Test Report issued under the responsibility of:

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TEST REPORT
IEC 62368-1
Audio/video, information and communication technology equipment
Part 1: Safety requirements

Report Number .....:	31081075.300
Date of issue .....:	February 4, 2020
Total number of pages .....:	75 pages + Attachments
Applicant's name .....:	TDK-Lambda Americas Inc.
Address .....:	401 Mile of Cars Way, Suite 325, National City, CA, 91950 USA
Test specification:	
Standard .....:	IEC 62368-1:2014 (Second Edition)
Test procedure .....:	CB Scheme
Non-standard test method .....:	N/A
Test Report Form No. .....:	IEC62368_1B
Test Report Form(s) Originator .....:	UL(US)
Master TRF .....:	2014-03

This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

General disclaimer:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing CB Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.

Test Item description .....:		Switch Mode Power Supply	
Trade Mark .....:		TDK·Lambda	
Manufacturer.....:		Same as applicant	
Model/Type reference .....:		1) CPFE1000F-12, 2) CPFE1000F-28, 3) CPFE1000F-48	
Ratings .....:		Input: 100–240V, 50–60Hz (Operating Range 85–265V, 47–63Hz), 12A (CPFE1000F-12) / 16A (CPFE1000F-28, CPFE1000F-48) Output: 1) 9.6–14.4 (12) Vdc, 60 A, 720 W max 2) 22.4–33.6 (28) Vdc, 36 A, 1008 W max 3) 38.4–57.6 (48) Vdc, 21 A, 1008 W max	
Testing procedure and testing location:			
☐	CB Testing Laboratory:	TUV Rheinland of North America, Inc.	
Testing location/ address ..... :		1279 Quarry Lane, Ste. A, Pleasanton, CA 94566 USA	
☐	Associated CB Testing Laboratory:		
Testing location/ address..... :			
Tested by (name + signature) .....:			
Approved by (name + signature).....:			
☐	Testing procedure: TMP/CTF Stage 1		
Testing location/ address..... :			
Tested by (name + signature) .....:			
Approved by (name + signature).....:			
☒	Testing procedure: WMT/CTF Stage 2	TDK-Lambda Americas, Inc	
Testing location/ address..... :		401 Mile of Cars Way, Suite 325 National City, CA 91950	
Tested by (name + signature) .....:		Anthony Villasenor	
Witnessed by (name + signature) .....:		Dan Aquino	
Approved by (name + signature).....:		Chan Wang	
☐	Testing procedure: SMT/CTF Stage 3 or 4		
Testing location/ address..... :			
Tested by (name + signature) .....:			
Approved by (name + signature).....:			
Supervised by (name + signature) .....:			

List of Attachments (including a total number of pages in each attachment):

Attachment 1: National Differences (37 pages)
Attachment 2: Photos (6 pages)
Attachment 3: Schematics (1 page)
Attachment 4: PWB Component Layout (1 page)
Attachment 5: Power Supply CB Certificates (2 pages)

Summary of testing:

The test data was taken from the TUV CB report 31081075.001 which is in accordance with IEC 60950-1.

The product was tested on a bench top with full load which drew the output power to the max. rated value. Refer to body of report and appended tables for details of each test.

Tests performed (name of test and test clause):	**Testing location:**
31081075.300 Input Test (B.2.5) Electrical Strength Test (5.4.9) Safeguards Against Capacitor Discharge after Disconnection of a Capacitor (5.5.2.2) Touch Current Test (5.7.2) Simulated single fault conditions (B.4) Maximum operating temperatures for materials, components and systems (5.4.1.4, 6.3.2, 9.0, B.2.6) Limited Power Source (Q.1) Simulated Abnormal operating condition tests (B.3**)**	31081075.300 TDK-Lambda Americas, Inc. 401 Mile of Cars Way, Suite 325 National City, CA 91950
31081075.001 Input Test (B.2.5) Safeguards Against Capacitor Discharge after Disconnection of a Capacitor (5.5.2.2) Resistance of the protective bonding system (5.6.6) Maximum operating temperatures for materials, components and systems (5.4.1.4, 6.3.2, 9.0, B.2.6) Touch Current Test (5.7.2) Electrical Strength Test (5.4.9) Simulated single fault conditions (B.4) Simulated Abnormal operating condition tests (B.3**)** Power Supply Output Short-Circuit / Overload Test (5.3.7)	31081075.001 TDK-Lambda Americas, Inc. 401 Mile of Cars Way, Suite 325 National City, CA 91950

