

UL TEST REPORT AND PROCEDURE

Standard:	UL 60950-1, 2nd Edition, 2019-05-09 (Information Technology Equipment - Safety - Part 1: General Requirements) CAN/CSA C22.2 No. 60950-1-07, 2nd Edition, 2014-10 (Information Technology Equipment - Safety - Part 1: General Requirements)
Certification Type:	Component Recognition
CCN:	QQGQ2, QQGQ8 (Power Supplies for Information Technology Equipment Including Electrical Business Equipment)
Complementary CCN:	N/A
Product:	Power Supply
Model:	NV350 or NV3 or NV-350 (these models are identical) (may be prefixed by NS - # / or - where # may be up to any four letters and may be followed by - \$; where \$ maybe any number between 000 to 999, indicating non-safety related model differences.)
Rating:	100-240 Vac nominal, (85-264 Vac including tolerances) 47-440 Hz, 5.5 A rms max.
Applicant Name and Address:	TDK-LAMBDA UK LTD KINGSLEY AVE ILFRACOMBE DEVON EX34 8ES UNITED KINGDOM

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

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Prepared By: Guoqing Zhang / Project Engineer

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

A range of switch mode power supplies for building in.

Model Differences

Unit Configuration Code:

NV350 or NV3 or NV-350 (these models are identical)

(may be prefixed by NS - # / or - where # may be up to any four letters and may be followed by - \$; where \$ maybe any number between 000 to 999, indicating non-safety related model differences)

followed by: S, R, Q, P, V, C, T, U, K or L where:

Option Letter	Airflow Option
S	Forward airflow, standard fan
R	Reverse airflow, standard fan
Q	Forward airflow, quiet fan
P	Reverse airflow, quiet fan
V	Forward airflow, temperature controlled fan
C	Customer air, fan not fitted
T	Forward airflow, top fan
U	Customer air, fan not fitted, cover not fitted
K	Custom fan/chassis assembly
L	Fixed speed fan (see non-standards below)

followed by: S, I or J where:

Option Letter	Input Option
S	Screw input terminals
I	IEC input

J IEC input dual fused

followed by: S, M, L, R, or T, where:

Option Letter	Leakage Option
S	Standard Leakage (Class B Filter)
M	Medium Leakage
L	Low Leakage
R	Reduced Leakage
T	Tiny Leakage

Unit configuration may be given using the above code and/or by the option description. The input terminal type (screw or IEC) may alternatively be determined by examination of the unit.

optionally followed by: EN#V, EN12V, EN13.5V, IN#V, IN12V, IN13.5V, ES#V, ES12V, ES13.5V, IS#V, IS12V or IS13.5V. Where:

Description	Option Description
EN#V	AC good, global module good, PSU enable, 5-5.5V, 2A standby output
EN*V	AC good, global module good, PSU enable, 12-13.5V, 1A standby output
IN#V	AC good, global module good, PSU inhibit, 5-5.5V, 2A standby output
IN*V	AC good, global module good, PSU inhibit, 12-13.5V, 1A standby output
ES#V	AC good, PSU enable, 5-5.5V, 2A standby output
ES*V	AC good, PSU enable, 12-13.5V, 1A standby output
IS#V	AC good, PSU inhibit, 5-5.5V, 2A standby output
IS*V	AC good, PSU inhibit, 12-13.5V, 1A standby output

Where: # represents the standby output voltage and is in the range 5 to 5.5V.

Where * represents the standby output voltage and is in the range of 12-13.5V.

The Global Options Inhibit and Enable functions permit the customer to turn off or on the main PSUs outputs and the fan. The standby supply is for use by the customer and provides an SELV output that continues to operate when all the main PSUs outputs have been turned off using the Inhibit or Enable functions. All the functions of the Global Option pass through a single 8 way PWB socket and are all rated SELV.

