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REPORT

On

DIRECT-PLUG-IN AND CORD-CONNECTED CLASS 2 POWER UNITS

CHANGZHOU POSITIVE ENERGY ELECTRICAL EQUIPMENT CO., LTD.

ROOM 402, BUILDING 1, NO.12-2.MEIHUA ROAD

CHANGZHOU JIANGSU 213012 CHINA

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PRODUCT COVERED:

USL, CNL - Direct Plug-in type Class 2 Power Supplies, indoor use, Models ZNL-UXXXXYYY series, where "XXX" is 3 digits from 120 to 360 which represents the rated output voltage after divided by 10. (e.g.: 150 = 15.0 V dc, 300 = 30.0 V dc); "YYY" is 3 digits from 010 to 246 which represents the rated output current after divided by 100. (e.g.: 030 = 0.3 A, 100 = 1.0 A). Max output power is 59W.

GENERAL:

These units covered by this Report are direct plug-in type Class 2 Power Supplies.

Each unit consists of a switching mode transformer and other related electronic circuitry housed in a thermoplastic enclosure, and provided with non-polarized blades for connection to line voltage and an Output Cord terminated with a nonstandard polarized connector for output connection. Each unit does not include a grounding connection, and has no user accessible metal parts, which are likely to become energized.

ELECTRICAL RATINGS:

Model	Input			Output		
	V	Hz	A	V (dc)	A (dc)	POWER (W)
ZNL-UXXXXYYY series	100-240	50-60	2.5	12-30	0.1-2.0	0<P≤30
				24-36	0.8-2.46	30<P≤59

TECHNICAL CONSIDERATIONS (Not For Field Representative's Use):

USL Products designated UL have been investigated using US requirements as noted in the Test.

CNL Products designated CUL have been investigated using Canadian requirements as noted in the Test Record.

The maximum room ambient temperature is 25°C (Tmra) for indoor use units.

Each unit weights less than 1 pound (454 g).

CONSTRUCTION DETAILS:

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

Abbreviations	Date of Manufacturing
Corrosion Protection	Cautionary Markings
Segregation	Spacings
Blade Construction	Printed Wiring Board
Markings	Instruction Manual

For CNL Unit, cautionary markings and instructions shall be provided in both English and French.

Markings - See Sec. Gen., Markings for detail. The following markings shall be additionally provided:

"Class 2 Power Supply"

"CAUTION - Risk of Electric Shock." and the following, "Do not expose to liquid, vapor, or rain" or "Dry location use only".

"See instruction manual for use in countries other than the U.S.A." or "See instructions for input voltage conversion", or "See instructions if the input plug does not fit the power outlet".

Instruction Manual - See Sec. Gen., Instruction Manual. The following instructions shall be provided in the instruction manual:

The following instruction shall be preceded by "IMPORTANT SAFETY INSTRUCTIONS - SAVE THESE INSTRUCTIONS" and "DANGER - TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK. CAREFULLY FOLLOW THESE INSTRUCTIONS" in letters of 1/8 inch (3.18 mm) high or in a readily visible contrasting text

"For connection to a supply not in the U.S.A., use an attachment plug adapter of the proper configuration for the power outlet, if needed" or, "if the shape of the plug does not fit the power outlet, use an attachment plug adaptor of the proper configuration for the power outlet."

Illustrations - The following Illustration is referenced in this report:

ILL. No.	Description
1	Enclosure Construction
2	Output Cord Strain Relief Dimension
3	PWB Component and Trace layout
4	Transformer Specification for type EE22
5	Transformer Specification for type PQ2620
6	Model Difference of components rating
7	Insulation sheet drawing
8	Output connector photograph
9	Line Choke L2 specification
10	Line Choke LF1 Type RK-01-135 specification
11	Line Choke LF1 Type DT-220414001 specification
12	Heat Sink Drawing (HS1)

MODEL DIFFERENCE -

All models are similar to each other except for model designation and transformer type, output ratings and related components ratings according to ILL.6.