Summary of compliance with National Differences:
List of countries addressed

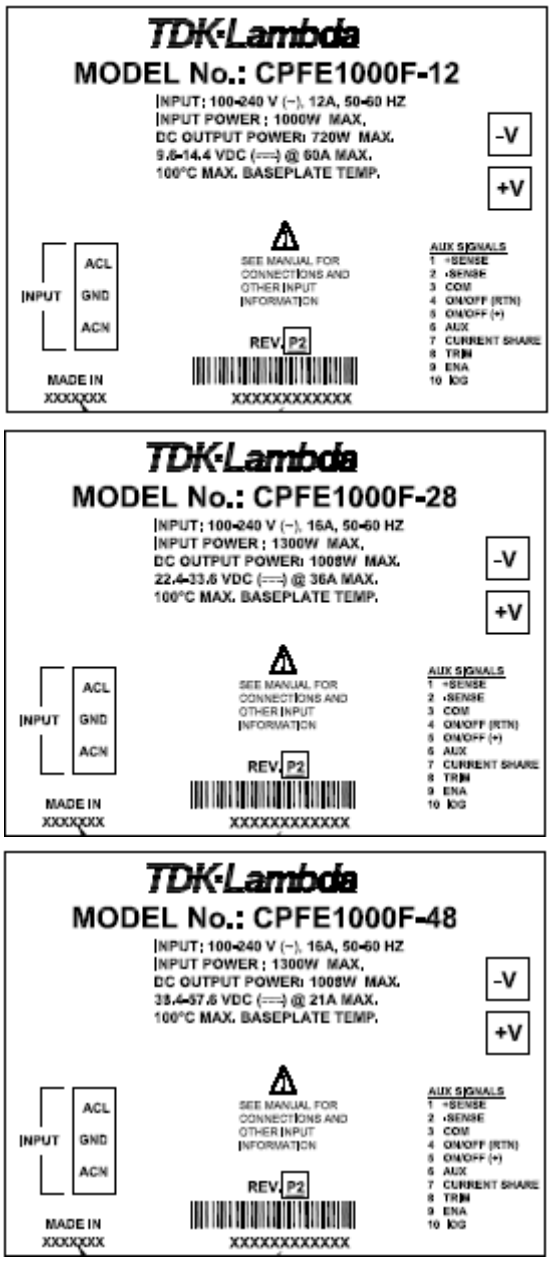
EU Group Differences, EU Special National Conditions, CA, DK, US, AU, NZ, IT, JP

Explanation of used codes: CA = Canada, DK = Denmark, US = United States of America, AU = Australia, NZ = New Zealand, IT = Italy, JP = Japan

☒ **The product fulfils the requirements of EN 62368-1:2014+A11:2017.**

Copy of marking plate:

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.



TEST ITEM PARTICULARS:	
Classification of use by ..... :	☐ Ordinary person ☒ Instructed person ☒ Skilled person ☐ Children likely to be present
Supply Connection..... :	☒ AC Mains ☐ DC Mains ☐ External Circuit - not Mains connected - ☐ ES1 ☐ ES2 ☒ ES3
Supply % Tolerance ..... :	☒ +10%/-10% ☐ +20%/-15% ☐ +____%/ -_____% ☐ None
Supply Connection – Type ..... :	☐ pluggable equipment type A - ☐ non-detachable supply cord ☐ appliance coupler ☐ direct plug-in ☐ mating connector ☐ pluggable equipment type B - ☐ non-detachable supply cord ☐ appliance coupler ☒ permanent connection ☐ mating connector ☐ other:_____
Considered current rating of protective device as part of building or equipment installation..... :	Not relying on protective device as part of the building installation, power supply has 90A circuit breakers for overcurrent protection. Installation location: ☒ building; ☐ equipment
Equipment mobility ..... :	☐ movable ☐ hand-held ☐ transportable ☐ stationary ☒ for building-in ☐ direct plug-in ☐ rack-mounting ☐ wall-mounted
Over voltage category (OVC) ..... :	☐ OVC I ☒ OVC II ☐ OVC III ☐ OVC IV ☐ other: _____
Class of equipment ..... :	☒ Class I ☐ Class II ☐ Class III
Access location ..... :	☐ restricted access location ☒ N/A Operator Accessible.
Pollution degree (PD) ..... :	☐ PD 1 ☒ PD 2 ☐ PD 3
Manufacturer's specified maxium operating ambient:	60°C
IP protection class ..... :	☒ IPX0 ☐ IP___
Power Systems ..... :	☒ TN ☐ TT ☐ IT - ____ V $_{L-L}$
Altitude during operation (m) ..... :	☐ 2000 m or less ☒ 3000 m
Altitude of test laboratory (m) ..... :	☐ 2000 m or less ☒ 3000 m
Mass of equipment (kg) ..... :	☒ 2.4 kg
POSSIBLE TEST CASE VERDICTS:	
- test case does not apply to the test object ..... :	N/A