NV350 Modules:

Up to 3 of the following modules types may be fitted:

- @B
- or @BH
- or @C
- or @CM

where @ is the output voltage of the module and is within the range given in the single output module table.

or @/#DB (/ can be replaced with a _)

where @ is the output voltage of channel 1 and # is the output voltage of channel 2 of the module. Voltages are within the range given in the DB module tables.

or @/#DA (/ can be replaced with a _)

where @ is the output voltage of channel 1 and # is the output voltage of channel 2 of the module. Voltages are within the range given in the DA module tables. Only 1 DA module may be fitted.

or B/S

where B/S indicates that a blanking plate is fitted in place of a module.

The following nomenclature may optionally be used for outputs connected in series:
(Note that outputs may be connected in series even when this nomenclature is not used)

@BB or @ BHB or @BBH or @BHBH or @CC or @CCM

where @ is the total voltage of any two B, BH, C or CM modules connected in series.

or @/#BDB or @BHDB (/ can be replaced with a _)

where @ is the total series voltage of any B or BH module and DB module channel 1. # is the output voltage of the DB module channel 2. Voltages for # are within the range given in the DB module tables.

or @HDB

where @ is the total series voltage of any DB module channel 1 and channel 2.

Note.

For all outputs connected in series:

Permissible min. value for @ is given by summing the min. voltage ratings of the outputs connected in series.

Permissible max. value for @ is given by summing the max. voltage ratings of the outputs connected in series.

Custom Models:

Model: NV350 SJS 24B 24/24DB 12/12DB (K30012)

Maximum outputs: 24V, 8A; 24V, 7A; 24V, 2A; 12V, 13A; 12V, 5A (total power 350W max.)

Maximum ambient: 50°C

Orientations: Horizontal with chassis lowest, on either side or vertical with the airflow upwards.

Comments: PSU is fitted with dual fused IEC inlet and double pole mains switch (option J).

Model: NV350 SJS 24B 24/24DB 24/12DB (K30036)

Maximum outputs: 24V, 8A; 24V, 7A; 24V, 2A; 24V, 7A; 12V, 5A (total power 350W max.)

Maximum ambient: 50°C

Orientations: Horizontal with chassis lowest, on either side or vertical with the airflow upwards.

Comments: PSU is fitted with dual fused IEC inlet and double pole mains switch (option J).

Model: NV350 LSS 24/24DB 15.5/5.5DB (K30045A)

Maximum outputs: 24V, 1A; 24V, 0.7A; 15.5V, 6.4A; 5.5V, 6.4A. (total power 175W max.)

Maximum ambient: 50°C

Orientations: Horizontal with chassis lowest, on either side.

Comments: PSU has fan drive voltage fixed at 5.5V.

Model: NV350 LSS 24/24DB (K30045B)

Maximum outputs: 24V, 7A; 24V, 0.7A. (total power 184.8W max.)

Maximum ambient: 50°C

Orientations: Horizontal with chassis lowest, on either side.

Comments: PSU has fan drive voltage fixed at 5.5V.

Model: NV350 TSS 24B 15BH 5/15DB (K30052X, where X can be any character)

Maximum outputs: 350W max.

Comments: PSU has top fan fitted.

Compliant with EN/IEC/UL/CSA 60950-1 only

Model: NV350 KISES5V 12/12DB 5B (X00004#, where # can be any number of characters)

Maximum outputs: 350W max.

Comments: PSU has top fan, at an angle fitted. Output cables of 12 to 24 AWG, max 50 cm long are supplied with this model.

Compliant with EN/IEC/UL/CSA 60950-1 only

Model: NV350 NV3LISIS5V 3.3B 12BH (K30068X, where X can be any character)

Maximum outputs: 201.4W max.

Comments: PSU has fixed, reduced speed fan set to 5.5V.

