



Test Report issued under the responsibility of:



<b>TEST REPORT</b> <b>IEC 60950-1</b> <b>Information technology equipment – Safety –</b> <b>Part 1: General requirements</b>	
<b>Report Number</b> .....	31082331.019
<b>Date of issue</b> .....	12/29/2014
<b>Total number of pages</b> .....	157
<b>Applicant's name</b> .....	TDK-Lambda Ltd.
<b>Address</b> .....	56 Haharoshet St., P.O.B. 500 Karmiel Industrial Zone Karmiel 2161401, Israel
<b>Test specification:</b>	
<b>Standard</b> .....	IEC 60950-1:2005 (Second Edition) + Am 1:2009 + Am 2:2013
<b>Test procedure</b> .....	CB Scheme
<b>Non-standard test method</b> .....	N/A
<b>Test Report Form No</b> .....	IEC60950_1F
<b>Test Report Form(s) Originator</b> .....	SGS Fimko Ltd
<b>Master TRF</b> .....	Dated 2014-02
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<b>Test item description .....</b>	Switching power supplies and accessory rack
<b>Trade Mark .....</b>	TDK-Lambda, <b><i>TDK-Lambda</i></b>
<b>Manufacturer.....</b>	TDK-Lambda Ltd.
<b>Model/Type reference .....</b>	<p>1) Single Power Supply Modules:</p> <p>1a) HFE1600-48xy (x=/S, blank; y="/POE", blank)</p> <p>1b) HFE1600-32xy (x=/S, blank; y="/POE", blank)</p> <p>1c) HFE1600-24xy (x=/S, blank; y="/POE", blank)</p> <p>1d) HFE1600-12xy (x=/S, blank; y="/POE", blank)</p> <p>1e) HFE1600-48xy-z (x=/S, blank; y="/POE", blank, z=R)</p> <p>1f) HFE1600-32xy-z (x=/S, blank; y="/POE", blank, z=R)</p> <p>1g) HFE1600-24xy-z (x=/S, blank; y="/POE", blank, z=R)</p> <p>1h) HFE1600-12xy-z (x=/S, blank; y="/POE", blank, z=R)</p> <p>1i) HFE1600-48/INF</p> <p>1j) HFE1600-48/SD</p> <p>1k) RFE1600-48xy (x=/S, blank; y="/POE", blank)</p> <p>1l) RFE1600-32xy (x=/S, blank; y="/POE", blank)</p> <p>1m) RFE1600-24xy (x=/S, blank; y="/POE", blank)</p> <p>1n) RFE1600-12xy (x=/S, blank; y="/POE", blank)</p> <p>1o) HFE1600-12/S-R/001</p> <p>2) Accessory Rack:</p> <p>2a) HFE1600-S1U-z (z="TB" or blank)</p> <p>2b) HFE1600-D1U-z (z="TB" or blank)</p>
<b>Ratings .....</b>	<p>1) Input:</p> <p>1a) HFE1600-48xy: AC 100 - 240V, 14.2 A max., 50/60 Hz;</p> <p>1b) HFE1600-32xy: AC 100 - 240V, 14.2 A max., 50/60 Hz;</p> <p>1c) HFE1600-24xy: AC 100 - 240V, 14.2 A max., 50/60 Hz;</p> <p>1d) HFE1600-12xy: AC 100 - 240V, 14.2 A max., 50/60 Hz;</p> <p>1e) HFE1600-48xy-z: AC 100 - 240V, 11.7 A max., 50/60 Hz;</p> <p>1f) HFE1600-32xy-z: AC 100 - 240V, 11.7 A max., 50/60 Hz;</p> <p>1g) HFE1600-24xy-z: AC 100 - 240V, 11.7 A max., 50/60 Hz;</p> <p>1h) HFE1600-12xy-z: AC 100 - 240V, 11.7 A max., 50/60 Hz;</p> <p>1i) HFE1600-48/INF: AC 100 - 240V, 14.2 A max., 50/60 Hz;</p> <p>1j) HFE1600-48/SD: AC 100 - 240V, 14.2 A max., 50/60 Hz;</p> <p>1k) RFE1600-48xy: AC 100 - 240V, 14.2 A max., 50/60 Hz;</p> <p>1l) RFE1600-32xy: AC 100 - 240V, 14.2 A max., 50/60 Hz;</p> <p>1m) RFE1600-24xy: AC 100 - 240V, 14.2 A max., 50/60 Hz;</p> <p>1n) RFE1600-12xy: AC 100 - 240V, 14.2 A max., 50/60 Hz;</p> <p>1o) HFE1600-12/S-R/001: AC 100 - 240V, 11.7 A max., 50/60 Hz;</p> <p>1) Output:</p> <p>(*) Main output:</p>

1a) HFE1600-48xy at ambient temperature up to 50°C: DC 48V (DC 38.4~58V), 33A max., 1600W max.

