



Test Report issued under the responsibility of:



TEST REPORT IEC 62368-1 Audio/video, information and communication technology equipment Part 1: Safety requirements	
Report Number:	32083425.001
Date of issue:	September 2, 2020
Total number of pages:	164 pages + Attachments
Applicant's name:	TDK-Lambda Ltd.
Address:	56 Haharoshet St., P.O.B. 500 Karmiel Industrial Zone Karmiel 2161401, Israel
Test specification:	
Standard:	IEC 62368-1:2014 (Second Edition)
Test procedure:	CB Scheme
Non-standard test method:	N/A
Test Report Form No.	IEC62368_1B
Test Report Form(s) Originator	UL(US)
Master TRF:	2014-03
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Test Item description	Switching power supplies and accessory racks
Trade Mark	TDK·Lambda
Manufacturer	TDK Lambda Ltd. 56 Haharoshet St., P.O.B. 500 Karmiel Industrial Zone Karmiel 2161401, Israel
Model/Type reference	<p>1) Single Power Supply Modules: HFE1600-48xyzu/mmmmm or HFE1600-48xyzu-mmmmm, HFE1600-32xzu/mmmmm or HFE1600-32xzu-mmmmm, HFE1600-24xzu/mmmmm or HFE1600-24xzu-mmmmm, HFE1600-12xzu/mmmmm or HFE1600-12xzu-mmmmm (x=/S, blank; y=/POE, blank; z=-R, blank; u=/CO, blank; m=A-Z, 0-9, blank)</p> <p>2) Single Power Supply Modules: RFE1600-48xyu/mmmmm or RFE1600-48xyu-mmmmm, RFE1600-32xu/mmmmm or RFE1600-32xu-mmmmm, RFE1600-24xu/mmmmm or RFE1600-24xu-mmmmm, RFE1600-12xu/mmmmm or RFE1600-12xu-mmmmm (x=/S, blank; y=/POE, blank; u=/CO, blank; m=A-Z, 0-9, blank)</p> <p>3) HFE1600-48/INF</p> <p>4) HFE1600-48/SD</p> <p>5) HFE1600-12/S-R/001</p> <p>6) Accessory rack: HFE1600-S1U-wu/mmmmm or HFE1600-S1U-wu-mmmmm HFE1600-D1U-wu/mmmmm or HFE1600-D1U-wu-mmmmm (w=TB or blank, u=/CO, blank, m=A-Z, 0-9, blank)</p> <p>7) Communication Module: HFE1600-LAN</p> <p>8) Single Power Supply Modules: HFE2500-48xyzu/mmmmm or HFE2500-48xyzu-mmmmm HFE2500-24xzu/mmmmm or HFE2500-24xzu-mmmmm HFE2500-12xzu/mmmmm or HFE2500-12xzu-mmmmm (x=/S, blank; y=/POE, blank; z=-R, blank; u=/CO, blank; m=A-Z, 0-9, blank)</p> <p>9) Single Power Supply Modules: RFE2500-48xyu/mmmmm or RFE2500-48xyu-mmmmm RFE2500-24xu/mmmmm or RFE2500-24xu-mmmmm RFE2500-12xu/mmmmm or RFE2500-12xu-mmmmm (x=/S, blank; y=/POE, blank; u=/CO, blank; m=A-Z, 0-9, blank)</p> <p>10) Single Power Supply Module: HFE2500-48/S-CQC</p> <p>11) Single Power Supply Module: HFE2500-12/S-R/RE</p> <p>12) Single Power Supply Module: HFE2500-24/S-Ky, HFE2500-12/S-Ky (y=/POE)</p>

	<p>13) Accessory rack: HFE2500-S1Uwu/mmmmm or HFE2500-S1Uwu-mmmmm (w=-TB, blank; u=/CO, blank; m=A-Z, 0-9, blank)</p> <p>14) Communication Module: HFE2500-LAN</p> <p>15) Single Power Supply Module: HFE2500-48/S-CQC2</p>
<p>Ratings</p>	<p>1) a) models without suffix -R (base models): Input: 100 - 240 VAC, 14.2 A max., 50/60 Hz; (*Output: at ambient temperature up to 50°C, Vin=170-240 VAC, : 48VDC (38.4~58VDC), 33A max., 1584W max. 32VDC (25.6~38.4VDC), 47A max., 1504W max. 24VDC (19.2~29VDC), 67A max., 1608W max. 12VDC (9.6~13.2VDC), 133A max., 1596W max. b) models with suffix -R (reverse fan models): Input: 100-240 VAC, 11.7 A max., 50/60 Hz; (*Output: at ambient temperature up to 50°C, Vin=170-240VAC, : 48VDC (38.4~58VDC), 27A max., 1296W max. 32VDC (25.6~38.4VDC), 38A max., 1216W max. 24VDC (19.2~29VDC), 54A max., 1296W max. 12VDC (9.6~13.2VDC), 107A max., 1284W max.</p> <p>2) Input: 100-240 VAC, 14.2 A max., 50/60 Hz; (*Output: at ambient temperature up to 50°C, Vin=170-240VAC, : 48VDC (38.4~58VDC), 33A max., 1584W max. 32VDC (25.6~38.4VDC), 47A max., 1504W max. 24VDC (19.2~29VDC), 67A max., 1600W max. 12VDC (9.6~13.2VDC), 133A max., 1596W max.</p> <p>3) Input:100-240 VAC, 14.2 A max., 50/60 Hz; (*Output: at ambient temperature up to 50°C, Vin=170-240VAC, : 48VDC (38.4~58VDC), 33A max., 1584W max.</p> <p>4) Input:100-240 VAC, 14.2 A max., 50/60 Hz; (*Output: at ambient temperature up to 50°C Vin=170-240VAC, : 48VDC (38.4~58VDC), 27A max., 1296W max.</p> <p>5) Input:100-240 VAC, 11.7 A max., 50/60 Hz; (*Output: at ambient temperature up to 35°C Vin=170-240VAC 12VDC (9.6~13.2VDC), 113A max., 1356W max.</p> <p>6) Input: (per each input): 100-240VAC, 14.2A/8.1A max., 50/60 Hz. (*Output: -output voltage: same with installed power supply modules -output current: HFE1600-S1U: according to number of installed modules but not more than 266A max. per each output, total 532A max. HFE1600-D1U: according to type and number of installed modules but not more than 266A max. per each output Auxiliary output (all): 12VDC/0.5A (* See "Condition of Use" for de-rating criteria vs. input voltage and vs. ambient temperature.</p>

