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## EU DECLARATION OF CONFORMITY

### NV350 Series

We, TDK-Lambda UK Limited, of Kingsley Avenue, Ilfracombe, Devon, EX34 8ES declare under our sole responsibility that the TDK-Lambda NV350 series of power supplies, as detailed on the attached products covered sheets, complies with the provisions of the following European Directives and is eligible to bear the CE mark:

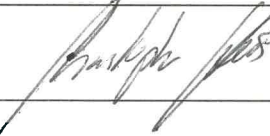
Low Voltage Directive	2014/35/EU
EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU
RoHS Directive (EU)	2015/863

Assurance of conformance of the described product with the provisions of the stated EC Directive is given through compliance to the following standards:

Electrical Safety (LVD)	EN60950-1:2006 + A2:2013
Electromagnetic Compatibility (EMC)	EN61000-6-3:2007 + A1:2011 EN61000-6-2:2005 EN61204-3:2001 EN55024:2010 EN55032:2015

Our representative in the EU is TDK-Lambda Germany GmbH, located at Karl-Bold-Str. 40, 77885 Achern, Germany.

Note: The EMC performance of a component power supply will be affected by the final installation, compliance to the stated EMC standards and conformance to the EMC Directive must be confirmed after installation by the final equipment manufacturer. For guidance with respect to test conditions please visit our website at [https://emea.lambda.tdk.com/EMC\\_Guidance](https://emea.lambda.tdk.com/EMC_Guidance) or contact your local TDK-Lambda sales office.

Name of Authorized Signatory	Christopher Haas
Signature of Authorized Signatory	
Position of Authorized Signatory	Technical Manager and Head of Quality & Compliance, TDK-Lambda Germany GmbH
Date	22 <sup>nd</sup> October 2019
Date series first CE marked	02 <sup>nd</sup> January 1997
Place where signed	Achern, Germany

## NV350 SERIES PRODUCTS COVERED

### Unit Nomenclature:

#### Unit Configuration Code:

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

followed by: S, R, Q, P, V, C, U or K 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 (Non-standards only)

followed by: S, J or I, where:

Option Letter	Input Option
S	Screw input terminals
I	IEC input
J	IEC dual fused input

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:

Option Letter	Global Option
EN#V	AC good, global module good, PSU enable, 5-5.5V, 2A standby output
EN12V	AC good, global module good, PSU enable, 12V, 1A standby output
EN13.5V	AC good, global module good, PSU enable, 13.5V, 1A standby output
IN#V	AC good, global module good, PSU inhibit, 5-5.5V, 2A standby output
IN12V	AC good, global module good, PSU inhibit, 12V, 1A standby output
IN13.5V	AC good, global module good, PSU inhibit, 13.5V, 1A standby output
ES#V	AC good, PSU enable, 5-5.5V, 2A standby output
ES12V	AC good, PSU enable, 12V, 1A standby output
ES13.5V	AC good, PSU enable, 13.5V, 1A standby output
IS#V	AC good, PSU inhibit, 5-5.5V, 2A standby output
IS12V	AC good, PSU inhibit, 12V, 1A standby output
IS13.5V	AC good, PSU inhibit, 13.5V, 1A standby output

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

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

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

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

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.

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 KISE5V 12/12DB 5B (X00004#, where # can be any number of characters)

Maximum outputs: 250W max.

Comments: PSU has a 45° angle fan fitted at the output end producing reverse air flow. Output cables of 12 to 24 AWG, which have a maximum length of 500mm, are supplied with this model. The chassis is 75mm longer in length compared to the standard chassis. See model on page 28. Compliant with EN/IEC/UL/CSA 60950-1 only

Model: NV350 LISIS5V 3.3B 12BH 5/15DB (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

Standard	60950-1	60601-1	61010-1
Nominal input voltage (V)	100 - 240	100 - 240	100 - 240
Input voltage range (V)	85 - 264	85 - 264	85 - 264
Input frequency range (Hz)	47 - 440	47 - 63	47 - 440
Maximum input current (A)	5.5	5.5	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	Occupied Slots	Maximum Average Current According to Slot Position (A)					
			Slot 1	Slot 2	Slot 3	Slot 4	Slot 5	Slot 6
B	3.14-3.6V	2	40	-	40	40	40	-
	4.75-5.5V		40*	-	40*	40*	40*	-
	7-9V		22.5**	-	22.5**	22.5**	22.5**	-
	12-15.5V		16***	-	16***	16***	16***	-
	24-28V		8****	-	8****	8****	8****	-
BH	12-15.5V	2	20#	-	20#	20#	20#	-
	24-28V		10##	-	10##	10##	10##	-
C	12-13.2V	3	33.34†	-	33.34†	33.34†	-	-
	15-16.5V		26.67†	-	26.67†	26.67†	-	-
	24-26.4V		16.67†	-	16.67†	16.67†	-	-
	27-32V		14.82††	-	14.82††	14.82††	-	-
CM	24-26.4V	3	-	16.67†††	16.67†††	16.67†††	-	-
DA CH1	11.88-12.25V	1	-	-	-	-	3¥	-



