UL TEST REPORT AND PROCEDURE

Standard:	UL 60950-1, 2nd Edition, 2007-03-27 (Information Technology Equipment - Safety - Part 1: General Requirements) CSA C22.2 No. 60950-1-07, 2nd Edition, 2007-03 (Information Technology Equipment - Safety - Part 1: General Requirements)
Certification Type:	Component Recognition
CCN:	QQGQ2, QQGQ8 (Power Supplies for Information Technology Equipment Including Electrical Business Equipment)
Product:	DC-DC Converter
Model:	ATC250-48D12-03xxx, ATCR250-48D12-03XXX (where "xxx" are either blank or any alphanumeric character combinations which do not have any safety related representations.)
Rating:	INPUT: DC -36V to -72V, 13.2A OUTPUT: DC +12V, 20.83A Max.; DC +3.3V, 4.5A Max. Total Output Power: 250W Max.
Applicant Name and Address:	ASTEC INTERNATIONAL LTD - PHILIPPINE BRANCH 16TH FL LU PLAZA 2 WING YIP ST KWUN TONG KOWLOON HONG KONG

This is to certify that representative samples of the products covered by this Test Report have been investigated in accordance with the above referenced Standards. The products have been found to comply with the requirements covering the category and the products are judged to be eligible for Follow-Up Service under the indicated Test Procedure. The manufacturer is authorized to use the UL Mark on such products which comply with this Test Report and any other applicable requirements of Underwriters Laboratories Inc. ('UL') in accordance with the Follow-Up Service Agreement. Only those products which properly bear the UL Mark are considered as being covered by UL's Follow-Up Service under the indicated Test Procedure.

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UL authorizes the applicant to reproduce the latest pages of the referenced Test Report consisting of the first page of the Specific Technical Criteria through to the end of the Conditions of Acceptability.

Any information and documentation involving UL Mark services are provided on behalf of Underwriters Laboratories Inc. (UL) or any authorized licensee of UL.

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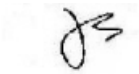

Supporting Documentation

The following documents located at the beginning of this Procedure supplement the requirements of this Test Report:

A. Authorization - The Authorization page may include additional Factory Identification Code markings.

B. Generic Inspection Instructions -

i. Part AC details important information which may be applicable to products covered by this Procedure. Products described in this Test Report must comply with any applicable items listed unless otherwise stated in the body of this Test Report.

ii. Part AE details any requirements which may be applicable to all products covered by this Procedure. Products described in this Test Report must comply with any applicable items listed unless otherwise stated in the body of each Test Report.

iii. Part AF details the requirements for the UL Certification Mark which is not controlled by the technical standard used to investigate these products. Products are permitted to bear only the Certification Mark(s) corresponding to the countries for which it is certified, as indicated in each Test Report.

Product Description

The equipment under test is a DC-DC converter for building-in.

Model Differences

DC-DC converter, model ATCR250-48D12-03XXX as modified model of ATC250-48DC12-03XXX. These 2 models are exactly the same except for model name and additional circuit for IC101.

Technical Considerations

- Equipment mobility : for building-in
- Connection to the mains : N/A
- Operating condition : continuous
- Access location : operator accessible
- Over voltage category (OVC) : OVC II
- Mains supply tolerance (%) or absolute mains supply values : N/A
- Tested for IT power systems : No
- IT testing, phase-phase voltage (V) : N/A
- Class of equipment : N/A
- Considered current rating (A) : 20A

- Pollution degree (PD) : PD 2
- IP protection class : IP X0
- Altitude of operation (m) : < 3000 m
- Altitude of test laboratory (m) : < 500 m
- Mass of equipment (kg) : <0.25
- The product was submitted and evaluated for use at the maximum ambient temperature (Tma) permitted by the manufacturer's specification of: 85°C
- The following are available from the Applicant upon request: Installation (Safety) Instructions / Manual
- The equipment under test is a DC-DC converter for building-in. A suitable electrical, mechanical and fire enclosure shall be provided by the end-system.
- Model ATC250-48D12-03xxx / ATCR250-48D12-03xxxmaintains Basic insulation between input and output circuits, between the Remote pins and input circuits, between the Remote pins and output circuits.
- The maximum output power of the combined outputs (DC +12V and DC +3.3V) is 250W.