	<p>7) Input: 12 VDC, 0.5A max.</p> <p>8) a) models without suffix –R (base models): Input: 100 – 240 VAC, 15 A max., 50/60 Hz; Output: Main output at ambient temperature up to 50°C, Vin=170-240Vac: 48VDC (38.4~58.0VDC), 52A max., 2496W max. 24VDC (19.2~29.0VDC), 104A max., 2496W max. 12VDC (9.6~13.2VDC), 200A max., 2400W max. b) models with suffix –R (reverse fan models): Input: 100 – 240 VAC, 13.5 A max., 50/60 Hz; Output: Main output at ambient temperature up to 50°C, Vin=170-240Vac: 24VDC (19.2~29.0VDC), 83.2A max., 1997W max. 12VDC (9.6~13.2VDC), 160A max., 1920W max.</p> <p>9) Input: 100 – 240 VAC, 15 A max., 50/60 Hz; Output: Main output at ambient temperature up to 50°C, Vin=170-240Vac 48VDC (38.4~58.0VDC), 52A max., 2496W max. 24VDC (19.2~29.0VDC), 96A max., 2304W max. 12VDC (9.6~13.2VDC), 200A max., 2400W max.</p> <p>10) Input: 100 – 240 VAC, 15 A max., 50/60 Hz; Output: Main output at ambient temperature up to 50°C, Vin=170-240Vac 48VDC (38.4~58.0VDC), 52A max., 2496W max.</p> <p>11) Input: 100 – 240 VAC, 15A max., 50/60 Hz; Output: Main output at ambient temperature up to 42°C, Vin=180- 240Vac 12,6VDC (9.6~13.2VDC), 185 Amax., 2331W max.</p> <p>12) Input: 100 – 240 VAC, 15A max., 50/60 Hz; Output: Main output at ambient temperature up to 50°C, Vin=180- 240Vac 12VDC (9.6~13.2VDC), 200A max., 2400W max. 24VDC (19.2~29.0VDC), 104A max., 2496W max.</p> <p>13) Input: (per each input): 100-240Vac, 15A max., 50/60 Hz; Output: Main output: -output voltage: same with installed units -output current: according to number of installed modules but not more than 320A max. per each output, total 640A max. Auxiliary output (all above except 4): 12VDC/0.5A</p> <p>14) Input: 12 Vdc, 0.5A max.</p> <p>15) Input: 100 – 240 VAC, 15 A max., 50/60 Hz; Output: Main output at ambient temperature up to 50°C, Vin=170-240Vac: 48VDC (38.4~58.0VDC), 52A max., 2496W max.</p>
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Testing procedure and testing location:		
<input type="checkbox"/>	CB Testing Laboratory:	TÜV Rheinland of North America, Inc.
Testing location/ address		1279 Quarry Lane, Ste. A, Pleasanton, CA 94566
<input type="checkbox"/>	Associated CB Testing Laboratory:	
Testing location/ address.....		
Tested by (name + signature)		
Approved by (name + signature).....		
<input type="checkbox"/>	Testing procedure: TMP/CTF Stage 1	
Testing location/ address.....		
Tested by (name + signature)		
Approved by (name + signature).....		
<input type="checkbox"/>	Testing procedure: WMT/CTF Stage 2	
Testing location/ address.....		
Tested by (name + signature)		
Witnessed by (name + signature)		
Approved by (name + signature).....		
<input checked="" type="checkbox"/>	Testing procedure: SMT/CTF Stage 3 or 4	TDK-Lambda Ltd.
Testing location/ address.....		56 Haharoshet St., P.O.B. 500 Karmiel Industrial Zone Karmiel, 2161401, Israel
Tested by (name + signature)		Maoz Maman <i>Maoz M.</i>
Approved by (name + signature).....		Boris Gorinshtein <i>Boris G.</i>
		Umar Sohi
Supervised by (name + signature)		James Howell

List of Attachments (including a total number of pages in each attachment):

Attachment 1: National Differences (46 pages)

Attachment 2: Photographs (15 pages)

Attachment 3: Schematics (23 pages)

Attachment 4: PCB Layouts (67 pages)

Attachment 5: Magnetics (26 pages)

Attachment 6: Additional test data (9 pages)

Summary of testing: The only difference in product is in additional redundant bleeder resistors RK73 series by KOA (51kohm, 1/4W) (R304-R307 for HFE1600 single power supply module series and R339-R342 for HFE2500 single power supply module series) and consequently a small modification of the PCB layouts and schematics. Creepage and clearance distances have been reevaluated based on the updated PCB layout.

Tests performed (name of test and test clause):**32083425.001**

- 5.4.8 Humidity conditioning (see Note 1)
- 5.4.9 Electric strength test (see Note 1)
- 5.5.2.2 Capacitor discharge test (test performed on model RFE1600-32/S, see Note 1)
- 5.7 Prospective touch voltage, touch current and protective conductor current (see Note 1)
- 6.2.2.2 Power measurement for worst-case fault (see Note1)
- 6.2.2.3 Power measurement for worst-case power source fault (see Note 1)
- 9.2.5 Temperature test (see Note 2)
- V.1.2 Test method 1 - Surfaces and openings tested with jointed test probe (see Note 3)

Note 1 - Due to the similar design, the output voltage and wattage does not affect the results of this test. RFE1600-32/S was evaluated because it was decided to be the worst case model for this test.

Note 2 - The test performed on populated HFE2500-S1U-TB rack by four HFE2500-12/S single power supply modules, because it was decided to be the worst case for this test.

Note 3 - Due to the similar design of enclosure, the test performed on HFE1600-12, HFE2500-12, RFE1600-12, RFE2500-12.

Following Testing Performed to IEC 60950-1 under CB Report No.**31082331.023 (HFE1600-LAN)***(Clause 1.6.2) Input Test (B.2.5)**(Clause 2.6.3.4) Earthing Test (5.6.6)***Testing location:**

TDK-Lambda Ltd. 56 Haharoshet St., P.O.B. 500
Karmiel Industrial Zone Karmiel 2161401, Israel

(Clause 2.10.2) Working Voltage Measurement
(5.4.1.8)

(Clause 5.2) Dielectric Strength Test (5.4.9)

31082331.019 (HFE1600-12/S-R/001)

(Clause 1.6.2) Input Test (B.2.5)

(Clause 4.5) Temperature test (5.4.1.4 / 9.2.5
/ B.2.6)

(Clause 5.2) Dielectric strength test (5.4.9)

(Clause 5.3) Abnormal operating and fault
conditions (B.3 / B.4)

31082331.017 (HFE1600-D1U)

(Clause 5.1) Touch current measurements
(5.7)

(Clause 5.2) Dielectric strength test (5.4.9)

**31082331.001 (Models HFE1600-48/RFE1600-
48 and HFE1600-12/RFE1600-12, HFE1600-S1U,
HFE1600-D1U models)**

(Clause 1.6.2) Input Test (B.2.5)

(Clause 1.7.11) Durability of Marking Test
(F.3.10)

(Clause 2.1.1.1) Accessibility to Energized parts
(V.1.2 / V.1.3)

(Clause 2.1.1.5) Energy hazard measurements
(5.2)

(Clause 2.1.1.7) Capacitor discharge test (5.5.2.2)

(Clause 2.2) SELV circuits – voltage
measurements (normal and fault
conditions) (5.2)

(Clause 2.6.3.4) Protective earthing trace earth
fault current; Earthing test (5.6.6)

(Clause 2.9.1) Humidity test (5.4.8)

(Clause 2.10.2) Determination of working voltage
(5.4.1.8)

(Clause 2.10.11) Semiconductor devices and
cement joints (5.4.2 / 5.4.3)

(Clause 4.2) Mechanical strength test

(Clause 4.5) Temperature rise measurements
(5.4.1.4 / 9.2.5 / B.2.6)

(Clause 5.1) Touch current measurements
(5.7)

(Clause 5.2) Dielectric strength test (5.4.9)

(Clause 5.3) Abnormal operating and fault
conditions (B.3 / B.4)

31182226.016 (Model HFE2500-12/S-R-RE)

(Clause 1.6.2) Input Test (B.2.5)

(Clause 4.5) Temperature measurements
(5.4.1.4 / 9.2.5 / B.2.6)

31182226.014 (Model HFE2500-LAN)

- (Clause 1.6.2) Input Test (B.2.5)
 (Clause 2.6.3.4) Earthing Test (5.6.6)
 (Clause 2.10.2) Working Voltage Measurement (5.4.1.8)
 (Clause 5.2) Dielectric strength test (5.4.9)

31182226.014 (Model HFE2500-12/S-R-RE)

- (Clause 1.6.2) Input Test (B.2.5)
 (Clause 4.5) Temperature measurements (5.4.1.4 / 9.2.5 / B.2.6)
 (Clause 5.2) Dielectric strength test (5.4.9)
 (Clause 5.3) Abnormal operating and fault conditions (B.3 / B.4)

