

## UL TEST REPORT AND PROCEDURE

<b>Standard:</b>	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)
<b>Certification Type:</b>	Component Recognition
<b>CCN:</b>	QQJQ2, QQJQ8 (Power Supplies for Use in Audio/Video, Information and Communication Technology Equipment)
<b>Complementary CCN:</b>	N/A
<b>Product:</b>	DC-To-DC Converters
<b>Model:</b>	iBD Series Model: iBD12***A%%V-###(-R)  where:  where *** represents rated output current between 0A - 7A. E.g. "007" means 7A where %%% represents rated output voltage between 0.8V - 5.5V. Note that the third digit is preceded by decimal point. 055 implies 5.5 Volts. where 0xx indicates a number or alphanumeric character which affects non-safety related features. Optional -R indicated optional RoHS compliance
<b>Rating:</b>	Optional Input: DC 6 V – 14 V (SELV) or DC 9.6 V – 14 V (SELV) Output: DC 0.8 V - 5.5 V (SELV), max. 7 A
<b>Applicant Name and Address:</b>	TDK-LAMBDA AMERICAS INC SUITE 100 3320 MATRIX DR RICHARDSON TX 75082 UNITED STATES

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: Mengis Tesfay / Project Handler      Reviewed By: Scott Shepler / 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 product consists of high density Non-Isolated Power Supply, DC-DC converter module. The converter is provided with input terminal pins for factory installation onto a printed wiring board with a connection to a dc source of supply and output terminal pins. Output voltage maybe adjusted by employing external trim resistor (connected between V-out trim terminal and ground terminal)

### Model Differences

Models covered within this series are identical except for output (with trip resistor) electrical rating.

### Test Item Particulars

Classification of use by	Instructed person
Supply Connection	External Circuit - not Mains connected ES1
Supply % Tolerance	None
Supply Connection – Type	No direct connection to Mains
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 III
Access location	N/A
Pollution degree (PD)	PD 2
Manufacturer's specified maximum operating ambient (°C)	25
IP protection class	IPX0
Power Systems	N/A
Altitude during operation (m)	2000 m or less
Altitude of test laboratory (m)	App 180 m
Mass of equipment (kg)	0.08

### Technical Considerations

- The product was submitted and evaluated for use at the maximum ambient temperature (T<sub>ma</sub>) permitted by the manufacturer's specification of : 25°C, Max. 105 °C at Q1
- The product is intended for use on the following power systems : No direct connection

- Considered current rating of protective device as part of the building installation (A) : No direct connection. An external input line in fuse with a max. value of 15 A is required.
- Mains supply tolerance (%) or absolute mains supply values : No direct connection
- The equipment disconnect device is considered to be : EUT is for building in
- The following are available from the Applicant upon request : Installation (Safety) Instructions / Manual
- The product was investigated to the following additional standard : EN 62368-1:2014 + A11:2017, BS EN 62368-1:2014 + A11:2017

### 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 output circuits are at ES1 energy levels : All
- The following output circuits are at PS3 energy levels : All output
- The maximum investigated branch circuit rating is : EUT is for building in
- The investigated Pollution Degree is : 2
- The following end-product enclosures are required : Fire, Electrical
- The following components require special consideration during end-product Thermal (Heating) tests due to the indicated maximum temperature measurements during component-level testing : The PWB is rated 105°C. ,
- The power supply was evaluated to be used at altitudes up to : "2,000 m"
- Heating Test shall be evaluated in end product.
- Classification of PIS has not been conducted. Therefore, all electrical components and conductors including printed wirings were assumed to be resistive PIS.
- Unit intended for building-in and supplied power from secondary circuit which is isolated from primary circuit by double or reinforced insulation.
- This DC-DC power converter module is non-isolating converter between input and output. If the input meets all requirements for ES1, then the output is also considered ES1.
- The units were tested with a maximum continuous output.
- The DC/DC converter are not internally fused. An external input line normal blow fuse with a maximum value of 15 A is required.
- The equipment shall be installed in compliance with the enclosure, mounting, spacing, casualty and segregation requirements of the end-use application.
- The power supply series provides functional insulation, between input and output.

### Additional Information

This report is based on VDE CB report, 210282-CI3-3, and CB Test Certificate Ref. CB DE1-56460 respectively, which was previously evaluated to UL/CSA/IEC 60950-1, 2nd edition, + Amendment 1, and Amendment 2. Testing conducted in accordance with IEC 60950-1:2005 (Second Edition), Am1:2009 + Am2:2013; UL 60950-1, 2nd Edition, 2014-10-14; and CAN/CSA C22.2 No. 60950-1-07, 2nd Edition, 2014-10, was deemed equivalent to test required by IEC62368-1, 2nd Edition, CAN/CSA-C22.2 NO. 62368-1 2nd Ed, Issued December 1, 2014, and UL 62368-1 2nd Ed, Issued December 1, 2014. Testing correlation explanation is provided in Enclosure.

