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REPORT

On

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

ENERGY RECOVERY PRODUCTS (ZHUHAI) CO LTD
GUANGDONG, CHINA

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DESCRIPTION

PRODUCT COVERED:

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

ELECTRICAL RATINGS:

Model No.	Input				Output		
	Frequency (Hz)	Voltage (V ac)	Max. Current (A)	Power Factor (PF)	Voltage (V dc)	Current (A)	Power (W)
*VLMXXXA-VV-YYYYY-ZZZZZ (@)	50/60	120-277	1.05	≥0.9	12-58	1.65-8	24-96
		220-240					
VLBXXXA-VV-YYYYY-ZZZZZ (#)	50/60	120-277	2.8	≥0.9	12-48	5.4-21.67	65-260
		220-240					

For both model series VLMXXXA-VV-YYYYY-ZZZZZ and VLBXXXA-VV-YYYYY-ZZZZZ,

"A" represents the input voltage, and can be "W" or "E", representing input voltage 120-277 V and 220-240V respectively.

"VV" represents the output voltage, in increments of 1 from 12 to 58, while "YYYYY" and "ZZZZZ" can be any alpha-numeric character or blank and are for marketing purpose only.

@: "XXX" represents output power, can be "024" to "095", in increments of 1 from 24 W to 95 W; can be "100" represents 96W.

#: "XXX" represents total output power. "XXX" can be "065" to "260", in increments of 1 from 65 W to 260 W.

For any specific models, the maximum output current rating= output power/output voltage.

ELECTRICAL RATINGS: CON'T

See table below for electrical rating of typical margin models.

Model No.	Input				Output		
	Frequency (Hz)	Voltage (V ac)	Current (A)	Power Factor (PF)	Voltage (V dc)	Current (A)	Power (W)
VLM024W-12	50/60	120-277	1.05	≥0.9	12	2	24
VLM024W-48	50/60	120-277	1.05	≥0.9	48	0.5	24
VLM100W-12	50/60	120-277	1.05	≥0.9	12	8	96
VLM100W-48	50/60	120-277	1.05	≥0.9	48	2	96
VLM100W-58	50/60	120-277	1.05	≥0.9	58	1.65	96
VLB065W-12	50/60	120-277	2.8	≥0.9	12	5.4	65
VLB065W-48	50/60	120-277	2.8	≥0.9	48	1.35	65
VLB260W-12	50/60	120-277	2.8	≥0.9	12	21.67	260
VLB260W-48	50/60	120-277	2.8	≥0.9	48	5.4	260

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.

For model series VLMXXXA-VV-YYYYY-ZZZZZ (Output Voltage: 21-48V; Output voltage: 12-20V with maximum 5A rated output current),

The output has been evaluated as Class 2, Clause 7.12.1

For model series VLMXXXA-VV-YYYYY-ZZZZZ (Output Voltage: 12-20V with rated output current greater than 5A),

The output has been evaluated as Low voltage Limited energy, Section 8.14

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

For Model series VLMXXXA-VV-YYYYY-ZZZZZ (Output voltage: 21-48V; Output voltage: 12-20V with maximum 5A rated output current),

The output has been evaluated as LED Class 2, Annex A.

TECHNICAL CONSIDERATIONS (NOT FOR FIELD REPRESENTATIVE'S USE): (CONT'D)

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.

DIFFERENCES BETWEEN MODELS:

Table I. Model difference of **4** models in the VLM100W Series.

Component/Model Series Name	VLM100W-12-YYYYY- ZZZZZ	VLM100W-24-YYYYY-ZZZZZ
Rating of components		
L3	580uH	580uH
C35	820 uF, 16 V, 105 °C	120uF, 35V, 105 °C
Q10 , Q11	3.23 A, 30V	60V, 20A
R15 , R16	1.2 Ω, 0.5 W	1.54Ω, 0.5 W
R54	1.5 KΩ, 0.125 W	6.8KΩ, 0.125W
R57	26 KΩ, 0.0625 W	12.1KΩ, 0.0625W
R49 , R52	10 KΩ, 0.1 W	N/A
R47, R50, R51	10 Ω, 0.1 W	N/A
C44	0.1uF, 16V, 105 °C	N/A
D13	30V, 0.2A	N/A
IC5	IC, SO8	N/A
R44	604 Ω, 0.1 W	N/A
R48	49.9 KΩ, 0.0625 W	N/A
C32	0.1uF, 16V, 105 °C	N/A
Z5	4.7V, 0.5W	N/A
R29	6.1 KΩ, 0.0625W	N/A
D3, D4	N/A	N/A