Engineering Conditions of Acceptability

For use only in or with complete equipment where the acceptability of the combination is determined by Underwriters Laboratories Inc. When installed in an end-product, consideration must be given to the following:

- When installing the equipment, all requirements of the relevant standard must be fulfilled.
- Power supply for building-in: Requirements for protection against electric shock, grounding, fire enclosure and EMC must be considered in the end-system.
- The equipment shall be powered from a source that provides double or reinforced insulation from the mains supply.
- The unit has no in-line fuse. For safe operation of Model ATC250-48D12-03xxx, a Hollyland type 20N-150L, maximum 15A, minimum 72Vac or equivalent must be fitted in-line by the user prior to use.
- The outputs of Model ATC250-48D12-03xxx are SELV but the DC+12V output is Energy Hazardous

(>240VA); the accessibility of the output shall be checked when installed in the end system. Field connection shall be evaluated in the system.

- Model ATC250-48D12-03xxx operating conditions: , , Installation must provide at least 200LFM forced air cooling; , , At -36V and ambient temperature up to 85°C, maximum load is DC +12V = 10.2A; DC +3.3V = 2.1A; , , At -72V and ambient temperature up to 85°C, maximum load is DC +12V = 4.0A; DC +3.3V = 1.3A; , , At -36V and ambient temperature up to 44°C, maximum load is DC +12V = 19.6A; DC +3.3V = 4.5A; , , At -72V and ambient temperature up to 42 °C, maximum load is DC +12V = 19.6A; DC +3.3V = 4.5A; , , At -36V and ambient temperature up to 44 °C, maximum load is DC +12V = 20.83; DC +3.3V = 0A; , , At -72V and ambient temperature up to 42 °C, maximum load is DC +12V = 20.83; DC +3.3V = 0A; , , At -54V and ambient temperature up to 85°C, maximum load is DC +12V = 10.0A; DC +3.3V = 1.0A; , , At -54V and ambient temperature up to 48°C, maximum load is DC +12V = 19.6A; DC +3.3V = 4.5A.

- Electromedical Equipment connected to patient: This equipment is not an electromedical equipment intended to be physically connected to patient.

- The following Production-Line tests are conducted for this product: Electric Strength

- The end-product Electric Strength Test is to be based upon a maximum working voltage of: Primary-SELV: 107.5 Vrms, 155 Vpk

- The following secondary output circuits are SELV: all outputs

- The power supply terminals and/or connectors are: Not investigated for field wiring

- The investigated Pollution Degree is: 2

- The following magnetic devices (e.g. transformers or inductor) are provided with an OBJY2 insulation system with the indicated rating greater than Class A (105°C): T101, T102, T103 (Class A), T1 (Class F)

- The following end-product enclosures are required: Electrical , Fire , Mechanical

- The following secondary output circuits are at hazardous energy levels: 12 Vdc output

- The following secondary output circuits are at non-hazardous energy levels: 3.3 Vdc output

Additional Information

Project Number - 11CA38739
1) Adding alternate model ATCR250-48D12-03XXX

Additional Standards

The product fulfills the requirements of: N/A

Markings and instructions	
Clause Title	Marking or Instruction Details
Power rating - Ratings	Ratings (voltage, frequency/dc, current)
Power rating - Company identification	Listee's or Recognized company's name, Trade Name, Trademark or File Number
Power rating - Model	Model Number
Special Instructions to UL Representative	
N/A	

Production-Line Testing Requirements

Electric Strength Test Special Constructions - Refer to Generic Inspection Instructions, Part AC for further information.

Model	Component	Removable Parts	Test probe location	V rms	V dc	Test Time, s
All models in this report	-	-	-	-	-	-

Earthing Continuity Test Exemptions - This test is not required for the following models:

All models in this report

Electric Strength Test Exemptions - This test is not required for the following models:

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Electric Strength Test Component Exemptions - The following solid-state components may be disconnected from the remainder of the circuitry during the performance of this test:

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Sample and Test Specifics for Follow-Up Tests at UL

