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REPORT

ON

COMPONENT - POWER SUPPLIES,
MEDICAL ELECTRICAL EQUIPMENT

Celetron USA Inc.
Simi Valley, California

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DESCRIPTION

PRODUCT COVERED:

USR, CNR: Component - Power Supplies, Medical Electrical Equipment, Models MVLT110-ZXXX, MVLT100-ZXXX, MVLT80-ZXXX, MVMT60-ZXXX, and MVLT45-ZXXX, where Z is any number 1 to 4, and X is any number.

GENERAL:

The components described in this Report are switch mode power supplies. They are not provided with an enclosure. Number of secondary windings can vary from 1 to 4.

ELECTRICAL RATINGS:

MODELS: MVLT110-ZXXX, MVLT80-ZXXX

Convection Cooling:

Input			Output			
V	A	Hz	Pins	V	A max	W
100-240	2.5	50-60	1-4	3.3 to 5.1	12	60
			1-4	5.1 to 48	7.5	80
			9-10	5 to 30	4.1	80
			11	+ 5 to + 30	1.1	28
			12	+ 5 to + 30	1.1	28
			Maximum Output Power = 80W at 50°C and derated by 2.5%/°C until 70°C.			

Forced Air Cooling: Minimum 150 LFM:

Input			Output			
V	A	Hz	Pins	V	A max	W
100-240	2.5	50-60	1-4	3.3 to 5.1	15	77
			1-4	5.1 to 48	18	110
			9-10	5 to 30	4.1	95
			11	+ 5 to + 30	1.1	28
			12	+ 5 to + 30	1.1	28
			Maximum Output Power = 110 W at 50°C and derated by 2.5%/°C until 70°C.			

ELECTRICAL RATINGS: (Cont'd)

MODELS: MVLT100-ZXXX, MVLT80-ZXXX, MVMT60-ZXXX, MVLT45-ZXXX

Convection Cooling:

Input			Output			
V	A	Hz	Pins	V	A max	W
100-240	2.2	50-60	1-4	5 to 12	12	60
			1-4	12 to 14.3	7.5	90
			1-4	14.4 to 24	6.9	100
			9-10	12 to 24	4.0	48
			11	-5 to 24	0.8	20
			12	-5 to 24	0.8	20

Maximum Output Power: MVLT100-ZXXX = 100 W
 MVLT80-ZXXX = 80 W
 MVMT60-ZXXX = 60 W
 MVLT45-ZXXX = 45 W

Forced Air Cooling:

MODEL: MVLT100-ZXXX

Input			Output			
V	A	Hz	Pins	V	A max	W
100-240	2.2	50-60	1-4	5 to 12	14	70
			1-4	12 to 14.3	7.5	90
			1-4	14.4 to 24	6.9	100
			9-10	12 to 24	4.0	48
			11	-5 to 24	0.8	20
			12	-5 to 24	0.8	20

Maximum Output Power: 120 W with 200 LFM Forced Air

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

USR - indicates investigation to the Standard Medical Electrical Equipment, UL 2601-1, Second Edition.

CNR - indicates investigation to CSA C22.2 No. 601.1

The products were tested on a 20 A branch circuit. If used on a branch circuit greater than this, additional testing may be necessary.

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

1. For use only in (or with) complete equipment where the acceptability of the combination is determined by Underwriters Laboratories Inc.
2. These components have been judged on the basis of the spacings required in the Standard for Medical Electrical Equipment, UL 2601-1, Part 1, which covers the end use product for which the component is designed.
3. * The output current and power of these components if specified, have been derated in order to comply with the temperature requirements of UL 2601-1 for ambients above 50°C.
4. * This power supply if specified, has been evaluated for use in a 50°C to 70°C ambient in accordance with the manufacturer's specifications.
5. If provided with forced air, the measurement (in LFM) shall be made directly over the main transformer.
6. The insulation system for the isolation transformer is R/C insulation system (OBJY2), Class F.
7. These power supplies shall be installed in compliance with the enclosure (Clause 16), separation (Clause 17), and marking (Clause 6.1, 6.4) requirements for the end use application.
8. These power supplies are Class I.