Table I (Cont'd):

Component/Model Series Name	VLM100W-48-YYYYY- ZZZZZ	VLM100W-58-YYYYY-ZZZZZ
Rating of components		
L3	N/A	N/A
C35	56uF, 63V, 105 °C	68uF, 80V, 105 °C
Q10 , Q11	N/A	N/A
R15 , R16	N/A	N/A
R54	49.9KΩ, 0.125W	49.9KΩ, 0.125W
R56	86.6KΩ, 0.125W	100KΩ, 0.125W
R57	5.62KΩ, 0.0625W	4.02KΩ, 0.0625W
R49 , R52	N/A	N/A
R47, R50, R51	N/A	N/A
C44	N/A	N/A
D13	N/A	N/A
IC5	N/A	N/A
R44	2.37KΩ, 0.5 W	2.37KΩ, 0.5 W
R48	N/A	N/A
C32	N/A	N/A
Z5	4.7V, 0.5W	4.7V, 0.5W
R29	6.49 KΩ, 0.0625 W	6.49 KΩ, 0.0625 W
D3, D4	170V, 8A	170V, 8A

Table II. Model difference of 3 models in the VLB260W Series.

Component/Model Series Name	VLB260-12- YYYYY-ZZZZZ	VLB260-24-YYYYY- ZZZZZ	VLB260-48-YYYYY-ZZZZZ
Rating of components			
L1	43.6 mH	32.2 mH	32.2 mH
L4	12.15 uH	41.4 uH	41.4 uH
L5	12.15 uH	41.4 uH	41.4 uH
C36	1800uF,16V,105C	680uF,35V,105 C	330uF, 63V, 105 C
C37	1800uF,16V,105C	680uF,35V,105 C	330uF, 63V, 105 C
C45	1800uF,16V,105C	680uF,35V,105 C	330uF, 63V, 105 C
C68	1800uF,16V,105C	680uF,35V,105 C	330uF, 63V, 105 C
C40	0.01uF,50V, 105C	0.01uF,50V, 105C	N/A
C31	1000pF,50V, 105C	1000pF,50V, 105C	N/A
Q8	140A,60V	107A,100V	N/A
Q10	140A,60V	107A,100V	N/A
D2	30 V,0.2A	30 V,0.2A	N/A
D30	100 V,0.15 A	100 V,0.15 A	N/A
D31	100V,0.15 A	100V,0.15 A	N/A
R125	24.3 K Ω ,0.125 W	64.9 K Ω ,0.125 W	147 K Ω ,0.125W
R22	15.4 K Ω ,0.1 W	17.4 K Ω ,0.1 W	13 K Ω ,0.1 W
R36	48.7K Ω ,0.1 W	49.9K Ω ,0.1 W	49.9K Ω ,0.1 W
R39	13.7 Ω ,0.1 W	17.4K,1%,0.1 W	15.4K Ω ,0.1 W
R50	1.5K Ω ,0.25 W	30K Ω ,0.25W	30K Ω ,0.25W
R83	1.5K Ω ,0.25 W	1.5K Ω ,0.25W	30K Ω ,0.25W
R86	1.5K Ω ,0.25 W	1.5K Ω ,0.25W	30K Ω ,0.25W
R87	1.5 Ω ,0.25 W	1.5K Ω ,0.25W	30K Ω ,0.25W
C26	220pF,1KV, 105C	N/A	N/A
D4	N/A	N/A	120V,30A
D5	N/A	N/A	120V,30A
R144	N/A	N/A	7.5K Ω ,0.1 W
HS2	N/A	N/A	HEATSINK,SECONDARY,D4-D5

These products been evaluated for the following characteristics.