Model	Component	Material	Test	Sample(s)	Test Specifics
N/A	-	-	-	-	-

TABLE: List of Critical Components

Object/part or Description	Manufacturer/ trademark	type/model	technical data	CCN	Marks of Conformity
Power Board	Various	Various	Rated V-0, 130°C. Overall measured 59.0 by 45.8 mm, 2.9 mm thick.	ZMPV2	UL
Control Board	Various	Various	Rated V-0, 130°C. Overall measured 58.9 by 45.8 mm, 1.6 mm thick.	ZMPV2	UL
Bias Transformer (T101)	Various	Various	Windings etched on PCB. Rated V-0, 130°C.	ZMPV2	UL
Power Transformers (T102, T103)	Various	Various	Windings etched on PCB. Rated V-0, 130°C.	ZMPV2	UL
Auxiliary Transformer (T1)	Jinchuan Soft Device Factory (E301402)	BSFEY15-360	Provided with Class (F) insulation system, Chengdu Branch Yibin Jinchuan Electronic Appliance Co Ltd (E301402), designated JC155.	OBJY2	UL
Transistors (Q102, Q103, Q106, Q107, Q108, Q118, Q119, Q120)	Various	Various	Rated min. 5.7A, min. 100V.	-	-
Bridging Capacitor (C105)	AVX/Kyocera	X7R	Rated max. 1200pF, min. 2500V.	-	-
Bridging Capacitor (C105) - Alternate	Johanson	X7R	Rated max. 1200pF, min. 3000V.	-	-
Bridging Capacitors (C57, C58)	AVX/Kyocera	X7R	Rated max. 2200pF, min. 2500V.	-	-
Bridging Capacitors (C57, C58) - Alternate	Johanson	X7R	Rated max. 2200pF, min. 3000V.	-	-
Optocouplers (IC7, U3, U5) (IC101 for model ATCR250-48D12-03XXX only)	NEC Electronics Corp Compound Semiconductor Device DIV (E72422)	PS2911-1	Single Insulation, isolating voltage: 2500 Vac, rated 100°C.	FPQU2	UL
Optocoupler (U2, U6)	Vishay Infrared Components Inc (E52744)	ILD206T	Single Insulation, isolating voltage: 3333 Vac, rated 100°C.	FPQU2	UL
Input Choke (L101)	Vishay	IHLP2525CZ	Rated max. 2.2µH, 125°C.	-	-
Input Choke (L3)	Emerson	85270014520	Rated min. 170µH, 130°C.	-	-
Primary Heatsink	Various	Various	Metal alloy. Approximate overall measured 58.1 by 45.2 by 1.6 mm thick. Refer to Enclosures-Miscellaneous ID 7-01 for details dimensions.	-	-

Object/part or Description	Manufacturer/ trademark	type/model	technical data	CCN	Marks of Conformity
Insulator between Primary Heatsink and Secondary Circuit	E I Dupont De Nemours & Co Inc (E39505)	Kapton	Rated V-0. minimum 130°C. Refer to Enclosures-Miscellaneous ID 7-02 for details dimensions.	QMFZ2	UL
Gap Filler between Primary Heatsink and Power Board	Bergquist Co (E59150)	Gap Filler 2000 (g) (h)(s)	Rated V-0, minimum 0.39 mm thick, 150°C.	QMFZ2	UL
Marking Label (If provided)	Various	Various	Suitable for use on each type of surface to which applied, rated for maximum surface temperature specified.	PGJI2 or PGDQ2	UL

Enclosures

Type	Supplement Id	Description
Photographs	3-01	Top View of Assembly (Model ATC250-48D12-03xxx)
Photographs	3-02	Bottom View of Assembly (Model ATC250-48D12-03xxx)
Photographs	3-03	Top View of Power Board (Model ATC250-48D12-03xxx)
Photographs	3-04	Bottom View of Power Board (Model ATC250-48D12-03xxx)
Photographs	3-05	Top View of Control Board (Model ATC250-48D12-03xxx)
Photographs	3-06	Bottom View of Control Board (Model ATC250-48D12-03xxx)
Diagrams		
Schematics + PWB	5-01	PWB Layout with Spacings
Schematics + PWB	5-02	PWB Layout for model ATCR250-48D12-03XXX
Manuals	6-01	Operating manual
Miscellaneous	7-01	Dimensional drawing of Heatsink
Miscellaneous	7-02	Dimensional drawing of Insulator