1b) HFE1600-32xy at ambient temperature up to 50°C: DC 32V (DC 25.6~38.4V), 50A max., 1600W max.

1c) HFE1600-24xy at ambient temperature up to 50°C: DC 24V (DC 19.2~29V), 67A max., 1600W max.

1d) HFE1600-12xy at ambient temperature up to 50°C: DC 12V (DC 9.6~13.2V), 133A max., 1600W max.

1e) HFE1600-48xy-z at ambient temperature up to 50°C: DC 48V (DC 38.4~58V), 27A max., 1300W max.

1f) HFE1600-32xy-z at ambient temperature up to 50°C: DC 32V (DC 25.6~38.4V), 38A max., 1200W max.

1g) HFE1600-24xy-z at ambient temperature up to 50°C: DC 24V (DC 19.2~29V), 54A max., 1300W max.

1h) HFE1600-12xy-z at ambient temperature up to 50°C: DC 12V (DC 9.6~13.2V), 107A max., 1300W max.

1i) HFE1600-48/INF at ambient temperature up to 50°C: DC 48V (DC 38.4~58V), 33A max., 1600W max.

1j) HFE1600-48/SD at ambient temperature up to 50°C: DC 48V (DC 38.4~58V), 33A max., 1600W max.

1k) RFE1600-48xy at ambient temperature up to 50°C: DC 48V (DC 38.4~58V), 33A max., 1600W max.

1l) RFE1600-32xy at ambient temperature up to 50°C: DC 32V (DC 25.6~38.4V), 50A max., 1600W max.

1m) RFE1600-24xy at ambient temperature up to 50°C: DC 24V (DC 19.2~29V), 67A max., 1600W max.

1n) RFE1600-12xy at ambient temperature up to 50°C: DC 12V (DC 9.6~13.2V), 133A max., 1600W max.

1o) HFE1600-12/S-R/001 at ambient temperature up to 35°C: DC 12V (DC 9.6~13.2V), 113A max., 1356W max.

(\*) See "Condition of Use" for de-rating criteria vs. input voltage and vs. ambient temperature.

Auxiliary output (all single power supply modules): 12V/0.5A

2) Input:

2a) (per each input): AC 100-240V, 14.2A/8.1A max., 50/60 Hz.

2b) (per each input): AC 100-240V, 14.2A/8.1A max., 50/60 Hz.

2) Output:  
Main output:

2a) output voltage: same with installed power supply modules; output current: according to number of installed modules but not more than 266A max. per each output, total 532A max.; Auxiliary output (all): DC 12V/0.5A

2b) output voltage: same with installed power supply modules; output current: according to number of installed modules but not more than 266A max. per each output.; Auxiliary output (all): DC 12V/0.5A

<b>Testing procedure and testing location:</b>		
<input checked="" type="checkbox"/>	<b>CB Testing Laboratory:</b>	TUV Rheinland of North America, Inc.
<b>Testing location/ address .....</b>		1279 Quarry Lane, Ste. A, Pleasanton, CA 94566
<input type="checkbox"/>	<b>Associated CB Testing Laboratory:</b>	
<b>Testing location/ address .....</b>		
<b>Tested by (name + signature) .....</b>		
<b>Approved by (name + signature) .....</b>		
<input type="checkbox"/>	<b>Testing procedure: TMP/CTF Stage 1:</b>	
<b>Testing location/ address .....</b>		
<b>Tested by (name + signature) .....</b>		
<b>Approved by (name + signature) .....</b>		
<input type="checkbox"/>	<b>Testing procedure: WMT/CTF Stage 2:</b>	
<b>Testing location/ address .....</b>		
<b>Tested by (name + signature) .....</b>		
<b>Witnessed by (name + signature) .....</b>		
<b>Approved by (name + signature) .....</b>		
<input checked="" type="checkbox"/>	<b>Testing procedure: SMT/CTF Stage 3 or 4:</b>	
<b>Testing location/ address .....</b>		TDK-Lambda Ltd. 56 Haharoshet St., P.O.B. 500 Karmiel Industrial Zone Karmiel 2161401, Israel
<b>Tested by (name + signature) .....</b>		V. Rodionov
<b>Witnessed by (name + signature) .....</b>		Justin Lewis



