



Test Report issued under
the responsibility of:



**TEST REPORT
IEC 61010-1
Safety requirements for electrical equipment for measurement, control, and
laboratory use
Part 1: General requirements**

Report Reference No : E331788-A13-CB-1

Date of issue : 2013-07-22

Total number of pages : 19

CB Testing Laboratory : UL International Germany GmbH

Address : Admiral-Rosendahl-Strasse 23, 63263 Neu-Isenburg (Zeppelinheim),
Germany

Applicant's name : TDK-LAMBDA UK LTD

Address : KINGSLEY AVE
ILFRACOMBE
DEVON
EX34 8ES UNITED KINGDOM

Test specification:

Standard : IEC 61010-1:2010, 3rd Edition

Test procedure : CB Scheme

Non-standard test method : N/A

Test Report Form No. : IEC61010_1H

Test Report Form originator : VDE Testing and Certification Institute

Master TRF : 2011-11

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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	TDK-LAMBDA UK LTD KINGSLEY AVE ILFRACOMBE DEVON EX34 8ES UNITED KINGDOM
Model/Type reference	EFE300 or EFE-300 series. (may be followed by characters as described in Model Differences, see Model Differences for details)
Ratings	100-240 Vac nom, 45-440 Hz 4.7 Arms max (see Model Differences for details)

Testing procedure and testing location:	
<input type="checkbox"/> CB Testing Laboratory	Testing location / address
<input type="checkbox"/> Associated CB Test Laboratory	Testing location / address
	Tested by (name + signature)
	Approved by (name + signature).....
<input type="checkbox"/> Testing Procedure: TMP/CTF Stage 1	Testing location / address
	Tested by (name + signature)
	Approved by (name + signature).....
<input type="checkbox"/> Testing Procedure: WMT/CTF Stage 2	Testing location / address
	Tested by (name + signature)
	Witnessed by (name + signature) ..
	Approved by (name + signature).....
<input checked="" type="checkbox"/> Testing Procedure: SMT/CTF Stage 3 or 4	Testing location / address: TDK-LAMBDA UK LTD, Kingsley Avenue, Ilfracombe, Devon, EX34 8ES, UK
	Tested by (name + signature): N. S. Marsh 
	Approved by (name + signature).....: K. P. Tizzard 
	Supervised by (name + signature) .: Bartlomiej Zmijewski 
<input type="checkbox"/> Testing Procedure: RMT	Testing location / address
	Tested by (name + signature)
	Approved by (name + signature).....
	Supervised by (name + signature) .:

List of Attachments
National Differences (4 pages)
Enclosures (120 pages)
Summary of Testing:
No tests were conducted
Summary of Compliance with National Differences:

Issue Date: 2013-07-22
Amendment 1 2015-08-07

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Countries outside the CB Scheme membership may also accept this report.

List of countries addressed: AT, BE, CA, CH, CZ, DE, DK, FI, FR, GB, IL, IT, JP, NO, SE, SI, SK, US

The product fulfills the requirements of: UL 61010-1 3rd Ed., CAN/CSA 22.2 No. 61010-1-12 3rd Ed., EN61010-1:2010

Copy of Marking Plate - Refer to Enclosure titled Marking Plate for copy.

Test item particulars :	
Type of item tested	Laboratory
Description of equipment function	Switch mode power supply
Connections to mains supply	To be determined in the end use equipment
Overvoltage category	II
Pollution degree	2
Means of Protection	Class I (PE connected)
Environmental conditions	Normal
For use in wet locations	No
Equipment mobility	Built-in
Operating conditions	Continuous
Overall size of the equipment: (W X D X H) (mm) :	85 x 172 x 41 mm
Mass of the equipment (kg)	1kg max
Marked degree of protection to IEC 60529	none
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(s) of receipt of test item	N/A
Date(s) of Performance of tests	N/A
General remarks:	
"(see Enclosure #)" refers to additional information appended to the report.	
"(see Form A.xx)" refers to a table appended to the report.	
Bottom lines for measurement tables Form A.xx are optional if used as record.	
Throughout this report a point is used as the decimal separator.	
Manufacturer's Declaration per Sub Clause 4.2.5 of IEC60068-2-11:	
The application for obtaining a CB Test Certificate includes more than one factory 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	
When differences exist, they shall be identified in the General Product Information section.	
Name and address of Factory(ies):	TDK-LAMBDA UK LTD KINGSLEY AVE ILFRACOMBE DEVON EX34 8ES UNITED KINGDOM PANYU TRIO MICROTRONIC CO LTD

