Test Report issued under the responsibility of:

TEST REPORT
IEC 60950-1
Information technology equipment - Safety - Part 1: General requirements

Report Reference No ..... :	E135494-A34-CB-5
Date of issue ..... :	2015-04-14
Total number of pages ..... :	93
CB Testing Laboratory ..... :	UL International Demko A/S
Address ..... :	Borupvang 5A, 2750 Ballerup, Denmark
Applicant's name ..... :	TDK-LAMBDA UK LTD
Address ..... :	KINGSLEY AVE ILFRACOMBE DEVON EX34 8ES UNITED KINGDOM
Test specification:	
Standard ..... :	IEC 60950-1:2005 (Second Edition); Am1:2009 + Am2:2013
Test procedure ..... :	CB Scheme
Non-standard test method ..... :	N/A
Test Report Form No. ..... :	IEC60950_1F
Test Report Form originator ..... :	SGS Fimko Ltd
Master TRF ..... :	Dated 2014-02

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 ..... :	TDK-LAMBDA UK LTD KINGSLEY AVE ILFRACOMBE DEVON EX34 8ES UNITED KINGDOM
Model/Type reference ..... :	EFE300M Series or EFE-300M Series (see model differences for details of models and nomenclature)
Ratings ..... :	100-240Vac nom, 4.9Arms max, 45-440Hz (optional) 133-318Vdc nom, 3.5Adc max (optional) (See model differences for details of ratings)

Testing procedure and testing location:		
[ ]	**CB Testing Laboratory**	
	Testing location / address .....:	
[ ]	**Associated CB Test 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**	
	Testing location / address .....:	
	Tested by (name + signature) .....:	
	Witnessed by (name + signature) ..:	
	Approved by (name + signature)....:	
[x]	**Testing Procedure: SMT/CTF Stage 3 or 4**	
	Testing location / address .....:	TDK-Lambda UK. Ltd, Kingsley Avenue, Ilfracombe, EX34 8ES
	Tested by (name + signature) .....:	N. S. Marsh, S. Hirstwood 
	Approved by (name + signature)....:	K. P. Tizzard 
	Supervised by (name + signature) .:	Onome Sanomi 
[ ]	**Testing Procedure: RMT**	
	Testing location / address .....:	
	Tested by (name + signature) .....:	
	Approved by (name + signature)....:	
	Supervised by (name + signature) .:	

List of Attachments
National Differences (57 pages)
Enclosures (213 pages)
Summary Of Testing Unless otherwise indicated, all tests were conducted at TDK-Lambda UK. Ltd, Kingsley Avenue, Ilfracombe, EX34 8ES.
Tests performed (name of test and test clause) **Testing location / Comments**

End Product Reference Page

General Guidelines

Heating (4.5.1, 1.4.12, 1.4.13)

Component Failure (5.3.1, 5.3.4, 5.3.7)

Summary of Compliance with National Differences:

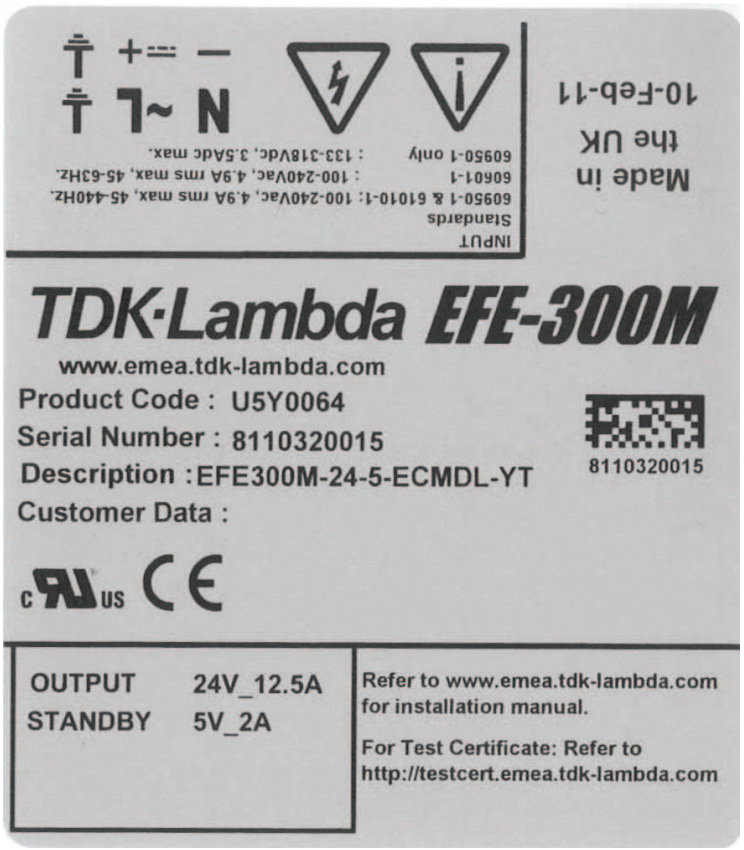
Countries outside the CB Scheme membership may also accept this report.