CLASS 2 POWER SUPPLIES, MODEL ZNL-UXXXXYYY - FIG. 1
(ASLO REPRESENT other MODELS which output power $0 < P \leq 30$)

General - Fig. 1 represents external view of Model ZNL-U300100, it also represents Models expect as noted below.

1. Enclosure - R/C (QMFZ2/8), DONGGUAN JINHUA INDUSTRT CO LTD (E357034), Type HZ-88, rated V-0, HWI=2, HAI=0, 115 °C, measured minimum 1.5 mm thick, White or Black Color. Two halves construction secured together by ultrasonic welding. Enclosure Measured overall approx. 49.0 by 39.0 by 100.0 mm, provided with an approx. 9 by 10 mm opening for Output Cord Strain Relief. Provided with an approx. 6.0 by 2.0 mm opening for LED cover. Provided with a platform, measures approx. 23.6 mm by 31.5 mm by 5.1 mm height for Input Blades mounting. See ILL.1 for construction details.
2. Blades - Non-polarized, non-grounding configuration, plated copper alloy and each blade located minimum 17 mm from side of blade platform edge, integrally molded on blade platform. See Sec. Gen. ILL. 1 for dimensions and location of blades.
3. Output Cord - R/C (AVLV2/8), or R/C (AVLV2) and CSA Certified, two stranded conductors, rated minimum 300 V, minimum 80°C, minimum 26 AWG. One end of cord terminated at internal connections by mechanical security before soldering to PWB, the other end terminated in a non-standard polarized output connector. Minimum 1.8 m external length. Provided with molded-on strain relief. See ILL. 8 for details of output connector.
4. Output Cord Strain Relief - PVC bushing integrally molded on Output Cord and physically fitted in Enclosure. See ILL. 2 for construction details.
5. LED Cover - R/C (QMFZ2/8), R/C (QMFZ2/8), DONGGUAN JINHUA INDUSTRT CO LTD (E357034), Type HZ-88, rated V-0, HWI=2, HAI=0, 115 °C, measured minimum 1.5 mm thick, White Color.

CLASS 2 POWER SUPPLY, MODEL ZNL-U300100 - FIG.2 AND FIG. 3
(ALSO REPRESENT MODELS which output power $0 < P \leq 30$)

General - Fig.2 and Fig. 3 represent internal view of Model ZNL-U300100, they also represent the internal view of Models ZNL-UXXXXYYY series except as noted below.

1. Printed Wiring Board (PWB) - R/C (ZPMV2), rated minimum 130°C, V-0, overall approx. 92 mm by 41 mm by 1.65 mm thickness. See ILL. 3 for component and trace layout.
2. Input Leads - Two provided. R/C (AVLV2), or R/C(AVLV8) and CSA Certified, rated min. 300 V, min. 80°C, 24 AWG minimum. Provided with minimum 0.33 mm thick insulation on each conductor. One end terminated to PWB by soldering and mechanical securing before soldering. The other end terminated in Input Blades.
3. Insulation Sheet - R/C(QMFZ2/8), Sichuan Longhua Film Co Ltd (E254551), Type PP-(i)(j), min. 0.4 mm thick, White or Black Color, V-0, rated 105°C. Fixed on Enclosure Base and located between Input Blades and PWB. See ILL. 7 for dimensions details.
4. Fuse (F1) - Listed (JDYX/7), HONGHU BLUELIGHT ELECTRONIC CO LTD (E324232), non-time-delay type, Type L3CT, rated 250 V ac, minimum 1 A. Secured on PWB by soldering.
5. Varistor (VR1)- R/C (VZCA2/8), secured on PWB by soldering. SPD type 5, Following types may be used.