31182226.011 (Models RFE2500, HFE2500-48/S-CQC and HFE2500-12/S-R/RE)

- (Clause 1.6.2) Input Test (B.2.5)
 (Clause 4.5) Temperature measurements (5.4.1.4 / 9.2.5 / B.2.6)
 (Clause 5.1) Touch current measurements (5.7)
 (Clause 5.2) Dielectric strength test (5.4.9)
 (Clause 5.3) Abnormal operating and fault conditions (B.3 / B.4)

31182226.001 (Models HFE/RFE2500-12 and HFE/RFE2500-48 HFE2500-S1U)

- (Clause 1.6.2) Input Test (B.2.5)
 (Clause 1.7.11) Durability of Marking Test (F.3.10)
 (Clause 2.1.1.1) Accessibility to Energized parts (V.1.2 / V.1.3)
 (Clause 2.1.1.5) Energy hazard measurements (5.2)
 (Clause 2.1.1.7) Capacitor discharge test (5.5.2.2)
 (Clause 2.2) SELV circuits – voltage measurements (normal and fault conditions) (5.2)
 (Clause 2.6.3.4) Protective earthing trace earth fault current; Earthing test (5.6.6)
 (Clause 2.9.1) Humidity test (5.4.8)
 (Clause 2.10.2) Determination of working voltage (5.4.1.8)
 (Clause 2.10.11) Semiconductor devices and cement joints (5.4.2 / 5.4.3)
 (Clause 4.2) Mechanical strength test
 (Clause 4.5) Temperature rise measurements (5.4.1.4 / 9.2.5 / B.2.6)
 (Clause 5.1) Touch current measurements (5.7)
 (Clause 5.2) Dielectric strength test (5.4.9)

(Clause 5.3)	Abnormal operating and fault conditions (B.3 / B.4)	
(Annex C)	Transformer Evaluation (G.5.3)	
<p>Summary of compliance with National Differences:</p> <p>List of countries addressed</p> <p>Australia, Canada, Denmark*, Finland*, Ireland*, Germany*, Italy*, Norway*, Sweden*, United Kingdom*, USA, CENELEC common modifications as listed in online CB-Bulletin.</p> <p>* European Group Differences and National Differences</p> <p><input checked="" type="checkbox"/> The product fulfils the requirements of EN62368-1:2014+A11:2017</p>		



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

32V MODEL:
32V  95A (50A PER INSTALLED HFE1600-32 UNIT)
12V  0.5A

24V MODEL:
24V  127A (67A PER INSTALLED HFE1600-24 UNIT)
12V  0.5A

12V MODEL:
12V  253A (133A PER INSTALLED HFE1600-12 UNIT)
12V  0.5A

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

TDK-Lambda



MADE IN CHINA



EU representative: TDK-Lambda Germany GmbH,
Karl-Bold-Str. 40, D-77855 Achem



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

32V MODEL:
32V  95A (50A PER INSTALLED HFE1600-32 UNIT)
12V  0.5A

24V MODEL:
24V  127A (67A PER INSTALLED HFE1600-24 UNIT)
12V  0.5A

12V MODEL:
12V  253A (133A PER INSTALLED HFE1600-12 UNIT)
12V  0.5A

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

TDK-Lambda

MADE IN ISRAEL


EU representative: TDK-Lambda Germany GmbH,
Karl-Bold-Str. 40, D-77855 Achem

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

32V MODEL:

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

24V MODEL:

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

12V MODEL:

12V  532A (133A PER INSTALLED HFE1600-12 UNIT)
12V  0.5A

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



TDK-Lambda



MADE IN CHINA

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



32V MODEL:

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

24V MODEL:

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

12V MODEL:

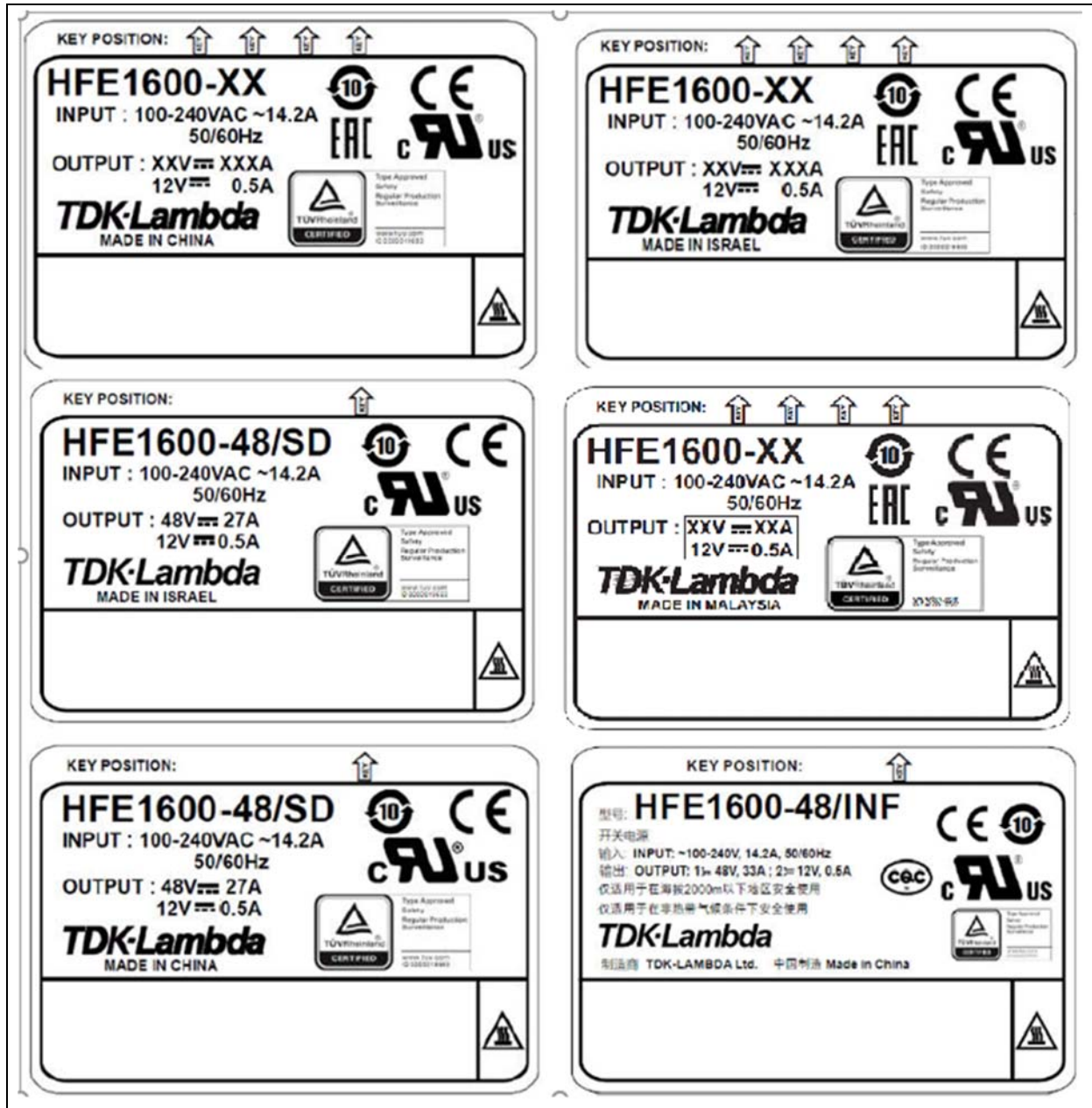
12V  532A (133A PER INSTALLED HFE1600-12 UNIT)
12V  0.5A