SHIJI INDUSTRIAL ESTATE
DONGYONG
NANSHA
GUANGZHOU GUANGDONG CHINA

GENERAL PRODUCT INFORMATION:

Report Summary

The original report was modified on 2015-08-07 to include the following changes/additions:

1. XU2 added as an alternative circuit reference for XU8.
2. Addition of single fuse nomenclature.
3. CCL updated and new certificates added to the critical component list.
4. Handbook updated.
5. Change of CBTL
6. Change of factory's name and address

Product Description

EFE300 or EFE-300 range. Switch mode power supplies for building into end equipment.

Model Differences

Nominal Input Voltage Range	100 - 240V AC
Maximum Input Voltage Range	85* - 264V AC
Input Frequency	45-440 Hz maximum
Maximum Input Current	4.7A rms

* Channel 1 output is linearly derated from 90Vac to 85Vac, 4W per volt to 280W.

All ratings apply for ambient temperatures up to 50°C. From 50 to 70°C the output power is derated at 2.5% per deg C.

Unit Configuration Code:

EFE300 or EFE-300x-a-bcde- f-g-hij

(may be prefixed by NS - # / where # may be any number of characters indicating non safety related model differences). Products may additionally be marked with U2x or Y2x where x can be any number of characters indicating non-safety related model differences.

where:

x=Nothing or J for Japanese models (may have non-safety differences)

a=Channel 1 Output Voltage: any voltage within the Adjustment Range for the Vout (nom) from the Output Table below, e.g. 12.8 for 12.8V output (12Vout nom), 24.6 for 24.6V output (24Vout nom).

b=CN for Open Frame with fan output , CU for U chassis with fan output, CC for U chassis and cover with fan output, EC for U chassis and cover with fan.

c=M for Molex input connector or equivalent, J for JST connector or equivalent.

d=D for dual fused input or L for single fuse in the live line.

e=S for Standard Leakage, L for Low Leakage, R for Reduced Leakage, T for Tiny Leakage.*

f=Nothing for horizontal output connector, V for vertical output connector.

g=Nothing for standard channel 1 output voltage, xD or xPD where D is for units with programmed negative load regulation, PD is for units with programmed positive load regulation, x is the voltage of the regulation in 100mVolts and is within the Output Adjustment range (example, 7D = 0.7V of negative load regulation,

24PD = 2.4V of positive load regulation).

hij=Three numbers from 0 to 9 which denotes various output voltage/current settings within the specified ranges of each output for a particular unit or blank for standard output settings. (may define non-safety related parameters/feature, e.g. reduced primary current limit, reduced OVP)

* Input frequencies above 63Hz, leakage current must be assessed in the end use application.

* L < 300uA leakage, R < 150uA leakage and T < 75uA leakage.

Output parameters:

O/P Channel	Vout nom (V).	Range (V)	Max O/P (A)	Max O/P (W)
CH1	12	11.4 - 13.2*	25	300 (400**)
	24	22.8 - 26.4*	12.5	300 (400**)
Fan output	12	Fixed	0.25	3

* Can be adjusted from nominal at the factory only

** Peak power of 400W for 10 seconds maximum, maximum rms power of 300W (see handbook for details)
Maximum continuous power output 300W (excluding fan output)

Output Limitations

All outputs are SELV

Additional Information

This report is a reissue of CBTR Ref No: E331788-A13-CB-1 dated 2013-07-22 and CB certificate No: DK-33895-UL, dated 2013-07-23. Based on the previously conducted testing and the review of product technical documentation including photos, schematics, wiring diagrams and similar, it has been determined that the product complies with the standard.

The original report was modified to include the following changes:

1. XU2 added as an alternative circuit reference for XU8.
2. Addition of single fuse nomenclature.
3. CCL updated and new certificates added to the critical component list.
4. Handbook updated.

Customer Air Cooling (CN, CU and CC options):

The following method must be used for determining the safe operation of PSUs. The components listed in the following table must not exceed the temperatures given. To determine the component temperatures the heating tests must be conducted in accordance with the requirements of the standard concerned.