Model No.	Input type	Output type [] CC [X] CV	Rated for	Type HL (c)	Type TL (d)	Class P (e)
VLMXXXA-VV-YYYYY-ZZZZZ (Output Voltage: 21-48 V; 12-20V with rated output current≤5A)	Branch Circuit (Mains)	UL: Isolated, Class 2 (a), CUL:LED Class 2 (b2)	Damp	No	No	Yes
VLMXXXA-VV-YYYYY-ZZZZZ (12-20V with rated output current>5A)		UL: Isolated, LVLE CUL: Isolated				
VLBXXXA-VV-YYYYY-ZZZZZ		Isolated				
VLMXXXA-VV-YYYYY-ZZZZZ with suffix "VV" = '49' to '58'		Isolated				

a- As defined in UL 8750, Clause 7.12.1

b1- As defined in UL 8750, Section 8.14

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

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

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

e- Evaluated per UL 8750 requirements for Class P LED drivers

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.

Date code Consist of: MMY, where YY represents the year and MM represents the month.

For example, 0817 represents August 2017.

Product markings-

1. Listed company name or File number
2. Model designation
3. Factory ID, when more than one factory
4. Date Code
5. Class P- see product characteristics table
6. Electrical Ratings- see electrical ratings table
7. Output Type- see product characteristics table.
8. Environmental considerations- see product characteristics table
9. Polarity of the Input and Output Connections
10. Maximum ambient temperature (T_{ma}):
FOR VLBXXXXA-VV-YYYYY-ZZZZZ MODEL SERIES: 55 °C
FOR VLM100A-VV-YYYYY-ZZZZZ MODEL SERIES: 54 °C
11. Temperature Measurement Point (T_c) declared by manufacture: 90 °C
12. Class P LED drivers- "For Connections Use Wire Rated for at Least 90°C (194°F)" or equivalent.
13. "DOUBLE INSULATION", "DOUBLE INSULATED" or symbol:  (Optional)
14. "CASE MUST BE GROUNDED"
15. For Model Series VLB260W-VV-YYYYY-ZZZZZ only, "Bond all conductors in the same polarity before power connection", except when all conductors in the same polarity are soldered together in the factory
16. **Device marked 'Use only within an enclosure'.**

Model VLM100W-48 - FIG. 1-2 (External and Internal view), FIG. 3 (PCB Layout - Top), FIG. 4 (PCB Layout - Bottom) , FIG. 9-12 (alternate housing)

General - The general design, shape and arrangement shall be as illustrated except where variations are specifically described. Also represents model series VLMXXXW-VV-YYYYY-ZZZZZ except as specified.

No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F)IG (I)LL
1	Housing	-	Various	Various	Extruded aluminum, 0.75 mm thick min. Four-part construction, top, bottom and two sides, secured together by screws. Two mounting tabs are on two sides. See Ill. 1 for dimension details. (unit in mm)	I1
1.1	Alternate housing	-	-	-	Aluminum, 1.0 mm thick min. Consists of two end plates secured to top cover and base assembly by screws. Provided with two M4 mounting screws on top cover, spaced 52 mm apart. Two mounting tabs are on top side. Also, provided with two openings on top cover for lead wire exit, each measuring Ø7.0 mm See Ill. 1, I25-I27 for dimension details. (unit in mm)	I1, I25- I27
1.2	Alternate housing	-	Various	Various	Aluminum, 0.75 mm thick min. Two-part construction, secured together by snap fit indents on top cover. See Ill. 31, 32 for dimension details. (unit in mm)	F9 F10 F11 I31, I32
1.3	Alternate housing	-	Various	Various	Aluminum, 0.6 mm thick min. Consists of two part construction, secured together by snap fit indents on top cover. Provided with two #8-32 mounting screws on top cover, spaced 50.8 mm apart (from center to center). Provided with two openings for lead wire exit, each measuring Ø7.0 mm See Ill. 33 for dimension details. (unit in mm)	F12 I33
*						

