UL TEST REPORT AND PROCEDURE

Standard:	UL 62368-1, 2nd Ed, 2014-12-01 (Audio/video, information and communication technology equipment Part 1: Safety requirements) CAN/CSA C22.2 No. 62368-1-14, 2nd Ed, Issued: 2014-12-01 (Audio/video, information and communication technology equipment Part 1: Safety requirements)
Certification Type:	Component Recognition
CCN:	QQJQ2, QQJQ8 (Power Supplies for Use in Audio/Video, Information and Communication Technology Equipment)
Complementary CCN:	N/A
Product:	Switching Power Supply and Accessory Rack
Model:	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) 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) 3) HFE1600-48/INF 4) HFE1600-48/SD 5) HFE1600-12/S-R/001 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) 7) Communication Module: HFE1600-LAN 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) 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) 10) Single Power Supply Module: HFE2500-48/S-CQC 11) Single Power Supply Module: HFE2500-12/S-R/RE 12) Single Power Supply Module: HFE2500-24/S-Ky, HFE2500-12/S-Ky (y=/POE) 13) Accessory rack: HFE2500-S1Uwu/mmmmm or HFE2500-S1Uwu-mmmmm (w=-TB, blank; u=/CO, blank; m=A-Z, 0-9, blank) 14) Communication Module: HFE2500-LAN 15) Single Power Supply Module: HFE2500-48/S-CQC2
Rating:	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.

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.

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.

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.

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.

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.

7) Input: 12 VDC, 0.5A max.

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.

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.

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.

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.

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.

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 14) Input: 12 Vdc, 0.5A max. 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.
Applicant Name and Address:	TDK-LAMBDA LTD 56 HAHAROSHET STREET P.O.B. 500 KARMIEL INDUSTRIAL ZONE 2161401 KARMIEL ISRAEL

This is to certify that representative samples of the products covered by this Test Report have been investigated in accordance with the above referenced Standards. The products have been found to comply with the requirements covering the category and the products are judged to be eligible for Follow-Up Service under the indicated Test Procedure. The manufacturer is authorized to use the UL Mark on such products which comply with this Test Report and any other applicable requirements of UL LLC ('UL') in accordance with the Follow-Up Service Agreement. Only those products which properly bear the UL Mark are considered as being covered by UL's Follow-Up Service under the indicated Test Procedure.

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Prepared By:	Mark John De Sagun / Project Handler	Reviewed By:	Hubert Koszewski / Reviewer

Supporting Documentation

The following documents located at the beginning of this Procedure supplement the requirements of this Test Report:

A. Authorization - The Authorization page may include additional Factory Identification Code markings.

B. Generic Inspection Instructions -

i. Part AC details important information which may be applicable to products covered by this Procedure. Products described in this Test Report must comply with any applicable items listed unless otherwise stated in the body of this Test Report.

ii. Part AE details any requirements which may be applicable to all products covered by this Procedure. Products described in this Test Report must comply with any applicable items listed unless otherwise stated in the body of each Test Report.

iii. Part AF details the requirements for the UL Certification Mark which is not controlled by the technical standard used to investigate these products. Products are permitted to bear only the Certification Mark(s) corresponding to the countries for which it is certified, as indicated in each Test Report.

Product Description

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.

(See model differences for more information)

Model Differences

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.

VARIABLE	RANGE OF VARIABLE	CONTENT
x	/S – with communication option blank-without	(all models) external communication
y	/POE - with output circuit additionally meets 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 "-".

Test Item Particulars	
Classification of use by	Skilled person (Except of the front panel of HFE/RFE series, which are accessible to ordinary person)
Supply Connection	AC Mains External Circuit - not Mains connected ES1 (for HFE1600-LAN and HFE2500-LAN only)
Supply % Tolerance	+10%/-10%

Supply Connection – Type	pluggable equipment type A - appliance coupler permanent connection mating connector Note: appliance coupler (for HFE1600-S1U without suffix /TB, HFE1600-D1U without suffix /TB and HFE2500-S1U without suffix /TB racks only), permanent connection (for HFE1600-S1U-TB, HFE1600-D1U-TB, HFE2500-S1U-TB and RFE series), mating connector (for HFE single power supply modules, HFE1600-LAN and HFE2500-LAN)
Considered current rating of protective device as part of building or equipment installation	20 A; building;
Equipment mobility	for building-in rack-mounting
Over voltage category (OVC)	OVC II
Class of equipment	Class I Class III
Access location	component for building-in (operator accessible only front side of HFE1600/RFE1600 and HFE2500/RFE2500 single power supply modules, HFE1600-LAN and HFE2500-LAN communication modules)
Pollution degree (PD)	PD 2
Manufacturer's specified maximum operating ambient (°C)	50°C full load, up to 70°C with de-ratings, refer to Additional Information below
IP protection class	IPX0
Power Systems	TN TT IT - 230 V L-L
Altitude during operation (m)	3000 (all models except HFE2500-24/S-Ky and HFE2500-12/S-Ky) and 3048m (for models HFE2500-24/S-Ky and HFE2500-12/S-Ky) m
Altitude of test laboratory (m)	2000 m or less
Mass of equipment (kg)	HFE1600 - max 1.6kg, RFE1600 - max 1.7kg, HFE1600-S1U (full populated rack) - max 13.6kg, HFE1600-D1U (full populated rack) - max 13.0kg, HFE2500 - max 2.1kg, RFE2500 - max 2.5kg, HFE2500-S1U (full populated rack) - max 13.4kg, HFE1600-LAN and HFE2500-LAN - max 0.8kg

