 type. Located across the line.	
12	Y Capacitor (C17)	FOWX2, CN	Various	Various	Rated 400 V min., 100 C min., 2200 pF max. Y1 type. Bridging Primary and Secondary.	
13	Opto-couplers (IC3, IC6, IC7)	FPQU2, CN	Various	Various	Rated 5000 V isolation voltage.	
14	MOSFET (Q4)	-	Various	Various	Rated 650 V min., 22.5 A max.	
15	Transistor (Q1, Q28)	-	Various	Various	Rated 30 V min., 50 mA max.	
16	Transistor (Q2)				Rated 600 V min., 1 A max.	
17	Transistors (Q3, Q7)				Rated 50 V min., 100 mA max.	
18	Transistors (Q5, Q6)				Rated 80 V min., 500 mA max.	



No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F)IG (I)LL
19	Transistors (Q8, Q27)	-	Various	Various	Rated 100 V min., 1 A max.	
20	Transistors (Q9, Q26, Q29, Q31, Q32)				Rated 60 V min., 115 mA max.	
21	Transistor (Q13)				Rated 80 V min., 1 A max.	
22	Transistors (Q14, Q17, Q30, Q34, Q35)				Rated 60 V min., 600 mA max.	
23	Transistor (Q15)				Rated 40 V min., 600 mA max.	
24	Transistor (Q16, Q19, Q33)				Rated 40 V min., 600 mA max.	
25	Transistor (Q20)				Rated 100 V min., 0.17 A max.	
26	Transistor (Q25)				Rated 20 V min., 3.6 A max.	
27	IC (IC1)	-	Various	Various	Type MP44010HS-C537.	
28	IC (IC2)				Type MP6902DS.	
29	IC (IC4)				Type AP4310.	
30	IC (IC11)				Type AS331K.	
31	IC (IC12)				Type LM358A.	
32	IC (IC13)				Type LM393D.	
33	IC (IC14)				Type AS321K.	
34	Shunt Regulators (IC9, IC10)	-	Various	Various	Type AS431I.	
35	Electrolytic Capacitor (C4)	-	Various	Various	Rated 450 V min., 105 C min., 4.7 $\mu$ F.	
36	Electrolytic Capacitor (C11)				Rated 450 V min., 105 C min., 0.47 $\mu$ F.	
37	Electrolytic Capacitors (C15, C38)				Rated 25 V min., 105 C min., 47 $\mu$ F.	
38	Electrolytic Capacitor (C16)				Rated 50 V min., 105 C min., 47 $\mu$ F.	
39	Electrolytic Capacitors (C19, C28, C31, C32, C42)				Rated 100 V min., 105 C min., 150 $\mu$ F.	
40	Diode (D4)	-	Various	Various	Rated 600 V min., 10 A min.	
41	Diodes (D9, D10, D19)				Rated 600 V min., 1 A min.	

No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F)IG (I)LL
42	Diode (D11)	-	Various	Various	Rated 400 V min., 1 A min.	
43	Diode (D12)				Rated 100 V min., 0.1 A min.	
44	Resistor (R13)	-	Various	Various	Rated 2 k $\Omega$ min., 2 W min.	
45	Resistors (R33, R34)				Rated 0.1 $\Omega$ min., 1 W min.	
46	Resistor (R32)				Rated 470 $\Omega$ min., 2 W min.	
47	Resistor (R75)				Rated 2.7 M $\Omega$ min., 0.1 W min.	
48	Resistors (R112, R136)				Rated 1 M $\Omega$ min., 1/4 W min.	
49	Resistor (R133)				Rated 0.3 $\Omega$ min, 2 W min.	
50	Resistor (R177)				Rated 5.1 k $\Omega$ min., 2 W min.	
51	Potting Compound	QMFZ2, CN	DONGUAN ZHAOSHUN SILICONE NEW MATERIAL TECHNOLOGY CO LTD (E329120)	ZS-GF series	Silicone. Rated V-0, 150 C. Fully covering the PCB and all components.	
52	Insulation Liner	QMFZ2, CN	DUPONT TEIJIN FILMS U S L P (E93687)	MYLAR A	PET. VTM-2, min. 0.18 mm thick.	(I)14

Winding devices - See below for details.

