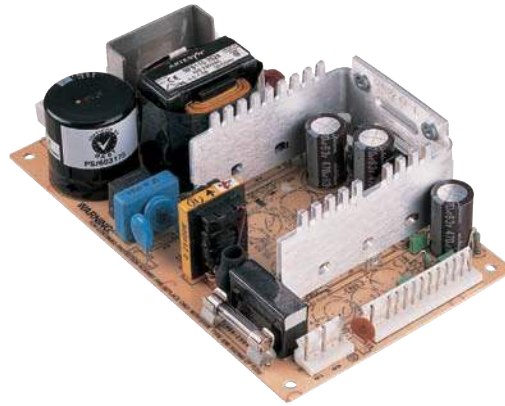


## NFS110 Series

### Single & Quad output

**Total Power:** 80 - 110 W  
**Input Voltage:** 85 - 264 Vac  
120 - 370 Vdc  
**# of Outputs:** Single, quad



### Special Features

- 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
- 2 year warranty

### Safety

- VDE0805/EN60950/  
IEC950/IEC1010  
File No. 10401-3336-0213
- Licence No. 4001467 7
- UL1950 File No. E132002
- CSA C22.2 No. 950  
File No. LR41062C

## Electrical Specifications

Output		
Voltage adjustability:	+5.1 V o/p on multi's 5.1 V single output 12 V single output 15 V single output 24 V single output	3.0% 3.0% 12 - 14 V 15 - 18 V 24 - 30 V
Line regulation:	LL to HL, FL All outputs on all units	±0.1% max.
Overshoot/undershoot:	At turn-on	0%
Temperature coefficient:	All outputs	±0.02%/°C
Overvoltage protection:	Multi o/p 5.1 V only 5.1 V single output 12 V single output 15 V single output 24 V single output	6.25 V ± 0.75 V 6.25 V ± 0.75 V 15.75 V ± 1.0 V 22 V ± 1.5 V 33 V ± 2.5 V
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		
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 230 Vac, 50 Hz	0.2 mA, max. 0.4 mA, max.

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

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:	EN61000-4-3, level 3	Perf. criteria 1
Fast transients:	EN61000-4-4, level 3	Perf. criteria 1
Radiated immunity:	EN61000-4-5, level 3	Perf. criteria 2
Conducted immunity:	EN61000-4-6, level 3	Perf. criteria 1
General Specifications		
Hold-up time:	110 Vac @ 80 W 110 Vac @ 110 W 230 Vac @ 80 W 230 Vac @ 100 W	35 ms 17 ms 140 ms 100 ms
Efficiency:	Multiple outputs +5.1 V single 12 V and 15 V singles 24 V single	70% typical 70% typical 72% typical 75% typical
Isolation voltage:	Input/output Input/chassis	3000 Vac 1500 Vac
Approvals and standards: (see note 12)	VDE0805, EN60950, IEC950, IEC1010, UL1950, CSA C22.2 No. 950	
Weight:	Singles Multiple outputs	550 g (19.4 oz) 600 g (21.2 oz)
MTBF (@25 °C):	MIL-HDBK-217E	125,000 hours min.

## Environmental Specifications

Thermal performance:	Operating ambient	0 °C to +70 °C
(See notes 9, 10)	Non-operating	-40 °C to +85 °C
	0 °C to 50 °C convection cooled	80 W
	+50 °C to +70 °C, convection cooled	Derate 2 W/°C
	0 °C to +50 °C, 20 CFM forced air	110 W
	+50 °C to +70 °C, 20CFM forced air	Derate 2.75 W/°C
	Peak, 0 °C to +50 °C, max. 60 seconds	110W
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 rms peak

## Ordering Information

Output Voltage	Output Currents			Ripple <sup>(4)</sup>	Total Regulation <sup>(5)</sup>	Model Numbers <sup>(13, 15, F)</sup>
	Max <sup>(1)</sup>	Peak <sup>(2)</sup>	Fan <sup>(3)</sup>			
+5.1 V	8 A	20 A	10 A	50 mV	± 2.0%	NFS110-7601PJ <sup>(14)</sup>
+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 <sup>(6, 14)</sup>
+24 V (I <sub>B</sub> ) <sup>(6)</sup>	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 <sup>(14)</sup>
15 V	4 A	7.5 A	5 A	150 mV	± 4.0%	
-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%	
12 V	7 A	9 A	9 A	120 mV	± 2.0%	NFS110-7612J <sup>(7,8)</sup>
15 V	5 A	7.3 A	7.3 A	150 mV	± 2.0%	NFS110-7615J <sup>(7,8)</sup>
24 V	3.5 A	4.5 A	4.5 A	240 mV	± 2.0%	NFS110-7624J <sup>(7,8)</sup>

### Notes

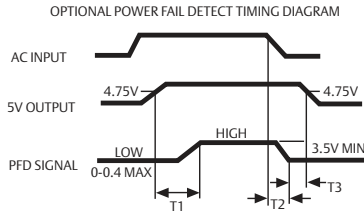
- 1 Convection cooled, 80 W maximum.
- 2 Peak outputs lasting less than 60 seconds with duty cycle less than 10%. Total peak power must not exceed 110 W.
- 3 Forced air, 20 CFM at 1 atmosphere, 110 W maximum.
- 4 Figure is peak-to-peak. Output ripple is measured across a 50 MHz bandwidth using a 12 inch 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 Recommend a minimum load of 11 W to achieve the design MTBF. See the derating curve on page 4.
- 14 Power failure detect is optional by including the suffix "P" to the model number.
- 15 The 'J' suffix indicates that these parts are Pb-free (RoHS 6/6) compliant.
- 16 NOTICE: Some models do not support all options. Please contact your local Emerson Network Power representative or use the on-line model number search tool at <http://www.PowerConversion.com> to find a suitable alternative.

