Underwriters Laboratories (UL LLC)
Safety Certification Body (CB) Report

Model:	EFE300 or EFE-300 series. (may be followed by characters as described in Model Differences, see Model Differences for details)
Device Description:	Switch mode power supply
Applicant:	TDK-LAMBDA UK LTD KINGSLEY AVE ILFRACOMBE DEVON EX34 8ES UNITED KINGDOM
Manufacturer:	Same as Applicant
Manufacturing Facility(ies):	Same as Applicant PANYU TRIO MICROTRONIC CO LTD SHIJI INDUSTRIAL ESTATE DONGYONG, NANSHA GUANGZHOU GUANGDONG CHINA TRIO-TRONICS (THAILAND) LTD. 7/295 MU.6, MAP YANG PHON SUB-DISTRICT, PLUAK DAENG DISTRICT RAYONG PROVINCE THAILAND TDK-LAMBDA CORP 2704-1 SETTAYA-MACHI NAGAOKA-SHI, NIIGATA-KEN, 940-1195 Japan
Report No.:	E331788-D1004-2/A3/C0-CB
Report (Re)Issue Date:	2021-11-16, 2022-09-06 (A1); 2023-12-04 (A2); 2024-01-09 (A3)
Base Standard(s):	IEC 61010-1:2010/AMD1:2016/COR1:2019
Additional Standards:	-
Report Types:	This report consists of the following report types: - CB Report & Certificate

This report covers the Safety evaluation of the referenced model(s) according to the standard(s) specified above.

The **CB Certificate** is provided as a separate enclosure to this report and not provided in the body of this report.

Table of Contents

Report Modifications Summary

The following changes were made to this report. If none listed in the below table, this report is the originally issued report.

The following scheme is used throughout this report to reflect the **Report No.**:

(File No.) – (Report Ref. No.) – (x) / A(y) / C(z) – YYY, where:
(x) = Report (Re)Issue No.
(y) = Amendment No.
(z) = Correction No.
YYY = Report Type (UL/CB/IEC)

*NOTE: The **CB Certificate** may not be updated for report corrections that don't affect the CB Certificate contents; therefore if this report includes a correction number (z), it may not be reflected in the CB Certificate.*

Date Modified *(Year-Month-Day)*	Modifications Made (include Report Reference Number)	Modified By
2019-09-06	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 including E331788-A13-CB-1 Amendment 1 dated 2015-08-07 and CB Certificate No.: DK-33895-A1-UL issued on 2015-08-14. 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 with limited testing being required. The original report was modified to include the following changes: 1. Modification of base PWB to accommodate an additional 2x discharge resistors with relevant testing to show continued compliance. 2. Updates to the LoCC. 3. Updates to the enclosures. 4. Addition of a new fan. 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	Luca Benini

	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.	
2020-08-20	This report is an technical amendment of CBTR Ref. No. E331788-D1004-1/A0/C0-ULCB issued on 2019-09-06, CB Test Certificate Ref. No. DK-87639-UL. Based on the previously conducted testing and the review of product technical documentation including photos, schematics, wiring diagrams and similar, has been determined that the product continues to comply with the standard. The original report was modified to include the following changes: - Addition of alternate discharge resistors XR54, XR55, rated 180 kOhm	Markus Schlosser
2021-11-16	This report is an technical amendment 2 of CBTR Ref. No. E331788-D1004-1/A0/C0-ULCB issued on 2019-09-06, CB Test Certificate Ref. No. DK-87639-UL and CBTR Ref. No. E331788-D1004-1/A1/C0-ULCB and CB Test Certificate Ref. No. DK-87639-M1-UL . Based on the previously conducted testing and the review of product technical documentation including photos, schematics, wiring diagrams and similar, has been determined that the product continues to comply with the standard. No tests conducted under this investigation due to reissue of CB Test Report Ref. No. E331788-D1004-1/A1/C0-ULCB. All required tests were carried out under the original investigation This report is a reissue of CBTR Ref. No. E331788-D1004-1/A0/C0-ULCB issued on 2019-09-06, CB Test Certificate Ref. No. DK-87639-UL and CBTR Ref. No. E331788-D1004-1/A1/C0-ULCB and CB Test Certificate Ref. No. DK-87639-M1-UL. Based on the previously conducted testing and the review of product technical documentation including photos, schematics, wiring diagrams and similar, has been determined	Marcin Zurek