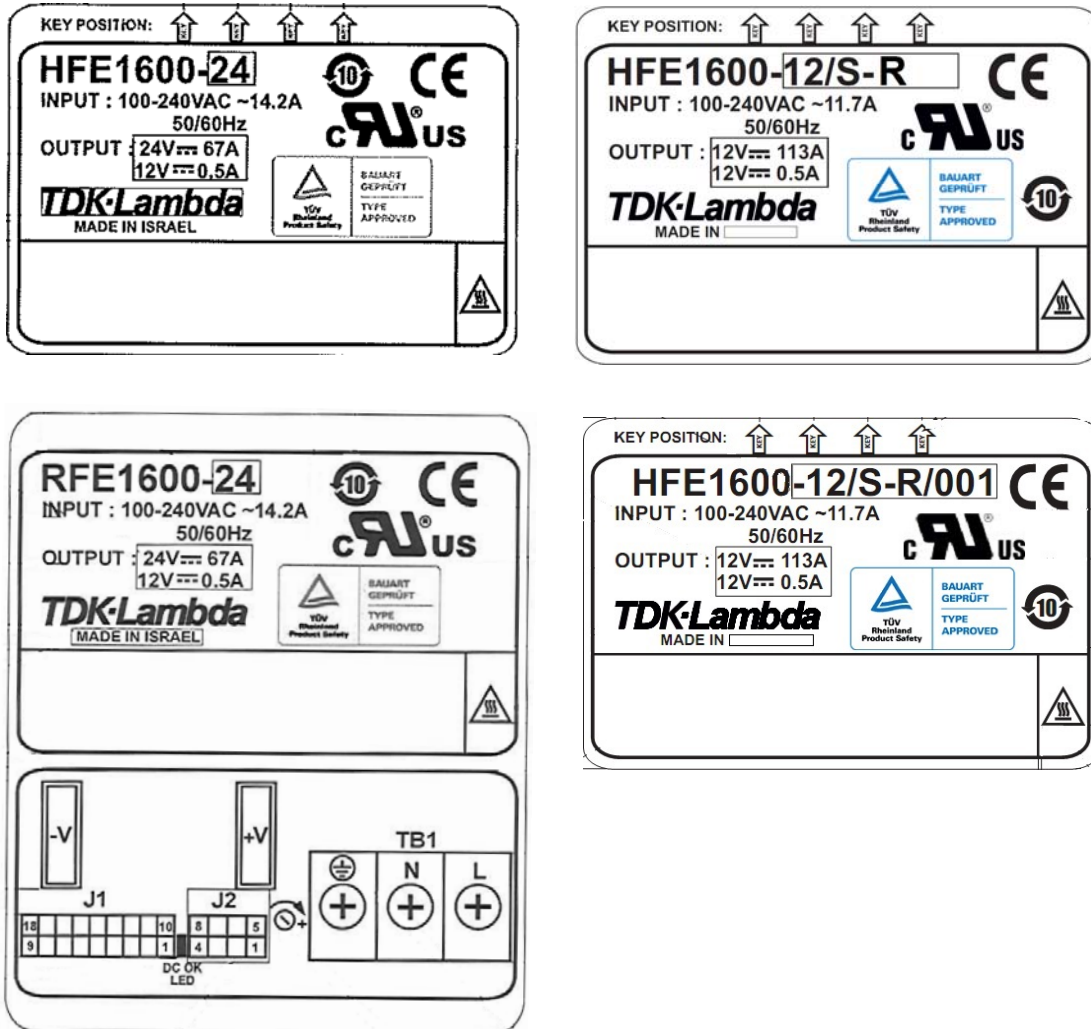
<b>Approved by (name + signature) .....</b> :	Rahul Mehta	
<b>Supervised by (name + signature).....</b> :		
<b>List of Attachments (including a total number of pages in each attachment):</b>		
<ul style="list-style-type: none"> <li>- Attachment A: Group Differences and National Differences (Pages 85-110)</li> <li>- Attachment B: Photo Documentation (Pages 111-114)</li> <li>- Attachment C: Electrical schematics (Pages 115-125)</li> <li>- Attachment D: PCB Layout (Pages 126-150)</li> <li>- Attachment E: Magnetics Construction (Pages 151-157)</li> </ul>		