List of countries addressed: AR, AT, AU, BE, BG, BY, CA, CH, CN, CS, CZ, DE, DK, ES, EU, FI, FR, GB, GR, HU, IE, IL, IN, IT, JP, KR, MY, NL, NO, NZ, PL, PT, RO, SA, SE, SI, SK, UA, US, ZA

The product fulfills the requirements of: CSA C22.2 No. 60950-1-07 revision date 2014/10/14, EN 60950-1:2006 + A1:2010 + A11:2009 + A12:2011+A2:2013, UL 60950-1 2nd Ed. Revised 2014/10/14

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 :	
Equipment mobility ..... :	for building-in
Connection to the mains ..... :	Connection to mains via host equipment
Operating condition ..... :	continuous
Access location ..... :	for building-in
Over voltage category (OVC) ..... :	OVC II
Mains supply tolerance (%) or absolute mains supply values ..... :	+10%, -10% (AC), or 120-350Vdc
Tested for IT power systems ..... :	Yes - Norway only
IT testing, phase-phase voltage (V) ..... :	230V
Class of equipment ..... :	Class I (earthed)
Considered current rating of protective device as part of the building installation (A) ..... :	20A
Pollution degree (PD) ..... :	PD 2
IP protection class ..... :	IP X0
Altitude of operation (m) ..... :	5000m
Altitude of test laboratory (m) ..... :	64m
Mass of equipment (kg) ..... :	1kg max.
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 ..... :	2014-12-03 to 2015-01-05
Date(s) of Performance of tests ..... :	2014-12-09 to 2015-01-07
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 point is used as the decimal separator.	
Manufacturer's Declaration per Sub Clause 4.2.5 of IECEE 02:	Yes
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 EX34 8ES UNITED KINGDOM PANYU TRIO MICROTRONIC CO LTD

SHIJI INDUSTRIAL ESTATE
DONGYONG
NANSHA
GUANGZHOU
GUANGDONG CHINA

TDK-LAMBDA CORP
2704-1 SETTAYA-MACHI
NAGAOKA-SHI
NIIGATA-KEN 940-1195 JAPAN

GENERAL PRODUCT INFORMATION:

Report Summary

All applicable tests according to the referenced standard(s) have been carried out.

Product Description

EFE300M series. Switch mode power supplies for building into end equipment.

Model Differences

Nominal Input Voltage Range	100 - 240V AC or 133 - 318VDC
Maximum Input Voltage Range	90** - 264V AC or 120 - 350VDC
Input Frequency	45-440* Hz maximum or DC
Maximum Input Current	4.9A rms or 3.5A DC

** 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.

EFE300M or -EFE300M models as described below:
(may be prefixed by NS - # / where # may be any characters indicating non safety related model differences)
Products may additionally be marked with U5x or Y5x where x can be any characters indicating non-safety related model differences excluding itemized models shown below.

Unit Configuration Code: EFE300Mxy-a-b-cdef-ghijk
where:

x= Nothing or J for Japanese models (may have non-safety differences).
Y= Blank for Y2 capacitors from output to earth, P for Y1 capacitors from output to earth.
a= Channel 1 output Voltage: see Ch1 in the outputs table below, adjustment range column.
b= Standby voltage: see standby voltage table below or 0 for omitted
c= HN for Open frame, no fan, with 12V / 1A fan supply. HU for U chassis, no fan, with 12V / 1A fan supply. HC for Cover + chassis, no fan, with 12V / 1A fan supply. EC for Cover + chassis, end fan (temp controlled). NN for Open frame, no fan, no fan supply. NU for U chassis, no fan, no fan supply. NC for Cover + chassis, no fan, no fan supply. CN for Open frame, no fan, with 12V / 0.25A fan supply. CU for U chassis, no fan, with 12V / 0.25A fan supply. CC for Cover + chassis, no fan, with 12V / 0.25A fan supply.
d= M for Molex input connector or equivalent, J for JST connector or equivalent.
e= D for dual fused input or L for single fuse in the live line.
f= S for standard Leakage, L for low Leakage, R for reduced Leakage, T for tiny Leakage. *

g= Y for Oring FET included or N for nothing.
h= E for enable, T for inhibit, N for no inhibit, no enable.
i= Nothing for horizontal output connector, -V for vertical output connector, -S for screw terminal
j= 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).
k= Nothing or -x where x is 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)