	that the product continues to comply with the standard. The original report was modified to include the following changes: - The standard has been upgraded to the latest revision date. - Standards were updated on critical component list - Components licenses were attached to the report - Factory TRIO-TRONICS (THAILAND) LTD. was added to the report - Capacitor Murata SA series with the same electrical ratings has been added as alternate to critical component list. No testing was deemed necessary.	
2022-09-06	This report is Administrative Amendment of CBTR Ref. No. E331788-D1004-2/A0/C0-ULCB. The report was modified to include the following changes: - Factory TDK-LAMBDA CORP was added to the report Based on the previously conducted testing and the review of product technical documentation including photos, schematics, wiring diagrams and similar, has been determined that the product continues to comply with the standard. No testing was deemed necessary.	Grzegorz Kowalski
2023-12-04	Technical Amendment 2: This is a technical amendment of CBTR Ref. No. E331788-D1004-2/A1/C0-CB dated 2022-09-06, CB test certificate Ref. No. DK-120985-A1-UL dated 2022-09-07. This report was issued to include the following modifications: 1) addition of series connection (outputs' connection) 2) correction of CB certification for the following component in CCL: - J1 input connector (Alternative 2), Japan Solderless Terminal MFG Co. ,VH series, - Fuse F1 (two fuses), Littelfuse, 216 series, - Fuse F1 (alternative), Littelfuse, 477 Series, - C7 and C8 X Capacitors (Optional), Kemet, PHE840MB Series and R.46 Series, - C12, C13 Y Capacitors (Optional), Kemet, PHE850 Series, - C12, C13 Y Capacitors (Optional) (Alternative 5), Vishay Electronica Portugal, Lda 338-6. 3) update of Enclosures (manual, licenses, diagrams) The following tests were considered necessary: Insulation requirements (6.7, Annex K) Working Voltage Measurement Test (60950)	Kamil Janeczek
2024-01-09	Technical Amendment 3: This is a technical amendment of CBTR Ref. No. E331788-D1004-2/A2/C0-CB issued on 2023-12-04, CBTC Ref. No. DK-120985-M1-UL issued on 2023-12-05. Based on the previously conducted testing and the review of product technical documentation including photos, schematics, wiring diagrams and similar, has been determined that the product continues to comply with the standard. The report was issued to include the following modifications: - addition of instruction for FUS as well as in Model Differences (For open frame units no electrical ratings are	Kamil Janeczek

	placed on a marking label. Electrical ratings in the manual must match those in the test report.) - change of CCN for L4 output choke from QMFZ2 to "QMFZ2 or QMTS2" No testing was considered necessary.	

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 Number .....:	E331788-D1004-2/A3/C0-CB
Date of issue .....:	2021-11-16, 2022-09-06 (A1); 2023-12-04 (A2); 2024-01-09 (A3)
Total number of pages.....:	117
Name of Testing Laboratory preparing the Report.....:	UL International Demko A/S Borupvang 5A, DK-2750 Ballerup, Denmark
Applicant's name.....:	TDK-LAMBDA UK LTD
Address .....:	KINGSLEY AVE ILFRACOMBE DEVON EX34 8ES UNITED KINGDOM
Test specification:	
Standard.....:	IEC 61010-1:2010, IEC 61010-1:2010/AMD1:2016
Test procedure .....:	CB Scheme
Non-standard test method……..:	N/A
TRF template used .....:	IECEE OD-2020-F1:2020, Ed.1.3
Test Report Form No.....:	IEC61010_1P
Test Report Form Originator.....:	VDE Prüf- und Zertifizierungsinstitut GmbH
Master TRF.....:	2021-04-12

If this Test Report Form is used by non-IECEE members, the IECEE/IEC logo and the reference to the CB Scheme procedure shall be removed.

