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

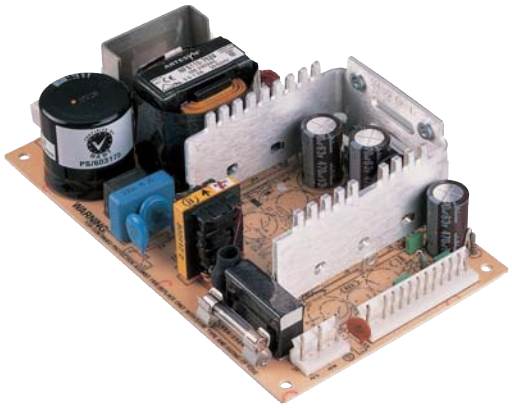
- 7.0 x 4.25 x 1.8 inch package
- Medical, dental and laboratory applications
- Overvoltage and short circuit protection
- 110 W with 20 CFM
- UL, VDE and CSA safety approvals
- EN60601-1 and UL2601 medical approvals
- Available RoHS compliant
- 2 year warranty

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



RoHS 2002/95/EC

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
Short circuit protection		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

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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 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, UL2601 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
	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 Max [1]	Peak [2]	Fan [3]	Ripple [4]	Total Regulation [5]	Model Numbers [13, 14, F]
+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) [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%	NFS110-7904PJ
+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 [7,8]
15 V	5 A	7.3 A	7.3 A	150 mV	±2.0%	NFS110-7915J [7,8]
24 V	3.5 A	4.5 A	4.5 A	240 mV	±2.0%	NFS110-7924J [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 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 ² 5. This output will maintain ±5.0% regulation if I_A ² 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,

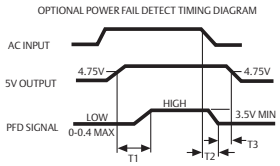
AC (J1) mating connector

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

DC (J2) mating connector

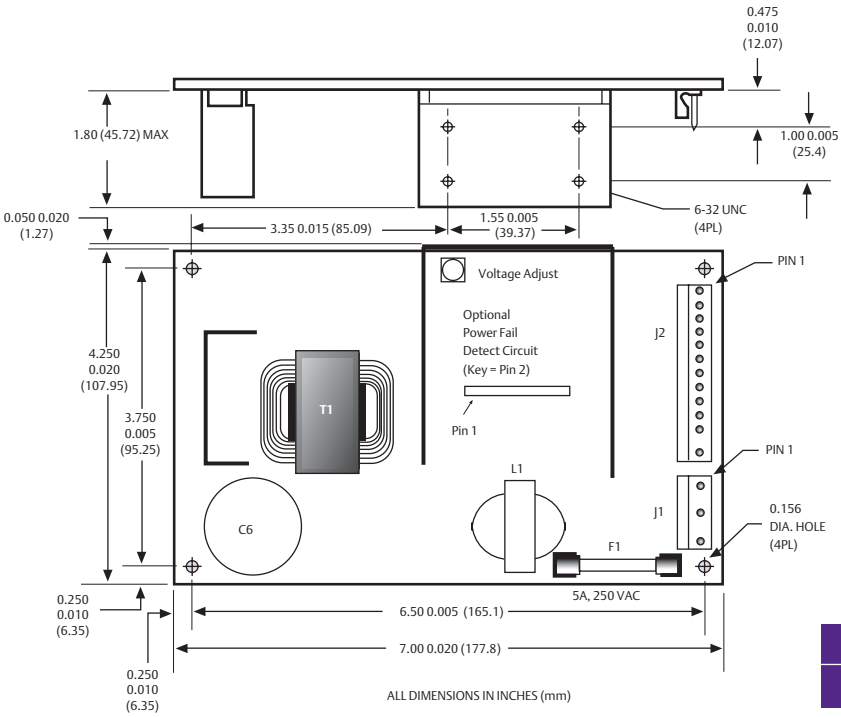
Molex 09-50-3131 or Molex 09-91-1300 mating connector with 2478 or equivalent crimp terminals.

OPTIONAL POWER FAIL DETECT TIMING DIAGRAM

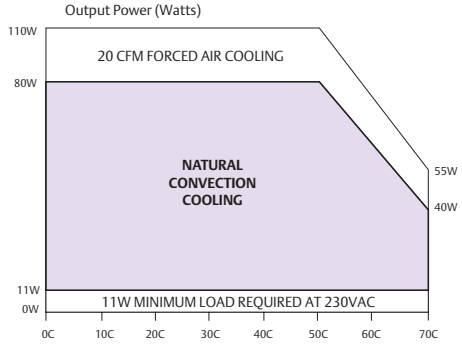


Power fail detect signal (Note 8)

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				
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_{out}
Pin 2	+5.1 V	+5.1 V	+5.1 V	V_{out}
Pin 3	+5.1 V	+5.1 V	+5.1 V	V_{out}
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_{out}
Pin 9	+12 V	+12 V	+15 V	V_{out}
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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