

UL TEST REPORT AND PROCEDURE

Standard:	UL 62368-1, 2nd Ed, 2014-12-01 (Audio/video, information and communication technology equipment Part 1: Safety requirements) CAN/CSA C22.2 No. 62368-1-14, 2nd Ed, Issued: 2014-12-01 (Audio/video, information and communication technology equipment Part 1: Safety requirements)
Certification Type:	Component Recognition
CCN:	QQJQ2, QQJQ8 (Power Supplies for Use in Audio/Video, Information and Communication Technology Equipment)
Complementary CCN:	N/A
Product:	Modular Power Converter, ALPHA series
Model:	Alpha 400, Alpha 400W, MA400, CA400, Alpha-400, Alpha-400W, MA-400, CA-400 Alpha 600, CA600, Alpha 600W, Alpha-600, CA-600 Alpha 800, Alpha 800W, CA800 Alpha 1000, Alpha 1000W, CA1000 Alpha 1500, Alpha 1500W, CA1500 (see Model Differences for details of models and nomenclature)
Rating:	Alpha 400: 100 – 240Vac nominal, 7A max, 47-63Hz Alpha 600: 100 - 240Vac or 177-326Vdc nominal. 47-63Hz, 10Aac or 6Adc Alpha 800/1000: 94.5 - 240Vac nominal, 133-328Vdc nominal, 16Aac, 11Adc, 47-63Hz Alpha 1500: 94.4-240Vac nominal, 16A Max, 47-63 Hz Output: See Model Differences
Applicant Name and Address:	TDK-LAMBDA UK LTD KINGSLEY AVE ILFRACOMBE EX34 8ES UNITED KINGDOM

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 UL LLC ('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.

The applicant is authorized to reproduce the referenced Test Report provided it is reproduced in its entirety.

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 UL LLC (UL) or any authorized licensee of UL.

Prepared By: Piotr A. Bizunowicz / Project
Handler

Reviewed By: Hubert Koszewski / Reviewer

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 Alpha is a factory configurable modular switch mode power supply intended for building in to host equipment. The range covers the following: Alpha 400, Alpha 600, Alpha 800 (or Alpha 1000) and Alpha 1500 (there are non-standard variations to all ranges).

Model Differences

Refer to enclosure 7-03 for detail

Test Item Particulars

Classification of use by	Skilled person
Supply Connection	AC Mains DC Mains
Supply % Tolerance	+10%/-10%
Supply Connection – Type	to be determined in End Product (mating connector)
Considered current rating of protective device as part of building or equipment installation	20 A; building;
Equipment mobility	for building-in
Over voltage category (OVC)	OVC II
Class of equipment	Class I
Access location	N/A
Pollution degree (PD)	PD 2
Manufacturer's specified maximum operating ambient (°C)	50
IP protection class	IPX0
Power Systems	TN TT dc mains
Altitude during operation (m)	3000 m
Altitude of test laboratory (m)	64 m
Mass of equipment (kg)	max. 3.5

Technical Considerations

- The product was submitted and evaluated for use at the maximum ambient temperature (T_{ma}) permitted by the manufacturer's specification of : 50°C
- The product is intended for use on the following power systems : TN, TT, DC mains supply
- Considered current rating of protective device as part of the building installation (A) : 20
- Mains supply tolerance (%) or absolute mains supply values : +10%/-10%
- The equipment disconnect device is considered to be : Appliance inlet for models equipped with one, or evaluated in End Product for models with spade or screw connectors - compare Enclosure 7-03 "Model Differences".
- The following were investigated as part of the protective earthing/bonding : Printed wiring board trace (refer to Enclosure - Schematics + PWB for layouts)
- The Risk Group of a lamp or lamp system (including LEDs) is : Exempt
- The following are available from the Applicant upon request : Installation (Safety) Instructions / Manual, also in languages other than English, including French language for Canadian national difference.
- The product was investigated to the following additional standard : EN 62368-1:2014 + A11:2017, AS/NZS 62368.1:2018