No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F) IG (I) LL
2	Input Lead Wire	AVLV2, CN	Various	Various	Min. 18 AWG, rated min. 300 V, style 10552, min. 150 C, min. 152 mm long. Neutral is white in color.	
3	Output Lead Wire	AVLV2, CN	Various	Various	For Non-Class 2 models only: Min. 18 AWG, rated 300 V, style 10552, 150 C, min. 152 mm long. For Class 2 models: Min. 18 AWG, rated 300 V, 105 C, min. 152 mm long.	
4	Bushing for Input/Output Lead Wires For item 1 or 1.2	QMFZ2, CN	Various	Various	For Housing item 1, 1.2 only Silicone Rubber, rated 85°C, suitable for two conductors. 1.2 mm thick minimum, See Ill. 2 for dimension details. Secured to housing by physical fit.	I2
4.1	Alternate Bushing for Input/Output Lead Wires For item 1.1 or 1.3	-	-	-	Same as above except shaped as shown. See Ill. 30 for dimension details.	I30
*5	Insulation Sheet For item 1 or 1.2	QMFZ2, CN	Various	Various	PET film. Min. 0.18 mm thick. Rated 110 C and VTM-2, provided as insulation between PWB assembly and metal enclosure (top and bottom). See Ill.3 for detailed dimension. Potting was provided between PWB sharp solder side and the sheet for mechanical protection.	I3
5.1	Alternate Insulation Sheet For item 1.1 or 1.3	QMFZ2, CN	Various	Various	Same as above except for dimensions. See ILL. 28 for details.	I28
6	Insulating Tape	QMFZ2, CN	3M COMPANY ELECTRICAL MARKETS DIV (EMD) (E17385)	1350T-1 (b)	Polyethylene terephthalate film tape, 0.05 mm thick. Wrapped completely over the Insulation Sheet (Item 6).	

(CONT'D - General)

No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F) IG (I) LL
For Main Board						
*8	Printed Wiring Board	ZPMV2, CN	Various	Various	Rated min. V-1, 130 C. Suitable for support of live parts. See Ill.4 for PCB and trace layout.	I4
9	Fuse (F1)	JDYX2, CN	CONQUER ELECTRONICS CO LTD (E82636)	MST	Rated 300 V, 1.6 A, connected in series with ungrounded supply.	
-	(Alternate)	JDYX, CN	Various	Various	Same as the above.	
10	Potting Compound	QMFZ2, CN	DONGGUAN ZHAOSHUN SILICONE NEW MATERIAL TECHNOLOGY CO LTD (E329120)	ZS-GF Series	Silicone (SI) , Rated V-0, and 150 °C. Fully covered all components inside enclosure, including the solder side.	
*10 .1	Alternate Potting Compound	QMFZ2	Shenzhen City Jia Di New Materials Co., Ltd. (E485392)	JD-505	Silicone Rubber (SIR). Fills the case so to completely cover all electrical components and the circuit board. RTI 150 C. White or Black in color.	
11	Y-Capacitor (C29)	FOWX2, CN	Various	Various	Class Y2. Rated 5 kV, 1000pF, 125 °C.	
12	Optical Isolator (IC4)	FPQU2, CN	LITE-ON TECHNOLOGY CORP (E113898)	LTV-217	Rated 50 mA, 3750 Vac isolation voltage, and 115 °C max operating temperature.	
13	Bridge Rectifier (D1)	-	Various	Various	Rated 1000 V, 1.5 A.	
14	X Capacitor (C1, C5)	FOWX2, CN	Various	Various	Class X2. Rated 305 V min., 0.1 uF max, and 110 °C min. Located across the line.	
15	Varistor (MV1)	-	Various	Various	SPD Type 5. Rated min. operating voltage 320 V ac, and min. 105 °C.	
16	PTC (RT2)	XGPU2, CN	Various	Various	Rated 4.7 KΩ at 25 °C, 110 °C min.	
17	NTC (RT3)	XGPU2, CN	Various	Various	Rated 10 Ω, 3A at 25 °C, 110 °C min.	
18	Transistor (Q1)	-	Various	Various	Rated min. 600 V, 0.3 A.	
*						

(CONT'D - General)