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











TDK-Lambda

MADE IN ISRAEL

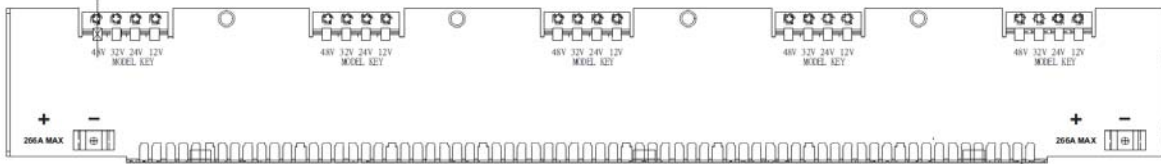


HFE1600-LAN  
INPUT : 12V \approx 0.5A MAX

TDK-Lambda
MADE IN ISRAEL


Type Approved
Safety
Regular Production
Surveillance
www.tuv.com
© 0000019692

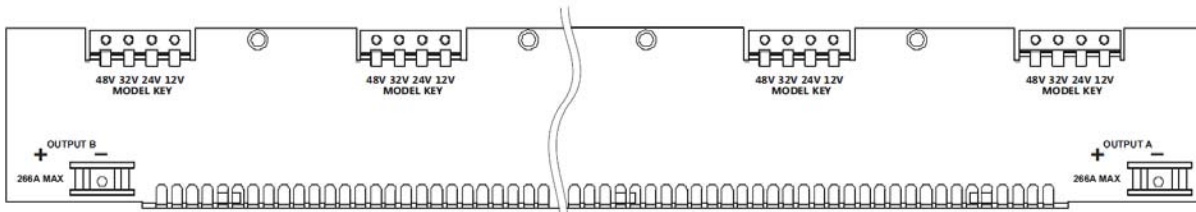
KEY POSITION:    

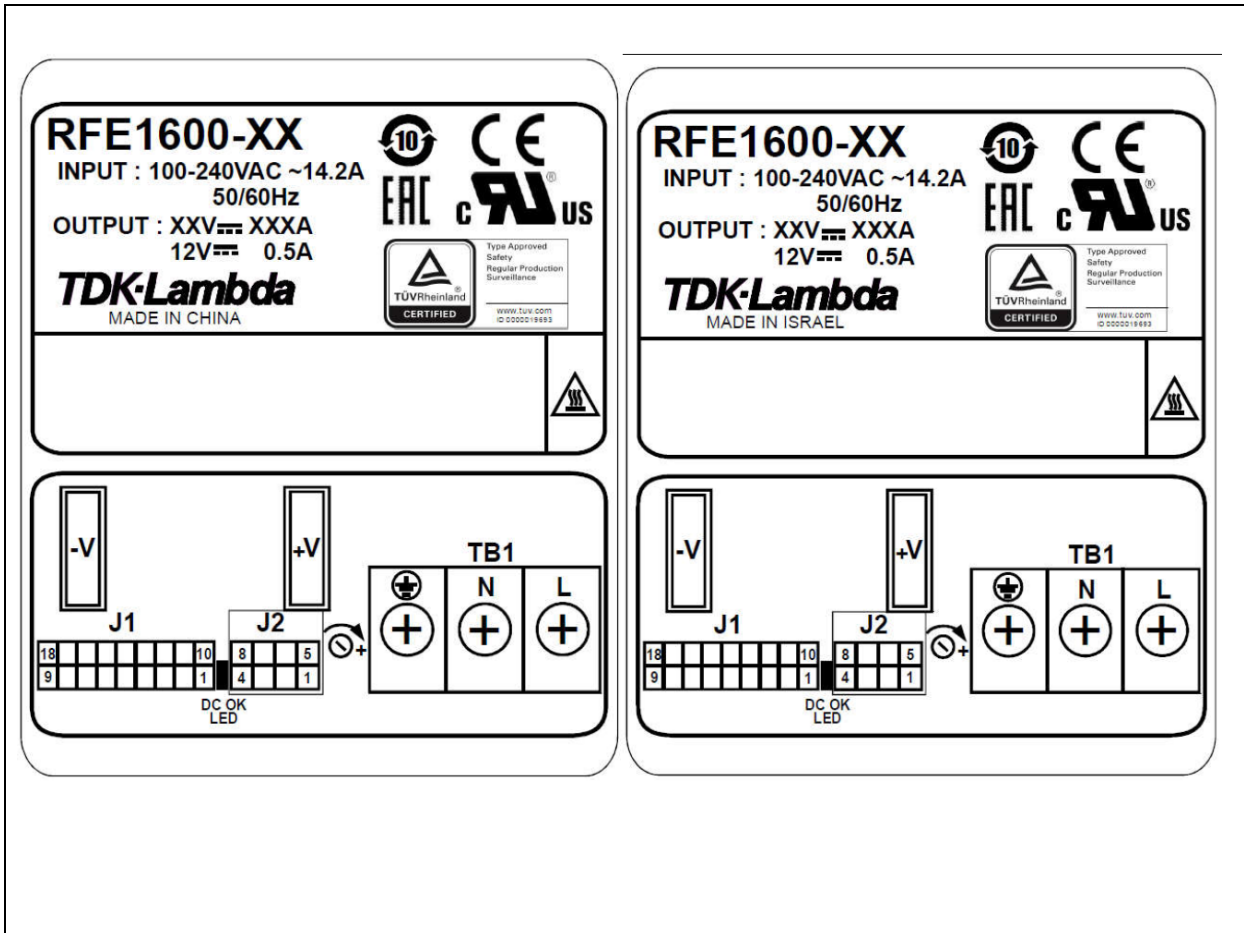
HFE1600-XXX-R/001 
INPUT : 100-240VAC \sim 11.7A
50/60Hz
OUTPUT : XXV \approx XXXA
12V \approx 0.5A

TDK-Lambda
MADE IN MALAYSIA

Type Approved
Safety
Regular Production
Surveillance
www.tuv.com
© 0000019692


HFE1600 S1U



HFE1600 D1U





HFE2500-S1U

INPUT : 100-240VAC ~15A EACH INPUT
50/60Hz
OUTPUT: MAX. OUTPUT POWER: 9500W
MAX. OUTPUT CURRENT: 640A
(MAX. 320A PER EACH OUTPUT)

- 48V MODEL:
48V \equiv 196A (49A PER INSTALLED HFE2500-48 UNIT)
12V \equiv 0.5A
- 32V MODEL:
32V \equiv 296A (74A PER INSTALLED HFE2500-32 UNIT)
12V \equiv 0.5A
- 24V MODEL:
24V \equiv 395A (99A PER INSTALLED HFE2500-24 UNIT)
12V \equiv 0.5A
- 12V MODEL:
12V \equiv 640A (190A PER INSTALLED HFE2500-12 UNIT)
12V \equiv 0.5A

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



HFE2500-S1U

INPUT : 100-240VAC ~15A EACH INPUT
50/60Hz
OUTPUT: MAX. OUTPUT POWER: 9500W
MAX. OUTPUT CURRENT: 640A
(MAX. 320A PER EACH OUTPUT)

- 48V MODEL:
48V \equiv 196A (49A PER INSTALLED HFE2500-48 UNIT)
12V \equiv 0.5A
- 32V MODEL:
32V \equiv 296A (74A PER INSTALLED HFE2500-32 UNIT)
12V \equiv 0.5A
- 24V MODEL:
24V \equiv 395A (99A PER INSTALLED HFE2500-24 UNIT)
12V \equiv 0.5A
- 12V MODEL:
12V \equiv 640A (190A PER INSTALLED HFE2500-12 UNIT)
12V \equiv 0.5A