<b>Summary of testing:</b>	
<p><b>Tests performed (name of test and test clause):</b></p> <p><i>[testing performed during original evaluation, report number 31082331.001]</i></p> <p>Clause 1.2.1 Maximum output voltage, current and measurements  Clause 1.6.2 Power Input Measurements  Clause 1.7.11 Durability of Marking Test  Clause 2.1.1.1 Accessibility to Energized parts  Clause 2.1.1.5 Energy hazard measurements  Clause 2.1.1.7 Capacitor discharge test  Clause 2.2 SELV circuits – voltage measurements (normal and fault conditions)  Clause 2.6.3.4 Protective earthing trace earth fault current; Earthing test  Clause 2.9.1 Humidity test  Clause 2.10.2 Determination of working voltage  Clause 2.10.11 Semiconductor devices and cement joints  Clause 4.2 Mechanical strength test  Clause 4.5 Temperature rise measurements  Clause 5.1 Touch current measurements  Clause 5.2 Dielectric strength test  Clause 5.3 Abnormal operating and fault conditions</p> <p>Testing performed for report 31082331.017</p> <p>Clause 5.1 Touch current measurements  Clause 5.2 Dielectric strength test</p> <p><b>Testing performed for report 31082331.019</b></p> <p><b>Clause 1.6.2 Power input measurements</b>  <b>Clause 4.5 Temperature rise measurements</b>  <b>Clause 5.2 Dielectric strength test</b>  <b>Clause 5.3 Abnormal operating and fault</b></p>	<p><b>Testing location:</b></p> <p>TDK-Lambda Ltd. 56 Haharoshet St., P.O.B. 500  Karmiel Industrial Zone Karmiel 2161401, Israel</p> <p><i>[according to original test report, report number 31082331.001]</i></p> <p>TDK-Lambda Ltd. 56 Haharoshet St., P.O.B. 500  Karmiel Industrial Zone Karmiel 2161401, Israel</p>

<b>conditions</b>	
<b>Summary of compliance with National Differences</b> <b>List of countries addressed:</b> EU Group Differences, EU Special National Conditions, DK, IT, SE, US. Explanation of used codes: DK = Denmark, IT = Italy, SE = Sweden, US = United States of America <input checked="" type="checkbox"/> <b>The product fulfils the requirements of IEC 60950-1:2005 + Am 1:2009 + Am 2:2013; EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 + A2:2013</b>	

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.



## HFE1600-D1U

INPUT : 100-240VAC ~14.2A/8.1A EACH INPUT  
50/60Hz  
OUTPUT: MAX. OUTPUT POWER: 6080W  
MAX. 266A PER EACH OUTPUT

**48V MODEL:**

48V  $\Rightarrow$  63A (33A PER INSTALLED HFE1600-48 UNIT)  
12V  $\Rightarrow$  0.5A

**32V MODEL:**

32V  $\Rightarrow$  95A (50A PER INSTALLED HFE1600-32 UNIT)  
12V  $\Rightarrow$  0.5A

**24V MODEL:**

24V  $\Rightarrow$  127A (67A PER INSTALLED HFE1600-24 UNIT)  
12V  $\Rightarrow$  0.5A

**12V MODEL:**

12V  $\Rightarrow$  253A (133A PER INSTALLED HFE1600-12UNIT)  
12V  $\Rightarrow$  0.5A

USE ONLY HFE SERIES POWER  
SUPPLIES OF THE SAME OUTPUT  
VOLTAGE RATING.



