

# NFS110 SERIES

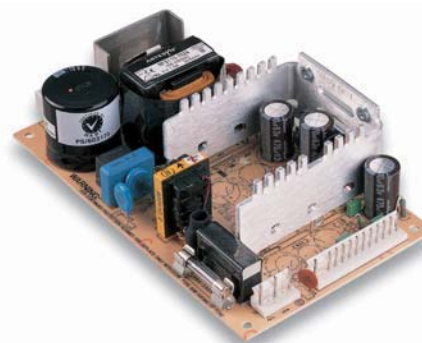
AC/DC Single & Multi Output: 110Watts

LOW TO MEDIUM POWER AC/DC POWER SUPPLIES

80-110 W AC/DC Universal Input Switch Mode Power Supplies

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- 7.0 x 4.25 x 1.8 inch package
- Overvoltage and short circuit protection
- 110 W with 20 CFM
- Adjustable outputs
- EN55022, EN55011 conducted emissions level B
- UL, VDE and CSA safety approvals
- CE mark
- Available RoHS compliant



The NFS110 series is a 110 W universal input ac-dc power supply on a 7 x 4.25 inch card. The NFS110 series has four single and three quad output models and has proven itself to be highly reliable and versatile product for a wide range of communication and industrial applications, with a very high peak current capability on each output for drive and motor applications. The NFS110 provides 80 W of output power with free air convection cooling which can be boosted to 110 W with 20 CFM of air. Standard features include overvoltage and short circuit protection. The series, with full international safety approval and the CE mark, meets conducted emissions EN55022 level B. The NFS110 series is designed for use in low power data networking, computer, telecom and industrial applications such as servers, thermal printers, storage devices, vending machines and POS equipment.

**CE** (LVD)

**2 YEAR WARRANTY**

All specifications are typical at nominal input, full load at 25 °C unless otherwise stated

## SPECIFICATIONS

### OUTPUT SPECIFICATIONS

Voltage adjustability	+5.1 V o/p on multi's	±3.0%
	5.1 V single output	±3.0%
	12 V single output	12-14 Vac
	15 V single output	15-18 Vac
	24 V single output	24-30 Vac
Line regulation	LL to HL, FL	±0.1% max.
	All outputs on all units	
Overshoot/undershoot	At turn-on	0%
Temperature coefficient	All outputs	±0.02%/°C
Overvoltage protection	Multi o/p 5.1 Vac only	6.25 Vac ±0.75 Vac
	5.1 Vac single	6.25 Vac ±0.75 Vac
	12 Vac single	15.75 Vac ±1.0 Vac
	15 Vac single	22 Vac ±1.5 Vac
	24 Vac single	33 Vac ±2.5 Vac
Output power limit	Primary power limited	Pin max. 160 W Pout min. 110 W
Minimum output current	(See Note 13)	0 A
Short circuit protection		Burst mode operation

### INPUT SPECIFICATIONS

Input voltage range	85-264 Vac	
	120-370 Vdc	
Input frequency range	47-440 Hz	
Input surge current	230 Vac 35 A	
Safety ground leakage current	110 Vac, 50 Hz	0.2 mA, max.
	230 Vac, 50 Hz	0.4 mA, max.

### EMC CHARACTERISTICS

Conducted emissions	EN55022, FCC part 15	Level B
Radiated emissions	EN55022, FCC part 15	Level A
ESD air	EN61000-4-2, level 3	Perf. criteria 1
ESD contact	EN61000-4-2, level 4	Perf. criteria 1
Surge	EN61000-4-5, level 3	Perf. criteria 1
Fast transients	EN61000-4-4, level 3	Perf. criteria 1
Radiated immunity	EN61000-4-3, level 3	Perf. criteria 2
Conducted immunity	EN61000-4-6, level 3	Perf. criteria 1