This report is not valid as a CB Test Report unless signed by an approved IECEE 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 NCB. 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.....:	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)

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):

[X] **CB Testing Laboratory:**		
Testing location/ address .....:	UL International Demko A/S Borupvang 5A, DK-2750 Ballerup, Denmark	
Tested by (name, function, signature) .....:	Kamil Janeczek, Project Handler	Janeczek Kamil
Approved by (name, function, signature) ....:	Krzysztof Wasilewski, Reviewer	Krzysztof Wasilewski
[ ] **Testing procedure: CTF Stage 1:**		
Testing location/ address .....:		
Tested by (name, function, signature) .....:		
Approved by (name, function, signature) ....:		
[ ] **Testing procedure: CTF Stage 2:**		
Testing location/ address .....:		
Tested by (name, function, signature) .....:		
Witnessed by (name, function, signature) ...:		
Approved by (name, function, signature) ....:		
[ ] **Testing procedure: CTF Stage 3:**		
[ ] **Testing procedure: CTF Stage 4:**		
Testing location/ address .....:	TDK-LAMBDA UK LTD, KINGSLEY AVE ILFRACOMBE, DEVON EX34 8ES - UNITED KINGDOM	
Tested by (name, function, signature) .....:	M.Carter, K.Laffey - Tester	See the original CBTR for signature

Witnessed by(name, function, signature) ....:	Marcin Zurek - Engineer	See the original CBTR for signature
Approved by (name, function, signature) ....:	Kamil Janeczek - Project Handler	See the original CBTR for signature
Supervised by (name, function, signature) ..:	Mario Zucchi - Reviewer	See the original CBTR for signature

List of Attachments (including a total number of pages in each attachment)		
Document No.	Documents included / attached to this report (description)	Page No.
	Refer to Appendix A of this report. All attachments are included within this report.	

Documents referenced by this report (available on request):		
Document Name or No.	Documents description	Page No.
	Refer to Appendix A of this report. All attachments are included within this report.	

Summary of testing:

Refer to the Test List in Appendix B of this report if testing was performed as part of this evaluation.

Clause	Comment
Refer to the Test List in Appendix B of this report if testing was performed as part of this evaluation.	*Refer to the Test List in Appendix B of this report if testing was performed as part of this evaluation.*

Test Report History:
This report may consist of more than one report and is only valid with additional or previous issued reports:

Report Ref. No.	Item
Refer to Report Modifications under General product information for any modifications made to this report.	

Tests performed (name of test and test clause):	**Testing location:**
Refer to the Test List in Appendix B of this report if testing was performed as part of this evaluation.	*Refer to the Test List in Appendix B of this report if testing was performed as part of this evaluation.*

Summary of compliance with National Differences (List of countries addressed):

USA, Canada, EU Group

[X] The product fulfils the requirements of UL 61010-1 (3rd Ed.); Am. 1, CAN/CSA C22.2 No. 61010-1-12; UPD1:2015; UPD2:2016; AMD1:2018; COR1:2019; UPD3:2023 UL 61010-1, 3rd ed, Rev June 6, 2023, EN 61010-1:2010/A1

Statement concerning the uncertainty of the measurement systems used for the tests

(may be required by the product standard or client)

[ ] **Internal procedure used for type testing through which traceability of the measuring uncertainty has been established:**

Procedure number, issue date and title:

Calculations leading to the reported values are on file with the NCB and testing laboratory that conducted the testing.

[X] **Statement not required by the standard used for type testing**

(Note: When IEC or ISO standard requires a statement concerning the uncertainty of the measurement systems used for tests, this should be reported above. The informative text in parenthesis should be delete in both cases after selecting the applicable option)

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.

Refer to the enclosure(s) titled Marking Label in the Enclosures section in Appendix A of this report for a copy.

Test item particulars :	
Type of item:	Laboratory
Description of equipment function:	Switch mode power supply
Connection 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 equipment (W x D x H)	85 x 172 x 41 mm
Mass of 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 (Not Applicable)
- Test object does meet the requirement.....:	P (Pass)
- Test object does not meet the requirement .....:	F (Fail)
Testing:	
Date of receipt of test item .....:	2013-06-25, 2018-09-13 to 2019-08-02, 2022-11-22 to 2023-08-22
Date(s) of performance of tests .....:	2013-07-05 to 2013-07-08, 2018-09-17 to 2019-08-15, 2022-11-23 to 2023-08-22

General remarks:

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 testing laboratory.
"(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 Forms A.xx are optional if used as record.