## HFE1600-S1U

INPUT : 100-240VAC ~14.2A/8.1A EACH INPUT  
50/60Hz  
OUTPUT: MAX. OUTPUT POWER: 7600W  
MAX. OUTPUT CURRENT: 532A  
(MAX. 266A PER EACH OUTPUT)

**48V MODEL:**

48V  $\Rightarrow$  157A (33A PER INSTALLED HFE1600-48 UNIT)  
12V  $\Rightarrow$  0.5A

**32V MODEL:**

32V  $\Rightarrow$  237A (50A PER INSTALLED HFE1600-32 UNIT)  
12V  $\Rightarrow$  0.5A

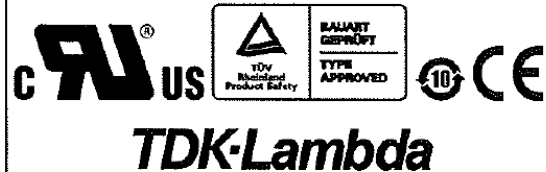
**24V MODEL:**

24V  $\Rightarrow$  318A (67A PER INSTALLED HFE1600-24 UNIT)  
12V  $\Rightarrow$  0.5A

**12V MODEL:**

12V  $\Rightarrow$  400A (133A PER INSTALLED HFE1600-12UNIT)  
12V  $\Rightarrow$  0.5A

USE ONLY HFE SERIES POWER  
SUPPLIES OF THE SAME OUTPUT  
VOLTAGE RATING.





<b>Test item particulars.....:</b>	
<b>Equipment mobility</b> ..... :	<input type="checkbox"/> movable <input type="checkbox"/> hand-held <input type="checkbox"/> transportable <input type="checkbox"/> stationary <input checked="" type="checkbox"/> for building-in <input type="checkbox"/> direct plug-in
<b>Connection to the mains</b> ..... :	<input checked="" type="checkbox"/> pluggable equipment (*) <input checked="" type="checkbox"/> type A (*) <input type="checkbox"/> type B <input type="checkbox"/> permanent connection <input checked="" type="checkbox"/> detachable power supply cord (*) <input type="checkbox"/> non-detachable power supply cord <input type="checkbox"/> not directly connected to the mains  NOTE: Connection to the mains depends on model: refer to General Product Information below. (*)-for HFE1600-S1U and HFE1600-D1U racks only (also see Note above)
<b>Operating condition</b> ..... :	<input checked="" type="checkbox"/> continuous <input type="checkbox"/> rated operating / resting time:
<b>Access location</b> ..... :	<input checked="" type="checkbox"/> operator accessible (see NOTE below) <input type="checkbox"/> restricted access location  <i>NOTE: Only front side of HFE1600-xy-z and RFE1600-xy units, HFE1600-D1U-z and HFE1600-S1U-z racks may be accessible for user. Component for build-in.</i>
<b>Over voltage category (OVC)</b> ..... :	<input type="checkbox"/> OVC I <input checked="" type="checkbox"/> OVC II <input type="checkbox"/> OVC III <input type="checkbox"/> OVC IV <input type="checkbox"/> other:
<b>Mains supply tolerance (%) or absolute mains supply values</b> ..... :	±10%
<b>Tested for IT power systems</b> ..... :	<input checked="" type="checkbox"/> Yes (Norway only) <input type="checkbox"/> No
<b>IT testing, phase-phase voltage (V)</b> ..... :	
<b>Class of equipment</b> ..... :	<input checked="" type="checkbox"/> Class I <input type="checkbox"/> Class II <input type="checkbox"/> Class III <input type="checkbox"/> Not classified
<b>Considered current rating of protective device as part of the building installation (A)</b> ..... :	
<b>Pollution degree (PD)</b> ..... :	<input type="checkbox"/> PD 1 <input checked="" type="checkbox"/> PD 2 <input type="checkbox"/> PD 3
<b>IP protection class</b> ..... :	IPX0

<b>Altitude during operation (m)</b>	max. 3000m
.....	
:	
<b>Altitude of test laboratory (m)</b>	50m
.....	
:	
<b>Mass of equipment (kg)</b>	1) max. 2.1kg
.....	2) max. 10.5kg
:	
<b>Possible test case verdicts:</b>	
- 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)	
<b>Testing..... :</b>	
<b>Date of receipt of test item .....</b>	<i>[according to original test report with number 31082331.001]: 06/21/2010</i>
	31082331.017 – 07/08/2013
	<b>31082331.019 – 04/28/2014</b>
<b>Date(s) of performance of tests .....</b>	<i>[according to original test report with number 31082331.001]: 06/21/2010 – 08/05/2010</i>
	31082331.017 – 07/08/2013 to 07/09/2013
	<b>31082331.019 – 04/28/2014 to 05/27/2014</b>
<b>General remarks:</b>	
"(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 <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.	