* At 440Hz, leakage current is > 3.5mA and therefore 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**)
	28	27 - 32*	10.72	300 (400**)
	40	36 - 42*	7.5	300 (350***)
	48	47 - 50*	6.25	300 (350***)
	50	50.1 - 54*	6.0	300 (350***)
Standby	5	Fixed	2	10
	12	12	1	12
	13.5	12-13.5*	1	13.5
Fan output	12	Fixed	0.25	3
	12	Fixed	1	12

* Can be adjusted from nominal at the factory only.
** Peak power of 400W for 10 seconds maximum, maximum rms power of 300W:
*** Peak power of 350W for 10 seconds maximum, in any 1 minute cycle, maximum rms power of 300W:

where T1 = peak power time on
and T2 = reduced power time on

Maximum continuous power output 300W (excluding fan output)

Output Limitations

All standard outputs are SELV up to and including 48V nominal. Voltages above 48V nominal are non SELV and must not be accessible to an end operator..
All outputs have basic spacings to earth, and due consideration must be given to this in the end product design, except for Y50029# which has functional spacings to earth.

Non Standard models.

Model: Y5J008# (where # can be any letter) or EFE300MJ-12.1-5-008 or EFE300MJ-12.1-5-008-SGP
Maximum outputs: 12.1V, 21.49A, plus 5V, 2A standby.
Maximum ambient: As standard model.
Orientations: As standard model.
Comments: Fan speed is controlled at 6600rpm up to and between 45 to 50 degrees C ambient after which

the fan resumes its normal nominal voltage rating. Can be fitted with or without fan guard.

Model: Y5J006# (where # can be any letter) or EFE300MJ-12-5-006.
Maximum outputs: 11.4V to 13.2V*, 25A, (300W max) plus 5V, 2A standby.
Maximum ambient: As standard model.
Orientations: As standard model.
Comments: Longer version than standard model to accommodate additional reservoir capacitor for a greater hold up time.

Model: Y5J015# (where # can be any letter) or EFE300MJ-12.1-5-009 or EFE300MJ-12.1-5-009-SGP
Maximum outputs: 12.1V, 24.79A plus 5V, 2A standby.
Main output may also be 11.4 to 13.2V at 25A max. limited to 300W max.
Maximum ambient: As standard model.
Orientations: As standard model.
Comments: Model is the same as Y5J008# but is a NN.

Model Y50016# (where # can be any letter), NS-TLA/EFE300M-48.5-12-HNMDL-YE-V
Maximum outputs: 47-54V, 6.25A 300W max, plus 12V, 1A standby plus 12V, 1A fan output.
Maximum ambient: As standard model.
Orientations: As standard model.
Comments: OCP raised by 5% compared to the standard model.

Model Y50018# (where # can be any letter), NS-TLG/EFE300M-54-5-ECMDL-YT
Maximum outputs: 54V 5.5A, plus 5V, 2A standby.
Maximum ambient: As standard model.
Orientations: As standard model.
Comments: Extended U chassis with non-standard OVP to maintain SELV

Model Y50029# (where # can be any letter except E), EFE300M-13-5-HNMDS-NT-S/NS-TLA
Maximum outputs: As standard model
Maximum ambient: As standard model.
Orientations: As standard model.
Comments: Elongated PWB to accommodate additional filtering components.

Model Y50029E, EFE300M-13-5-HNMDS-NT-S/NS-TLA
Maximum outputs: As standard model
Maximum ambient: As standard model.
Orientations: As standard model.
Comments: Based on Y50029# but with a larger value boost capacitor, up to a value of 220 micro-farads, for a better hold up time.

Additional Information

This report to include IEC60950-1 amendment 2:2013, is a reissue of CBTR Ref. No: E135494-A34-CB-4 dated 2014-07-01 including amendments and corrections with CB certificate Ref. No:DK-39587-UL and DK-39588-UL dated 2014-07-01.

Based on previously conducted testing and the review/update of product technical documentation including photos, schematics, wiring diagrams and similar, it has been determined that the product continues to comply with the standard only the tests listed below, completed under the active CTF Stage 3 program were deemed necessary.