- test object does meet the requirement ..... :	P (Pass)
- test object does not meet the requirement ..... :	F (Fail)
TESTING:	
Date of receipt of test item..... :	12/28/2020 (31081075.300) 05/24/2010 (31081075.001)
Date (s) of performance of tests ..... :	12/28/2020 (31081075.300) 05/24/2010-05/27/2010 (31081075.001)
GENERAL REMARKS:	
"(See Enclosure #)" refers to additional information appended to the report. **"(See appended table)" refers to a table appended to the report.** **Throughout this report a ☐ comma / ☒ point is used as the decimal separator.**	
Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:	
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided.....:	☒ **Yes** ☐ **Not applicable**
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies) :	TDK-LAMBDA MALAYSIA SDN BHD PLO33 Kawasan Perindustrian Senai 81400 Senai, Malaysia

GENERAL PRODUCT INFORMATION:

Product Description:

The equipment is a switch-mode power supply. All models are constructionally equivalent from a safety-critical standpoint and differ only in output voltage and current due to variations in output resistance values.

Conditions of Acceptability:

1. The units are considered to operate under the conditions of:
    a. Pollution Degree 2 environment
    b. Equipment mobility: Component for building-in.
    c. Class of equipment: Class I
2. Model CPFE1000F-12 maximum ambient at 60°C from 85 to 265 V ac input (Max baseplate temperature: 85°C)
3. Models CPFE1000F-28 and CPFE1000F-48 maximum ambient at 60°C from 170 to 265 V ac input, linearly de-rated to 50°C at 85 V ac input. (Max baseplate temperature: 85°C at 170 to 265 V ac operation, 70°C below 170 V ac operation)
4. Fire enclosure requirements must be addressed in the end-use product.
5. Re-evaluation of the heating, dielectric, and bonding tests need to conducted in the end-use product.
6. Short-circuit back-up protection in accordance with clause 2.7.3 shall be evaluated in end-use product.
7. Suitability of enclosure shall be provided in end product.
8. Power supply outputs are not investigated for limited power circuits

History of CB report:

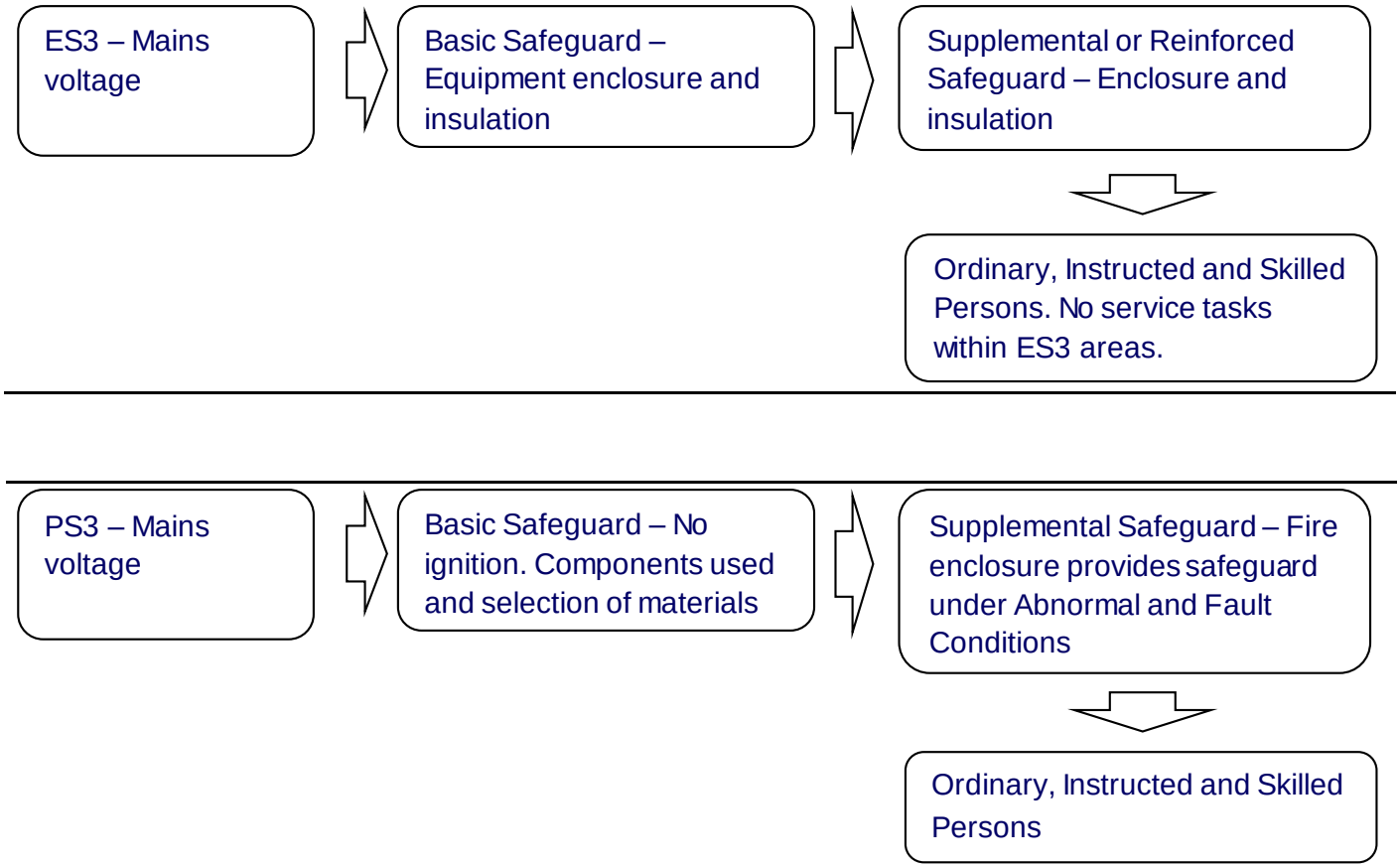
31081075.300 - Original IEC/EN 62368-1 CB report