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)..... :	Same as Applicant PANYU TRIO MICROTRONIC CO LTD SHIJI INDUSTRIAL ESTATE DONGYONG, NANSHA GUANGZHOU

GUANGDONG CHINA

TRIO-TRONICS (THAILAND) LTD.
7/295 MU.6,
MAP YANG PHON SUB-DISTRICT,
PLUAK DAENG DISTRICT
RAYONG PROVINCE THAILAND

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

General product information and other remarks:

Report Summary

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

Refer to the Report Modifications for any modifications made to this report.

Product Description

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

Additional Information

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.

This report is an technical amendment 2 of CBTR Ref. No. E331788-D1004-1/A0/C0-ULCB issued on 2019-09-06, CB Test Certificate Ref. No. DK-87639-UL and CBTR Ref. No. E331788-D1004-1/A1/C0-ULCB and CB Test Certificate Ref. No. DK-87639-M1-UL . Based on the previously conducted testing and the review of product technical documentation including photos, schematics, wiring diagrams and similar, has been determined that the product continues to comply with the standard.
No tests conducted under this investigation due to reissue of CB Test Report Ref. No. E331788-D1004-1/A1/C0-ULCB. All required tests were carried out under the original investigation

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The original report was modified to include the following changes:
- The standard has been ugraded to the latest revision date.
- Standards were updated on critical omponent list
- Components licenses were attached to the report
- Factory TRIO-TRONICS (THAILAND) LTD.was added to the report
- Capacitor Murata SA series with the same electrical ratings has been added as alternate to critical component list.
No testing was deemed necessary.

Technical Considerations

- The product was investigated to the following standards:

  Main Standard(s):

  IEC 61010-1:2010/AMD1:2016/COR1:2019

  From Country Differences:

  - USA: UL 61010-1, 3rd Edition, May 11, 2012, Revised July 19, 2019
  - Canada: CAN/CSA-C22.2 No. 61010-1(2012-05), 3rd Edition, with revisions through 2018-11
  - EU Group: EN 61010-1:2010/A1:2019 (Edition 3.1)

  Additional Standards:

  -

- The following additional investigations were conducted: N/A
- The product was not investigated to the following standards or clauses: N/A
- The following accessories were investigated for use with the product: N/A
- 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 (full load): 70°C maximum (output de-rated 2.5% /°C above 50°C)

  Evaluated for a maximum altitude of 3000m

  Multilayer PWB's accepted under CBTR Ref. No.: E349607-A23 dated 2014-07-31 and letter report, Enclosure Multi-layer PWB Letter Reports of this report.

For any non-certification testing - Unless specified otherwise in this report, the compliance “Decision Rule” is based on Simple Acceptance (Measurement Uncertainty is not taken into account when making a

statement of conformity)

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 Edition, May 11, 2012, Revised July 19, 2019, CAN/CSA-C22.2 No. 61010-1(2012-05), 3rd Edition, with revisions through 2018-11, IEC 61010-1:2010/AMD1:2016/COR1:2019, EN 61010-1:2010/A1:2019 (Edition 3.1)
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 Vrms; 762 Vpeak Primary to Secondary 392 Vrms; 668 Vpeak 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.

Report Modifications

Date Modified *(Year-Month-Day)*	Modifications Made (include Report Reference Number)	Modified By
2019-09-06	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 including E331788-A13-CB-1 Amendment 1 dated 2015-08-07 and CB Certificate No.: DK-33895-A1-UL issued on 2015-08-14. 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 with limited testing being required. The original report was modified to include the following changes: 1. Modification of base PWB to accommodate an additional 2x discharge resistors with relevant testing to show continued compliance. 2. Updates to the LoCC. 3. Updates to the enclosures. 4. Addition of a new fan.	Luca Benini