DA CH2	-11.9 to -11.6V		-	-	-	-	1¥¥	-
DB CH1	3.14-3.6V	2	25	-	25	25	25	-
	4.75-5.5V		25	-	25	25	25	-
	5.5-6.5V††††		25	-	25	25	25	-
	12-15.5V		13¥¥¥	-	13¥¥¥	13¥¥¥	13¥¥¥	-
	24-28V		7¥¥¥¥	-	7¥¥¥¥	7¥¥¥¥	7¥¥¥¥	-
DB CH2	3.3-6V‡	2	10	-	10	10	10	-
	7-15.5V		5	-	5	5	5	-
	24-32V		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:

Code	Cooling Option	Input Voltage Range (Vac)	Total PSU output power (W)	Max. ambient (°C)	Derating †
S, V, T	Forward airflow, standard fan (fixed speed & temp. controlled)	90 - 264 ‡	350W continuous (400W peak if 350W average #)	65	2.5% per °C above 50°C
S, V	Forward airflow, standard fan (fixed speed & temp. controlled)	115 - 264	450W continuous (510W peak if 450W average #)	65	2.5% per °C above 50°C
S, V, T	Forward airflow, standard fan (fixed speed & temp. controlled)	180 - 264	664W continuous (740W peak if 600W average #)	65	2.5% per °C above 50°C
R	Reverse airflow, standard fan	90 - 264 ‡	250 W continuous (no peak rating)	65	2.5% per °C above 50°C
Q	Forward airflow, quiet fan	90 - 264 ‡	350 W continuous (no peak rating)	65	2.5% per °C above 50°C

T	Top fan for model K30052x only	90 - 264 ‡	350 W continuous (no peak rating)	65	2.5% per °C above 50°C
P	Reverse airflow, quiet fan	90 - 264 ‡	250 W continuous (no peak rating)	60	3.8% per °C above 50°C
C, U	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).

#### 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, ie 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, eg 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 stabilised.

Circuit Ref.	Description	Max. Temperature (°C)
L2, L3, L4	Filter/PFC assy: Choke winding	155
C3, C4	Filter/PFC assy: X capacitors	100
L1	Filter/PFC assy: Boost choke winding	130
C1	Filter/PFC assy: Electrolytic capacitor	60 (105)
T1	Filter/PFC assy: Flyback transformer winding	130
RLY1	Filter/PFC assy: Relay	100
TX1, TX2	Modules: Power transformer windings	130
L1, XL1	B, BH & DB module chokes	130
L1	C & CM module chokes	140
Global option T2	Global Options: Transformer winding	90 (130)
Various	All other choke & transformer windings	110
Various	All ≤10mm diameter electrolytic capacitors	80 (105)
Various	All 12.5mm diameter electrolytic capacitors	85 (105)
TX1	DA Module: Flyback transformer windings	100 (130)
XTH101	Primary IMS measured adjacent to XTH101	100 (105)

See component layout drawings below for locations of components. Higher temperature limit (in brackets) may be used but product life may be reduced.

### Input Connections:

Input screw terminals – 6-32 screws with 8.25mm spacing between screw head centres. Screw head diameter is 6.6mm  
Input IEC 60320 – rated 10A/250Vac (15A/132Vac)

### Output Connections:

Maximum Torque Settings for Output Screw Terminals: M3 – 0.5 – 0.6Nm  
M4 – 1.1 – 1.3Nm

**NV350 FEP or NF3 or NV-350FEP** (these models are identical)

followed by: S, R or C, where:

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

followed by: S or I, where:

S = Screw input terminals  
I = 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 - 13.2	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

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

Standard	60950-1	60601-1	61010-1
Nominal input voltage (V)	100 - 240	100 - 240	100 - 240
Input voltage range (V)	85 - 264	85 - 264	85 - 264
Input frequency range (Hz)	47 - 440	47 - 63	47 - 440
Maximum input current (A)	5.5	5.5	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

#### Input Connections:

Input screw terminals – M3 screws with 8.25mm spacing between screw head Centres.

Maximum torque setting for input screw terminals: M3: 0.5 to 0.6Nm

#### Output Connections:

Molex 4455 series 5 way socket (J20, J21, J22, J23, J24)

Molex 5045 series 2 way header (J10)

#### Customer Air Cooling:

The following method must be used for determining the safe operation of PSUs when customer supplied airflow is used. 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. 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 stabilised.