### GENERAL SPECIFICATIONS

Hold-up time	110 Vac @ 80 W	35 ms
	110 Vac @ 110 W	17 ms
	230 Vac @ 80 W	140 ms
	230 Vac @ 110 W	100 ms
Efficiency	Multiple outputs	70% typical
	+5.1 V single	70% typical
	12 V and 15 V singles	72% typical
	24 V single	75% typical
Isolation voltage	Input/output	3000 Vac
	Input/chassis	1500 Vac
Switching frequency	At 100 Watts output	20-70 kHz
	At zero load	100-250 kHz
Approvals and standards (See Note 12)		VDE0805, EN60950, IEC950 IEC1010, UL1950 CSA C22.2 No. 950
Weight	Singles	550 g (19.4 oz)
	Multiple outputs	600 g (21.2 oz)
MTBF (See Note 9)	MIL-HDBK-217E	125,000 hours

### ENVIRONMENTAL SPECIFICATIONS

Thermal performance (See Notes 9, 10)	Operating, see curve	0 °C to +70 °C
	Non-operating	-40 °C to +85 °C
	0 °C to +50 °C, amb. convection cooled	80 W
	+50 °C to +70 °C, amb. convection cooled	Derate 2 W/°C
	0 °C to +50 °C, 20 CFM forced air	110 W
	+50 °C to +70 °C, 20 CFM forced air	Derate 2.75 W/°C
Peak, 0 °C to +50 °C, max. 60 seconds		110 W
Relative humidity	Non-condensing	5% to 95% RH
Altitude	Operating	10,000 feet max.
	Non-operating	40,000 feet max.
Vibration (See Note 11)	5-500 Hz	2.4 G approx.

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AC/DC Single & Multi Output: 110Watts

OUTPUT VOLTAGE	OUTPUT CURRENTS			RIPPLE (4)	TOTAL REGULATION (5)	MODEL NUMBERS (13,14,F)
	MAX (1)	PEAK (2)	FAN (3)			
+5.1 V	8 A	20 A	10 A	50 mV	±2.0%	NFS110-7601PJ
+12 V	4.5 A	9 A	5 A	120 mV	±3.0%	
-12 V	0.5 A	1.5 A	1 A	120 mV	±3.0%	
-5 V	0.5 A	1.5 A	1 A	50 mV	±3.0%	
+5.1 V (I <sub>A</sub> )	8 A	20 A	10 A	50 mV	±2.0%	NFS110-7602PJ (6)
+24 V (I <sub>B</sub> ) (6)	3.5 A	4.5 A	4.5 A	240 mV	+10/-5.0%	
+12 V	4.5 A	9 A	5 A	120 mV	±3.0%	
-12 V	0.5 A	1.5 A	1 A	120 mV	±3.0%	
+5.1 V	8 A	20 A	10 A	50 mV	±2.0%	NFS110-7604PJ
+15 V	4 A	7.5 A	5 A	150 mV	±3.0%	
-15 V	0.5 A	1.5 A	1 A	150 mV	±3.0%	
-5 V	0.5 A	1.5 A	1 A	50 mV	±3.0%	
5.1 V	16 A	22 A	20 A	50 mV	±2.0%	NFS110-7605J (7,8)
12 V	7 A	9 A	9 A	120 mV	±2.0%	NFS110-7612J (7,8)
15 V	5 A	7.3 A	7.3 A	150 mV	±2.0%	NFS110-7615J (7,8)
24 V	3.5 A	4.5 A	4.5 A	240 mV	±2.0%	NFS110-7624J (7,8)