<b>Manufacturer's Declaration per sub-clause 4.2.5 of IECCE 02:</b>	
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 .....	<input checked="" type="checkbox"/> <b>Yes</b> <input type="checkbox"/> <b>Not applicable</b>
	The units manufactured in each factory are fully identical. All tested samples are representing products from each factory.
<b>Name and address of factory (ies).....</b>	1) TDK-Lambda Ltd. 56 Haharoshet St., P.O.B. 500 Karmiel Industrial Zone Karmiel 2161401, Israel 2) WUXI TDK-LAMBDA ELECTRONICS CO LTD Wuxi-Singapore Industrial Park No.6, Xing Chuang Er Lu., Wuxi, Jiangsu Province 3) PANYU TRIO MICROTRONICS CO LTD SHIJI INDUSTRIAL ESTATE DONGYONG NANSHA GUANGZHOU GUANGDONG 511453 CHINA
<b>General product information:</b>	
All products are Class I, designed for Overvoltage Category II and Pollution Degree 2.	
HFE1600-xy-z units may be used in the complete set of the accessory rack HFE1600-S1U-z/HFE1600-D1U-z or separately from the accessory rack HFE1600-S1U-z/HFE1600-D1U-z in accordance with the "Conditions of Use".	
For HFE1600-xy-z and for RFE1600-xy units using separately the means of connection to the mains shall be specified in end-installation.	
RFE1600-xy units are same with the HFE1600-xy-z units and have minor differences due to using of separate input TB, separate signals connectors and output bus-bars instead of common I/O connector which used in HFE1600-xy-z units.	
Accessory racks HFE1600-S1U-z/HFE1600-D1U-z intended for use only with HFE1600-xy-z units.	
Accessory rack HFE1600-S1U-z intended for using with up to five power supply modules all connected by output in parallel.	
Accessory rack HFE1600-D1U-z intended for using with up to four power supply modules with separate output for each couple of power supply modules.	
Accessory racks HFE1600-S1U/HFE1600-D1U are Pluggable Type A, intended for connection to mains via standard detachable power supply cord.	
For accessory racks HFE1600-S1U/HFE1600-D1U an appliance coupler(s) considered as disconnect device(s).	
For accessory racks HFE1600-S1U-TB/HFE1600-D1U-TB, for HFE1600-xy-z and for RFE1600-xy units the means of connection to the mains shall be specified in end-installation.	
HFE1600-xy-z, RFE1600-xy units and accessory racks HFE1600-S1U-TB/HFE1600-D1U-TB have no a disconnect device provided with unit. An appropriate disconnect device shall be provided by end-installation.	
In all units the outputs considered SELV and separated by reinforced insulation from primary mains. All outputs are unearthed and may or may not be connected to earth in end-installation.	
Model's configuration code:	
1. HFE 1600-xy-z/RFE1600-xy: <ul style="list-style-type: none"> <li>• Basic power supply module- without communication option, front-to-rear air flow;</li> </ul>	