Manufacturer / File No.	Types	MLV, Vpk	In, kA	Volts (Vac)	Degree (°C)
Dongguan Taiqiang Electronic Co Ltd/ E533111	10D471K	1190	2.5	300	125

7. Bleeding Resistors (R1, R2, R41, R45) - Each rated max. 1.5M ohm, min. 0.25W.
8. Bridge (BD1) - Rated minimum 4 A, minimum 1k V, secured on PWB by soldering.
9. Capacitors (EC1, EC3, EC4, EC7, EC8) - Electrolytic with integral pressure relief. See ILL.6 for rating details. Secured on PWB by soldering.
10. Line Choke (LF1) - Type RK-01-135, Manufactured by ZHEN JIANG DANTU AI JIA ELECTRONIC PLANT, rated min. 15 mH. Secured on PWB by soldering. Constructed as follows. See ILL. 10 for details.
 - a. Core - Ferrite, overall measured 12 mm length by 8 mm diameter.
 - b. Winding - R/C (OBMW2), polyurethane enameled copper wire, rated minimum 130°C, Diameter and turns information show as tabulated below.

Winding	Pin No.	Wire Size, mm	No. of Turns
N1	1 - 2	ϕ 0.26 X 1	80
N2	4 - 3	ϕ 0.26 X 1	80

- c. Bobbin - Three-flanged bobbin. R/C (QMFZ2), CHANG CHUN PLASTICS CO LTD (E59481), Type T375J, PMC, black or brown color, rated V-0, 150°C, measures minimum 0.45 mm thick.
 - d. Vanish - R/C (OBOR2), SUZHOU TAIHU ELECTRIC ADVANCED MATERIAL CO LTD (E228349), Type T-4260(a), rated min. 130°C.
11. Diodes (D1, D2, D3, D4, D5, ZD1, U2) - SMD type, secured on PWB by soldering. See tabulated as below for Electrical Rating details.

Components	Rating		
	D1	D4	D5
	Min. 1000 V, Min. 1A	Min. 75 V, Min. 0.2A	Min. 1000 V, Min. 1A
Location	Primary	Primary	Primary
Components	Rating		
	ZD1	U2	D2, D3
	Min. 9.1 V, 5 mA	Min. 36 V, Min. 5 mA	See ILL. 6 Model difference for rating details.
Location	Secondary		

12. Resistors (R3, R4, R5, R6, R23, R26, R27, R28) - See ILL. 6 for rating details. Secured on PWB by soldering.
13. IC (U1) - Manufactured by Kiwi Instruments Corp, Type KP201. Secured on PWB by soldering.
14. MOSFET (Q1) - Rated 650V, 12 A. Secured on PWB by soldering. Screwed to HS1 by metal screw.
15. Heatsink (HS1) - Aluminium alloy, minimum mm thick, see ILL. 12 for dimensions details. Fixed to Q1 by one metal screw.
16. IC (U3) - Manufactured by Fuxin Semiconductor Co., Ltd., Type FXI358S. Secured on PWB by soldering. Located in secondary circuit.
- Alternate IC (U3) - Manufactured by KEXIN, Type LM358.
17. Y-capacitor (CY1) - R/C (FOWX2/8), Class Y1, rated min. 250 Vac, Max. 4700 pF, Min. 125°C, the following type in the table may be used. Secured on PWB by soldering.

Manufacturer	Type
Dongguan Taiqiang Electronic Co Ltd (E537780)	TD
DONG GUAN CITY JIANKUN ELECTRONICS TECHNOLOGY CO LTD (E340699)	JT
SHANTOU HIGH-NEW TECHNOLOGY DEVELOPMNT ZONE SONGTIAN ENTERPRISE CO LTD (E208107)	CD

18. Optical Coupler (PC1) - Primary-to-Secondary. R/C (FPQU2/8), rated minimum 5000 Vac. The following types may be used.

MFR/File	Type	Isolation Voltage (V ac)	Min. Operation(°C)
LITE-ON Technology Corporation/ E113898	LTV-817	5300	100
EVERLIGHT ELECTRONICS CO LTD/ E214129	EL817	5000	100
BRIGHT LED ELECTRONICS CORP/ E236324	BPC-817	5000	100

19. Transformer (T1) - Type EE22, Primary-to-Secondary, Outer wrapped with minimum three layers of Insulation Tape mentioned as item E extend min. 6.4 mm between core and secondary components. See ILL. 4 for Insulation and construction.