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





KEY POSITION: ↑ ↑ ↑ ↑

HFE2500-XX
INPUT : 100-240VAC ~15A
50/60Hz
OUTPUT : XXV ~ XXXA
12V ~ 0.5A

TDK-Lambda
MADE IN CHINA

 
ERC c  US




 Type Approved
Safety
Regular Production
Surveillance
www.tuv.com
ID 123456789





KEY POSITION: ↑ ↑ ↑ ↑

HFE2500-XX
INPUT : 100-240VAC ~15A
50/60Hz
OUTPUT : XXV ~ XXXA
12V ~ 0.5A

TDK-Lambda
MADE IN MALAYSIA

 
ERC c  US




 Type Approved
Safety
Regular Production
Surveillance
www.tuv.com
ID 123456789





KEY POSITION: ↑ ↑ ↑ ↑

HFE2500-XX
INPUT : 100-240VAC ~15A
50/60Hz
OUTPUT : XXV ~ XXXA
12V ~ 0.5A

TDK-Lambda
MADE IN ISRAEL

 
ERC c  US




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Safety
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Surveillance
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ID 123456789





KEY POSITION: ↑ ↑ ↑ ↑

HFE2500-XXX-R
INPUT : 100-240VAC ~13.5A
50/60Hz
OUTPUT : XXV ~ XXXA
12V ~ 0.5A

TDK-Lambda
MADE IN ISRAEL

 
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KEY POSITION: ↑ ↑ ↑ ↑

HFE2500-XX/S-Ky
INPUT : 100-240VAC ~15A
50/60Hz
OUTPUT : XXV ~ XXXA
12V ~ 0.5A

TDK-Lambda
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KEY POSITION: ↑ ↑ ↑ ↑

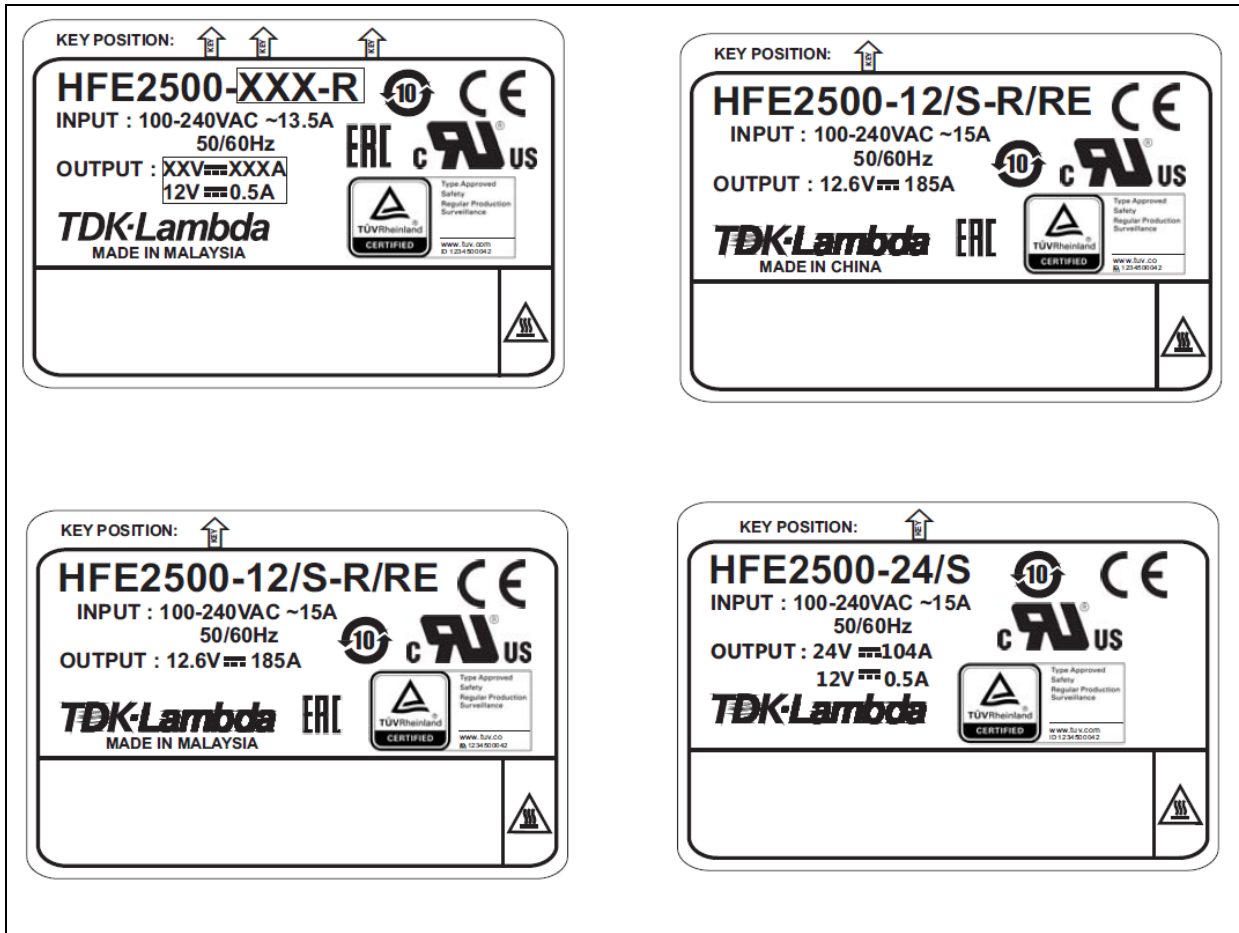
HFE2500-XX/S-Ky
INPUT : 100-240VAC ~15A
50/60Hz
OUTPUT : XXV ~ XXXA
12V ~ 0.5A

TDK-Lambda
MADE IN MALAYSIA

 
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ID 123456789





HFE2500-S1U-TB

INPUT : 100-240VAC ~15A EACH INPUT
50/60Hz

OUTPUT: MAX. OUTPUT POWER: 9500W
MAX. OUTPUT CURRENT: 640A
(MAX. 320A PER EACH OUTPUT)

48V MODEL:
48V \equiv 196A (49A PER INSTALLED HFE2500-48 UNIT)
12V \equiv 0.5A

32V MODEL:
32V \equiv 296A (74A PER INSTALLED HFE2500-32 UNIT)
12V \equiv 0.5A

24V MODEL:
24V \equiv 395A (99A PER INSTALLED HFE2500-24 UNIT)
12V \equiv 0.5A

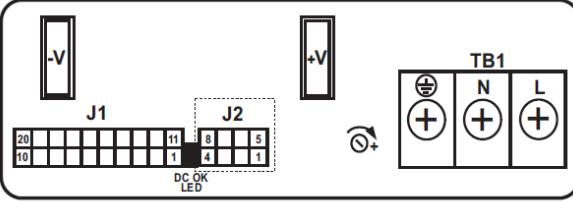
12V MODEL:
12V \equiv 640A (190A PER INSTALLED HFE2500-12 UNIT)
12V \equiv 0.5A

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



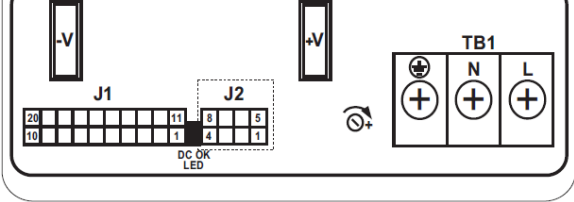
RFE2500-XX/S
INPUT : 100-240VAC ~15A
50/60Hz
OUTPUT : XXV \equiv XXXA
12V \equiv 0.5A

TDK-Lambda
MADE IN CHINA



RFE2500-XX/S
INPUT : 100-240VAC ~15A
50/60Hz
OUTPUT : XXV \equiv XXXA
12V \equiv 0.5A

TDK-Lambda
MADE IN ISRAEL



HFE2500-LAN
INPUT : 12V \equiv 0.5A MAX

TDK-Lambda
MADE IN ISRAEL

KEY POSITION:

