

# NFS110 Medical Series

## Single and quad output

**Total Power:** 80 - 110 W  
**Input Voltage:** 90 - 253 Vac  
127 - 357 Vdc  
**# of Outputs:** Single, quad

### Special Features

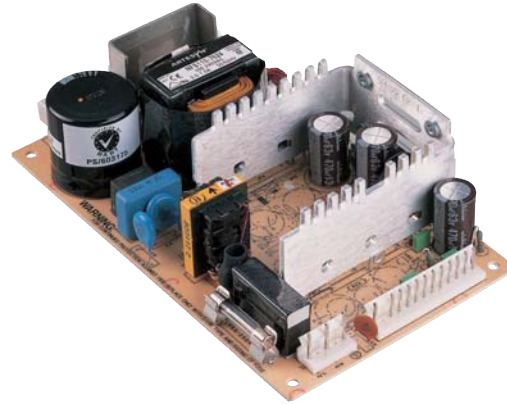
- 7.0 x 4.25 x 1.8 inch package
- Medical, dental and laboratory applications
- Overvoltage and short circuit protection
- 110 W with 20 CFM
- UL, VDE and CSA safety approvals
- EN60601-1 and UL2601 medical approvals
- Available RoHS compliant
- 2 year warranty

### Safety

VDE0805/EN60601-1/  
IEC601/IEC1010  
File No. 10401-3336-1049  
Licence No. 2874

UL2601 File No. E147937

CSA C22.2 No. 125  
File No. LR41062C



## Electrical Specifications

### Output

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 V
	15 V single output	15-18 V
	24 V single output	24-30 V
Line regulation	LL to HL, FL	±0.1% max.
	All outputs on all units	
Overshoot/undershoot	At turn-on no lead	0%
Temperature coefficient	All outputs	±0.02%/°C
Overvoltage protection	Multi o/p 5.1 V only	6.25 V ±0.75 V
	5.1 V single	6.25 V ±0.75 V
	12 V single	15.75 V ±1.0 V
	15 V single	22 V ±1.5 V
	24 V single	33 V ±2.5 V
Output power limit	Primary power limited	Pin max. 160 W Pout min. 110 W
		Burst mode operation

### Input

Input voltage range		90-253 Vac
		127-357 Vdc
Input frequency range		47-440 Hz
Input surge current	110 Vac. 50 Hz	17 A
	230 Vac. 50 Hz	35 A
Safety ground leakage current	132 Vac	50 µA
	264 Vac	100 µA

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

## EMC Characteristics

Conducted emissions	EN55022, FCC part 15	Level A
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 2

## 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	4000 Vac
	Input/chassis	1500 Vac
Approvals and standards (see note 12)		VDE0750, IEC60601, IEC1010, UL2601 CSA C22.2 No. 125
Weight	Singles	550 g (19.4 oz)
	Multiple outputs	600 g (21.2 oz)
MTBF (@25° C)	MIL-HDBK-217E	125,000 hours min.

## 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, 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, 14, 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%	NFS110-7901PJ
+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%	NFS110-7902PJ
+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%	NFS110-7904PJ
+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%	NFS110-7912J <sup>(7,8)</sup>
15 V	5 A	7.3 A	7.3 A	150 mV	±2.0%	NFS110-7915J <sup>(7,8)</sup>
24 V	3.5 A	4.5 A	4.5 A	240 mV	±2.0%	NFS110-7924J <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 at the static output regulation at 25 °C, including initial tolerance, line voltage within stated limits and output voltages adjusted to their factory settings. Also for NFS110-7902PJ, for 24 V output stated regulation  $I_A / I_B \geq 5$ . This output will maintain ±5.0% regulation if  $I_A \geq 5 A$ , where  $I_A = +5.1 V$  output current and  $I_B = +24 V$  output current.
- 6 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).
- 7 Power fail detect not available on single output models.
- 8 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.
- 9 Caution: Allow a minimum of 1 second after disconnecting the power when making thermal measurements.
- 10 The user should read the PSU installation instructions in conjunction with the relevant national safety regulations in order to ensure compliance.
- 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 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.
- 14 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

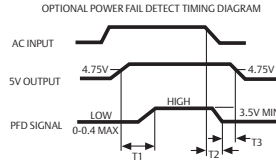
NFS110-7901PJ	+5.1 V (7.5-10 A)	150 mV peak, 1 ms recovery
	+12 V (2.5-5 A)	100 mV peak, 0.5 ms recovery
	-12 V (0.5-1 A)	100 mV peak, 0.5 ms recovery
	-5 V (0.5-1 A)	100 mV peak, 0.5 ms recovery
NFS110-7902PJ	+5.1 V (7.5-10 A)	150 mV peak, 1 ms recovery
	+12 V (2.5-5 A)	100 mV peak, 0.5 ms recovery
	-12 V (0.5-1 A)	100 mV peak, 0.5 ms recovery
	24 V (1.5-3 A)	300 mV peak, 1 ms recovery
NFS110-7904PJ	+5.1 V (7.5-10 A)	150 mV peak, 1 ms recovery
	+15 V (2.5-5 A)	100 mV peak, 0.5 ms recovery
	-15 V (0.5-1 A)	100 mV peak, 0.5 ms recovery
	-5 V (0.5-1 A)	100 mV peak, 0.5 ms recovery
NFS110-7905J	+5.1 V (10-20 A)	250 mV peak, 1 ms recovery
NFS110-7912J	+12 V (4.5-9 A)	360 mV peak, 1 ms recovery
NFS110-7915J	+15 V (3.65-7.3 A)	450 mV peak, 1 ms recovery
NFS110-7924J	+24 V (2.25-4.5 A)	720 mV peak,

