

UL TEST REPORT AND PROCEDURE

Standard:	UL 61010-1, 3rd Edition, 2012-05-11 (ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL, AND LABORATORY USE - Part 1: General Requirements) CAN/CSA-C22.2 No. 61010-1, 3rd Edition, 2012-05, (ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL, AND LABORATORY USE - Part 1: General Requirements)
Certification Type:	Component Recognition
CCN:	QQHC2, QQHC8 (Power Supplies for Measurement, Control and Laboratory Use)
Product:	Switch Mode Power Supply
Model:	EFE300M Series (EFE300Mxy-a-b-cdef-ghijk) or Y5J008# or Y5J006# (where # can be any letter) (see model differences for details of models and nomenclature)
Rating:	100-240Vac nom, 4.9A rms max, 45-440Hz (See model differences for details of ratings)
Applicant Name and Address:	TDK-LAMBDA UK LTD KINGSLEY AVE ILFRACOMBE DEVON EX34 8ES 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.

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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

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

Model Differences

Nominal Input Voltage Range	100 - 240V AC
Maximum Input Voltage Range	90** - 264V AC
Input Frequency	45-440* Hz maximum
Maximum Input Current	4.9A 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.

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.

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.	Range (V)	O/P Current (A)	Max O/P Power (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	12-13.5*	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# (60950-1 approved model) 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 may also include a without fan and open frame type.

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.

Technical Considerations

- Type of item tested : Laboratory
- Description of equipment function : Switch Mode Power Supply for building in.
- Connections to mains supply : None
- 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) : 164mm x 85mm x 41mm maximum
- Mass of the equipment (kg) : 1kg maximum
- Marked degree of protection to IEC 60529 : None
- Equipment classification: Commercial, Professional
- Equipment class: Class I
- Equipment type: For building in
- The product was submitted and tested for use at the maximum recommended ambient temperature (Tmra) of: 50°C maximum load, 70°C reduced load.

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:

- 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 61010-1:2010 3rd Ed., EN 61010-1:2010.
- 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)
- The output connectors are: Not investigated for field wiring
- Creepage and clearance distances were based on a maximum working voltage of: Primary to earth dead metal: 668Vpeak, 348Vrms., Primary to secondary: 880Vpeak, 408Vrms.
- 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 test in

accordance with the handbook., Temperature test for customer air models.,

- The unit is considered acceptable for use at on a max branch circuit of: 20A
- The unit is considered acceptable for use in a max ambient of: 50°C maximum load, 70°C reduced load.
- End-product temperature tests for power supplies shall consider that the following transformers employ the indicated insulation system: Transformer Tx1, Class F (155°C)., Transformer Tx2, Class F (155°C).
- End-product dielectric strength tests shall be based on the maximum working voltage of: Primary to earth dead metal: 668Vpeak, 348Vrms., Primary to secondary: 880Vpeak, 408Vrms.
- The leakage current tests have been provided for information only. This test must be considered in the end product application and must be repeated for frequencies above 63Hz.
- This product has been assessed for a maximum altitude of 5000m
- The risk associated with clause 5.4.5 shall be assessed in the end product.
- Multi-layer PWBs accepted under CBTR Ref. No: E349607-A23 dated 2014-07-31 and letter report in Enclosure 8-03 of this report.

Additional Information

This report is a reissue of CBTR Ref. No: E331788-A16-CB1 dated 2013-07-25 and CB certificate DK-33970-UL dated 2013-07-25. Based on the previously conducted testing, limited testing for this report 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 has been modified for the following:

1) Addition/deletion to the critical components list and new certificates.

2) 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 Y5J0015#.

TX2: 230129 is identical to the other TX2 transformers used for standard models but includes an additional comment for Sony models Y5J008# and Y5J015#.

3) Alternate fan.

4) Alternative fuse testing (not mains input fuse)

5) CBTL updated from UK to UL international Demko A/S.

Additional Standards

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