

## NFS110 Medical Series

Single and quad output

### Data Sheet

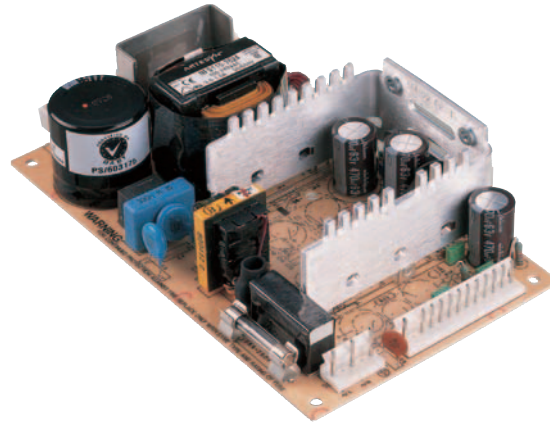
**Total Power: 80 - 110 W**  
**Input Voltage: 100 - 240Vac**  
**127 - 357 Vdc**  
**# of Outputs: Single, quad**

### SPECIAL FEATURES

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

### SAFETY

- EN60950-1/IEC60950-1
- EN60601-1
- UL60601-1/CSA C22.2 No. 601-1 File No. E182560



### 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 no lead	0%
Temperature coefficient:	All outputs	±0.02% / °C
Overshoot protection:	Multi o/p 5.1 V only 5.1 V single 12 V single 15 V single 24 V single	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
Short circuit protection:		Burst mode operation
Input		
Input voltage range:		100 - 240 Vac 127 - 357 Vdc
Input frequency range:		47 - 440 Hz
Input surge current:	110 Vac. 50 Hz 230 Vac. 50 Hz	17 A 25 A
Safety ground leakage current:	132 Vac 264 Vac	50 µA 100 µA

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

### EMC Charateristics

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 110 Vac @ 110 W 230 Vac @ 80 W 230 Vac @ 110 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	4000 Vac 1500 Vac
Approvals and standards: (see note 12)		VDE0750, IEC60601, IEC1010, UL60601, CSA C22.2 No. 125
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, see curve	0°C to +70°C
(See notes 9, 10)	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
Relative humidity:	Peak, 0 °C to +50 °C, max. 60 seconds	110W
Altitude:	Non-condensing	5% to 95% RH
	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 ( $I_A$ )	8 A	20 A	10 A	50 mV	+ 2.0%	NFS110-7902PJ
+24 V ( $I_B$ ) <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%	
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>

## Transient Response

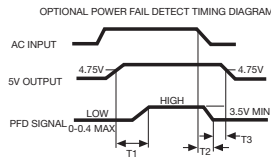
NFS110-7901PJ	+5.1 V (7.5-10 A)	150 mV peak, 1 ms recovery
	+12 V (2.5-5 A)	100 mV peak, 0.5 ms recovery
	-12 V (0.5-1 A)	100 mV peak, 0.5 ms recovery
	-5 V (0.5-1 A)	100 mV peak, 0.5 ms recovery
NFS110-7902PJ	+5.1 V (7.5-10 A)	150 mV peak, 1 ms recovery
	+12 V (2.5-5 A)	100 mV peak, 0.5 ms recovery
	-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
NFS110-7905J	+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, 1 ms recovery