No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F)IG (I)LL
1	Inductors (L1, L3)	-	-	-	-	
1.1	Core	-	-	-	Ferrite. 14 mm OD by 8 mm ID by 4 mm Thickness.	
1.2	Coil (N1)	OBMW2	Various	Various	Enamel copper wire, 130 C min., 0.40 mm in diameter, 30 turns.	
1.3	Coil (N2)	OBJT2	Various	Various	Triple insulation wire, 130 C min., 0.40 mm in diameter, 30 turns.	
1.4	Insulating Tape	OANZ2	Various	Various	For L1 only. Fully wrapping up the inductor.	
2	Inductor (L4)	-	-	-	-	
2.1	Core	-	-	-	Ferrite. 14 mm OD by 19 mm Height.	
2.2	Coil (N1)	OBMW2	Various	Various	Enamel copper wire, 130 C min., 0.55 mm in diameter, 128.5 turns.	
2.3	Tape	OANZ2	Various	Various	Fully wrapping up the coil.	
3	Inductor (L6)	-	-	-	-	
3.1	Core	-	-	-	Ferrite. 10 mm OD by 5 mm ID by 5 mm Thickness.	
3.3	Coil (N1)	OBMW2	Various	Various	Enamel copper wire, 130 C min., 0.50 mm in diameter, 8 turns.	
3.4	Coil (N2)					
4	Transformer (T1)	-	-	-	-	
4.1	Electrical Insulation System	OBJY2	MAO HSIN ELECTRONIC CO LTD (E182305)	GH-130 (Table IV)	Class 130 (B). Fully wrapped by Insulating Tape (item 4.6), 2 layer, min. 31 mm wide, to separate from potting compound.	(I)12
4.2	Core	-	-	-	Ferrite. 34 mm Length by 32 mm Width by 31.5 mm Height.	
4.3	Bobbin	QMFZ2, CN	SUMITOMO BAKELITE CO LTD (E41429)	PM-9820	Phenolic. 0.65 mm thick min., rated V-0, 150 C min. For mechanical support only.	
4.4	Primary Windings	OBMW2	Various	Various	ANSI Type MW28.	
4.5	Secondary Windings	OBJT2	GREAT LEOFLON INDUSTRY CO LTD (E211989)	TRW(B)	Triple insulation wire. Rated 130 C, 1.41 kV peak for ITE.	
4.6	Insulating Tape	OANZ2	3M COMPANY ELECTRICAL MARKETS DIV (EMD) (E17385)	1350T-1	PET. Rated 130 C min., 0.05 mm per layer, 2 layers provided between windings.	
4.7	Primary Crossover Lead Insulation				2 layer of Insulating Tape (4.6).	
4.8	Bent-up Tape				2 layers of Insulating Tape (4.6), so as to provide min. 12.7 mm over surface spacing between Secondary Pin to Core.	
4.9	Varnish	OBOR2	JOHN C DOLPH CO (E317427)	BC-359	Rated 130 C min.	

## Model VRP30W-12 - Fig. 3

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	QMFZ2, CN	SABIC JAPAN L L C (E207780)	945	PC, rated V-0, 120 C. Min. 1.8 mm thick. Two-part construction secured together by clips.	(I)2
			SABIC INNOVATIVE PLASTICS US L L C (E121562)			
2	Input Leads	AVLV2, CN	Various	Various	18 AWG min., rated 300 V, 105 C.	
3	Output Leads				24 AWG min., rated 300 V, 105 C. With Bushing, QMFZ2/8, JIANGSU HONGDA NEW MATERIAL CO LTD (E231325), HD-8750, SIR, V-0, 150 C, min. 2.8 thick.	
4	Printed Wiring Board	ZPMV2	Various	Various	Rated V-0, 130 C. Suitable for support of live parts.	(I)5
5	Daughter Board 1					(I)8
6	Daughter Board 2					(I)9
7	Daughter Board 3					(I)10
8	Fuse (F1)	JDYX, CN	Various	Various	Rated 1 A, min. 300 V, connected in series with ungrounded supply.	
		JDYX2, CN	CONQUER ELECTRONICS CO LTD (E82636)	MST		
9	Fuse (F2)	JDYX, CN	Various	Various	Rated 6.3 A, min. 250 V.	
		JDYX2, CN	CONQUER ELECTRONICS CO LTD (E82636)	MST		
10	Varistor (MV1)	VZCA2, CN	Various	Various	SPD type 5. Minimum rated operating voltage 150 Vac min., 85 C min.	
11	Thermistor (RT1)	XGPU2	Various	Various	Rated 2.5 $\Omega$ , 5 A.	
12	X Capacitor (C1)	FOWX2, CN	Various	Various	Rated 305 V min., 100 C min., 0.1 $\mu$ F max. X2 type. Located across the line.	
13	Y Capacitor (C20)	FOWX2, CN	Various	Various	Rated 400 V min., 100 C min., 2200 pF max. Y1 type. Bridging Primary and Secondary.	
14	Capacitor (C38)	-	Various	Various	Rated 450 V min., 100 C min., 0.047 $\mu$ F max.	
15	Capacitor (C41)				Rated 450 V min., 100 C min., 0.15 $\mu$ F max.	
16	Opto-coupler (IC3)	FPQU2, CN	Various	Various	Rated 5000 V isolation voltage.	
17	MOSFET (Q1)	-	Various	Various	Rated 600 V min., 5 A max.	

