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REPORT

On

COMPONENT - POWER SUPPLIES, INFORMATION TECHNOLOGY EQUIPMENT

Astec International Ltd
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DESCRIPTION

PRODUCT COVERED:

USR, CNR Component – DC-DC Converter, Models DS850DC-3, DS850DC-3-003 ,DS850DC-3-004, DS650DC-3, DS650DC-3-002, DS650DC-3-003 for use in Information Technology Equipment.

ELECTRICAL RATINGS:

MODEL	INPUT	OUTPUT	
DS850DC-3 or DS850DC-3-004	DC -40 V to -60 V	DC + 12 V	70.0 A
	28.0 A	DC + 3.3 Vsb	6.0 A
	Or		
	DC -48 V to -60 V	DC + 12 V	70.0 A
	24.0 A	DC + 3.3 Vsb	6.0 A
DS850DC-3-003	DC – 48 V to – 60 V	DC + 12 V	70.0 A
	24.0 A	DC + 5 Vsb	4.0 A
DS650DC-3	DC -40 V to -60 V	DC + 12 V	53.0 A
DS650DC-3-003	21.0 A	DC + 3.3 Vsb	6.0 A
DS650DC-3-002	DC -40 V to -60 V	DC + 12 V	53.0 A
	21.0 A	DC + 5.0 Vsb	4.0 A

Maximum Continuous Output Power is 850 W for DS850DC-3, DS850DC-3-003 and DS850DC-3-004.
Maximum Continuous Output Power is 650 W for DS650DC-3, DS650DC-3-002 and DS650DC-3-003.

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

General – The unit is for use in product where the acceptability of the combination is determined by Underwriters Laboratories Inc.

* Both USR and CNR indicate investigation to the Standard for Safety of Information Technology Equipment, UL 60950-1, Second Edition + Amendment 1 + Amendment 2, date **October 14, 2014** and CAN/CSA-C22.2 **No. 60950-1-07, Second** Edition + Amendment 1 + Amendment 2 date **October, 2014.**

Conditions of Acceptability – When installed in the end-use equipment, the following are the considerations to be made:

*1. This component has been judged on the basis of the required creepages and clearances in the **Second** Edition of the Standard for Safety of Information Technology Equipment, UL 60950-1, Second Edition **+ Amendment 1 + Amendment 2** and CAN/CSA C22.2 No. 60950-1-07, Second Edition **+ Amendment 1 + Amendment 2**, Sub-clause 2.10 and Annex G (altitude requirement, Table A.2 of IEC 60664-1:1992), which covers the end-use product for which the component was designed. The functional insulation has been evaluated by conducting Component Failure Test per Sub-clause 5.3.4(c) of UL 60950-1, Second Edition and CAN/CSA C22.2 No. 60950-1-07, Second Edition **+ Amendment 1 + Amendment 2.**

2. This power supply has only been evaluated for use in pollution degree 2 environment.

*3. This power supply has been evaluated with the assumption that the power source is a TNV-2 power system as defined by UL 60950-1, Second Edition **+ Amendment 1 + Amendment 2** and CAN/CSA C22.2 No. 60950-1-07, Second Edition **+ Amendment 1 + Amendment 2.**

4. A suitable electrical, mechanical and fire enclosure shall be provided by end use equipment.

5. This power supply has been evaluated for use in Class I equipment as defined in UL 60950-1, Second Edition **+ Amendment 1 + Amendment 2** and CAN/CSA C22.2 No. 60950-1-07, Second Edition **+ Amendment 1 + Amendment 2** and shall be properly earthed or bonded to earth in the end-use. An additional evaluation shall be made if the power supply is intended for use in other than Class I equipment.

6. The secondary output of the power supply is considered SELV and the output (+12.0V) is considered energy hazardous, the unit shall be handled with care during end product installation. Sub-clause 2.2 per UL 60950-1, Second Edition **+ Amendment 1 + Amendment 2** and CAN/CSA-C22.2 No 60950-1-07, Second Edition **+ Amendment 1 + Amendment 2** were used to maintain the reinforced insulation of SELV from primary circuits.

7. This power supply has been evaluated for use in 25°C and 50°C ambient.

8. Transformers T1 and T5 employ Class 155(F) electrical insulation system.

9. This power supply was not evaluated for end system mounting.

10. The secondary DC output connector has not been evaluated for field connections.

11. This power supply is classified as Level 5 as defined by UL 60950-1, Second Edition and CAN/CSA-C22.2 No. 60950-1-07, Second Edition **+ Amendment 1 + Amendment 2**.

12. Compliance to the temperature limits of user touchable parts and surfaces of the power supply shall be considered at the end system.

13. The clearance and creepage distances have additionally been assessed for suitability up to 3100m elevation.

14. The power supply maintains Basic insulation between SELV input and SELV output. The transformer that separates the SELV input to SELV output was tested for electric strength test suitable for Basic insulation in accordance with clause 2.2.4.

