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 (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:	Component AC-DC Power Supply
Model:	ZMS100-X/E/T/J CUS100MA-X/E/T/J Where: -X = Output Voltage (see Ratings tab) /E or blank /T or blank /J or blank May be additionally prefixed by SP and/or NS # followed by / or - (where # may be any number of characters)
Rating:	Input: 100 – 240 Vac; 47 – 63 Hz; 2.2 A max. Output: Forced air cooling: ZMS100-12: 12Vdc; 8.4A; 100.8W ZMS100-15: 15Vdc; 6.7A; 100.5W ZMS100-24: 24Vdc; 4.2A; 100.8W ZMS100-28: 28Vdc; 3.6A; 100.8W ZMS100-36: 36Vdc; 2.8A; 100.8W ZMS100-48: 48Vdc; 2.1A; 100.8W Convection cooling: ZMS100-12: 12Vdc; 6.7A; 80.4W ZMS100-15: 15Vdc; 5.4A; 81W ZMS100-24: 24Vdc; 3.4A; 81.6W ZMS100-28: 28Vdc; 2.9A; 81.2W ZMS100-36: 36Vdc; 2.25A; 81W ZMS100-48: 48Vdc; 1.67A; 80.2W
Applicant Name and Address:	TDK-LAMBDA UK LTD KINGSLEY AVE

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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: Grzegorz Goraj / Project Handler Reviewed By: Robert Dmitruk / 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 power supply is an open frame switch mode power supply for building-in.

Model Differences

All models are identical except the following differences.

All models provide different transformer construction. The secondary output windings have different number of turns to get different secondary output voltages.

12V and 15V models have an additional secondary winding (W4). This winding is not used for the other models. Winding W4 utilizes triple insulated wire, which provides reinforced insulation between the output contacts. Therefore, no short or overload was applied directly on the output contacts.

2 different PCB layouts are used: the 12V & 15V models share the same PCB layout, and the 24V, 28V, 36V and 48V models share the same PCB layouts.

The unit differences are also in electrical scheme due to different output voltages:

- 12V & 15V models have different values of resistors XR20, XR21, XR35 and XR42

- 24V, 28V, 36V and 48V models have different values of resistors XR20, XR21, XR5, XR41

The following components are glued to prevent movement:

- For 12V & 15V models: RT1, C5, C11, C7, C8, C9, C12, FE wire on PCB near C8, primary windings of transformer TX1 on PCB

- 24V, 28V, 36V and 48V models: RT1, C5, C6, C7, C8, C11, C2, FE wire on PCB near C2/C11, primary windings of transformer TX1 on PCB

All models have additional suffixes denoting the following options:

-X = Output Voltage (see Ratings tab)

/E = Curve B radiated for emc

/T = Earth fast-on terminal not fitted

/J = JST input and/or output connectors fitted

There are no differences except the following for models with prefixes SP and/or NS # followed by / or - (where # may be any number of characters indicating nonsafety related model differences).

Test Item Particulars

Classification of use by	Skilled person
Supply Connection	AC Mains

Supply % Tolerance	+10%/-10%
Supply Connection – Type	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 Class II
Access location	N/A
Pollution degree (PD)	PD 2
Manufacturer's specified maximum operating ambient	70°C with derating above 50°C (2,5%/°C) °C
IP protection class	IPX0
Power Systems	N/A
Altitude during operation (m)	5000 m
Altitude of test laboratory (m)	2000 m or less
Mass of equipment (kg)	0.15 kg

Technical Considerations

- The product was submitted and evaluated for use at the maximum ambient temperature (Tma) permitted by the manufacturer's specification of : 70°C (de-rating of the output power at 2.5% per °C from 50°C to 70°C)
- The product is intended for use on the following power systems : TN, TT
- 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 : provided in end-product
- SMPS complies with either class I or Class II construction (unit for building-in). End product consideration.

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 end-product Electric Strength Test is to be based upon a maximum working voltage of : Primary-Secondary: 273 Vrms/ 586 Vpk, Primary – Earthed Dead Metal: 276 Vrms/ 589 Vpk
- The following output circuits are at ES1 energy levels : All outputs
- The following output circuits are at PS3 energy levels : All outputs
- 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 (for class I end product)
- An investigation of the protective bonding terminals has : been conducted. Additional evaluation of quick-connect connector shall be considered when installed in class I end-product.
- The following end-product enclosures are required : Mechanical, Electrical, Fire
- 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) : TX1 (Class F/155°C)
- The equipment is suitable for direct connection to : AC mains supply
- The power supply was evaluated to be used at altitudes up to : "5,000 m"
- The power supply may be either forced air or convection cooled. Due to the fact that air flow for cooling depends on end product use, only convection cooling was considered during temperature measurement. Therefore additional tests shall be considered in end-product which may include temperature measurements during normal, abnormal and single fault conditions. Based on components used the following thermocouple locations and limits during normal operation may be considered but are not exclusive:
  L1 Common Mode Choke 155 (145 with TC on winding)
  C6, C7, C8 Electrolytic Capacitors 105
  C5 Electrolytic Capacitors 105
  C1 X Capacitor 100
  C2, C3, C4, C10, C11 Y Capacitors 125
  TX1 Transformer Winding 140 (130 with TC on winding)
  XU2, XU3, XU4 Opto-Coupler 110 ambient, 125 junction temperature
  J1 Input Connector 105
  J2 Output Connector 105
- Safety instructions shall be considered in end-product.
- This power supply may be used in Class I end-product construction.
  J3 protective bonding tab has to be reliably connected to main earthing terminal of end-product.
  Clearance and creepage in this assembly between AC Mains circuits and J3 tab are deemed to comply with Basic Insulation requirements.
  Evaluation of additional insulation, clearance and creepage is needed after installation in end-product.
- This power supply may be used in Class II end-product without Functional Earthing.
  J3 tab has to be left unconnected.
  Insulation, clearance and creepage has been evaluated in this assembly and is deemed to meet Reinforced Insulation between J3 tab and secondary circuits and meet Basic Insulation between J3 tab and AC Mains circuit.
  Evaluation of additional insulation, clearance and creepage is needed after installation in end-product.
- The power supply provides internally two fuses, one in line and one in neutral. Additional marking may be considered in end-product.

Additional Information

All models have been tested according to output rating except temperature measurements were not conducted for ratings with forced air flow. Additional testing shall be considered in end-product.