	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.	
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	changes: - Addition of alternate discharge resistors XR54, XR55, rated 180 kOhm	
2021-11-16	This report is an technical amendment 2 of CBTR Ref. No. E331788-D1004-1/A0/C0-ULCB issued on 2019-09-06, CB Test Certificate Ref. No. DK-87639-UL and CBTR Ref. No. E331788-D1004-1/A1/C0-ULCB and CB Test Certificate Ref. No. DK-87639-M1-UL . Based on the previously conducted testing and the review of product technical documentation including photos, schematics, wiring diagrams and similar, has been determined that the product continues to comply with the standard. No tests conducted under this investigation due to reissue of CB Test Report Ref. No. E331788-D1004-1/A1/C0-ULCB. All required tests were carried out under the original investigation This report is a reissue of CBTR Ref. No. E331788-D1004-1/A0/C0-ULCB issued on 2019-09-06, CB Test Certificate Ref. No. DK-87639-UL and CBTR Ref. No. E331788-D1004-1/A1/C0-ULCB and CB Test Certificate Ref. No. DK-87639-M1-UL. Based on the previously conducted testing and the review of product technical documentation including photos, schematics, wiring diagrams and similar, has been determined that the product continues to comply with the standard. The original report was modified to include the following changes: - The standard has been upgraded to the latest revision date. - Standards were updated on critical component list - Components licenses were attached to the report - Factory TRIO-TRONICS (THAILAND) LTD. was added to the report - Capacitor Murata SA series with the same electrical ratings has been added as alternate to critical component list. No testing was deemed necessary.	Marcin Zurek
2022-09-06	This report is Administrative Amendment of CBTR Ref. No. E331788-D1004-2/A0/C0-ULCB. The report was modified to include the following changes: - Factory TDK-LAMBDA CORP was added to the report Based on the previously conducted testing and the review of product technical documentation including photos, schematics, wiring diagrams and similar, has been determined that the product continues to comply with the standard. No testing was deemed necessary.	Grzegorz Kowalski
2023-12-04	Technical Amendment 2: This is a technical amendment of CBTR Ref. No. E331788-D1004-2/A1/C0-CB dated 2022-09-06, CB test certificate Ref. No. DK-120985-A1-UL dated 2022-09-07. This report was issued to include the following modifications: 1) addition of series connection (outputs' connection) 2) correction of CB certification for the following component in CCL: - J1 input connector (Alternative 2), Japan Solderless Terminal MFG Co. ,VH series, - Fuse F1 (two fuses), Littelfuse, 216 series, - Fuse F1 (alternative), Littelfuse, 477 Series,	Kamil Janeczek

	- C7 and C8 X Capacitors (Optional), Kemet, PHE840MB Series and R.46 Series, - C12, C13 Y Capacitors (Optional), Kemet, PHE850 Series, - C12, C13 Y Capacitors (Optional) (Alternative 5), Vishay Electronica Portugal, Lda 338-6. 3) update of Enclosures (manual, licenses, diagrams) The following tests were considered necessary: Insulation requirements (6.7, Annex K) Working Voltage Measurement Test (60950)	
2024-01-09	Technical Amendment 3: This is a technical amendment of CBTR Ref. No. E331788-D1004-2/A2/C0-CB issued on 2023-12-04, CBTC Ref. No. DK-120985-M1-UL issued on 2023-12-05. Based on the previously conducted testing and the review of product technical documentation including photos, schematics, wiring diagrams and similar, has been determined that the product continues to comply with the standard. The report was issued to include the following modifications: - addition of instruction for FUS as well as in Model Differences (For open frame units no electrical ratings are placed on a marking label. Electrical ratings in the manual must match those in the test report.) - change of CCN for L4 output choke from QMFZ2 to "QMFZ2 or QMTS2" No testing was considered necessary.	Kamil Janeczek

Description of 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.

May be prefixed by SP followed by / or - (SP indicates a sales code).

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 single unit outputs are SELV. Outputs connected in series are considered to be non-SELV and must not be made accessible in the end equipment.

Ratings on marking label
For open frame units no electrical ratings are placed on a marking label. Electrical ratings in the manual must match those in the test report

Description of special features:
(HV circuits, high pressure systems etc.)

See additional information above.