15. Basic insulation is maintained between SELV input and protective earth.

16. The equipment disconnect device is considered to be input connector.

17. The class of laser product is Class 1(1).

18. The following Production-Line tests are 100% conducted for these products: Earthing Continuity test and Electric Strength test.

CONSTRUCTION DETAILS:

Spacing - The following spacings are maintained in the power supply, Model DS850DC-3, **DS850DC-3-003 and ,DS850DC-3-004, DS650DC-3, DS650DC-3-002, DS650DC-3-003.**

1. Minimum 1.4 mm creepage distance and minimum 1.2 mm clearance distance between primary and secondary pins and traces of transformers (T1, T5, T300).

2. Minimum 1.4 mm creepage distance and minimum 1.2 mm clearance distance between primary and secondary pins and traces of Optocouplers (IC2, IC309, IC310, IC502, IC503).

3. Minimum 1.4 mm creepage distance and minimum 1.2 mm clearance distance between primary and secondary traces other than item 1 to 2.

4. Minimum 1.4 mm creepage distance and minimum 1.2 mm clearance distance between primary traces and protective earth.

See ILL.1 to ILL.3 for details.

MODEL DIFFERENCE:

Model DS850DC-3-003 is identical to Model DS850DC-3 except for output rating and Auxiliary Transformer (T1) secondary winding no. of turns.

Model DS850DC-3-004 is identical to Model DS850DC-3 except for Model Designation.

Model DS650DC-3 is idential to Model DS850DC-3 except input/output rating and output power.

Model DS650DC-3-003 is idential to Model DS650DC-3 except reverse airflow.

Model DS650DC-3-002 is idential to Model DS850DC-3-003 except input/output rating and output power.

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

Factory Location and Identification	Wire Connections
Abbreviations	Connectors and Receptacles
C-UL Requirements	Earthing/Bonding
Corrosion Protection	Mechanical Assembly
Internal Wiring	Insulating Tubing/sleeving
Segregation	Earthing Symbol
Wire Positioning Devices	Tolerances
Marking Methods	Capacitors
Markings	Optocouplers
Internal Polymeric Materials	Voltage Surge Suppressors
Printed Wiring Board	NTC Thermistors

ILLUSTRATIONS:

ILL. 1 – Main PWB Trace Layout
ILL. 2 – Secondary Control Board PWB Trace Layout
ILL. 3 – Logic Board PWB Trace Layout.

GENERAL:

General - The general design, shape and arrangement shall be as illustrated, in the following figures, except where variations are specifically described.

MODEL DS850DC-3 – FIG. 1

*General – Fig. 1 shows the overall view of Models DS850DC-3, DS850DC-3-003, DS850DC-3-004, **DS650DC-3, DS650DC-3-002 and DS650DC-3-003** unless otherwise specified.

1. Cover – Steel, L-shaped as shown. Overall measured approximately 280 by 81 by 40 mm, minimum 0.8 mm thick. Secured to Base, Item 2, by screws. Provided with 10 ventilation slots, each measured approximately 16.5 by 5.5mm.

2. Base – Steel, L-shaped as shown. Overall measured approximately 280 by 81 by 40 mm, minimum 0.8 mm thick. Provided with fan guard at the front panel, overall measured approximately 39 by 39 mm. Secured to the Cover Chassis. Item 1 by screws.

3. DC Input Connector – Constructed with plastics (QMFZ2), rated minimum V-2, minimum 105°C.

4. Fan – (GPMV2), Sanyo Denki Co Ltd (E46810), Type 9GV0412K303, rated 12V dc, 0.84A. Secured to the Cover Chassis, Item 1 and Base chassis, Item 2 by screws.

   Alternate – Same as above except Sunonwealth Electric Machine Industry Co Ltd (E77551), Type PSD1204PQBX-A(Y), rated 12V dc, 0.8A.

6. Handle – Metal,Shaped as shown. Overall measured approximately 25 by 40 mm, minimum 5.0 mm in diameter. Secured to the Base chassis, Item 2 by screws.

MODEL DS850DC-3 - FIG. 2

*General – Fig.2 shows the internal view of Models DS850DC-3, DS850DC-3-003, DS850DC-3-004, **DS650DC-3, DS650DC-3-002 and DS650DC-3-003** unless otherwise specified.

1. Main Printed Wiring Board (PWB) – (ZPMV2). See Section General for details. Measured approximately 274 by 77 mm, minimum 1.6 mm thick. Rated minimum V-1, minimum 130 °C. See ILL. 1 for trace layout.

2. Control Daughterboard Printed Wiring Board (PWB) – (ZPMV2), See Section General for details. Measured approximately 140 by 30 mm, minimum 1.0 mm thick. Rated minimum V-1, minimum 130 °C. See ILL. 2 for trace layout.

3. Logic Daughterboard Printed Wiring Board (PWB) – (ZPMV2), See Section General for details. Measured approximately 135 by 30 mm, minimum 1.0 mm thick. Rated minimum V-1, minimum 130°C. See ILL. 3 for trace layout.

4. Fuse (F1) – (JFHR2), Littelfuse Inc(E71611), Type TLS, rated 40 A, 170 V dc. Fuse rating permanently marked on PWB adjacent to the fuse.