No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F) IG (I) LL
For Main Board						
19	E-Capacitor (C9)	FOWX2, CN	Various	Various	Rated 15 μ F max., 450 V min. and 105 °C min.	
20	E-Capacitor (C35)	FOWX2, CN	Various	Various	Rated 82 μ F max., 63 V min. and 105 °C min. Wrapped the body with insulating tape (Item 6).	
21	MOSFET (Q10,Q11)	-	Various	Various	Rated min 20 - 23 A, 30 - 60 V. See Table I for detailed model difference.	
22	Resistor (R54, R57, R31, R24, R29, R32)	-	Various	Various	Rated total resistance 0.489 K Ω - 0.536 K Ω . See Table I for detailed model difference.	
23	MOSFET (Q3)	-	Various	Various	Rated min. 650 V, 6.5 A.	
24	MOSFET (Q6, Q7)	-	Various	Various	Rated min. 600 V, 5 A.	
For Daughter Board						
25	Transistor (Q5)	-	Various	Various	Rated min. 80 V, 500 mA.	
26	Printed Wiring Board	ZPMV2, CN	Various	Various	Rated min. V-1, 130 °C. Suitable for support of live parts. See Ill.5 for PCB and trace layout.	I5
27	IC (IC3)	-	Various	S016	Consists of 16 pins.	

For Model Series VLMXXXW-VV-YYYYY-ZZZZZ,

For Other Components, see Table I for rating in different models.

Winding devices - See below for details.

No.	Item	CCN	Manufacturer (File Number)	Part Number	Rating	(F) IG (I) LL
1	Line Filter (L1)	-	-	-	See Ill. 6 for details.	I6
1.1	Core	-	Various	Various	Ferrite.	
1.2	Coil (N1, N2)	OBMW2	Various	Various	Enamel copper wire, 130 °C min. N1, N2: 0.40 mm wire diameter X 60 turns X 1P	
1.3	Insulating Tape	QMFZ2, CN	Various	Various	Polyethylene terephthalate film tape, 0.05 mm thick. Wrapped completely over line filter, one layer thick.	
2	Line Filter (L2)	-	-	-	See Ill. 7 for details.	I7
2.1	Core	-	Various	Various	Ferrite.	
2.2	Coil (N1, N2)	OBMW2	Various	Various	Enamel copper wire, 130 °C min. N1, N2: 0.32 mm wire diameter X 150 turns X 1P	
2.3	Insulating Tape	QMFZ2, CN	Various	Various	Polyethylene terephthalate film tape, 0.05 mm thick. Wrapped completely over line filter.	
3	Line Filter (L3)	-	-	-	See Ill. 8 for details, and see Table I for model difference.	I8
3.1	Core	-	Various	Various	Ferrite.	
3.2	Coil (N1, N2)	OBMW2	Various	Various	Enamel copper wire, 130 °C min. N1: 0.1 mm wire diameter X 85 turns X 1 P N2: 0.15 mm wire diameter X 10 turns X 1 P	
3.3	Insulating Tape	QMFZ2, CN	Various	Various	Polyethylene terephthalate film tape, 0.05 mm thick per layer, 2 layers provided.	
3.4	Bobbin	QMFZ2, CN	Various	Various	0.75 mm thick min., rated V-0, 130 C, two-flange type.	
4	Line Filter (L4)	-	-	-	Refer to Ill. 9 for details.	I9
4.1	Core	-	Various	Various	Ferrite.	
4.3	Coil (N1)	OBMW2	Various	Various	Enamel copper wire, 130 °C min. N1: 0.4 mm wire diameter X 8 turns X 1 P	
4.4	Coil (N2)	OBMW2	Various	Various	Insulated triple wire, 130 °C min. N2: 0.4 mm wire diameter X 8 turns X 1 P	

5	Line Filter (L7)	-	-	-	Refer to Ill. 10 for details.	I10
5.1	Core	-	Various	Various	Ferrite.	
5.3	Coil (N1, N2)	OBMW2	Various	Various	Enamel copper wire, 130 °C min. N1, N2: 0.5 mm wire diameter X 8 turns X 1 P	

Winding devices - See below for details.