Technical Considerations

- The product was submitted and evaluated for use at the maximum ambient temperature (Tma) permitted by the manufacturer's specification of : 50°C full load, up to 70°C with de-ratings (see additional information for more information)
- The product is intended for use on the following power systems : TT, TN, IT (only for Norway) (except HFE1600-LAN and HFE2500-LAN)
- Considered current rating of protective device as part of the building installation (A) : 20A as part of building installation or 30 A for all models except N/A for models HFE1600-LAN and HFE2500-LAN as part of equipment installation
- Mains supply tolerance (%) or absolute mains supply values : +10%/-10%
- The equipment disconnect device is considered to be : Appliance inlet for accessory rack HFE1600-S1U, HFE1600-D1U and HFE2500-S1U (all without suffix /TB). For other models, an appropriate disconnect device to be considered in end-application.

- The following were investigated as part of the protective earthing/bonding : Printed wiring board trace (refer to Enclosure - Schematics + PWB for layouts)
- The Risk Group of a lamp or lamp system (including LEDs) is : Exempt
- The following are available from the Applicant upon request : Installation (Safety) Instructions / Manual
- The product was investigated to the following additional standard : EN 62368-1:2014 + A11:2017, CSA CAN/CSA-C22.2 NO. 62368-1 2nd Ed, Issued December 1, 2014
- Power Supplies and Communication Module were evaluated to be 'hot-swappable' with the Accessory Racks. 'Hot-swap' function is allowed due to the lack of current interruption condition provided by protection circuitry in power supplies.
- The "POE" designation used does not refer to Power Over Ethernet with LPS limit. It is used by the manufacturer for connection to an end product with the POE designation. Additional evaluation is required in the end product to determine if the output designated as POE meets the LPS criteria.
- Equipment mobility: for building-in and rack-mounting.
  For building-in (models HFE1600 single power supply modules series, HFE2500 single power supply modules series ,RFE1600 single power supply modules series , RFE2500 single power supply modules series , HFE1600-48/INF, HFE1600-48/SD, HFE1600-12/S-R/001,HFE1600-LAN and HFE2500-LAN , HFE2500-48/S-CQC , HFE2500-12/S-R/RE , HFE2500 single power supply modules KY series, HFE2500-48/S-CQC2, are intended to be built in to accessory racks HFE1600-S1U, HFE1600-D1U, or HFE2500-S1U).
  For rack-mounting (RFE1600 single power supply modules series , RFE2500 single power supply modules series, HFE1600-S1U, HFE1600-D1U, HFE2500-S1U)
- Class of Equipment: Class I and Class III.
  Class I (all models except HFE1600-LAN and HFE2500-LAN).
  Class III (HFE1600-LAN and HFE2500-LAN only).

Engineering Conditions of Acceptability

For use only in or with complete equipment where the acceptability of the combination is determined by UL LLC. When installed in an end-product, consideration must be given to the following:

- The following product-line tests are conducted for this product : Earthing Continuity, Electric Strength
- The end-product Electric Strength Test is to be based upon a maximum working voltage of : Primary – Earthed Dead Metal: 240 Vrms/ 548 Vpk;, Primary-Secondary: 240 Vrms/618.8 Vpk
- The following output circuits are at ES1 energy levels : All outputs
- The following output circuits are at PS1 energy levels : Auxiliary and communication outputs
- The following output circuits are at PS3 energy levels : All outputs except for 12V auxiliary and communication outputs.
- The investigated Pollution Degree is : 2
- Proper bonding to the end-product main protective earthing termination is : Required
- An investigation of the protective bonding terminals has : been conducted
- The following end-product enclosures are required : Electrical, Fire, Mechanical
- The following magnetic devices (e.g. transformers or inductor) are provided with an OBJY2 insulation system with the indicated rating greater than Class A (105°C) : All transformers are Class F (155).
- The equipment is suitable for direct connection to : AC mains supply (all models except HFE1600-LAN and HFE2500-LAN)
- The power supply was evaluated to be used at altitudes up to : 3048 m for models HFE2500-24/S-Ky and HFE2500-12/S-Ky and 3000 m for all other models.
- 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.
- Considerations to Touch Current in the end product for unearthed circuits shall be considered.
- 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.
- 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.