Engineering Conditions of Acceptability

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

- The following product-line tests are conducted for this product : Earthing Continuity, Electric Strength
- The following output circuits are at ES1 energy levels : Refer to module description on Enclosure 7-03, section "Energy source levels and outputs connected in series"
- The following output circuits are at ES2 energy levels : Refer to module description on Enclosure 7-03, section "Energy source levels and outputs connected in series"
- The following output circuits are at PS3 energy levels : All outputs (by declaration)
- The maximum investigated branch circuit rating is : 20 A
- The investigated Pollution Degree is : 2
- Proper bonding to the end-product main protective earthing termination is : Required
- An investigation of the protective bonding terminals has : been conducted
- The following input terminals/connectors must be connected to the end-product supply neutral : "N"
- The following end-product enclosures are required : Electrical, Fire, Mechanical
- The following magnetic devices (e.g. transformers or inductor) are provided with an OBJ2 insulation system with the indicated rating greater than Class A (105°C) : Alpha 400: T205 (Class F); , Alpha 600: T203 (Class F); , Alpha 800/1000: T202 (Class F), T302 (Class F), T4/T1 (Class F or Class A optional – refer to CCL); , Alpha 1500: T202 (Class F), T302 (Class F);
- The following components require special consideration during end-product Thermal (Heating) tests due to the indicated maximum temperature measurements during component-level testing : Refer to enclosure 7-03 section "Derating"
- The equipment is suitable for direct connection to : AC mains supply,; DC mains supply for models with DC input rating.
- The power supply was evaluated to be used at altitudes up to : 3000m
- The end-product Electric Strength Test for the Alpha 400 is to be based upon a maximum working voltage of : Primary – Earthed Dead Metal: 291 Vrms / 400 Vpk, Primary-Secondary: 336 Vrms /864 Vpk
- The end-product Electric Strength Test for the Alpha 600 is to be based upon a maximum working voltage of : Primary – Earthed Dead Metal: 380 Vrms / 412 Vpk, Primary-Secondary: 406 Vrms / 728 Vpk
- The end-product Electric Strength Test for the Alpha 800/1000 is to be based upon a maximum working voltage of : Primary – Earthed Dead Metal: 360 Vrms / 384 Vpk, Primary-Secondary: 377 Vrms / 824Vpk
- The end-product Electric Strength Test for the Alpha 1500 is to be based upon a maximum working voltage of : Primary – Earthed Dead Metal: 284 Vrms / 384 Vpk, Primary-Secondary: 330 Vrms / 652 Vpk


Additional Information

The main transformers for this product (T205 Alpha 400, T203 Alpha 600, T202 & T302 Alpha 800/1000 and 1500) do not have an overall part number as some parts are listed in the bill of materials for the forward converters (primary windings, cores etc.) and others are listed in the bill of materials for individual modules (secondary's).

Additional Standards

The product fulfills the requirements of: IEC 62368-1:2014,
EN 62368-1:2014 + A11:2017,
AS/NZS 62368.1:2018,
UL 62368-1 2nd Edition, Issued December 1, 2014,
CSA CAN/CSA-C22.2 No. 62368-1 2nd Edition, Issued December 1, 2014

Markings and Instructions

Clause Title	Marking or Instruction Details
Equipment identification marking – Manufacturer identification	Listee's or Recognized companys name, Trade Name, Trademark or File Number
Equipment identification marking – model identification	Model Number
Equipment rating marking – ratings	"Input Ratings (voltage, frequency/dc, current/power)", "Output Ratings (voltage, frequency/dc, current/power)"
Fuses – replaceable by skilled person	(component ID: _____), Ratings (____A), "Ratings (____A, ____V)", and (symbol of required characteristics) located on or adjacent to fuse or fuseholder or in service manual.
Class I equipment -Terminal for main protective earthing	Provided adjacent to the main protective earthing terminal  (IEC 60417-5019)
Terminals for external primary power supply conductors	Capital letter "N" located adjacent to a terminal intended exclusively for connection of the primary power neutral conductor
Equipment for use in location where children are not likely to be presented	"This equipment is not suitable for use in locations where children are likely to be present" (Instruction)/"Cet équipement ne convient pas à une utilisation dans des lieux pouvant accueillir des enfants" (Instruction)

Special Instructions to UL Representative

N/A