Compliant with EN/IEC/UL/CSA 60950-1 only

ELECTRICAL & THERMAL RATINGS:

Input Parameters

Nominal input voltage (V)	100 - 240
Input voltage range (V)	85 - 264
Input frequency range (Hz)	47 - 63
Maximum input current (A)	5.5
Inrush Current (A)	<15

For input voltages between 85 and 89.9V the output power is derated to 94% of the values given in the Cooling Options Table.

Output Modules:

Module	Output Voltage	Slots	Maximum Average Current According to Slot Position (A)					
			Slot 1	Slot 2	Slot 3	Slot 4	Slot 5	
B	3.14-3.6V	2	40	-	40	40	40	
	4.75-5.5V	2	40*	-	40*	40*	40*	
	7-9V	2	2.5**	-	22.5**	22.5**	22.5**	
	12-15.5V	2	16***	-	16***	16***	16***	
	24-28V	2	8****	-	8****	8****	8****	
BH	12-15.5V	2	20#	-	20#	20#	20#	
	24-28V	2	10##	-	10##	10##	10##	
C	12-13.2V	3	33.34†	-	33.34†	33.34†	-	
	15-16.5V	3	26.67†	-	26.67†	26.67†	-	
	24-26.4V	3	16.67†	-	16.67†	16.67†	-	
	27-32V	3	14.82††	-	14.82††	14.82††	-	
CM	12-13.2V	3	-	-	33.34†††	33.34†††	33.34†††	-
	15-16.5V	3	-	-	26.67†††	26.67†††	26.67†††	-
	24-26.4V	3	-	-	16.67†††	16.67†††	16.67†††	-
	27-32V	3	-	-	14.82†††	14.82†††	14.82†††	-
DA CH1	11.88-12.25V	1	-	-	-	-	3¥	
DA CH2	11.9 to -11.6V	1	-	-	-	-	1¥¥	
DB	3.14-3.6V	2	25	-	25	25	25	
CH1	4.75-5.5V	2	25	-	25	25	25	
	5.5-6.5V††††	2	25	-	25	25	25	
	12-15.5V	2	13¥¥¥	-	13¥¥¥	13¥¥¥	13¥¥¥	
	24-28V	2	7¥¥¥¥	-	7¥¥¥¥	7¥¥¥¥	7¥¥¥¥	
DB	3.3-6V‡	2	10	-	10	10	10	
CH2	7-15.5V	2	5	-	5	5	5	
	24-32V	2	2	-	2	2	2	

* - Linearly derate from 40 to 36A over the voltage range 5.2 to 5.5 V.

** - Linearly derate from 22.5 to 20A over the voltage range 8 to 9V.

*** - Linearly derate from 16 to 13A over the voltage range 13.5 to 15.5 V.

**** - Linearly derate from 8 to 7A over the voltage range 26 to 28 V.

- Linearly derate from 20 to 16.5A over the voltage range 13.2 to 15.5 V.

- Linearly derate from 10 to 8.5A over the voltage range 25.7 to 28 V.

† - C & CM modules may output up to 600W for up to 10 seconds providing that the converter ratings are not exceeded and the average power from the module does not exceed the following: 400W for 115 - 264Vac input or 350W for 90Vac input (average power may be linearly interpolated between 90 and 115Vac input).

†† - Derate to 400W above 27V. C & CM modules may output up to 600W for up to 10 seconds providing that the converter ratings are not exceeded and the average power from the module does not exceed the following: 400W for 115 - 264Vac input or 350W for 90Vac input (average power may be linearly interpolated between 90 and 115Vac input).

††† - CM Module cannot be fitted to slot 1 due to medical spacing requirements.

†††† - See Table below

DB modules with 6V nominal, Output Channel1

Cooling options C, S, T & V	O/P 1 : 5.5 - 6V O/P 1 + O/P 2 : 195W total.
	O/P 1 : 6 - 6.5V O/P 1 + O/P 2 : Linearly derate from 195 to 170W total.
Cooling option Q	O/P 1 : 5.5 - 6V O/P 1 + O/P 2 : 180W total.
	O/P 1 : 6 - 6.5V O/P 1 + O/P 2 : Linearly derate from 180 to 140W total.
Cooling options P & R	O/P 1 : 5.5 - 6.5V O/P 1 + O/P 2 : 120W total.