Transformer constructed as follows:

- A: Core - Ferrite, Open type construction, overall measured approx. 20 mm by 11.35 mm by 12.35 mm thick, wrapped by three layers of Insulation Tape, 0.05 mm thick per layer. Core is considered as primary part.
- B: Bobbin - R/C (QMFZ2), SUMITOMO BAKELITE CO LTD (E41429), Type PM-9820, black or brown color, rated V-0, 150°C, measured minimum 0.51 mm thick.
- C: Primary Windings (N1, N2, N4, N5) - R/C (OBMW2), enameled copper magnet wire, rated 130°C Min. See below table Windings Information for turns and diameter.
- D: Secondary Windings (N3) - R/C (OBJT2), GREAT LEOFLON INDUSTRIAL CO LTD(E211989), Type TRW(B), rated 130°C. See below table Windings Information for turns and diameter.

Winding Information:

Winding	Location	Pin No.	Wire Size, mm	No. of Turns
N1	PRI	4-3	ϕ 0.35*1	46
N2	PRI	2-NC	ϕ 0.15*2	20
N3	SEC	10-9	ϕ 0.8*1	17
N4	PRI	5-2	ϕ 0.15*2	11
N5	PRI	3-1	ϕ 0.35*1	21

- E: Insulation Tape - R/C (OANZ2), JINGJIANG JINGYANG INSULATING PRODUCT CO LTD (E309872), Type JY133, PET, all color, rated 130°C, 0.05 mm thick.
- F: Tubing - R/C (YDPU2), GREAT HOLDING INDUSTRIAL CO LTD(E156256), type TFT, Rated 300 Vac, 200°C.
- G. Primary Crossover Lead Insulation - One layer of Insulation Tape as Item E is used as primary crossover lead insulation.
- H. Varnish - R/C (OBOR2), SUZHOU TAIHU ELECTRIC ADVANCED MATERIAL CO LTD (E228349), Type T-4260(a), rated min. 130°C.

I. Transformer insulation provided as follows:

For insulation employed with insulation tape Type JY133:

<u>Location</u>	<u>Material</u>	<u>Layers</u>	<u>Total Thickness (mm)</u>
Outer-wrap	Insulation Tape	3	Min. 0.15
N5 to N4	Insulation Tape	2	Min. 0.10
N4 to N3	Insulation Tape	2	Min. 0.10
N3 to N2	Insulation Tape	2	Min. 0.10
N2 to N1	Insulation Tape	2	Min. 0.10
N1 to Core	Bobbin	-	0.51

CLASS 2 POWER SUPPLY, MODEL ZNL-U360167 - FIG.4 AND FIG. 5
(ALSO REPRESENT MODELS which output power $30 < P \leq 59$)

MODEL ZNL-U360167 are identical to MODEL ZNL-U300100 except for following components in the PWB board. Also represent the internal view of Models which output power $30 < P \leq 59$ except as noted below.

1. Line Choke (LF1) -Manufactured by SuZhou DianTu ELECTRONICS TECHNOLOGY CO., LTD., rated min. 15 mH. Secured on PWB by soldering. Constructed as follows. See ILL. 11 for details.
 - a. Core - Ferrite, overall measured 12 mm length by 8 mm diameter.
 - b. Windings (N1, N2) - R/C (OBMW2), Enameled copper wire, each rated minimum 130°C, measures 0.1 mm thick by 1.0 mm width by 52 turns.
 - b. Base - R/C (QMFZ2), CHANG CHUN PLASTICS CO LTD (E59481), Type T375J, PMC, black or brown color, rated V-0, 150°C, measures minimum 0.45 mm thick.
 - c. Vanish - R/C (OBOR2), SUZHOU TAIHU ELECTRIC ADVANCED MATERIAL CO LTD (E228349), Type T-4260(a), rated min. 130°C.
2. Line Choke (L2) - Open type construction. Rated 350 uH. Secured on PWB by soldering. Located in secondary circuit. See ILL. 9 for Construction and Insulation details.
 - A: Core - Ring type. Ferrite, measures approx. 9.0 mm OD by 5.0 mm ID, 3.0 mm in width.
 - B: Windings (N1/N2) - R/C (OBMW2), Enameled copper wire, each rated minimum 130°C, measures 0.65 mm diameter by 4.5 turns.
3. Resistors (R1, R2, R41, R45) - Rated maximum 1.5M Ohm, 1/4 W minimum.