<ul style="list-style-type: none"> <li>• Followed by “/S”- with communication option, front-to-rear air flow;</li> <li>• Followed by “/POE”- with output circuit additionally meets of requirements of IEEE 802.3, front-to-rear air flow.</li> <li>• HFE1600-48/INF – fully same with HFE1600-48, specific customer suffix, without handle and PS release knob, front-to-rear air flow;</li> <li>• Followed by “-R” - with reversed air-flow direction, rear-to-front air flow;</li> <li>• HFE1600-12/S-R/001 – fully same with HFE1600-12/S-R, specific customer suffix;</li> <li>• HFE1600-48/SD – fully same with HFE1600-48-R, specific customer suffix;</li> </ul> <p>2. Accessory racks HFE1600-S1U-z/HFE1600-D1U-z:</p> <ul style="list-style-type: none"> <li>• Basic model: with AC input IEC inlets;</li> <li>• Followed by “-TB”- with AC input terminal blocks instead of IEC inlets.</li> </ul>																										
<p><b>Abbreviations used in the report:</b></p> <table border="0"> <tr> <td>- normal conditions</td> <td><b>N.C.</b></td> <td>- single fault conditions</td> <td><b>S.F.C</b></td> </tr> <tr> <td>- functional insulation</td> <td><b>OP</b></td> <td>- basic insulation</td> <td><b>BI</b></td> </tr> <tr> <td>- double insulation</td> <td><b>DI</b></td> <td>- supplementary insulation</td> <td><b>SI</b></td> </tr> <tr> <td>- between parts of opposite polarity</td> <td><b>BOP</b></td> <td>- reinforced insulation</td> <td><b>RI</b></td> </tr> </table> <p><b>Indicate used abbreviations (if any)</b></p> <table border="0"> <tr> <td>- primary</td> <td>PRI</td> </tr> <tr> <td>- ground (protective earth)</td> <td>GND</td> </tr> <tr> <td></td> <td>SELV</td> </tr> <tr> <td>- terminal block</td> <td>TB</td> </tr> <tr> <td>- Triple Insulated Wire</td> <td>TIW</td> </tr> </table>	- normal conditions	<b>N.C.</b>	- single fault conditions	<b>S.F.C</b>	- functional insulation	<b>OP</b>	- basic insulation	<b>BI</b>	- double insulation	<b>DI</b>	- supplementary insulation	<b>SI</b>	- between parts of opposite polarity	<b>BOP</b>	- reinforced insulation	<b>RI</b>	- primary	PRI	- ground (protective earth)	GND		SELV	- terminal block	TB	- Triple Insulated Wire	TIW
- normal conditions	<b>N.C.</b>	- single fault conditions	<b>S.F.C</b>																							
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- terminal block	TB																									
- Triple Insulated Wire	TIW																									
<p><b>CONDITIONS OF USE:</b></p> <ol style="list-style-type: none"> <li>1. All units shall be installed in compliance with the enclosure, mounting, spacing, casualty, segregation and other safety related requirements of the final application.</li> <li>2. The main outputs (48VDC, 32VDC, 24VDC or 12VDC) have been investigated for SELV with energy hazardous level.</li> <li>3. Auxiliary output (12VDC) has been investigated for SELV with non-energy hazardous level.</li> <li>4. All outputs are separated by reinforced insulation from supply mains and primary circuit. Outputs are unearthed and may or may not be earthed during product installation.</li> <li>5. For HFE1600-xy-z unit used separately and for RFE1600-xy units the voltage value for Dielectric Strength Test should be based on the maximum supply voltage for end-product.</li> <li>6. A suitable Electrical and Fire enclosure shall be provided by end-product.</li> <li>7. The products shall be properly bonded to the protective earth in end-product.</li> <li>8. For accessory racks HFE1600-S1U and HFE1600-D1U an appliance coupler(s) considered as Disconnect device(s). HFE1600-xy-z, RFE1600-xy units and accessory racks HFE1600-S1U-TB, HFE1600-D1U-TB have no disconnect device provided with unit. An appropriate disconnect device shall be provided in end-installation.</li> <li>9. All units were tested on a 30A branch circuit for each AC input. If used on a branch circuit greater than listed above, an additional testing may be necessary.</li> <li>10. All units (except HFE1600-48/SD, HFE1600-xy-R and HFE1600-12/S-R/001) are suitable for the maximum ambient operating temperature of 50°C at max. output power equal or less of 1600W. HFE1600-48/SD and HFE1600-xy-R are suitable for the maximum ambient operating temperature 35°C at max. output power equal or less of 1300W max. HFE1600-12/S-R/001 is suitable for the maximum ambient operating temperature 35° at max. output power equal or less of 1356W.</li> <li>11. The following de-rating criteria shall be applied when the ambient temperatures will exceed allowed max. ambient temperature at max. output power: All models (except listed separately below)</li> </ol>																										