This re-issue also covers the following:

1. Alternate fan
2 Standby voltage 12-13.5V is now a range with the nomenclature kept for legacy purposes.
3. 60950-1 2nd edition revision date 2014/10/14
4. Addition/deletion and new certificates for the critical components list.
5. Added two new transformer part numbers and drawings.
TX1: 230130 is Identical to the other TX1 transformers used for standard models but includes an additional comment for Sony models Y5J008# and Y5J015#.
TX2: 230129 is identical to the other TX2 transformers used for standard models but includes an additional comment for Sony models Y5J008# and Y5J015#.
6. Addition of Non-standard Y50029E. No additional testing required as previous tests for Y5J006# are sufficient.
7. Change of factory name from Trio Engineering Co Ltd to Panyu Trio Microtronic Co Ltd

Technical Considerations

- Equipment was evaluated for a maximum supply range of 85-264Vac and 120-350Vdc --
- The equipment was evaluated for operation at a maximum altitude of 5 000m. The requirements of IEC60664-1 table A.2 were applied for calculating the required clearances. --
- The 50V module is the 48V module, factory preset to 50V nominal output. Testing has been conducted on the 48V model at the worst case conditions including up to 54V output. --
- The product was investigated to the following additional standards: EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 +A2:2013 (which includes all European national differences, including those specified in this test report). --
- The product was submitted and evaluated for use at the maximum ambient temperature (Tma) permitted by the manufacturer's specification of: 50°C (full load); 70°C (output power decreasing linearly by 2.5%/°C above 50°C) --
- The product is intended for use on the following power systems: IT (Norway only), TN, DC mains supply --
- The following were investigated as part of the protective earthing/bonding: Printed wiring board trace (refer to Enclosure - Schematics + PWB for layouts) --
- The following are available from the Applicant upon request: Installation (Safety) Instructions / Manual --
- The equipment disconnect device is considered to be: Provided by the end equipment --
- Multi-layer PWB's acceped under CBTR ref. No. E349607-A23 dated 2014-07-31 and letter report in Enclosure 8-06 of this report. --

Engineering Conditions of Acceptability

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

- When operated at frequencies in excess of 63Hz, the requirements of clause 5.1.7 must be considered in the end use equipment as the leakage current for input frequencies above 63Hz may exceed 3.5mA. --
- The 48V output is SELV, but due to component tolerances consideration should be given to verifying this in the end-use equipment except for Model EFE300M-54-5-ECMDL-YT (Y50018A) which does meet SELV limits. --
- The following Production-Line tests are conducted for this product: Electric Strength Earthing

Continuity --

- The end-product Electric Strength Test is to be based upon a maximum working voltage of: Primary-SELV: 408 Vrms, 880 Vpk Primary-Earthed Dead Metal: 392 Vrms, 668 Vpk --
- The following secondary output circuits are SELV: All standard models up to and including 48V nominal. Voltages above 48V nominal are non SELV and must not be accessible to an end operator. --
- The following secondary output circuits are at hazardous energy levels: Channel 1 output --
- The power supply terminals and/or connectors are: Suitable for factory wiring only --
- 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 magnetic devices (e.g. transformers or inductor) are provided with an OBJY3 insulation system with the indicated rating greater than Class A (105°C): Transformers TX1 & TX2: Class F (140°C) - See table 1.5.1 for details of insulation systems used. --
- The following end-product enclosures are required: Mechanical, 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: Input connector J1 (75°C), Common mode choke winding L1, L2 (140°C mounted on Nema PWB material), X capacitors C7, C8 (100°C), Reservoir capacitor C9 (105°C), Boost choke winding L3 (140°C), Transformer winding TX1 (130°C), Transformer core TX1 (130°C), Transformer winding TX2 (130°C), Transformer core TX2 (130°C), Transformer braid (to pin 13) TX2 (130°C), Optocoupler U2, U4, U5, U6 (100°C), Channel 1 output capacitors C10, C11 (105°C), Primary choke (excluding 12V model) L6 (140°C mounted on Nema), Channel 1 Output choke L4 (140°C mounted on Nema), Fan regulator XU602 (125°C minimum coating rating), Boost FET (IMS board) XQ201 (125°C minimum coating rating), Channel 1 output FET (adjacent to R4) Q1,Q2 or Q5 (125°C minimum coating rating), Primary driver IC XU3 (125°C minimum coating rating), All other electrolytic capacitors (105°C) --
- Fans: The fan provided in this sub-assembly is provided with a fan guard to reduce the risk of operator contact with the rotor., The fan provided in this sub-assembly is not intended for operator access. --

Abbreviations used in the report:

- normal condition	N.C.	- single fault condition	S.F.C
- operational insulation	OP	- basic insulation	BI
- basic insulation between parts of opposite polarity:	BOP	- supplementary insulation	SI
- double insulation	DI	- reinforced insulation	RI

Indicate used abbreviations (if any)