   Alternate – Same as above except Copper Industries Inc Bussmann Div (E56412), Type TPS, rated 40A, 170 Vdc.

5. DC Output Connector – Constructed with plastics (QMFZ2), rated minimum V-2, minimum 105°C.

6. Relay (RLY1)– Constructed with plastics (QMFZ2), rated minimum V-2, minimum 100°C.

7. Capacitors (C5, C6) – (Line-to-Protective Earth). Marked with "Y1" or "Y2". See Section General for manufacturer and catalog number. Rated maximum
   0.33 uF, minimum 250 V ac, minimum 100°C.

8. Capacitor (C65) – (Line-to-Protective Earth). Marked with "Y1" or "Y2". See Section General for manufacturer and catalog number. Rated maximum 2200 pF, minimum 250 V ac, minimum 105°C.

9. Capacitors (C94, C95) – (Line-to-Protective Earth). Marked with "Y1" or "Y2". See Section General for manufacturer and catalog number. Rated maximum
   100 pF, minimum 250 V ac, minimum 85°C.

10. Capacitor (C93) – (Line-to-Protective Earth). Marked with "Y1" or "Y2". See Section General for manufacturer and catalog number. Rated maximum 1500 pF, minimum 250 V ac, minimum 85°C.

11. Common Mode Choke (L1) – Astec P/N: 852-70013030.

12. Current Transformer (L2) – Astec P/N: 852-70011480.

13. Common Mode Choke (L3) – Astec P/N : 852-70013040.

14. Output Chokes (L4, L5) – Astec P/N : 852-70010960.

15. Output Choke (L6) – Astec P/N: 852-70011510.

16. Output Choke (L7) – Astec P/N: 852-70011520.

17. Electrolytic Capacitors (C7, C8, C9, C10, C12, C13, C14) – With integral pressure relief, rated maximum 2200 uF, minimum 100 V, minimum 105°C.

18. Power Transistor (Q12) – Rated minimum 10 A, minimum 250 V.

19. Power Transistors (Q18, Q19, Q23-Q35, Q42-Q44) – Rated minimum 70 A, minimum 150 V.

20. Optocouplers (IC2, IC309, IC310, IC502, IC503) – See Section General for manufacturer and catalog number. Each rated minimum 3000 V ac isolation test voltage.

21. Gate Drive Transformers (T2, T3) – Astec P/N: 852-70011490.

22. Gate Drive Transformer (T300) – Astec P/N: 852-70011530.

23. Auxiliary Transformer (T1) – Astec P/N: 852-70011500. Provided with (OBJY2), Astec International Ltd (E94225), Class 155(F), insulation system designated 155-10B, for Model DS850DC-3, **DS650DC-3 and DS650DC-3-003** only.

Alternate – Same as above except Astec P/N: 852-66018670 for Model DS850DC-3-003 **and DS650DC-3-002 only.**

24. Power Transformer (T5) – Astec P/N: 852-70010950. Provided with (OBJY2), Astec International Ltd (E94225), Class 155(F), insulation system designated 155-10A.

25. Insulator – (QMFZ2),Toray Industries Inc (E86511), Type Lumirror S10, rated VTM-2, minimum 0.125 mm thick. Two provided, one located between PWB solder Side and Base chassis. Overall measured approximately 150 by 270 mm. One located between component side and cover chassis, overall measured approximately 75 by 240 mm.

26. Gap Pad – (QMFZ2), Bergquist Co (E59150), Type Gap Pad 1500, rated V-0, minimum 3.5 mm thick, overall measured approximately 28 by 40 mm. One provided on the top of the heatsink of Q27.

Alternate – Same as above except Laird Technologies (E180840), Type T-FLEX3150.

27. Primary Heatsink for Q19, Q25, Q27, Q29 – Metal, L-Shaped. Overall measured approximately 77 by 30 by 15 mm, minimum 2.0 mm thick. Secured on PWB by solder pins.

28. Primary Heatsink for Q18, Q23, Q24, Q26, Q28 – Metal, L-Shaped. Overall measured approximately 87 by 25 by 30mm, minimum 2.0 mm thick. Secured on PWB by solder pins.

29 Secondary Heatsink for Q33, Q34, Q35, Q44 – Metal, L-Shaped. Overall measured approximately 78 by 30 by 27mm, minimum 2.0 mm thick. Secured on PWB by solder pins.

30. Secondary Heatsink for Q30, Q31, Q32, Q43 – Metal, overall measured approximately 48 by 30 mm, minimum 2.0 mm thick. Secured on PWB by solder pins.

31. Secondary Heatsink for Q1, D2, D23 – Metal, overall measured approximately 51 by 23 mm, minimum 1.5 mm thick. Secured on PWB by solder pins.

32. Primary heatsink on the top of the heatsink of item 28 – Metal, L-Shaped. Overall measured approximately 75 by 28 by 35mm, minimum 1.0 mm thick. Secured on the top of item 28 by screws.