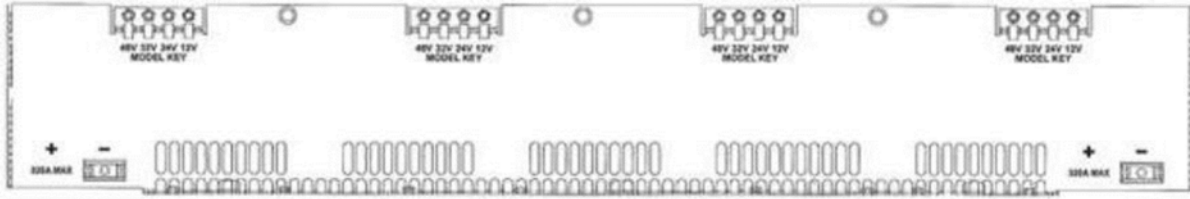
MODEL/型号/型號/모델명: HFE2500-48/S-CQC
AC/DC 开关电源/開關電源/스위칭 전원 공급 장치
INPUT/輸入/輸入/입력: ~100-240VAC, 15A, 50/60Hz
OUTPUT/輸出/輸出/출력: 48V \equiv 52A
12V \equiv 0.5A

仅适用于在海拔2000m以下地区安全使用
仅适用于在非热带气候条件下安全使用

TDK-Lambda
MADE IN CHINA/中国制造/中國製造/중국제조

注意: 100V檔最大輸出電流為3125A; 200V檔最大輸出電流為52A. 詳細請見使用說明書

320A max marking for HFE2500-S1U (screening on the top)



Risk Of Electrical Shock



Before touching output terminals, disconnect AC input and discharge each output terminal to chassis ground.

TEST ITEM PARTICULARS:	
Classification of use by	<input checked="" type="checkbox"/> Ordinary person (See comments in General Product Information) <input checked="" type="checkbox"/> Instructed person <input checked="" type="checkbox"/> Skilled person <input type="checkbox"/> Children likely to be present
Supply Connection	<input checked="" type="checkbox"/> AC Mains (all models except HFE1600-LAN and HFE2500-LAN) , <input type="checkbox"/> DC Mains <input checked="" type="checkbox"/> External Circuit - not Mains connected - <input checked="" type="checkbox"/> ES1 (for HFE1600-LAN and HFE2500-LAN only) <input type="checkbox"/> ES2 <input checked="" type="checkbox"/> ES3 (all models except HFE1600-LAN and HFE2500-LAN)
Supply % Tolerance	<input checked="" type="checkbox"/> +10%/-10% <input type="checkbox"/> +20%/-15% <input type="checkbox"/> + ____ %/ - ____ % <input type="checkbox"/> None
Supply Connection – Type	<input checked="" type="checkbox"/> pluggable equipment type A - <input type="checkbox"/> non-detachable supply cord <input checked="" type="checkbox"/> appliance coupler (for HFE1600-S1U without suffix /TB, HFE1600-D1U without suffix /TB and HFE2500-S1U without suffix /TB racks only) <input type="checkbox"/> direct plug-in <input type="checkbox"/> mating connector <input type="checkbox"/> pluggable equipment type B - <input type="checkbox"/> non-detachable supply cord <input type="checkbox"/> appliance coupler <input checked="" type="checkbox"/> permanent connection (for HFE1600-S1U-TB, HFE1600-D1U-TB, HFE2500-S1U-TB and RFE series) <input checked="" type="checkbox"/> mating connector (for HFE single power supply modules, HFE1600-LAN and HFE2500-LAN) <input type="checkbox"/> other: _____ <i>NOTE: Connection to the mains is various, depends on model: refer to General Product Information</i>
Considered current rating of protective device as part of building or equipment installation.....	30 A for all models except N/A for models HFE1600-LAN and HFE2500-LAN Installation location: <input type="checkbox"/> building <input checked="" type="checkbox"/> equipment

TESTING:	
Date of receipt of test item	32083425.001 (June 28, 2020) 31082331.023 (September 10, 2016) 31082331.019 (April 28, 2014) 31082331.017 (July 8, 2013) 31082331.001 (June 21, 2010) 31182226.016 (May 10, 2017) 31182226.014 (October 9, 2016; November 16, 2016) 31182226.011 (August 23, 2015) 31182223.001 (May 2, 2011)
Date (s) of performance of tests	32083425.001 (July 16, 2020) 31082331.023 (September 10 to October 10, 2016; November 16, 2016) 31082331.019 (April 28 to May 27, 2014) 31082331.017 (July 8 to 9, 2013) 31082331.001 (June 21 to August 5, 2010) 31182226.016 (May 10, 2017) 31182226.014 (October 9 to 10, 2016; November 16 to 20, 2016) 31182226.011 (August 23 to September 24, 2015) 31182223.001 (May 3 to 29, 2011)
GENERAL REMARKS:	
<p>"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report.</p> <p>Throughout this report a <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.</p>	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC60068-2-21:	
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"/> Yes <input type="checkbox"/> Not applicable
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies).....	1) TDK-Lambda Ltd. 56 Haharoshet St., P.O.B. 500 Karmiel Industrial Zone Karmiel 2161401, Israel 2) TDK-Lambda (China) Electronics Co., Ltd. No.95, Zhujiang Road, Xinwu District, Wuxi, Jiangsu 214028, P.R. China 3) TDK-LAMBDA (MALAYSIA) SDN BHD Lot 2&3, Batu 9-3/4 Kawasan Perindustrian Bandar Baru Jaya Gading, Kuantan, Pahang Malaysia 26070
GENERAL PRODUCT INFORMATION:	

Product Description – All products are Class I (excluding HFE1600-LAN and HFE2500-LAN models which are class III), designed for Overvoltage Category II and Pollution Degree 2.

The HFE single power supply modules series (HFE series) is a family of front-end (component) power supplies for built-in use with two series of 1600 W and 2500 W output power. All units provide a handle on front side for plugging/unplugging the unit to/from the rack. Rear side contains a connector with AC pins, output DC pins and signal pins. Only the front side is accessible to ordinary person once unit installed in the accessory racks.

The HFE series intended for accessory racks. The HFE series modules may be used in the complete set of the accessory rack HFE1600-S1U, HFE1600-D1U for HFE1600 series and HFE2500-S1U for HFE2500 series or other models of accessory racks separately from TDK-Lambda designed accessory racks, in accordance with the “Additional application considerations”.

The RFE single power supply modules series (RFE series) is a family of front-end (component) power supplies for built-in use with two series of 1600 W and 2500 W output power, which is the same as the HFE series and have minor differences due to using of separate input terminal block (TB), separate signals connectors and output bus-bars instead of common I/O connector which used in the HFE series modules. The RFE series is intended for use separately from TDK-Lambda designed accessory racks. The power supply cord not supplied with the unit and not evaluated in this report. Method of connection to the mains shall be evaluated in end use application.

For RFE series and HFE series modules which are used separately from TDK-Lambda designed accessory racks, the means of connection to the mains shall be specified in the end-installation.

The HFE1600-LAN and HFE2500-LAN models are optional communication ES1 module which may be used in the complete set of the accessory racks and powered by +12 V d.c. from auxiliary output of power supplies within the rack or separately by an external +12V ES1 output supply in accordance with the user manual.

Accessory racks:

HFE1600-S1U are intended for using with up to five HFE1600 power supply modules,
HFE1600-D1U are intended for using with up to four HFE1600 power supply modules,
HFE2500-S1U accessory rack is intended using with up to four HFE2500 power supply modules.