DB modules with 6V nominal channel 1 are not allowed when channel 2 exceeds 5.5V.

¥ - 3A forward air, 2A reverse air.

¥¥ - 1A forward air, 0.6A reverse air.

¥¥¥ - Linearly derate from 13 to 10A over the voltage range 12.5 to 15.5 V.

¥¥¥¥ - Linearly derate from 7 to 6A over the voltage range 25 to 28 V.

‡ - Voltage measured at the module power terminals. This voltage at the power terminals must not be exceeded when remote sense is used.

Cooling Options:

Cooling option	Input volts	continuous O/P power	peak power O/P (W)	Ambient(°C)	Derating(°C) †
S, V, T Forward air standard fan	90-264(Vac) ‡	350W	400 peak if 350 average #	65	2.5% per°C above 50
S, V Forward air standard fan	115-264(Vac)	450W	510 peak if 450 average #	65	2.5% per°C above 50
S, V, T Forward air					

standard fan	180-264(Vac)	664W	740 peak if 600 average #	65	2.5% per°C above 50
R					
Reverse air					
standard fan	90-264(Vac) ‡	250W	N/A	65	2.5% per°C above 50
Q					
Forward air					
quiet fan	90-264(Vac) ‡	350W	N/A	65	2.5% per°C above 50
P					
Reverse air					
quiet fan	90-264(Vac) ‡	250W	N/A	60	3.8% per°C above 50

C, U Cooling Option : Customer air, fan not fitted. Refer to Customer Air Cooling section in for details.

† Both the total output power and the module output currents are derated by the given value.

‡ For input voltages between 85 and 89.9V the output power is derated to 94% of the values given for 90V input.

The PSU may output the given peak power for up to 10 seconds providing that the average power from the PSU does not exceed the stated value.

- Continuous, peak and average power ratings may be linearly interpolated for input voltages between 90 and 180V.
- Global Option standby outputs (12-13.5V at 1A or 5-5.5V at 2A) should not be included when calculating total PSU output power, but they are subject to the current deratings for operation above 50°C.
- Global Options with output voltages between 5.01 and 5.5V have their max. output current linearly derated from 2A at 50°C ambient to 1.4A at 65°C ambient.
- For reverse airflow cooling all B, BH and DB modules are limited to a maximum output power of 150W (total for both channels on dual output modules).

NV350 FEP or NF3 (these models are identical)

followed by: S, R, C, or T where:

- S = Forward airflow, standard fan
- R = Reverse airflow, standard fan
- C = Customer air, fan not fitted
- T = Top fan, Forward airflow

followed by: S, I, or J where:

- S = Screw input terminals
- I = IEC input
- J = Dual fused IEC input

followed by: S, where:

S = Standard Leakage (Class B Filter)

Unit configuration may be given using the above code and/or by the option description. The input terminal type (screw or IEC) may alternatively be determined by examination of the unit.

optionally followed by: ES#V or IS#V, where:

- ES5V = AC good, PSU enable, 5-5.5V, 2A standby output
- ES12V = AC good, PSU enable, 12-13.5V, 1A standby output
- IS5V = AC good, PSU inhibit, 5-5.5V, 2A standby output
- IS12V = AC good, PSU inhibit, 12-13.5V, 1A standby output

where # represents the standby output voltage.