## Notes

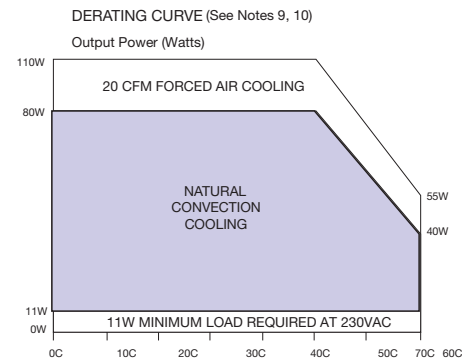
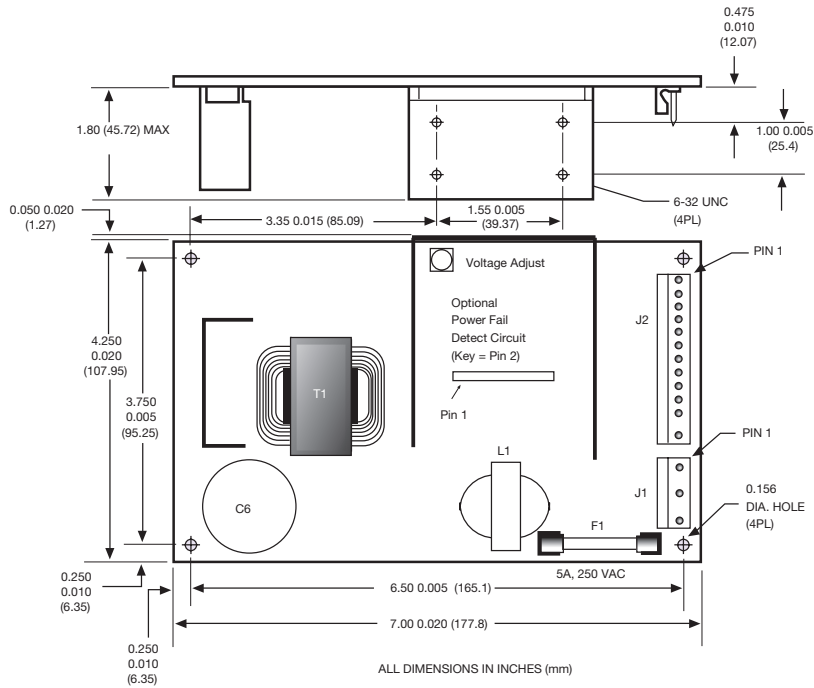
- Convection cooled, 80 W maximum.
- Peak outputs lasting less than 60 seconds with duty cycle less than 10%. Total peak power must not exceed 110 W.
- Forced air, 20 CFM at 1 atmosphere, 110 W maximum.
- Figure is peak-to-peak. Output ripple is measured across a 50 MHz bandwidth using a 12 inch twisted pair terminated with a 47  $\mu$ F capacitor.
- 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  $I_A / I_B \leq 5$ . This output will maintain  $\pm 5.0\%$  regulation if  $I_A \leq 5$  A, where  $I_A = +5.1$  V output current and  $I_B = +24$  V output current.
- 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).
- Power fail detect not available on single output models.
- 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.
- Caution: Allow a minimum of 1 second after disconnecting the power when making thermal measurements.
- The user should read the PSU installation instructions in conjunction with the relevant national safety regulations in order to ensure compliance.
- Three orthogonal axes, random vibration, 10 minute test for each axis.
- This product is only for inclusion by professional installers within other equipment and must not be operated as a stand alone product.
- 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.
- NOTICE: Some models do not support all options. Please contact your local Artesyn Embedded Technologies representative or use the on-line model number search tool at [www.artesyn.com/power](http://www.artesyn.com/power) to find a suitable alternative.

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)  
 $50 \text{ ms} \leq T1 \leq 200 \text{ ms}$   
 $T2$  will vary with line and load  
 $T3 \geq 3 \text{ ms}$   
Pout: 110 W  
PFD output is an open collector which will sink  $\leq 40 \text{ mA}$  in the low state.



**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. The kit is available, order part number "NFS110CJ".

Pin Connections			
J1	-7901PJ	-7902PJ	SINGLES
Pin 1	AC Ground	AC Ground	AC Ground
Pin 2	AC Neutral	AC Neutral	AC Neutral
Pin 3	AC Line	AC Line	AC Line
J2			
Pin 1	+5.1 V	+5.1 V	V <sub>out</sub>
Pin 2	+5.1 V	+5.1 V	V <sub>out</sub>
Pin 3	+5.1 V	+5.1 V	V <sub>out</sub>
Pin 4	Return	Return	Return
Pin 5	Return	Return	Return
Pin 6	Return	Return	Return
Pin 7	Return	Return	Return
Pin 8	+12 V	+12 V	V <sub>out</sub>
Pin 9	+12 V	+12 V	V <sub>out</sub>
Pin 10	PFD	PFD	N/C
Pin 11	-12 V	-12 V	N/C
Pin 12	Removed for Key		
Pin 13	-5 V	+24 V	N/C

N/C = no connection.

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