DC main output for:

HFE1600-S1U all HFE1600 power supply modules connected by output in parallel,
HFE1600-D1U two pair of HFE1600 power supply modules connected by output in parallel,
HFE2500-S1U all HFE2500 power supply modules connected by output in parallel

Connection to the mains:

When built in to the accessory rack, the inputs of each power supply modules are separate from each other. One of the slots may be replaced by an optional HFE1600-LAN or HFE2500-LAN communication module. Instructions are provided to the skilled installation personnel that an AC mains connection is not required when the communication module is installed.

Accessory racks HFE1600-S1U, HFE1600-D1U and HFE2500-S1U are Pluggable Type A, intended for connection to mains via standard detachable power supply cord. An appliance coupler(s) is/are considered as the disconnect device(s). The power supply cord not supplied with the unit and not evaluated in this report. Method of connection to the mains shall be evaluated in end use application.

For accessory racks HFE1600-S1U-TB, HFE1600-D1U-TB and HFE2500-S1U-TB and for RFE series modules, the power supply cord connection to the unit is non-detachable and the means of connection to the mains shall be specified in end-installation. Units are provided with terminal block for connection to AC mains, have no disconnect device provided with the unit. An appropriate disconnect device shall be provided by end-installation.

In all modules the outputs considered ES1 and separated by reinforced insulation from primary AC mains (ES3 primary).

For the HFE series and RFE series power supplies a suitable Electrical and Fire Enclosure is to be provided in the end product. All models have not been evaluated for these requirements.

For the accessory racks HFE1600-S1U, HFE1600-D1U and HFE2500-S1U a suitable Fire Enclosure is to be provided in the end product. All models have not been evaluated for these requirements.

The HFE series and RFE series power supplies and accessory racks designed by TDK-Lambda should only be installed in a Restricted Access Area. Access should be available to service personnel only.

All outputs are unearthed and may or may not be connected to earth in end-installation.

HFE2500-24/S-Ky and HFE2500-12/S-Ky are the same power supplies as HFE2500-12/S and HFE2500-24/S, but intended for altitudes up to 3048m or 10,000ft. instead.

HFE1600/R & HFE1600-12/S--R/001 & HFE1600-48/SD: Fan's air flow direction changed to Reverse direction - exhaust. De-rating, change output power from 1600W to 1300W due to de-rating factors (according to thermal evaluation with reverse airflow). Operating temperature de-rated.

HFE1600-48/INF: This model is identical to model HFE1600-48xyzu/mmmmm and HFE1600-48xyzu-mmmmm except of an increased hold up time where the modification does not affect safety.

HFE2500/R: Fan's airflow direction changed to Reverse direction - exhaust. De-rating, change output power from 2500W to 2000W due to de-rating factors (according to thermal evaluation with reverse airflow). Operating temperature de-rated.

HFE2500-12/S-R/RE: Fan's airflow direction changed to Reverse direction - exhaust. De-rating, change output power from 2500W to 2000W due to de-rating factors (according to thermal evaluation with reverse airflow). Operating temperature de-rated. Remote enable by dry contact, on/off fans accordingly to DC output on/off.

HFE2500-48/S-CQC: Model name, Rating & Safety approval label will include CQC mark. Change PMBus software, refer to customer specification. RTV (glue) point addition in some component to meet Customer Shock & vibration test.(identification for specific customer, fully same with base model HFE2500- 48/S.)

HFE2500-48/S-CQC2: Model name, Rating & Safety approval label will include CQC mark. Change PMBus software, refer to customer specification. RTV (glue) point addition in some component to meet Customer Shock & vibration test.This model is identical to model to HFE2500-48/S-CQC except for non-safety related differences.

HFE2500-48/S-CQC has the same specifications as the standard HFE2500-48/S except for:

1. PMBus software was modified refer to Mellanox specification.
2. RTV points was added to some component in target to meet customer Shock & Vibration characteristics.
3. Safety Label will include CQC certification.

Model Differences –		
Variable:	Range of variable:	Content:
x	/S – with communication option blank-without	(all models) external communication
y	/POE - with output circuit additionally meets of requirements of IEEE 802.3 Standard blank-base model	(For HFE1600-48 & HFE2500-48 only).
z	-R – with reverse air flow blank-standard air flow	FOR HFE only, standard airflow: front to rear
u	-CO – conformal coating used blank-without conformal coating	(all models) conformal coating used for environmental protection only
w	-TB- with input terminal blocks instead of IEC inlets blank-with IEC inlet	For HFE1600-S1U, HFE1600-D1U , HFE2500-S1U racks.
m	/any combination of A-Z and/or 0-9 blank-base model	Other options (not be safety relevant), may follow after "-".

Additional application considerations – (Considerations used to test a component or sub-assembly) –

The component was tested according to the standard IEC 62368-1:2014 (2nd Edition) and/or EN 62368-1:2014.

Additionally the component was also evaluated according to the standards CSA C22.2 No. 62368-1:2014 and UL 62368-1:2014 (2nd Edition) and fulfils the requirements of these standards.

1. The products are intended for use with external 30 A (USA) and (IEC) branch circuit. External circuit breaker did not open during the testing. The unit is approved for TN mains star connections and IT mains with 230 V a.c. phase to phase voltage. Modules provide internally one fuse in live supply conductor. Main secondary output circuits are separated from mains by reinforced insulation and rated ES1 and PS3 level. Aux secondary output is rated ES1 and PS2.
2. The modules and racks with terminal block do not provide disconnect device. Therefore, disconnect device must be provided as part of end product or as part of installation.
3. Safety Instructions: Instruction manual attached to the report – Attachment 7.
4. The power supply is rated class I. Power supply modules shall be properly bonded to the main protective bonding termination in the end product. The touch current to enclosure is below 7.07 mA_{pK}. An investigation of the protective bonding terminal has been conducted.
5. The equipment has been evaluated for use in a Pollution Degree 2 and overvoltage category II environment and a maximum altitude of 3048 m for models HFE2500-24/S-Ky and HFE2500-12/S-Ky and 3000 m for all other models.
6. All accessory rack model (models HFE1600-S1U-TB, HFE1600-D1U-TB and HFE2500-S1U-TB) are not supplied with slide rails and have not been evaluated for use with slide rails. Additional evaluation is required according to end use application.
7. The products were evaluated for a maximum ambient of 50°C. Following de-rating shall be considered for ambient temperature above 50°C:
All models (except listed separately below)
- +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;

For HFE2500-12-R:

- +50°C to +55°C: the max. output power should be de-rated by 2%/°C;

For HFE2500-24-R:

- +45°C to +50°C: the max. output power should be de-rated by 1%/°C
- +50°C to +55°C: the max. output power should be de-rated by 2%/°C;

8. Following input voltage de-rating shall be considered

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.

HFE2500-12-R:

- $265VAC \geq V_{in} \leq 170VAC$ - the max. output power equal 1920W;
- $170VAC > V_{in} \leq 100VAC$ - the max. output power equal 1200W;
- $V_{in} < 100VAC$ - 1.3%/V from the max. output power at 100VAC.

HFE2500-24-R:

- $265VAC \geq V_{in} \leq 170VAC$ - the max. output power equal 1997W;
- $170VAC > V_{in} \leq 100VAC$ - the max. output power equal 1200W;
- $V_{in} < 100VAC$ - 1.3%/V from the max. output power at 100VAC.

For HFE2500-12/S-R/RE:

- $265VAC \geq V_{in} \leq 180VAC$ - the max. output power equal 2331W;
- $180VAC \geq V_{in} \leq 170VAC$ - the max. output power equal 2080W;
- $170VAC > V_{in} \leq 100VAC$ - the max. output power equal 1450W;
- $V_{in} < 100VAC$ - 1.5%/V from the max. output power at 100VAC.

History Sheet.