- +50°C to +60°C: the max. output power should be de-rated by 2%/°C;
  - +60°C to +70°C: the max. output power should be de-rated by 2.5%/°C.
- For HFE1600-xy-R:
- +50°C to +55°C: the max. output power should be de-rated by 2%/°C;
- For HFE1600-48/SD:
- +50°C to +55°C: the max. output power should be de-rated by 2%/°C;
  - $V_{in} < 100VAC$  - 1%/V from the max. output power at 100VAC.
- For HFE1600-12/S-R/001:
- +35°C to +45°C: the max. output power should be de-rated by 2%/°C;
  - +45°C to +55°C: the max. output power should be de-rated by 2.5%/°C;
12. Depending on the input supply voltage the following de-rating criteria shall be applied:
- All models (except listed separately below)
- $265VAC \geq V_{in} \leq 170VAC$  - the max. output power equal 1600W;
  - $170VAC > V_{in} \leq 100VAC$  - the max. output power equal 1200W;
  - $V_{in} < 100VAC$  - 1%/V from the max. output power at 100VAC.
- HFE1600-48/SD and HFE1600-48-R:
- $265VAC \geq V_{in} \leq 170VAC$  - the max. output power equal 1300W;
  - $170VAC > V_{in} \leq 100VAC$  - the max. output power equal 1008W;
  - $V_{in} < 100VAC$  - 1%/V from the max. output power at 100VAC.
- HFE1600-32-R:
- $265VAC \geq V_{in} \leq 170VAC$  - the max. output power equal 1216W;
  - $170VAC > V_{in} \leq 100VAC$  - the max. output power equal 960W;
  - $V_{in} < 100VAC$  - 1%/V from the max. output power at 100VAC.
- HFE1600-24-R:
- $265VAC \geq V_{in} \leq 170VAC$  - the max. output power equal 1296W;
  - $170VAC > V_{in} \leq 100VAC$  - the max. output power equal 960W;
  - $V_{in} < 100VAC$  - 1%/V from the max. output power at 100VAC.
- HFE1600-12-R:
- $265VAC \geq V_{in} \leq 170VAC$  - the max. output power equal 1284W;
  - $170VAC > V_{in} \leq 100VAC$  - the max. output power equal 960W;
  - $V_{in} < 100VAC$  - 1%/V from the max. output power at 100VAC.
- HFE1600-12/S-R/001:
- $265VAC \geq V_{in} \leq 170VAC$  - the max. output power equal 1356W;
  - $170VAC > V_{in} \leq 100VAC$  - the max. output power equal 960W.

#### CB-Report History:

31082331.001 - original CB-report

31082331.003 - change of current rating from '14.2A' to '14.2 / 8.1A' for the accessory rack; correction of table 1.6.2 (some missing values for the 12V-modules re-entered)

31082331.005 - new CB-report for an upgrade of standard to IEC 60950-1:2005+A1, listing of additional models HFE1600-48/IHF & -48/SD and RFE1600-48xy/ -32xy/ -24xy / -12xy; derating (model HFE1600-48/SD with derating)

31082331.007 - new CB-report for a correction of model numbers: HFE1600-48/IHF to HFE1600-48/INF and HFE1600-S1U/TN to HFE1600-S1-TB

31082331.009 - Amendment 1 - This is abbreviated report to delete factory TDK-LAMBDA ELECTRONICS CO LTD, LOT 107 WUXI, SINGAPORE INDUSTRIAL PARK XING CHUANG ERLU WUXI JIANGSU 214028 CHINA and add factory WUXI TDK- LAMBDA ELECTRONICS CO LTD, No.6,Xing Chuang Er Lu, Wuxi,Jiangsu Province 214028, CHINA. This report also provides for corrections to the description of optocoupler PC101-PC106 in the Critical Component List and related CDF. There is no impact to previous evaluation and testing, no additional testing was deemed necessary.

31082331.011 - Amendment 2 - This is an abbreviated test report to correct the listing for the capacitances C101, C102 in the list of critical components as highlighted, see table 1.5

31082331.015 - New CB-report. Correction of critical components list according to CQC requirements; adding new model (rack) HFE1600-D1U-z which is identical with previously certified rack model HFE1600-S1U-z but it is designed for a maximum of 4 power supplies instead of five. Also a separate output busbar for each two of the power modules instead of a common output used for the HFE1600-S1U rack.; New CB-report also contains a minor modification of the HFE1600-S1U rack. All changes discussed above do not require any further testing.

31082331.017 - Amendment 1 - This is an abbreviated test report covering the addition of capacitors C17–C24 to model HFE1600-D1U-z. This report is an abbreviated report and is to be used in conjunction with report 31082331.015

**31082331.019 – New CB test report for upgrade of standard to IEC 60950-1:2005 (Sec. Ed.) + Am 1:2009 + Am 2:2013 , listing of additional models with reverse air flow direction/marked with suffix -R, adding custom model HFE1600-12/S-R/001 with special max. ambient temperature at 100% load. Due to similarity with previously certified models only partial testing done for models HFE1600-12-R and custom model HFE1600-12/S-R/001 as described above in section “Summary of testing”. This report also provides for corrections of Critical Component List and related CDF.**