The Global Options Inhibit and Enable functions permit the customer to turn off or on the main psu outputs and the fan. The standby supply is for use by the customer and provides an SELV output that continues to operate when all the main psu outputs have been turned off using the Inhibit or Enable functions. All the functions of the Global Option pass through a single 8 way PWB socket and are all rated SELV.

followed by @FE

where @ is the output voltage of the module and is within the range given in the FE module table as follows:

NV350 FEP Module:

FE Module, Output 1

Nominal Voltage (V)	Voltage Range (V)	#	Max. Current (A)	Max. Power (W)
12	11.5 - 15.5		29.2	350*

FE Module, Output 2

Nominal Voltage (V)	Voltage Range (V)		Max. Current (A)	Max. Power (W)
12	Fixed 12V		2	24.2*

* - Total Output Power must not exceed 350W.

Voltage measured at the module power terminals must not exceed the value shown in the table when remote sense is used. For 50°C max. ambient operation: 11.5 - 12.5V 350W total power. From 12.5 - 13.2V: Linearly derate total power from 350 to 306W. For 350W total output power (O/P 1 + O/P 2) : 11.5 - 12.5V: 50°C max. ambient. From 12.5 - 13.2V: Linearly derate max. ambient from 50 to 45°C

Cooling Options

COOLING OPTION: TOTAL POWER

S (FORWARD AIRFLOW)	350W
R (REVERSE AIRFLOW)	350W
C (CUSTOMER AIR)	350W
T (TOP FAN)	350W

The above ratings apply for ambient temperatures up to 50°C. From 50 to 65°C the total output power and the module current ratings are both derated at 2.5% per °C.

Global Option standby outputs (12V at 1A or 5V at 2A) should not be included when calculating total PSU output power, but they are subject to the output current deratings for operation above 50°C.

5V global options are derated to 1.8A max. when the psu is inhibited

NV350 PFC

ELECTRICAL & THERMAL RATINGS:

Input Parameters

Nominal input voltage (V)	100 - 240
Input voltage range (V)	85 - 264
Input frequency range (Hz)	47 - 63
Maximum input current (A)	5.5
Inrush Current (A)	<15

For input voltages between 85 and 89.9V the output power is derated to 94% of the values given in the Cooling Options Table.

Output Parameters

Max Output Power is 350W up to 50°C. Above 50°C, derate by 2.5%/°C.

Output Voltage - 375V +/- 20V

Fan Output - 12V nom at 0.25A max

Customer Air Cooling (options C or U):

The following method must be used for determining the safe operation of PSUs when C or U option (Customer Air) is fitted, i.e. fan not fitted to PSU. The minimum permitted airflow for customer air cooling is 0.5m/s.

For PSUs cooled by customer supplied airflow the components listed in the following table must not exceed the temperatures given. Additionally ratings specified for units with an internal fan must still be complied with, e.g. mains input voltage range, maximum output power, module voltage / current ratings and maximum ambient temperature. To determine the component temperatures the heating tests must be conducted in accordance with the requirements of the appropriate standards.

Test requirements include: PSU to be fitted in its end-use equipment and operated under the most adverse conditions permitted in the end-use equipment handbook/specification and which will result in the highest temperatures in the PSU. To determine the most adverse conditions consideration should be given to the end use equipment maximum operating ambient, the PSU/assembly loading and input voltage, ventilation, end use equipment orientation, the position of doors & covers, etc. Temperatures should be monitored using type K fine wire thermocouples (secured with cyanoacrylate adhesive, or similar) placed on the hottest part of the component (out of any direct airflow) and the equipment should be run until all temperatures have stabilized.

Test Item Particulars

Mass of equipment (kg)	1 kg max
Equipment mobility	for building-in
Connection to the mains	Connection to mains via host equipment, or via appliance inlet
Operating condition	continuous
Access location	for building-in
Over voltage category (OVC)	OVC II
Mains supply tolerance (%) or absolute mains supply values	+10%, -10%
Tested for IT power systems	Yes
IT testing, phase-phase voltage (V)	230V (Norway only)
Class of equipment	Class I (earthed)
Considered current rating of protective device as part of the building installation (A)	5.5
Pollution degree (PD)	PD 2
IP protection class	IP X0
Altitude of operation (m)	5000
Altitude of test laboratory (m)	64