Additional Information

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;
- Vin<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≥Vin≤170VAC - the max. output power equal 1600W;
- 170VAC>Vin≤100VAC - the max. output power equal 1200W;
- Vin<100VAC - 1%/V from the max. output power at 100VAC.

HFE1600-48/SD and HFE1600-48-R:
- 265VAC≥Vin≤170VAC - the max. output power equal 1300W;
- 170VAC>Vin≤100VAC - the max. output power equal 1008W;
- Vin<100VAC - 1%/V from the max. output power at 100VAC.

HFE1600-32-R:
- 265VAC≥Vin≤170VAC - the max. output power equal 1216W;
- 170VAC>Vin≤100VAC - the max. output power equal 960W;
- Vin<100VAC - 1%/V from the max. output power at 100VAC.

HFE1600-24-R:
- 265VAC≥Vin≤170VAC - the max. output power equal 1296W;
- 170VAC>Vin≤100VAC - the max. output power equal 960W;
- Vin<100VAC - 1%/V from the max. output power at 100VAC.

HFE1600-12-R:
- 265VAC≥Vin≤170VAC - the max. output power equal 1284W;
- 170VAC>Vin≤100VAC - the max. output power equal 960W;
- Vin<100VAC - 1%/V from the max. output power at 100VAC.

HFE1600-12/S-R/001:
- 265VAC≥Vin≤170VAC - the max. output power equal 1356W;
- 170VAC>Vin≤100VAC - the max. output power equal 960W.
HFE2500-12-R:

- 265VAC≥Vin≤170VAC - the max. output power equal 1920W;
- 170VAC>Vin≤100VAC - the max. output power equal 1200W;
- Vin<100VAC – 1.3%/V from the max. output power at 100VAC.

HFE2500-24-R:
- 265VAC≥Vin≤170VAC - the max. output power equal 1997W;
- 170VAC>Vin≤100VAC - the max. output power equal 1200W;
- Vin<100VAC – 1.3%/V from the max. output power at 100VAC.

For HFE2500-12/S-R/RE:
- 265VAC≥Vin≤180VAC - the max. output power equal 2331W;
- 180VAC≥Vin≤170VAC - the max. output power equal 2080W;
- 170VAC>Vin≤100VAC - the max. output power equal 1450W;
- Vin<100VAC – 1.5%/V from the max. output power at 100VAC.

Additional Standards

The product fulfills the requirements of: CSA C22.2 No. 60950-1-07 + A1:2011 + A2:2014

Markings and Instructions

Clause Title	Marking or Instruction Details
Equipment identification marking – Manufacturer identification	Listee's or Recognized companys name, Trade Name, Trademark or File Number
Equipment identification marking – model identification	Model Number
Equipment rating marking – ratings	"Input Ratings (voltage, frequency/dc, current/power)", "Output Ratings (voltage, frequency/dc, current/power)"
Disconnect device - Permanently connected equipment	Statement indicating that an appropriate disconnect device shall be incorporated in the building installation wiring. (Instruction)
Safety Instructions - Rack Mount	"Rack Mount Instructions - The following or similar rack-mount instructions are included with the installation instructions: A) Elevated Operating Ambient - If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (Tma) specified by the manufacturer. B) Reduced Air Flow - Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised. C) Mechanical Loading - Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading. D) Circuit Overloading - Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern. E) Reliable Earthing - Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips)."

Special Instructions to UL Representative

N/A

BD1.0	TABLE: Production-Line Testing Requirements					
BD1.1	**Electric Strength Test Special Constructions – Refer to Generic Inspection Instructions, Part AC for further information.**					
Model	Component	Removable parts	Test probe location	Test V rms	Test V dc	Test Time, s
See table 4.1.2	T101	-	Primary to Secondary	-	4000	1
See table 4.1.2	T102	-	Primary to Secondary	-	4000	1
See table 4.1.2	T104	-	Primary to Secondary	-	4000	1
BD1.2	**Earthing Continuity Test Exemptions – This test is not required for the following models:**					
	HFE1600-LAN and HFE2500-LAN					
BD1.3	**Electric Strength Test Exemptions – This test is not required for the following models:**					
	-					
BD1.4	**Electric Strength Test Component Exemptions – The following solid-state components may be disconnected from the remainder of the circuitry during the performance of this test.**					
	N/A					

BE1.0	Sample and Test Specifics for Follow-Up Tests at UL				
Model	Component	Material	Test	Sample (s)	Test Specifics
-	-	-	-	-	-