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Project 98NK21044

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REPORT

on

COMPONENT - POWER SUPPLIES, GENERAL PURPOSE

Power-One AG  
Uster, Switzerland

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## DESCRIPTION:

\*USR, CNR: Switching Power Supply, Models LW, EW, LX and EX Series, for use in Information Technology Equipment Including Electrical Business Equipment. See below Electrical Ratings (and Nomenclature) which models are covered by this Report.

## \*ELECTRICAL RATING:

Model	Input		A Maximum Input	Hz Minimum-Maximum
	V ac Rated Minimum-Maximum	V Operating Minimum-Maximum		
<u>Series W</u>				
Range x=L	93-240	85...264	4.0	14-440
	100-350	90...385	4.0	DC
Range x=E	100-350	90...385	4.0	DC
<u>Series xX</u>				
Range x=L	93-240	85...264	8.0	14-440
	100-350	90...385	8.0	DC
Range x=E	100-350	90...385	8.0	DC
	Output		A (rated)	W (rated)
	V dc SELV Maximum	V Non-SELV(+) Maximum	Minimum-Maximum	Maximum(++)
Series W(+++)	57.5	150	0-20	280
Series X(+++)	57.5	150	0-20	550

(+) - The Non SELV circuit is available if the two outputs of the unit are connected in series and will have a resulting output voltage of greater than 57.5 V.

(++) - Output Rating: See the Conditions of Acceptability for correlation of maximum temperature point and Product Ratings Use Guide.

(+++)- Ratings can be selected from specified one or two outputs.

## ENGINEERING CONSIDERATIONS (NOT FOR FIELD REPRESENTATIVE'S USE):

USR indicates investigation to the U.S. Standard for Safety of Information Technology Equipment Including Electrical Business Equipment, UL 1950 Third Edition.

CNR indicates investigation to the Canadian Harmonized Standard CSA 22.2-950 A1 to A4, CAN/CSA-C22.2 No. 234-M90.

Use - For use only in (or with) complete equipment where the acceptability of the combination is determined by Underwriters Laboratories Inc.

Special Considerations - The following items are considerations that were used when evaluating this product.

The equipment is considered: For building in, Class I (earthed).

\*GENERAL:

Model Differences - The difference between the W-Series and the X-Series is as follows:

The X-Series is identical to the W-Series except X-Series is twice the W-Series with minor component changes.

Conditions of Acceptability - When installed in the end use product, consideration shall be given to the following:

1. The power supply shall be installed in compliance with the enclosure, mounting, spacing, casualty and segregation requirements of the ultimate application.

2. Consideration should be given in the installation, that units with a rated output power of more than 240 W have energy hazardous level (>240 W).

3. This power supply has been judged on the basis of the required creepage and clearance distance in the Third Edition of the Standard for Information Technology Equipment, UL 1950, Clause 2.9 and CAN/CSA -22.2 -950 A1 to A4.

\*4. The output(s) for X and W family considered to be SELV up to a rated voltage of 57.5 V dc and hazardous secondary above 60 V dc to 150 V dc (W-Family) resp. 60 V dc to 150 V dc (X-Family).

5. The need for conducting a leakage current test is to be determined as part of the end product evaluation. If product is marked to use it above \*100 Hz (W-Family) resp. above 75 Hz (X-Family), warning label for high leakage current have to be put near the input terminals.

6. This power supply has been evaluated for use in a pollution degree 3 environment for AC-inputs and pollution degree for 2 dc-inputs. The maximum working voltage present for AC inputs is 296 V and for DC inputs is 470 V.

7. The power supply shall be properly bonded in the main protective earthing termination in the end product and a suitable electrical and fire enclosure shall be provided.

8. When optional second fuse is located in neutral conduction the following marking should be considered: "Caution: Neutral Fusing".

\*9. Power supplies shall be protected by Listed fuse external to power supply rated 10 A, 350 V dc minimum.

10. Below is an Output Power/Ambient Temperature Operation Guide. Consideration should be given to the temperature on the reference point on the case (T<sub>MP</sub>), described in the installation guide. This point should not exceed the value in the table below for a given power rating and ambient temperature (T<sub>a</sub>). Based upon the data in Test Record No. 2, the Temperature of the Reference Point on the Case (T<sub>MP</sub>) is an indicator of the internal component temperatures. If the temperature of the Reference Point is \*identical or exceeds the guide limits in the end-use application, \*temperatures of the critical components should be measured.

The temperature at the Reference Point is in correlation with the maximum transformer temperature. The transformer, built in a multilayer PCB, is rated 130°C. Tests were conducted in 50°C, 60°C and 70°C ambient. Linear interpolation is permitted between two different ambient temperatures.