Date	Report No.	Change/Modification	Rev. No.
—	—	—	—
Latest Change / Modification			
<p>This test report is based on CB Test Reports No.31082331.033 and 31182226.024 according to IEC 60950-1:2005 (Second Edition) + Am 1:2009 + Am 2:2013. The only difference in product is in additional redundant bleeder resistors RK73 series by KOA (51kohm, 1/4W) (R304-R307 for HFE1600 single power supply module series and R339-R342 for HFE2500 single power supply module series) and consequently a small modification of the PCB layouts and schematics. Creepage and clearance distances have been reevaluated based on the updated PCB layout.</p>			—

ENERGY SOURCE IDENTIFICATION AND CLASSIFICATION TABLE:	
(Note 1: Identify the following six (6) energy source forms based on the origin of the energy.) (Note 2: The identified classification e.g., ES2, TS1, should be with respect to its ability to cause pain or injury on the body or its ability to ignite a combustible material. Any energy source can be declared Class 3 as a worse case classification e.g. PS3, ES3.)	
Electrically-caused injury (Clause 5): (Note: Identify type of source, list sub-assembly or circuit designation and corresponding energy source classification) Example: +5 V dc input ES1	
Source of electrical energy	Corresponding classification (ES)
Primary circuits supplied by a.c. mains	ES3 (steady-state voltage and current)
Accessible terminals of appliance inlet	ES3 (stored capacitance)
Secondary circuit before rectifier of main transformer T104	ES2 (steady-state voltage and current)
Secondary circuit before rectifier of auxiliary transformer T101	ES2 (steady-state voltage and current)
Secondary main output connector	ES1 (steady-state voltage and current)
Secondary auxiliary output connector	ES1 (steady-state voltage and current)
Secondary communication connector	ES1 (steady-state voltage and current)
Electrically-caused fire (Clause 6): (Note: List sub-assembly or circuit designation and corresponding energy source classification) Example: Battery pack (maximum 85 watts): PS2	
Source of power or PIS	Corresponding classification (PS)
All primary circuits and secondary circuits inside the equipment enclosure	PS3
Secondary main output connector	PS3
Secondary auxiliary output connector	PS1
Secondary communication connector	PS1
Injury caused by hazardous substances (Clause 7) (Note: Specify hazardous chemicals, whether produces ozone or other chemical construction not addressed as part of the component evaluation.) Example: Liquid in filled component Glycol	
Source of hazardous substances	Corresponding chemical
N/A	N/A
Mechanically-caused injury (Clause 8) (Note: List moving part(s), fan, special installations, etc. & corresponding MS classification based on Table 35.) Example: Wall mount unit MS2	
Source of kinetic/mechanical energy	Corresponding classification (MS)
Sharp edges and corners	MS1
Equipment mass	MS1 (MS2 for complete rack)
Fan blades	MS3 (Assumed)
Thermal burn injury (Clause 9) (Note: Identify the surface or support, and corresponding energy source classification based on type of part, location, operating temperature and contact time in Table 38.) Example: Hand-held scanner – thermoplastic enclosure TS1	
Source of thermal energy	Corresponding classification (TS)

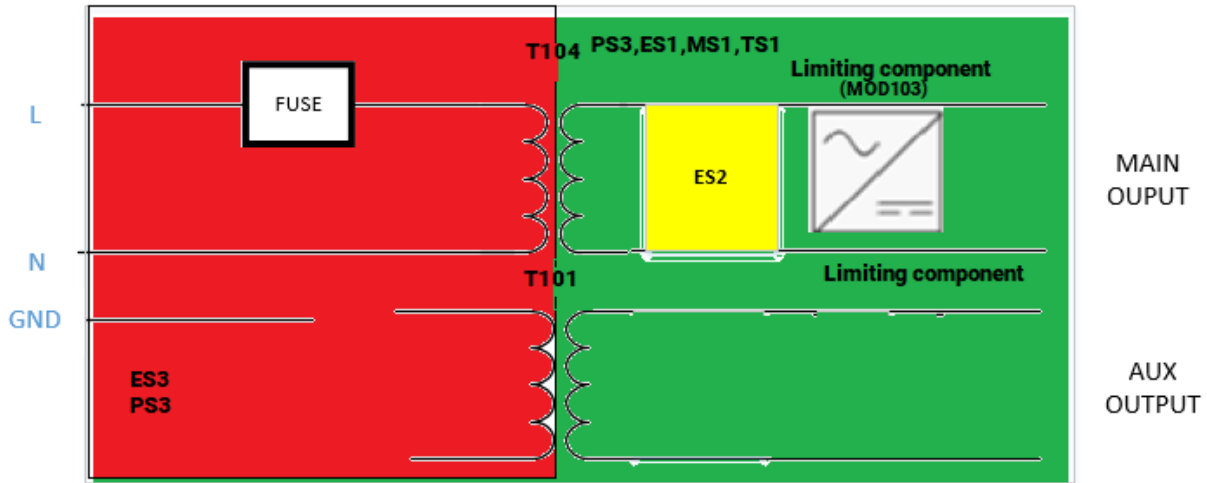
ENERGY SOURCE IDENTIFICATION AND CLASSIFICATION TABLE:	
Accessible surfaces- front panel	TS1
Radiation (Clause 10) (Note: List the types of radiation present in the product and the corresponding energy source classification.) Example: DVD – Class 1 Laser Product RS1	
Type of radiation	Corresponding classification (RS)
LED signal diode (indicator)	RS1

ENERGY SOURCE DIAGRAM

Indicate which energy sources are included in the energy source diagram. Insert diagram below

ES
 PS
 MS
 TS
 RS
Electrical Energy Source Classification

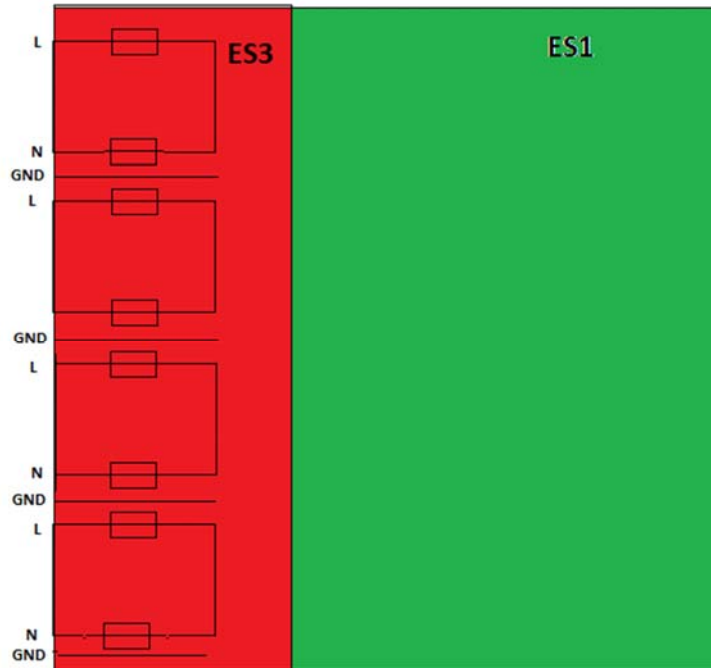
HFE/RFE 1600 & 2500 W, Models 12, 24, 32, 48 Vdc



HFE1600/2500 LAN



Empty RACK all series



Description of the circuits:**AC input: ES3 (steady state and capacitance), PS3****Primary circuit: ES3, PS3****Secondary circuit of T104 before rectification: ES2, PS3****Secondary circuit of T101 before rectification: ES2, PS3****Main output of the unit: ES1, PS3****Aux output of the unit: ES1, PS2****Communication/signal interface: ES1, PS1****Complete enclosure: TS1****LED: RS1****Mass: MS1 for modules, MS2 for racks****Edges/corners MS1****Fan: MS3 (Not accessible)**