**AC (J1) mating connector**

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

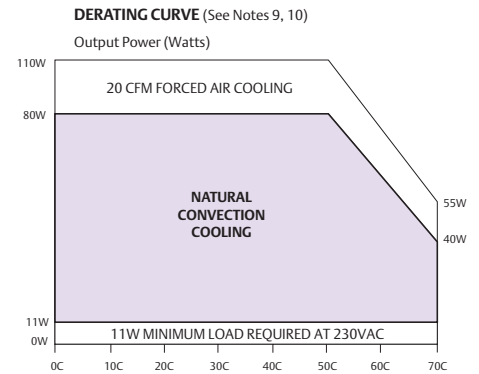
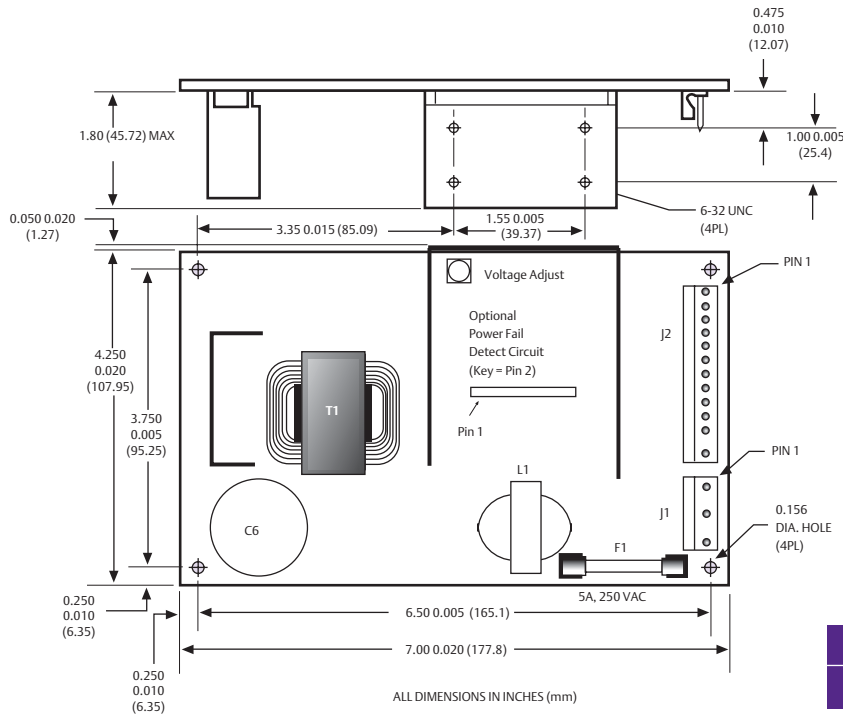
**DC (J2) mating connector**

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.



**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 "NFS110C".

Pin Connections				
J1	-7901PJ	-7902PJ	-7904PJ	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.

### Americas

5810 Van Allen Way  
Carlsbad, CA 92008  
USA

Telephone: +1 (760) 930 4600  
Facsimile: +1 (760) 930 0698

### Europe (UK)

Waterfront Business Park  
Merry Hill, Dudley  
West Midlands, DY5 1LX  
United Kingdom

Telephone: +44 (0) 1384 842 211  
Facsimile: +44 (0) 1384 843 355

### Asia (HK)

14/F, Lu Plaza  
2 Wing Yip Street  
Kwun Tong, Kowloon  
Hong Kong

Telephone: +852 2176 3333  
Facsimile: +852 2176 3888

For global contact, visit:

**[www.powerconversion.com](http://www.powerconversion.com)**  
**[technicalsupport@  
powerconversion.com](mailto:technicalsupport@powerconversion.com)**

While every precaution has been taken to ensure accuracy and completeness in this literature, Emerson Network Power assumes no responsibility, and disclaims all liability for damages resulting from use of this information or for any errors or omissions.

### Emerson Network Power.

The global leader in enabling  
business-critical continuity.

- AC Power
- Connectivity
- DC Power
- Embedded Computing
- **Embedded Power**
- Monitoring
- Outside Plant
- Power Switching & Controls
- Precision Cooling
- Racks & Integrated Cabinets
- Services
- Surge Protection

### EmersonNetworkPower.com

Emerson Network Power and the Emerson Network Power logo are trademarks and service marks of Emerson Electric Co.  
©2008 Emerson Electric Co.