No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F)IG (I)LL
18	Transistor (Q1)	-	Various	Various	Rated 650 V min., 5 A max.	
19	Transistors (Q2, Q3)				Rated 600 V min., 2.2 A max.	
20	Transistor (Q5)				Rated 40 V min., 600 mA max.	
21	Transistors (Q10, Q12, Q16)				Rated 40 V min., 600 mA max.	
22	Transistors (Q11, Q13, Q17)				Rated 60 V min., 600 mA max.	
23	Transistors (Q14, Q30, Q37)				Rated 60 V min., 115 mA max.	
24	IC (IC1)	-	Various	Various	Type SCY99092.	
25	IC (IC5)				Type AS331K.	
26	IC (IC6)				Type LM358ST or LM358DMR2G.	
27	IC (IC10)				Type AS321K.	
28	Shunt Regulators (IC4, IC7)	-	Various	Various	Type AS431I.	
29	Electrolytic Capacitors (C14, C15)	-	Various	Various	Rated 350 V min., 105 C min., 15 μF.	
30	Electrolytic Capacitor (C18)				Rated 50 V min., 105 C min., 22 μF.	
31	Electrolytic Capacitor (C21)				Rated 25 V min., 105 C min., 330 μF.	
32	Diodes (D11, D13, D53)	-	Various	Various	Rated 600 V min., 1 A min.	
33	Diode (D14)				Rated 100 V min., 15 A min.	
34	Diode (D50)				Rated 100 V min., 0.1 A min.	
35	Diode (D8)				Rated 600 V min., 2 A min.	
36	Resistor (R29)	-	Various	Various	Rated 0.1 Ω min., 1 W min.	
37	Resistor (R76)				Rated 10 kΩ min., 1 W min.	
38	Capacitor (C19)	-	Various	Various	Rated 400 V min., 0.047 μF max.	
39	Potting Compound	QMFZ2, CN	DONGUAN ZHAOSHUN SILICONE NEW MATERIAL TECHNOLOGY CO LTD (E329120)	ZS-GF series	Silicone. Rated V-0, 150 C. Fully employing the unit.	

Winding devices - See below for details.