All original sample and test dates are noted in the testing portion of this report. Construction review of submitted sample was conducted on 2021-01-05.

The nameplate included in the report is representative of all models covered under this report.

### Additional Standards

The product fulfills the requirements of: EN 62368-1:2014 + A11:2017  
BS EN 62368-1:2014 + A11:2017

<b>Markings and Instructions</b>	
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
<b>Special Instructions to UL Representative</b> N/A	

<b>BD1.0</b>						
<b>TABLE: Production-Line Testing Requirements</b>						
<b>BD1.1</b>						
<b>Electric Strength Test Special Constructions – Refer to Generic Inspection Instructions, Part AC for further information.</b>						
Model	Component	Removable parts	Test probe location	Test V rms	Test V dc	Test Time, s
N/A	--	--	--	--	--	--
<b>BD1.2</b>						
<b>Earthing Continuity Test Exemptions – This test is not required for the following models:</b>						
All Models						
<b>BD1.3</b>						
<b>Electric Strength Test Exemptions – This test is not required for the following models:</b>						
All Models						
<b>BD1.4</b>						
<b>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.</b>						
N/A						

<b>BE1.0</b>					
<b>Sample and Test Specifics for Follow-Up Tests at UL</b>					
Model	Component	Material	Test	Sample (s)	Test Specifics
N/A	-	-	-	-	-

4.1.2	TABLE: List of critical components					Pass
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Product Category CCN(s)	Mark(s) of conformity	Supplement ID
PWB	Interchangeable	Interchangeable	Min V-1, min 130°C	ZPMV2	UL	
Inductor/PWB	Interchangeable	Interchangeable	Inductor winding/trace Class A insulation, which is integrated within the PWB rated 130°C	Evaluated under this investigation	--	
Label (not shown)	Interchangeable	Interchangeable	Ink-stamped, silk- screened or self- adhesive suitable for surface to which applied, rated 40°C	PGDQ2	UL	

**Enclosures**

<b>Type</b>	<b>Supplement Id</b>	<b>Description</b>
Photographs	03-01	iBD series
Photographs	03-02	iBD series
Photographs	03-03	iBD Series
Diagrams	04-01	Component Layout
Schematics + PWB	05-01	Schematics
Schematics + PWB	05-02	PWB Trace Layout
Miscellaneous	07-01	Product Spec
Miscellaneous	07-02	Test correlation
Miscellaneous	07-03	Test Equipment List



**ENERGY SOURCE DIAGRAM**

Indicate which energy sources are included in the energy source diagram. Insert diagram below

**ES**     **PS**     **MS**     **TS**     **RS**

<b>ENERGY SOURCE IDENTIFICATION AND CLASSIFICATION TABLE:</b>	
(Note 1: Identify the following six (6) energy source forms based on the origin of the energy.) (Note 2: The identified classification e.g., ES2, TS1, should be with respect to its ability to cause pain or injury on the body or its ability to ignite a combustible material. Any energy source can be declared Class 3 as a worse case classification e.g. PS3, ES3.)	
<b>Electrically-caused injury (Clause 5):</b> (Note: Identify type of source, list sub-assembly or circuit designation and corresponding energy source classification) Example: +5 V dc input	
ES1	
Source of electrical energy	Corresponding classification (ES)
Input circuits (All Models)	ES1
Internal Circuits (All Models)	ES1
Output circuits (All Models)	ES1
<b>Electrically-caused fire (Clause 6):</b> (Note: List sub-assembly or circuit designation and corresponding energy source classification) Example: Battery pack (maximum 85 watts):	
PS2	
Source of power or PIS	Corresponding classification (PS)
All circuits	PS3 (declared)
<b>Injury caused by hazardous substances (Clause 7)</b> (Note: Specify hazardous chemicals, whether produces ozone or other chemical construction not addressed as part of the component evaluation.) Example: Liquid in filled component	
Glycol	
Source of hazardous substances	Corresponding chemical
N/A	-
<b>Mechanically-caused injury (Clause 8)</b> (Note: List moving part(s), fan, special installations, etc. & corresponding MS classification based on Table 35.) Example: Wall mount unit	
MS2	
Source of kinetic/mechanical energy	Corresponding classification (MS)
N/A	-
<b>Thermal burn injury (Clause 9)</b> (Note: Identify the surface or support, and corresponding energy source classification based on type of part, location, operating temperature and contact time in Table 38.) Example: Hand-held scanner – thermoplastic enclosure	
TS1	
Source of thermal energy	Corresponding classification (TS)
All circuits	TS3. For building in.
<b>Radiation (Clause 10)</b> (Note: List the types of radiation present in the product and the corresponding energy source classification.) Example: DVD – Class 1 Laser Product	
RS1	
Type of radiation	Corresponding classification (RS)
N/A	-