9. Consideration shall be given to measuring the temperatures on power electronic components and transformer windings when the power supply is installed in the end use product.
10. The power supplies were evaluated as having double insulation between primary and secondary, basic insulation between primary and ground, and operational insulation only between secondary and ground.
11. The power supplies have been evaluated as continuous operation, ordinary equipment and have not been evaluated in for use in the presence of flammable anaesthetic mixture with air, oxygen, or nitrous oxide. The output circuits have not been evaluated for direct patient connection (Type B, BF or C).
12. The end product evaluation shall ensure that the requirements related to Accompanying Documents, Clause 6.8 are met.
13. The grounding trace on the PWB has not been evaluated as the Protecting earth path for any metal parts accessible in the end product. However, the grounding path was subjected to the Earthing Test per Clause 18 (30 A for 2 minimum), from C36 to the grounding spade terminal only, with acceptable results.
14. The following marking or equivalent shall be provided in the end use equipment: "Grounding Reliability Is Achieved Only When the Equipment Is Connected to 'Hospital Grade' Receptacle Only" (Grounding Reliability Marking).
15. The power supply PWB has a rated maximum operating temperature of 130°C.
16. This product provides fusing in the line input lead only. Fusing the neutral lead shall be considered in the end product.

CONSTRUCTION DETAILS:

General - Unless item is specifically addressed in this Section, these components shall apply with the applicable requirements in the Section General.

Model Differences - All models are identical except for differences in the number of secondary windings, number of turns in the secondary windings and secondary components not described in this Report.

* Models MVLT100-ZXXX, MVLT80-ZXXX, MVMT60-ZXXX and MVLT45-ZXXX are identical except for differences in the output windings of the transformer, secondary components and minor primary component value changes. The primary difference is the output power which they can supply. Models MVMT60-ZXXX and MVLT45-ZXXX are identical to Models MVLT100-ZXXX and MVLT80-ZXXX except several components have been removed that do not affect safety.

* Model MVLT80-ZXXX maybe rated identical to Model MVLT110-ZXXX if trace layout is as shown in ILLS. 1 and 2.

MODEL MVLT110-4300 - FIGS. 1, 2 & 3

General - Shows component side of board with metal top and insulating sheet provided. Except where noted below, Model MVLT110-4300 represents all models.

1. Input Connector (J1) - R/C (RTRT2), Molex, Type 41761 or 41791 rated 94V-0. Soldered to PWB.
2. Capacitor (C1) - (PRI) Line-to-line. R/C (FOWX2,FOKY2), rated minimum 250 V ac, maximum 0.1 uF by Rifa, Type PHE843M or BC Components, Type MKP 338-2. Refer to Section General, X capacitors, X1 or X2 for alternate manufacturers.

Alternate - Same as above except Okaya Type XA or PA.

Alternate - Same as above except Vishay Roderstein Type F1772.

Alternate - Same as above except Carli Electronics Type MPX.

Alternate - Same as above except Pilkor Type PCX2-335-M.

Alternate - Same as above except Evox Rifa Type PHE 820M.

3. Capacitor (C39) - Line-to-Ground. R/C (FOWX2), minimum 250 V ac, maximum 5000 pF. Refer to Section General, Y capacitors, Y1 or Y2 for alternate manufacturers. (Evaluated to IEC 384-14.)

Alternate - Same as above except Vishay Roderstine Type WY or WKO or WKP.

Alternate - Same as above except Vishay Ceramite Type 30LV or 30LVS or 440L.

Alternate - Same as above except Samsung/Netrontech Type AA Series.

Alternate - Same as above except Pan Overseas Type AC Series.