Technical Considerations

- The NV350 range is suitable for use at an altitude of 5000 metres.
- 1.2 The product was submitted and evaluated for use at the maximum ambient temperature (T_{ma}) permitted by the manufacturer's specification of: 50°C (full load) to 65°C maximum (see enclosure 7-01 for models and conditions to which the extended ambient applies) with de-ratings.
- 1.4 The product is intended for use on the following power systems: TN, IT (Norway only)
- 1.11 The following were investigated as part of the protective earthing/bonding: Printed wiring board trace (refer to Enclosure - Schematics + PWB for layouts)
- 1.13 The following are available from the Applicant upon request: Installation (Safety) Instructions / Manual
- 1.5 The equipment disconnect device is considered to be: appliance inlet (if fitted), or provided by the end equipment.
- 1.7 The product was investigated to the following additional standards: CSA C22.2 No. 60950-1-07+A1:2011, EN 60950-1:2006 +A11:2009+ A12:2011+A1:2010 +A2:2013, UL 60950-1 2nd Ed. Revised 2011-12-19(which includes all European national differences, including those specified in this test report).
- 1.3 The means of connection to the mains supply is: Pluggable A (models fitted with an IEC60320 inlet only).
- Multilayer PWB's accepted under CBTR Ref. No. E349607-A23 dated 2014-07-31 and letter report, enclosure 7-06 of this report.

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:

- 1.2 The following Production-Line tests are conducted for this product: Earthing Continuity
Electric Strength
- 1.5 The following secondary output circuits are SELV: All.
- 1.3 The end-product Electric Strength Test is to be based upon a maximum working voltage of:
Primary-SELV: 363 Vrms, 650 Vpk
Primary-Earthed Dead Metal: 343 Vrms, 622 Vpk. These figures are based on the original test data.
- 1.11 The power supply terminals and/or connectors are: Screw terminals (where used) are suitable for factory wiring only.
- 1.13 The investigated Pollution Degree is: 2
- 1.15 Proper bonding to the end-product main protective earthing termination is: Required
- 1.19 The following end-product enclosures are required: Mechanical, Fire, Electrical with the exception of the IEC inlet face of units fitted with an IEC60320 inlet.
- 1.10 The following output terminals were referenced to earth during performance testing: All outputs and their return lines individually referenced to obtain maximum working voltage.
- 1.12 The maximum investigated branch circuit rating is: 20 A
- 1.16 An investigation of the protective bonding terminals has: been conducted
- 1.18 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): T1, T2, TX1 & TX2 (all Class F). See table 1.5.1 for details of insulation systems used.
- 1.6 The following secondary output circuits are at hazardous energy levels: 12BH, 24BH, 12C, 16C, 24C, 30C, 12CM, 12FE(NV350FEP model), 16CM, 24CM and 30CM modules.
- 1.20 The following components require special consideration during end-product Thermal (Heating) tests due to the indicated maximum temperature measurements during component-level testing:
Converter: L1 (130°C), L2 (155°C), L3 (155°C), T1 (130°C), C1 (100°C), C3 (100°C), C4 (100°C), RL1 (100°C); Modules: TX1 (130°C), TX2 (130°C), XL1 (130°C), B, BH & DB module L1 (130°C), C & CM module L1 (140°C); Global Option: T2 (130°C); All electrolytic capacitors: 105°C.
- 1.23 The equipment is suitable for direct connection to: AC mains supply (units with an IEC60320 inlet only). Only the end face with the IEC60320 inlet may be accessible to an end operator.
- 1.35 Fans: The end fan provided in this sub-assembly is provided with a fan guard to reduce the risk of operator contact with the stator.
The top fan provided in this sub-assembly is not intended for operator access.