No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F)IG (I)LL
1	Inductor (L1)	-	-	-	-	
1.1	Core	-	-	-	Ferrite. 14 mm OD by 8 mm ID by 4 mm Thickness.	
1.2	Coil (N1)	OBMW2	Various	Various	Enamel copper wire, 130 C min., 0.40 mm in diameter, 30 turns.	
1.3	Coil (N2)	OBJT2	Various	Various	Triple insulation wire, 130 C min., 0.40 mm in diameter, 30 turns.	
2	Inductor (L2)	-	-	-	-	
2.1	Core	-	-	-	Ferrite. Overall 22 mm Length by 18 mm Width by 19.4 mm Height.	
2.2	Bobbin	QMFZ2, CN	Various	Various	Phenolic. 0.71 mm thick min., rated V-0, 150 C min. For mechanical support only.	
2.3	Coil (N1, 6-3)	OBMW2	Various	Various	Enamel copper wire, 130 C min., 0.10 mm in diameter, 77.5 turns.	
2.4	Coil (N2, 5-1)				Enamel copper wire, 130 C min., 0.18 mm in diameter, 30 turns.	
2.5	Coil (N3, 3-A)				Enamel copper wire, 130 C min., 0.10 mm in diameter, 63 turns.	
2.6	Tape	OANZ2	Various	Various	Wrapping up the coil.	
3	Inductor (L3)	-	-	-	-	
3.1	Core	-	-	-	Ferrite. 15.24 mm OD by 8.53 mm Height by 5.94 mm thickness.	
3.2	Coil (N1)	OBMW2	Various	Various	Enamel copper wire, 130 C min., 0.29 mm in diameter, 226 turns.	
3.3	Insulating Tape	OANZ	Various	Various	Fully wrapping up the inductor.	
4	Inductor (L7)	-	-	-	-	(I)13
4.1	Core	-	-	-	Ferrite. 8 mm OD by 4 mm ID by 4 mm Thickness.	
4.3	Coil (N1)	OBMW2	Various	Various	Enamel copper wire, 130 C min., 0.40 mm in diameter, 8 turns.	
4.4	Coil (N2)					
5	Transformer (T1)	-	-	-	-	
5.1	Electrical Insulation System	OBJY2	MAO HSIN ELECTRONIC CO LTD (E182305)	GH-130 (Table IV)	Class 130 (B). Fully wrapped by Insulating Tape (item 5.6), 2 layer, min. 18.3 mm wide, to separate from potting compound.	
5.2	Core	-	-	-	Ferrite. 34 mm Length by 32 mm Width by 31.5 mm Height.	
5.3	Bobbin	QMFZ2, CN	SUMITOMO BAKELITE CO LTD (E41429)	PM-9820	Phenolic. 0.65 mm thick min., rated V-0, 150 C min. For mechanical support only.	
5.4	Primary Windings	OBMW2	Various	Various	ANSI Type MW28.	
5.5	Secondary Windings	OBJT2	GREAT LEOFLON INDUSTRY CO LTD (E211989)	TRW(B)	Triple insulation wire. Rated 130 C, 1.41 kV peak for ITE.	
5.6	Insulating Tape	OANZ2	3M COMPANY ELECTRICAL MARKETS DIV (EMD) (E17385)	1350T-1	PET. Rated 130 C min., 0.05 mm per layer, 2 layers provided between windings.	
5.7	Primary Crossover Lead Insulation				2 layer of Insulating Tape (6.7).	
5.8	Bent-up Tape				2 layers of Insulating Tape (6.7), so as to provide min. 12.7 mm over surface spacing between Secondary Pin to Core.	
5.9	Varnish	OBOR2	JOHN C DOLPH CO (E317427)	BC-359	Rated 130 C min.	

Table 1 - Winding details

Model HX1 - T1				
Winding	Location	Pin	Diameter, mm x strand	Number of Turns
N1	Primary	6-5	0.10 x 40 (LITZ)	18
N2	Primary	7-1	0.25 x 1	4
N3	Primary	1-4	0.25 x 1	4
N4	Secondary	14-10	0.10 x 40 (LITZ)	18
N5	Secondary	8-11	0.25 x 1	6
N6	Secondary	11-12	0.25 x 1	2
N7	Primary	3-2	0.10 x 40 (LITZ)	18
N8	Secondary	13-12	0.10 x 40 (LITZ)	18
Model series SLMPPPW-X.X-VV-YYY - T1				
Winding	Location	Pin	Diameter, mm x strand	Number of Turns
N1	Primary	3-6	0.10 x 4 (LITZ)	18
N2	Primary	1-5	0.25 x 1	4
N3	Primary	5-2	0.25 x 1	4
N4	Secondary	13-10	0.10 x 40 x 2 (LITZ)	9
N5	Secondary	9-7	0.30 x 1	4
N6	Secondary	7-11	0.30 x 1	2
N7	Secondary	8-13	0.25 x 1	3
N8	Primary	6-4	0.10 x 40 (LITZ)	18
N9	Secondary	12-11	0.10 x 40 x 2 (LITZ)	9
Model VRP30W-12 - T1				
Winding	Location	Pin	Diameter, mm x strand	Number of Turns
N1	Primary	1-2	0.21 x 1	224
N2	Primary	3-5	0.18 x 1	14
N3	Secondary	8-6	0.50 x 1	12
N4	Secondary	6-7	0.50 x 1	12
N5	Secondary	7-A	0.30 x 1	7