4. Fuse (F1) - (PRI) Time delay. R/C (JDYX2), Littelfuse, Type 221. Fuse leads soldered to printed wiring board. Electrically located on line side of supply. Rated as follows:

Model MVLT110-4300 - 250 V, 3.15 A

Models MVLT100-ZXXX, MVMT60-ZXXX, and MVLT45-ZXXX - 250 V, 4.0 A.

Model MVLT80-ZXXX - 250 V, 3.15 A (when used with PWB layouts ILL. 1 or ILL. 2); or 250 V, 4 A (when used with PWB layouts ILL. 3 or ILL. 4)

5. Inductor (L1) - (PRI) Open-type construction. Overall 16 by 16 by 17 mm. Core: Ferrite. Coil: Copper magnet wire-wound on bobbin of R/C (QMFZ2), Type Phenolic, minimum 1.0 mm thick.
6. Inductor (L2) - (PRI) Insulation System is R/C (OBJY2), EOS Corp., Class 155(F), designated SA 155. Open-type construction. Overall 22 by 20 by 13 mm. Core: Ferrite. Coil: Copper magnet wire-wound on bobbin of R/C (QMFZ2), Type Phenolic, minimum 1.0 mm thick. Minimum 3 layers of mylar tape, 0.05 mm thick, layered over top of copper magnet wire. Minimum 3 layers of mylar tape, 0.05 mm thick, wrapped around entire inductor such that the tape extends 20 mm from bobbin edge toward the center and 12 mm from bobbin edge outward, which is then folded up against bobbin. 7 mm wide mylar tape is then wrapped around the circumference of the bobbin by at least 2 layers to keep the folded edge in place. (Body of inductor physically touches secondary circuit components.)
7. Electrolytic Capacitors (C3, C62) - (PRI) Provided with integral pressure relief. Rated minimum 400 V dc, 105°C.
8. Transformer (T1) - (PRI/SEC) Concentrically wound, Insulation System is R/C (OBJY2), EOS Corp., Class 155(F), designated SA 155. Open-type construction. Core: Ferrite; overall 25 mm by 28 mm by 15 mm. Coil: Copper magnet wire wound on bobbin. Bobbin: R/C (QMFZ2), Phenolic, minimum 1.0 mm thick. 3 layers of teflon tape, teflon tape minimum thickness 0.091 mm, are wound across bobbin, opposite of primary terminals, with minimum 6.5 mm tape width measured from bobbin edge inward to center of bobbin. Primary windings are spooled over top of tape and bobbin, and the 3 layers of tape are folded over top of the primary windings such that there is a minimum of 6.5 mm width of tape measured from bobbin edge inward to center of bobbin. 1 layer of mylar tape, mylar tape minimum thickness 0.025 mm, is then wound over the width of the primary windings. 3 layers of teflon tape are then wound over top of the primary windings such that the tape edge extends past the edges of the last primary winding by a minimum of 4 mm, secondary terminal side. Secondary windings are then wound over top of 3 layers of teflon tape. Multiple secondary windings separated by mylar tape are then wound into transformer. The last secondary winding will be covered with 1 layer of mylar tape. The edge of the 3 layer teflon tape, located on the primary terminal side, is then folded back over top of the mylar tape surface such that the tape width is a minimum of 8.5 mm measured from the edge of the bobbin inward toward the center of bobbin. A final layer of mylar tape, minimum 8.5 mm, is then wound over top of the folded over section of the 3 layer teflon tape. This last layer of mylar tape secures the folded over portion of the 3 layer teflon tape. See Celetron drawing No. 05-35692-xxxx.

9. MOV (MV1,MV2) - One or two provided. R/C (XUHT2) Ohizumi, Type 500NR-07D or 500NR-10D. (Located across-the-line)

Alternate - Same as above except Maida Type D73 or D61 Series.

Alternate - Same as above except Stetron Type NS Series.

Alternate - Same as above except AVX Corporation Type VE09M00301K.