Test requirements include: PSU to be fitted in its end-use equipment and operated under the most adverse conditions permitted in the end-use equipment handbook/specification and which will result in the highest temperatures in the PSU. To determine the most adverse conditions consideration should be given to the end use equipment maximum operating ambient, the PSU loading and input voltage, ventilation, end use equipment orientation, the position of doors & covers, etc. Temperatures should be monitored using type K fine wire thermocouples (secured with cyanoacrylate adhesive, or similar) placed on the hottest part of the component (out of any direct airflow) and the equipment should be run until all temperatures have stabilised.

Circuit Ref.	Description	Max. Temperature (°C)
J1	Input connector	75
L1, L2	Common mode choke winding	115 (130)
C7, C8	X capacitors	100
C9	Reservoir capacitor (electrolytic)	60 (105)
L3	Boost choke winding	115 (140)

TX2	Transformer winding	120 (130)
TX2	Transformer core	120 (130)
TX2	Transformer braid	120 (130)
U2	Optocoupler	75 (100)
C10, C11	Channel 1 output capacitors	80 (105)
L6	Primary choke (24V model only)	120 (130)
L4	Channel 1 Output choke	115 (130)
XU8/XU2	Fan regulator	115 (130)
XQ201	Boost FET (IMS board)	115 (130)
Q1	Channel 1 output FET (adjacent to R4)	115 (130)
XU3	Primary driver IC	100 (130)
Various	All other electrolytic capacitors	80 (105)

See layouts in the handbook for components to be monitored locations.
Higher temperatures limits (in brackets) may be used but product life may be reduced.

Technical Considerations

- Equipment classification: Professional, Commercial
- Equipment class: Class I
- Equipment type: For building in
- The product was submitted and tested for use at the maximum recommended ambient temperature (T_{mra}) of: 50°C (full load): 70°C maximum (output de-rated 2.5% /°C above 50°C)
- Evaluated for a maximum altitude of 3000m --
- Multi-layer PWBs accepted under CBTR Ref. No: E349607-A23 dated 2014-07-31 and letter report, Enclosure 8-05 of this report. --

Engineering Conditions of Acceptability

When installed in an end-product, consideration must be given to the following:

- This component has been judged on the basis of the creepage and clearances required in the indicated Standards, which would cover the component itself if submitted for Listing: UL 61010-1 3rd Ed., CAN/CSA 22.2 No. 61010-1-12 3rd Ed., IEC 61010-1 3rd Ed., EN 61010-1 3rd Ed.
- The end-product shall consider that: The enclosure does not serve as a fire/electrical/mechanical enclosure
- The need for the following shall be considered in the end-product: Bonding to protective earthing terminal (Class I construction), MAINS disconnect device
- The output connectors are: Not investigated for field wiring,
- Creepage and clearance distances were based on a maximum working voltage of: 392 V_{rms}; 762 V_{peak} Primary to Secondary , 392 V_{rms}; 668 V_{peak} Primary to Earth
- Insulation between primary circuits and accessible dead metal complies with the requirements for : Basic insulation
- Insulation between primary and secondary circuits complies with the requirements for: Reinforced insulation
- The following tests shall be performed in the end-product evaluation: Dielectric Strength, Temperature (customer air models)
- The unit is considered acceptable for use at on a max branch circuit of: 20 A
- The unit is considered acceptable for use in a max ambient of: 50°C (full load): 70°C maximum

(output de-rated 2.5% /°C above 50°C)

- End-product temperature tests for power supplies shall consider that the following transformers employ the indicated insulation system: Transformer TX2, Class F (155 °C)
- End-product dielectric strength tests shall be based on the maximum working voltage of: 392 Vrms; 762 Vpeak Primary to Secondary , 392 Vrms; 668 Vpeak Primary to Earth
- At input frequencies above 63Hz Clause 6.4.4a requires investigation in the end application --
- Customer air models must be thermally tested as described in the Additional Information --
- Input connector is: Not investigated for field wiring --
- Input connector J2 pin 1 was investigated as the protective bonding terminal for the product --
- The risk associated with clause 5.4.5 requires assessment in the end equipment --