No.	Item	CCN	Manufacturer (File Number)	Part Number	Rating	(F) IG (I) LL
6	Transformer (T1)	-	-	-	Refer to I11. 11 for details. Manufactured by MAO HSIN ELECTRONIC CO LTD (E182305)	I11
-	Electrical insulation system (EIS)	OBJY2	MAO HSIN ELECTRONIC CO LTD (E182305)	GH-130	Rated 130°C (Class B).	
6.1	Core	-	Various	Various	Ferrite, 22.4 by 11.58 by 32.8 mm overall. Fully wrapped by 1 layer of Tape (Item 6.5) to maintain minimum 25.4 mm spacing between Core and secondary components.	
6.2	Bobbin	QMFZ2	SUMITOMO BAKELITE CO LTD (E41429)	SUMIKON PM- 9820	Phenolic, 0.71 mm thick minimum, rated V-0, 150 C.	
6.3	Primary Secondary Winding (N1, N2)	OBMW2	Various	Various	ANSI Type MW 28/75/79/80/82/83. Enamel copper wire, 130 °C min. N1: 0.3 mm wire diameter X 35 turns X 1 P N2: 0.12 mm wire diameter X 4 turns X 1 P	
6.4	Secondary Winding (N3A, N3B, N4)	OBMW2	Various	Various	ANSI Type MW 28, rated 130°C min, wrapped with insulating tape (Item 4.5). N3A: 0.1 mm wire diameter X 2 turns X 1 P N3B: 0.1 mm wire diameter X 2 turns X 1 P N4: 0.12 mm wire diameter X 4 turns X 1 P	
6.5	Tape	OANZ2	3M COMPANY ELECTRICAL MARKETS DIV (EMD) (E17385)	1350T-1 (b)	PET tape, 0.05 mm thick per layer, 2 layers provided. Min. 0.8 mm bent-up tape is provided between primary and secondary windings.	
6.6	Primary Crossover Lead Insulation	OANZ2	3M COMPANY ELECTRICAL MARKETS DIV (EMD) (E17385)	1350T-1 (b)	Same as the above. 2 layers provided.	
6.7	Varnish	OBOR2	JOHN C DOLPH CO (E317427)	BC-370	Rated 130°C.	
6.8	Bent Up Tape	OANZ2	3M COMPANY ELECTRICAL MARKETS DIV (EMD) (E17385)	1350T-1 (b)	PET tape, 0.05 mm thick per layer. 2 layers provided.	

Model VLB260W-12 - FIG. 5-6 (External and Internal view), FIG. 7 (PCB Layout - Top), FIG. 8 (PCB Layout - Bottom)

General - The general design, shape and arrangement shall be as illustrated except where variations are specifically described. Also represents model series VLB260W-VV-YYYYY-ZZZZZ except as specified.

No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F) IG (I) LL
1	Housing	-	Various	Various	Extruded aluminum, 0.75 mm thick min. Four-part construction, top, bottom and two sides, secured together by screws. Two mounting tabs are on two sides. See Ill. 12 for dimension details. (unit in mm)	I12
2	Input Lead Wire	AVLV2, CN	Various	Various	Min. 18 AWG, style 10552, rated min. 300 V, min. 150 C, min. 152 mm long.	
3	Output Lead Wire	AVLV2, CN	Various	Various	See Ill.13 for detailed number of output lead wire. Conductors with same polarity are bonded together by soldering as Ill. 24, or otherwise guidance is provided in Product Marking. Min. 18 AWG, rated 300 V, style 10552, 150 C, min. 152 mm long.	I13, I24
4	Bushing for Input Lead Wires	QMFZ2, CN	Various	Various	Silicone Rubber, rated 85°C, suitable for two conductors. See Ill. 14 for dimension details.	I14
5	Bushing for Output Lead Wires	QMFZ2, CN	Various	Various	Same as the above, except for dimension. See Ill. 15 for details.	I15
6	Insulation Sheet	QMFZ2, CN	Various	Various	PET film. Min. 0.18 mm thick. Rated 105 C and VTM-2, provided as insulation between PWB assembly and metal enclosure (top and bottom). See Ill.16 for detailed dimension. Potting was provided between PWB sharp solder side and the sheet for mechanical protection.	I16
7	Insulating Tape	QMFZ2, CN	3M COMPANY ELECTRICAL MARKETS DIV (EMD) (E17385)	1350T-1 (b)	Polyethylene terephthalate film tape, 0.05 mm thick. Wrapped completely over the Insulation Sheet (Item 6).	
8	Printed Wiring Board	ZPMV2, CN	Various	Various	Rated min. V-1, 130 C. Suitable for support of live parts. See Ill.17 for PCB and trace layout.	I17

(CONT'D - General)