## Notes

- 1 Convection cooled, 80 W maximum.
- 2 Peak outputs lasting less than 60 seconds with duty cycle less than 10%. Total peak power must not exceed 110 W.
- 3 Forced air, 20 CFM at 1 atmosphere, 110 W maximum.
- 4 Figure is peak-to-peak. Output ripple is measured across a 50 MHz bandwidth using a 12 inch twisted pair terminated with a 47 µF capacitor.
- 5 Total regulation is defined as the static output regulation at 25 °C, including initial tolerance, line voltage within stated limits and output voltages adjusted to their factory settings.
- 6 To achieve stated regulation on the 24 V output on the NFS110-7602PJ, the following load condition must be true:  $I_A / I_B \leq 5$ , where:  
I<sub>A</sub> = +5.1 V output current, and  
I<sub>B</sub> = +24 V output current  
The +24 V output will maintain ±5.0% regulation under the following additional condition: I<sub>A</sub> ≤ 5 A.
- 7 Single output models have floating outputs which may be referenced as either positive or negative. Higher voltage supplies may be adjusted over a wide output voltage range, as long as the total output power does not exceed 80 Watts (natural convection) or 110 Watts (forced air).
- 8 Power fail detect not available on single output models.
- 9 Derating curve is application specific for ambient temperatures >50 °C, for optimum reliability no part of the heatsink should exceed 90 °C and no semiconductor case temperature should exceed 100 °C.
- 10 Caution: Allow a minimum of 1 second after disconnecting the power when making thermal measurements.
- 11 Three orthogonal axes, random vibration, 10 minute test for each axis.
- 12 This product is only for inclusion by professional installers within other equipment and must not be operated as a stand alone product.
- 13 Artesyn Technologies recommends a minimum load of 11 W to achieve the design MTBF. See the derating curve on page 3.
- 14 The 'J' suffix indicates that these parts are Pb-free (RoHS 6/6) compliant. TSE RoHS 5/6 (non Pb-free) compliant versions may be available on special request, please contact your local sales representative for details.
- 15 NOTICE: Some models do not support all options. Please contact your local Artesyn representative or use the on-line model number search tool at <http://www.artesyn.com/powergroup/products.htm> to find a suitable alternative.

## TRANSIENT RESPONSE

NFS110-7601PJ	+5.1 V (7.5 A to 10 A)	150 mV peak, 1 ms recovery
	+12 V (2.5 A to 5 A)	100 mV peak, 0.5 ms recovery
	-12 V (0.5 A to 1 A)	100 mV peak, 0.5 ms recovery
	-5 V (0.5 A to 1 A)	100 mV peak, 0.5 ms recovery
NFS110-7602PJ	+5.1V (7.5 A to 10 A)	150 mV peak, 1 ms recovery
	+24 V (1.5 A to 3 A)	300 mV peak, 1 ms recovery
	+12 V (2.5 A to 5 A)	100 mV peak, 0.5 ms recovery
	-12 V (0.5 A to 1 A)	100 mV peak, 0.5 ms recovery
NFS110-7604PJ	+5.1 V (7.5 A to 10 A)	150 mV peak, 1 ms recovery
	+15 V (2.5 A to 5 A)	100 mV peak, 0.5 ms recovery
	-15 V (0.5 A to 1 A)	100 mV peak, 0.5 ms recovery
	-5 V (0.5 A to 1 A)	100 mV peak, 0.5 ms recovery
NFS110-7605J	+5.1 V (10 A to 20 A)	250 mV peak, 1 ms recovery
NFS110-7612J	+12 V (4.5 A to 9 A)	360 mV peak, 1 ms recovery
NFS110-7615J	+15 V (3.65 A to 7.3 A)	450 mV peak, 1 ms recovery
NFS110-7624J	+24V (2.25 A to 4.5 A)	720 mV peak, 1 ms recovery

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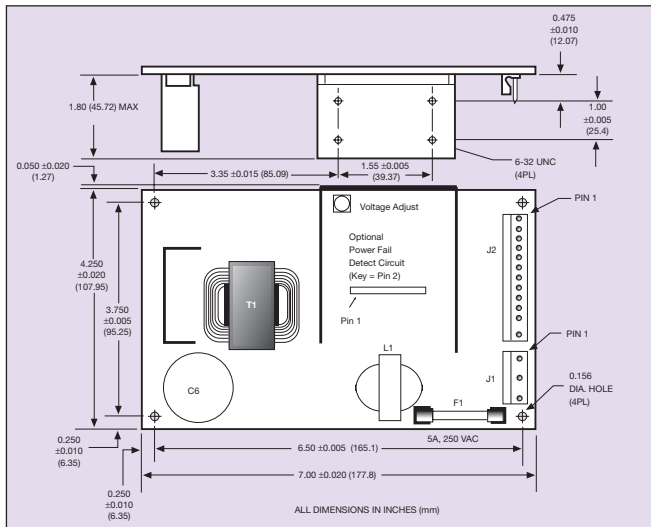
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## AC (J1) mating connector

Molex 09-50-3051 or Molex 09-91-0500 mating connector with 2478 or equivalent crimp terminals.