ENERGY SOURCE IDENTIFICATION AND CLASSIFICATION TABLE:	
(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.	
Electrically-caused injury (Clause 5): (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)**
Primary circuit	ES3
Output circuit	ES1
Electrically-caused fire (Clause 6): (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)**
Power Supply Primary circuit	PS3
Power Supply Output circuit	PS3
Power Supply Output circuit, J2	PS2
Injury caused by hazardous substances (Clause 7) (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**
No hazardous substances present in the product.	N/A
Mechanically-caused injury (Clause 8) (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)**
Equipment Weight/Mass	MS3
Sharp Edges	MS1
Thermal burn injury (Clause 9) (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)**
Power Supply Enclosure	TS1
Radiation (Clause 10) (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)**
No ionizing radiation produced in the product.	N/A

ENERGY SOURCE DIAGRAM

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

☒ **ES** ☒ **PS** ☒ **MS** ☒ **TS** ☐ **RS**



OVERVIEW OF EMPLOYED SAFEGUARDS				
Clause	**Possible Hazard**			
5.1	Electrically-caused injury			
Body Part (e.g. Ordinary)	Energy Source (ES3: Primary Filter circuit)	Safeguards		
		Basic	Supplementary	Reinforced (Enclosure)
Ordinary	ES3: primary circuit	Enclosure	Earth	Insulation/ Enclosure
Ordinary	ES1: output circuit	Enclosure	Earth	Insulation/ Enclosure
6.1	Electrically-caused fire			
Material part (e.g. mouse enclosure)	Energy Source (PS2: 100 Watt circuit)	Safeguards		
		Basic	Supplementary	Reinforced
Input	PS3: Mains circuits	Components and selection of materials	Equipment Enclosure	Insulation/ Enclosure
Output	PS3: Output	Components and selection of materials	Equipment Enclosure	Insulation/ Enclosure
Output	PS2: Output, J2	Components and selection of materials	Equipment Enclosure	
7.1	Injury caused by hazardous substances			
Body Part (e.g., skilled)	Energy Source (hazardous material)	Safeguards		
		Basic	Supplementary	Reinforced
No hazardous substances present in the product.	-	-	-	-
8.1	Mechanically-caused injury			
Body Part (e.g. Ordinary)	Energy Source (MS3:High Pressure Lamp)	Safeguards		
		Basic	Supplementary	Reinforced (Enclosure)
Ordinary	MS3: Mass of Equipment	Enclosure	-	-
Ordinary	MS1: Sharp Edges	Enclosure	-	-
9.1	Thermal Burn			
Body Part (e.g., Ordinary)	Energy Source (TS2)	Safeguards		
		Basic	Supplementary	Reinforced
Ordinary	TS1: Accessible surfaces	Enclosure	-	-
10.1	Radiation			
Body Part (e.g., Ordinary)	Energy Source (Output from audio port)	Safeguards		
		Basic	Supplementary	Reinforced
No ionizing radiation produced in the product.	-	-	-	-
Supplementary Information: (1) See attached energy source diagram for additional details. (2) "N" – Normal Condition; "A" – Abnormal Condition; "S" Single Fault				