No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F) IG (I) LL
9	Fuse (F1)	JDYX2, CN	COOPER BUSSMANN LLC (E19180)	SS-5H	Rated 300 V, 4 A, connected in series with ungrounded supply.	
-	(Alternate)	JDYX, CN	Various	Various	Same as the above.	
10	Potting Compound	QMFZ2, CN	DONGGUAN ZHAOSHUN SILICONE NEW MATERIAL TECHNOLOGY CO LTD (E329120)	ZS-GF Series	Silicone, Rated V-0, and 150 °C. Fully covered all components inside enclosure, including the solder side.	
13	Bridge Rectifier (D1)	-	Various	Various	Rated 800 V, 8 A.	
14	X-Capacitor (C1)	FOWX2, CN	Various	Various	Class X2. Rated 310 V min., 0.33 uF max, and 110 °C min. Located across the line.	
15	Varistor (MV1)	-	Various	Various	SPD Type 5. Rated min. operating voltage 320 V ac, and min. 105 °C.	
16	Varistor (MV2, MV3)	-	Various	Various	SPD Type 5. Rated min. operating voltage 320 V ac, and min. 105 °C.	
17	Transistor (Q1)	-	Various	Various	Rated min. 600 V, 0.4 A.	
18	NTC (RT5)	XGPU2, CN	Various	Various	Rated 10 Ω, 3A at 25 °C, 130 °C min.	
19	Heat Sink (HS1)	-	Various	Various	Aluminum, min. 1.88 mm thick. Secured by soldering. See Ill. 18 for detailed dimension.	I18
20	E-Capacitor (C10)	FOWX2, CN	Various	Various	Rated 180 µF max., 250 V min. and 105 °C min.	
21	E-Capacitor (C37, C36, C45, C68)	FOWX2, CN	Various	Various	Rated 1800 µF max., 16 V min. and 105 °C min.	
22	MOSFET (Q9, Q10)	-	Various	Various	Rated max. 107 A, 100 V. See Table II for detailed model difference.	
23	Resistor (R125, R22, R36, R36, R39, R50, R83, R86, R87, R144)	-	Various	Various	See Table II for detailed model difference.	
24	MOSFET (Q2)	-	Various	Various	Rated min. 650 V, 33 A. Secured on Heat Sink (HS1) by screw.	

(CONT'D - General)

No.	Item	CCN	Manufacturer (File Number)	Part/Model Number	Description / Technical Data	(F) IG (I) LL
25	Diode (D3)	-	Various	Various	Rated min. 1000 V, 8 A. Secured on Heat Sink (HS1) by screw.	
26	Transistor (Q4)	-	Various	Various	Rated min. 80 V, 500 mA.	
27	Thermal Pad (under Q6)	QMFZ2	Various	Various	<p>Silicone Rubber. 3 provided, applied on top of Transformer L2, under PWB (near MOSFET Q6), and under PWB (near MOSFET Q7 and Q9), inside the housing, respectively.</p> <p>For the one applied on the top of Transformer L2, with overall dimension 14.6 mm X 14.6 mm X 5.6 mm thick.</p> <p>For the one applied under PWB (near MOSFET Q6), with overall dimension 16.0 mm X 31 mm X 1.5 mm thick.</p> <p>For the one applied under PWB (near MOSFET Q7 and Q9), with overall dimension 13.0 mm X 22.2 mm X 1.5 mm thick.</p>	
28	E-Capacitor (C60)	-	Various	Various	Rated 10 μ F max., 50 V min. and 105 °C min.	
29	E-Capacitor (C13)	-	Various	Various	Rated 680 μ F max., 35 V min. and 105 °C min.	
30	E-Capacitor (C6)	-	Various	Various	Rated 100 μ F max., 25 V min. and 105 °C min.	
31	IC (IC1)	-	Various	S08	Consists of 8 pins.	
32	IC (IC2)	-	Various	S016	Consists of 16 pins.	
33	IC (IC18)	-	Various	S08	Consists of 8 pins.	
34	MOSFET (Q5, Q6)	-	Various	Various	Rated min 15 A, 650 V.	
35	Heat Sink (HS2)	-	Various	Various	<p>Aluminum, min. 1.88 mm thick. Secured by soldering. See Ill. 19 for detailed dimension.</p> <p>Absent in model VLB260W-12, see Table II for model difference.</p>	I19

For Model Series VLBXXXW-VV-YYYYY-ZZZZZ,

For Other Components, see Table II for rating in different models.