## DC (J2) mating connector

Molex 09-50-3131 or Molex 09-91-1300 mating connector with 2478 or equivalent crimp terminals.

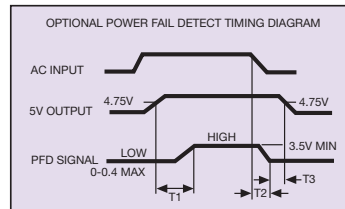


## Mechanical Notes

- A** Metallic or non-metallic stand-offs (maximum diameter 5.4 mm) can be used in all four mounting holes without effecting safety approval.
- B** The ground pad of the mounting hole near J1, allows system grounding through a metal stand-off to the system chassis.
- C** The heat sink is grounded, and allows system grounding by mechanical connection to the system chassis.
- D** The supply must be mechanically supported using the PCB mounting holes and may be additionally supported by the heatsink mounting holes.
- E** It is always advisable to attach the power supply heat sink to another thermal dissipator (such as a chassis or finned heatsink etc). The resulting decrease in heat sink mounted component temperatures will improve power supply lifetime.
- F** A standard L-bracket and cover is available for mounting which contains all screws, connectors and necessary mounting hardware. Two different kits are available, order part number 'NFS110 COVER KIT' or 'NFS110C'.

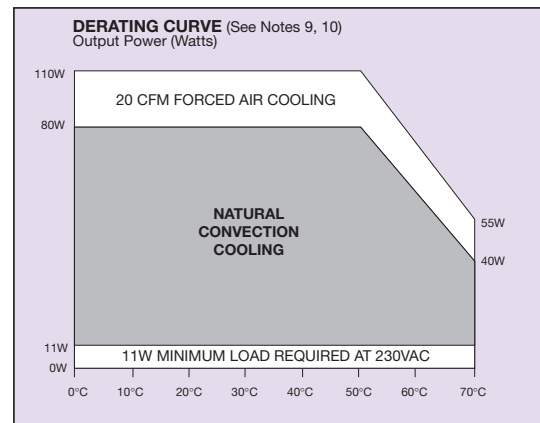
## International Safety Standard Approvals

- VDE0805/EN60950/IEC950/IEC1010 File No. 10401-3336-0049  
Licence No. 108333
- UL1950 File No. E136005
- CSA C22.2 No. 950 File No. LR41062C



## Power fail detect signal (Note 8)

50 ms ≤ T1 ≤ 200 ms  
T2 will vary with line and load  
T3 ≥ 3 ms  
Pout: 110 W  
PFD output is an open collector which will sink ≤ 40 mA in the low state.



## PIN CONNECTIONS

J1	-7601PJ	-7602PJ	-7604PJ	SINGLES
Pin 1	AC Ground	AC Ground	AC Ground	AC Ground
Pin 2	AC Neutral	AC Neutral	AC Neutral	AC Neutral
Pin 3	AC Line	AC Line	AC Line	AC Line
J2				
Pin 1	+5.1 V	+5.1 V	+5.1 V	V <sub>out</sub>
Pin 2	+5.1 V	+5.1 V	+5.1 V	V <sub>out</sub>
Pin 3	+5.1 V	+5.1 V	+5.1 V	V <sub>out</sub>
Pin 4	Return	Return	Return	Return
Pin 5	Return	Return	Return	Return
Pin 6	Return	Return	Return	Return
Pin 7	Return	Return	Return	Return
Pin 8	+12 V	+12 V	+15 V	V <sub>out</sub>
Pin 9	+12 V	+12 V	+15 V	V <sub>out</sub>
Pin 10	PFD	PFD	PFD	N/C
Pin 11	-12 V	-12 V	-15 V	N/C
Pin 12	Removed for Key			
Pin 13	-5 V	+24 V	-5 V	N/C

N/C = no connection.