### Transient Response

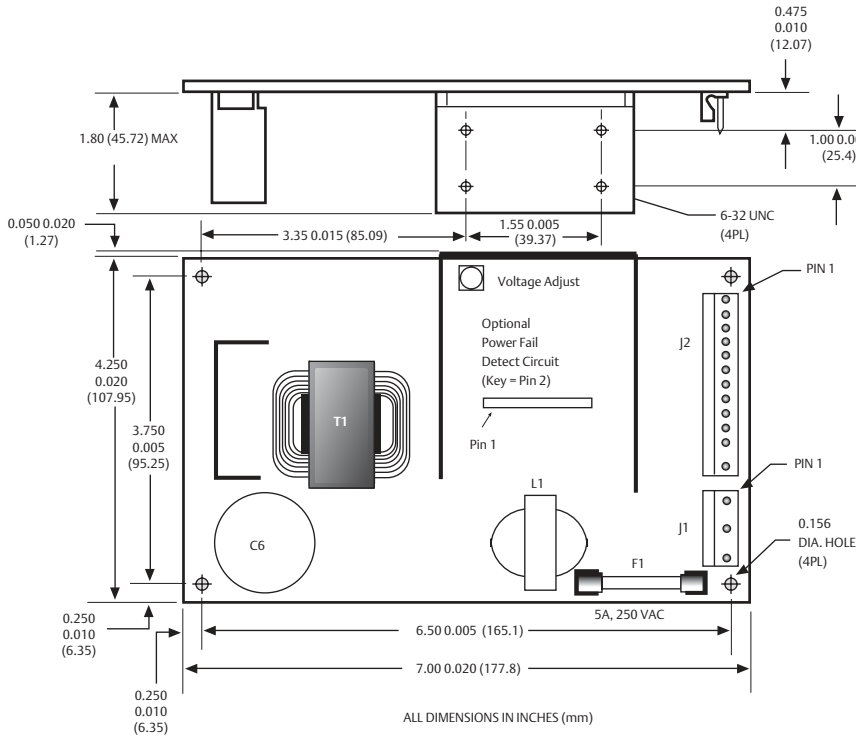
NFS110-7601PJ	+5.1 V (7.5 A to 10 A) +12 V (2.5 A to 5 A) -12 V (0.5 A to 1 A) -5 V (0.5 A to 1 A)	150 mV peak, 1 ms recovery 100 mV peak, 0.5 ms recovery 100 mV peak, 0.5 ms recovery 100 mV peak, 0.5 ms recovery
NFS110-7602PJ	+5.1 V (7.5 A to 10 A) +24 V (1.5 A to 3 A) +12 V (2.5 A to 5 A) -12 V (0.5 A to 1 A)	150 mV peak, 1 ms recovery 300 mV peak, 1 ms recovery 100 mV peak, 0.5 ms recovery 100 mV peak, 0.5 ms recovery
NFS110-7604PJ	+5.1 V (7.5 A to 10 A) +15 V (2.5 A to 5 A) -15 V (0.5 A to 1 A) -5 V (0.5 A to 1 A)	150 mV peak, 1 ms recovery 100 mV peak, 0.5 ms recovery 100 mV peak, 0.5 ms recovery 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	+24 V (2.25 A to 4.5 A)	720 mV peak, 1 ms recovery

**AC (J1) mating connector**  
Molex 09-50-3051 or Molex 09-91-0500 mating connector with 2478 or equivalent crimp terminals.

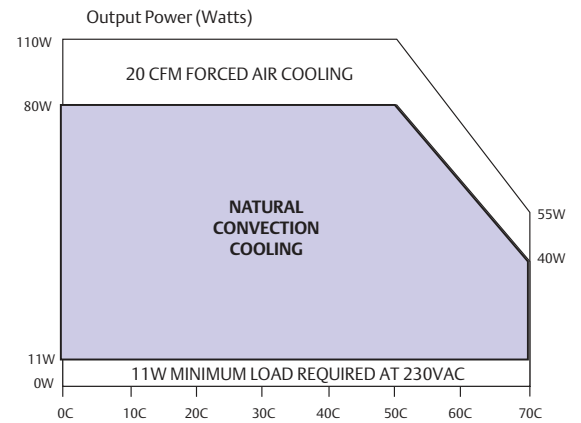
**DC (J2) mating connector**  
Molex 09-50-3131 or Molex 09-91-1300 mating connector with 2478 or equivalent crimp terminals.



Power fail detect signal (Note 8)  
50ms ≤ T1 ≤ 200ms  
T2 will vary with line and load  
T3 ≥ 3ms  
Pout: 110W  
PFD output is an open collector which will sink ≤ 40mA in the low state.



**DERATING CURVE** (See Notes 9, 10)



**Mechanical Notes:**

- A** Metallic or non-metallic stand-offs (maximum diameter 5.4mm) 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. The kit is available, order part number "NFS110CJ".

**Pin Connections**

	-7601PJ	-7602 P	-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
<b>J2</b>				
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

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