Additional Information

Project # 4789845826 line 1:

The original report was revised to include the following technical/administrative changes/additions:

Update CCL with the addition of 2 alternate Relays: TE Connectivity Relay 2-1416010-6 (RE034012) & Hongfa HF171F12-H3

The alternate components have same or better ratings, considered technically equivalent, no tests were deemed necessary, the sample requirements were waived, the product continues to comply with the standard.

This test report should be read in conjunction with the original Report, No.: E135494-A57-CB-3, issued date 2015-01-05 with CB Certificate DK-42825-UL, issued on 2015-01-05.

Project 4787707401 information:

This is Amendment 1 to the CB Test Report E135494-A57-CB-3 dated 2015-01-05 with CB Test Certificate DK-42825-UL. This Amendment is published due to changes provided in Report Summary.

No additional testing has been done.

This amendment shall be read in conjunction with Original Test Report and Test Certificate.

This report, to include IEC60950-1 amendment 2: 2013, is a re-issue of CBTR ref No: E135494-A57-CB-2 dated 2012-10-29 with CB Test Certificate Ref. No. DK-28914-UL issued 2012-10-29, amendment 1 issued 2013-11-27 with CB Test Certificate Ref. No. DK-28914-A1-UL issued 2013-11-27 and amendment 2 issued 2014-06-11 with CB Test Certificate Ref. No. DK-28914-A2-UL issued 2014-06-11. Based on the previously conducted testing and the review of product technical documentation including photos, schematics, wiring diagrams and similar, has been determined that the product continues to comply with the standard. Only the tests listed below was deemed necessary.

The original report was modified to include the following changes/additions:

Range approval for a dual fused input connector (option J). This option has been used before as a non-standard. Thermal comparison with worst case configuration to allow use across the range.

Range approval for top fan (option T). This option has been used before as a non-standard. Thermal comparison with worst case configuration to allow use across the range.

NV3 FEP restored back to original value: 11.5 - 15.5V

DB module, CH2 voltage range may be extended up to 6.0V (60W max) for some PSU configurations.

Consultation with the factory is required. This is in line with the 61010-1 report No: E331788-A17-CB-1

L option added to nomenclature for fixed speed fan (Non-standard only)

Alternative fuse testing (not mains input fuse)

Alternative J1 connector to include Tianli B825 series (same ratings no testing required)

Alternative/second source fan testing

Assessed for 5000 meters

Model: NV3 KISE5V 12/12DB 5B (X00004#) should have been: NV3 KISES5V 12/12DB 5B (X00004#)

Removed Avnet and Arrow from the manufacturers list.

Updated handbook

Addition/deletion of multilayer PWBs to critical component list

Correction/addition to the critical component list

Updated licenses

Updated drawings

Only limited testing was conducted to reflect these additions and all other tests were considered covered by the testing covered by Test Report Reference E135494-A57-CB-2 issued 2012-10-29 (CB Certificate DK-28914-UL), amendment 1 issued 2013-11-27 (CB Certificate DK-28914-A1-UL) and amendment 2 issued 2014-06-11 (CB Certificate DK-28914-A2-UL).

Additional Standards

The product fulfills the requirements of: CSA C22.2 No. 60950-1-07+A1:2011, UL 60950-1 2nd Ed. Revised 2011-12-19, EN 60950-1:2006 + A1:2010 + A11:2009 + A12:2011 + A2:2013

Markings and Instructions

Clause Title	Marking or Instruction Details
1.7.1 Power rating - Ratings	Ratings (voltage, frequency/dc, current)
1.7.1 Power rating - Company identification	Listee's or Recognized company's name, Trade Name, Trademark or File Number
1.7.1 Power rating - Model	Model Number
1.7.6 Fuses - Non-operator access/soldered-in fuses	Unambiguous reference to service documentation for instructions for replacement of fuses replaceable only by service personnel

2.7.6 Warning to service personnel	"CAUTION: Double pole/neutral fusing"
Special Instructions to UL Representative ,	