Winding devices - See below for details.

No.	Item	CCN	Manufacturer (File Number)	Part Number	Rating	(F) IG (I) LL
1	Line Filter (L1)	-	-	-	See Ill. 20 for details and Table II for model difference.	I20
1.1	Core	-	Various	Various	Ferrite.	
1.2	Coil (N1, N2)	OBMW2	Various	Various	Enamel copper wire, 130 °C min. N1, N2: 0.55 mm wire diameter X 70 turns X 1 P	
1.3	Barrier	ZPMV2, CN	Various	Various	0.55 mm thick min., rated V-0, 130 °C min.	
2	Line Filter (L2)	-	-	-	See Ill. 21 for details.	I21
2.1	Core	-	Various	Various	Ferrite.	
2.2	Coil (N1, N2, N3)	OBMW2	Various	Various	Enamel copper wire, 130 °C min. N1: 0.1 mm wire diameter X 40 turns X 1 P N2: 0.18 mm wire diameter X 13 turns X 1 P N3: 0.1 mm wire diameter X 28 turns X 1 P	
2.3	Insulating Tape	QMFZ2, CN	Various	Various	Polyethylene terephthalate film tape, 0.05 mm thick per layer, 2 layers provided.	
2.4	Bobbin	QMFZ2, CN	Various	Various	0.75 mm thick min., rated V-0, 130 C, two-flange type.	
3	Line Filter (L4, L5)	-	-	-	Refer to Ill. 22 for details and Table II for model difference.	I22
3.1	Core	-	Various	Various	Ferrite.	
3.3	Coil (N1)	OBMW2	Various	Various	Enamel copper wire, 130 °C min. N1: 0.6 mm wire diameter X 6 turns X 1 P	
3.4	Coil (N2)	OBMW2	Various	Various	Insulated triple wire, 130 °C min. N2: 0.6 mm wire diameter X 6 turns X 1 P	

Winding devices - See below for details.

No.	Item	CCN	Manufacturer (File Number)	Part Number	Rating	(F) IG (I) LL
4	Transformer (T1)	-	-	-	Refer to Ill. 23 for details. Manufactured by MAO HSIN ELECTRONIC CO LTD (E182305)	I23
-	Electrical insulation system (EIS)	OBJY2	MAO HSIN ELECTRONIC CO LTD (E182305)	GH-130	Rated 130°C (Class B).	
4.1	Core	-	Various	Various	Ferrite, 30.25 by 30.44 by 30.03 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)	SUMIKON PM- 9820	Phenolic, 0.71 mm thick minimum, rated V-0, 150 C.	
4.3	Primary Secondary Winding (N1, N2)	OBMW2	Various	Various	ANSI Type MW 28/75/79/80/82/83. Enamel copper wire, 130 °C min. N1: 0.45 mm wire diameter X 52 turns X 2 P N2: 0.2 mm wire diameter X 5 turns X 1 P	
4.4	Secondary Winding (N3, N4, N5)	OBMW2	Various	Various	ANSI Type MW 28, rated 130°C min, wrapped with insulating tape (Item 4.5). N3: 0.1 mm wire diameter X 3 turns X 1 P N4: 0.1 mm wire diameter X 3 turns X 1 P N5: 0.23 mm wire diameter X 4 turns X 1 P	
4.5	Tape	OANZ2	3M COMPANY ELECTRICAL MARKETS DIV (EMD) (E17385)	1350T-1 (b)	PET tape, 0.05 mm thick per layer, 2 layers provided. Min. 0.8 mm bent-up tape is provided between primary and secondary windings.	
4.6	Primary Crossover Lead Insulation	OANZ2	3M COMPANY ELECTRICAL MARKETS DIV (EMD) (E17385)	1350T-1 (b)	Same as the above. 2 layers provided.	
4.7	Varnish	OBOR2	JOHN C DOLPH CO (E317427)	BC-370	Rated 130°C.	
4.8	Bent Up Tape	OANZ2	3M COMPANY ELECTRICAL MARKETS DIV (EMD) (E17385)	1350T-1 (b)	PET tape, 0.05 mm thick per layer. 2 layers provided.	