4. Transformer (T1) - Type PQ2620, Primary-to-Secondary, Outer wrapped with minimum three layers of Insulation Tape mentioned as item E extend min. 6.4 mm between core and secondary components. See ILL. 5 for Insulation and construction.

Transformer constructed as follows:

- A: Core - Ferrite, Open type construction, overall measured approx. 26.5 mm by 29 mm thick, wrapped by three layers of Insulation Tape, 0.05 mm thick per layer. Core is considered as primary part.
- B: Bobbin - R/C (QMFZ2), SUMITOMO BAKELITE CO LTD (E41429), Type PM-9820, black or brown color, rated V-0, 150°C, measured minimum 0.51 mm thick.
- C: Primary Windings (N1, N4, N5) - R/C (OBMW2), enameled copper magnet wire, rated 130°C Min. See below table Windings Information for turns and diameter.
- D: Secondary Windings (N3) - R/C (OBJT2), GREAT LEOFLON INDUSTRIAL CO LTD(E211989), Type TRW(B), rated 130°C. See below table Windings Information for turns and diameter.

Winding Information:

Winding	Location	Pin No.	Wire Size, mm	No. of Turns
N1	PRI	4-2	ϕ 0.35*2	22
N2	PRI	NC-3	0.025*8	0.9
N3	SEC	10-9	ϕ 0.9*1	13
N4	PRI	5-3	ϕ 0.15*3	6
N5	PRI	2-1	ϕ 0.35*2	21

- E: Insulation Tape - R/C (OANZ2), JINGJIANG JINGYANG INSULATING PRODUCT CO LTD (E309872), Type JY133, PET, all color, rated 130°C, 0.05 mm thick.
- F: Tubing - R/C (YDPU2), GREAT HOLDING INDUSTRIAL CO LTD(E156256), type TFL, Rated 150 Vac, 200°C.
- G. Primary Crossover Lead Insulation - One layer of Insulation Tape as Item E is used as primary crossover lead insulation.
- H. Varnish - R/C (OBOR2), SUZHOU TAIHU ELECTRIC ADVANCED MATERIAL CO LTD (E228349), Type T-4260(a), rated min. 130°C.
- I. N2 Shielding Copper Foil - Copper. Measured 0.025 mm thick, 8.0 mm in width, 0.9 turn. Connected to pin No. 3 of Transformer. Wrap by two layers Insulation Tape (Total layer Thickness min. 0.1 mm). Located primary side.
- J. Transformer insulation provided as follows:

For insulation employed with insulation tape Type JY133:

Location	Material	Layers	Total Thickness (mm)
Outer-wrap	Insulation Tape	3	Min. 0.15
N5 to N4	Insulation Tape	2	Min. 0.10
N4 to N3	Insulation Tape	2	Min. 0.10
N3 to N2	Insulation Tape	2	Min. 0.10
N2 to N1	Insulation Tape	2	Min. 0.10
N1 to Core	Bobbin	-	0.51

5. X-Capacitor (CX1) - Line to Neutral. R/C (FOWX2/8), maximum 0.68 uF, Class X2. The following types may be used.

Manufacturer / File No.	Minimum voltage (V ac)	Type	Upper Temp (°C)
Dongguan Taiqiang Electronic Co Ltd/ E537780	275	MPX/MKP	110
GUANGDONG JURCC ELECTRONICS CO LTD/ E343072	275	MPX/MKP	110
Qi Rong Electronic Technology Co Ltd/ E492807	275	MKP	110