Alternate - Same as above except Littlefuse Type V175LA5.

Alternate - Same as above except Littlefuse Type V300LA2.

Alternate - Same as above, except Littlefuse Type V300LA10.

10. Insulation Sheet - R/C (QMFZ2), General Electric Co., Valox, Type FR1, rated minimum 94V-0, 3 layers. Adhesive between layers, Avery Type 1194 or 3M Type 9458. Provided under aluminum top cover. Glued to top of Power Supply T1, L8 by Avery 1194 or 3M Type 9458. Insulation sheet to extend beyond aluminum top cover on the primary side of board by minimum 8 mm. Insulation sheet to extend beyond metal top cover on side next to C3 and C62, by minimum 8 mm. Insulation sheet to extend through bottom of board, separating C23 from heat sink.
11. Heat Sink - Aluminum alloy, 2.0 mm thick. L-shaped, overall 76 by 85 by 22 mm.
12. Diode Bridge (D1 or D1-4) - (PRI) One bridge diode or four diodes, rated minimum 600 V ac, 3.0 A.
13. Resistor (R16) - 0.5 Ω , minimum 2 W, rated minimum 275°C, spaced off PWB by minimum 3.5 mm, wrapped in teflon tape. Provided for Models MVLT110-ZXXX and MVLT80-ZXXX only.
14. Diode (D2) - Rated minimum 600 V, minimum 3 A. Located in the primary circuit.
15. PWB - R/C (ZPMV2), rated minimum 94V-0, minimum 130°C. Provided with minimum 1.5 mm wide slots cut into board to separate primary/secondary circuitry and primary/ground circuitry. Refer to the following ILLS. for trace layout.

Models MVLT110-ZXXX and MVLT80-ZXXX - ILLS. 1 & 2

Models MVLT100-ZXXX, MVLT80-ZXXX, MVMT60-ZXXX, and MVLT45-ZXXX - ILLS. 3 & 4

16. Main FETs (Q1,Q2) - (PRI) Rated as follows:

Model MVLT110-4300 - minimum 400 V ac, minimum 10 A.

Model MVLT100-ZXXX and MVLT80-ZXXX - minimum 400 V ac, minimum 11 A.

Model MVMT60-ZXXX and MVLT45-ZXXX - minimum 400 V ac, minimum 4 A.

- Boost FETs (Q6,Q7) - (PRI) Rated as follows:

Model MVLT110-ZXXX - minimum 400 V ac, minimum 10 A.

Models MVLT100-ZXXX, MVLT80-ZXXX, MVMT60-ZXXX, and MVLT45-ZXXX - minimum 400 V ac, 11 A.

18. Optical Isolators (IC3,IC4) - (PRI/SEC) R/C (FPQU2), NEC, Type PS2561 or PS2581. Rated isolation minimum 3000 V ac. (Meets double/reinforced insulation requirements). Refer to Section General for alternate manufacturers and model numbers. (Minimum 8 mm creepage distance.)

Alternate - Same as above except Motorola Type MOC8102/MOC8106.

Alternate - Same as above except QT/Fairchild Type CNY17-2 or CNY17-3.

Alternate - Same as above except QT/Fairchild Type CNY17F-2.

Alternate - Same as above except QT/Fairchild Type CNY17G-1 or CNY17G-2 or CNY17G-3.

Alternate - Same as above except Vishay Telefunken Type TCDT1101 or TCDT1122G.

MODELS MVMT60-ZXXX AND MVLT45-ZXXX

General - Models MVMT60-ZXXX and MVLT45-ZXXX are identical to MVLT110-ZXXX, except for the following:

7. Electrolytic Capacitor (C62) - Not provided.

17. Boost FETs (Q7) - Not provided.

18. Optical Isolator (IC3) - Not provided.

File E173812 Vol. 1 Sec. 4 *Page 9 Issued: 07-31-01
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Replacement Page for Page 9.