*W-Family					
T <sub>a</sub>	25-50°C	50°C	60°C	70°C	Rated output power
T <sub>MP</sub> (max)	T <sub>a</sub> +36°C	86°C	88°C	94°C	280 W max
T <sub>MP</sub> (max)	T <sub>a</sub> +26°C	76°C	81°C	87°C	140 W max
*X-Family					
T <sub>a</sub>		50°C	60°C	70°C	Rated output power
T <sub>MP</sub> (max)		78°C	84°C	90°C	550 W max

\*Temperature Reference-Point Guide for the W-Family

\*(LWN, LWR): representative models of the W-Family. See nomenclature breakdown)

\*Measurement 1: (280 W max.)

LWN/50°C	U <sub>in</sub>	P <sub>out</sub> [W]	T <sub>MP</sub> [°C]	T <sub>ML</sub> [°C]	T <sub>MP'</sub> [°C]
A	85 V ac	219	86.2	120	86.2
B	106 V ac	250	85.5	119	86.5
C	134 V ac	280	84.5	120	84.5
D	111 V dc	277	86.0	119	87.0
E	90 V dc	241	87.0	120.1	86.9

Average T<sub>MP'</sub> = 86°C

\*Measurement 2: (280 W max.)

LWN/60°C	U <sub>in</sub>	P <sub>out</sub> [W]	T <sub>MP</sub> [°C]	T <sub>ML</sub> [°C]	T <sub>MP'</sub> [°C]
A	150 V ac	280	87.1	119.8	87.3
B	120 V ac	251	87.0	119	88.0
C	86 V ac	207	88.0	119	89.0
D	90 V dc	227	89.0	120	89.0
E	132 V dc	281	88.0	120	88.0

Average T<sub>MP'</sub> = 88°C

(Table Cont'd)

\*Measurement 3: (280 W max.)

LWN/70°C	U <sub>in</sub>	P <sub>out</sub> [W]	T <sub>MP</sub> [°C]	T <sub>ML</sub> [°C]	T <sub>MP'</sub> [°C]
A	90 V ac	200	94.6	120	94.6
B	161 V ac	266	94.0	120	94.0
C	85 V ac	184	93.8	120	93.8
D	155 V dc	250	93.0	120	93.0
E	196 V dc	274	93.0	120	93.0

Average T<sub>MP'</sub> = 94°C\*Measurement 4: (140 W max.)

LWR/70°C	U <sub>in</sub>	P <sub>out</sub> [W]	T <sub>MP</sub> [°C]	T <sub>ML</sub> [°C]	T <sub>MP'</sub> [°C]
A	96 V ac	111	86.2	118	88.0
B	156 V ac	145	84.0	116	88.0
C	90 V ac	117	86.0	119	87.0
D	125 V dc	139	85.1	118	87.1

Average T<sub>MP'</sub> = 87°C\*Measurement 5: (140 W max.)

LWR/60°C	U <sub>in</sub>	P <sub>out</sub> [W]	T <sub>MP</sub> [°C]	T <sub>ML</sub> [°C]	T <sub>MP'</sub> [°C]
A	104 V ac	140	79.0	118	81.0
B	90 V ac	128	80.0	119	81.0
C	85 V ac	114	79.0	117	82.0
D	123 V dc	140	79.0	117	81.0

Average T<sub>MP'</sub> = 81°C\*Measurement 6: (140 W max.)

LWR/50°C	U <sub>in</sub>	P <sub>out</sub> [W]	T <sub>MP</sub> [°C]	T <sub>ML</sub> [°C]	T <sub>MP'</sub> [°C]
A	102 V ac	140	72.0	116	76.0

T<sub>MP'</sub> = 76°C

Temperature Reference-Point Guide for the X-FamilyMeasurement 1: (550 W max.)

LXN/50°C	U <sub>in</sub>	P <sub>out</sub> [W]	T <sub>MP</sub> [°C]	T <sub>ML</sub> [°C]	T <sub>MP'</sub> [°C]
E	92 V dc	550	78.2	119.5	78.7
F	87 V ac	493	76.2	116.7	79.5
A1	108.6 V ac	553	75.7	17.5	78.3

Average T<sub>MP'</sub> = 78Measurement 2: (550 W max.)

LXN/60°C	U <sub>in</sub>	P <sub>out</sub> [W]	T <sub>MP</sub> [°C]	T <sub>ML</sub> [°C]	T <sub>MP'</sub> [°C]
A	142.7 V ac	551	81.7	118.5	83.2
B	85.3 V ac	442	83	118	85
G1	91.8 V dc	491	84.5	118.7	85.8
F1	115.3 V dc	551	83.8	118.4	85.4

Average T<sub>MP'</sub> = 84°CMeasurement 3: (550 W max.)

LXN/70°C	U <sub>in</sub>	P <sub>out</sub> [W]	T <sub>MP</sub> [°C]	T <sub>ML</sub> [°C]	T <sub>MP'</sub> [°C]
B1	198 V ac	550	88.4	119.2	89.2
C1	86.6 V ac	400	89.1	119.1	90
D1	93 V dc	443	89.8	118.6	91.2
E1	171 V dc	551	89	119.5	89.5

Average T<sub>MP'</sub> = 90°C