

# NFS40 Medical Series

## Single and triple output



LOW TO MEDIUM POWER AC/DC POWER SUPPLIES

40-50W AC/DC Universal Input Switch Mode Power Supplies

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- 5.0 x 3.0 x 1.2 inch package
- Medical, dental and laboratory applications
- Overvoltage and short circuit protection
- 40W with free air convection
- UL, VDE and CSA safety approved
- EN60601 and UL2601 medical approvals



The NFS40 medical series is a 40W universal input AC/DC power supply on a 5 x 3 inch card with a maximum component height of 1.2 inches for use in medical applications. The NFS40 medical series has the same generic feature set as the standard NFS40 series but has been designed with lower safety ground leakage and higher isolation as required for medical safety approval. The NFS40 provides 40W of output power with free air convection cooling which can be boosted to 50W with 20CFM of air. Standard features include overvoltage and short-circuit protection. The series, with full medical safety approval to EN60601 and UL2601 and the CE mark, meets conducted emissions EN55022 level A. The NFS40 medical series is designed for use in low power medical, dental and laboratory applications such as dialysis machines, monitoring equipment, instrumentation and infusion pump controls.

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	+5V output on triples Vout on singles	±5.0% ±5.0%
Line regulation	LL to HL, FL main output LL to HL, FL auxiliary output	±0.2% ±1.0%
Overshoot/undershoot	At turn-on	0%
Transient response	+5V (1.5A to 3A step)	±120mV max dev. 500µs recovery
Temperature coefficient	All outputs	±0.02%/°C
Overvoltage protection	+5V output	6.25 ±0.75Vout
Minimum output current	(See Note 10)	0A
Output power limit	Primary power limited	90W input power limit
Short circuit protection	Single Multiple	Continuous Short term

#### INPUT SPECIFICATIONS

Input voltage range		85 to 264VAC 120 to 370VDC
Input frequency range		47 to 440Hz
Input surge current	Cold start 110VAC, 60Hz Cold start 230VAC, 50Hz	10A 22A
Safety ground leakage current	110VAC, 60Hz 230VAC, 50Hz	18µA max. 28µA max.

#### 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	EN61000-4-5, 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	110VAC 230VAC	18ms 132ms
Efficiency	110VAC, 230VAC	70% typical
Isolation voltage	Input/output Input/chassis	4000VAC 1500VAC
Switching frequency		20 to 110kHz
Approvals and standards (See Note 12)		VDE0750, IEC601 EN60601-1, UL2601 CSA C22.2 No. 125
Weight		270g (9.6oz)
MTBF	MIL-HDBK-217E	170,000 hours

#### ENVIRONMENTAL SPECIFICATIONS

Thermal performance	Operating, see curve Non-operating 0°C to 50°C ambient temp., convection cooled 0°C to 50°C ambient, 20CFM Forced air 50°C to 70°C ambient Peak (30 seconds)	0°C to +70°C -40°C to +85°C 40W 50W Derate linearly to 50% load 60W
Relative humidity	Non-condensing	5% to 95% RH
Altitude	Operating Non-operating	10,000 feet max. 40,000 feet max.
Vibration (See Note 11)	5Hz to 500Hz	0.75G peak

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OUTPUT VOLTAGE	OUTPUT CURRENT			RIPPLE (4) PK-PK	TOTAL REGULATION (5)	MODEL NUMBERS
	CONV. MAX (1)	20CFM MAX. (2)	PEAK (3)			
+5.1V (V <sub>A</sub> )	3.0A	5.0A	7.0A	50mV	±2.0%	NFS40-7908
+12.0V (V <sub>B</sub> )	2.0A	2.0A	3.0A	120mV	±5.0%	
-12.0V (6)	0.35A	0.5A	---	120mV	±5.0%	
+5.1V (V <sub>A</sub> )	3.0A	5.0A	7.0A	50mV	±2.0%	NFS40-7910
+15.0V (V <sub>B</sub> )	2.0A	2.0A	2.5A	150mV	+10%/-3.0%	
-15.0V (6)	0.35A	0.5A	---	150mV	±5.0%	
12.0V (7)	3.3A	4.0A	5.0A	120mV	±2.0%	NFS40-7912
15.0V (7)	2.6A	3.3A	4.0A	150mV	±2.0%	NFS40-7915
24.0V (7)	1.6A	2.0A	2.5A	240mV	±2.0%	NFS40-7924
+5.1V	4A	7A	5.0A	50mV	±2.0%	NFS40-7928
+12.0V	0.35A	1A	0.5A	120mV	±5.0%	
-12.0V	0.35A	1A	0.5A	120mV	±5.0%	

## Notes

- 1 Natural convection cooling, 40W maximum.
- 2 Forced air, 20 CFM at 1 atmosphere, 50W maximum.
- 3 Peak output current lasting less than 30 seconds with duty cycle less than 10%. During peak loading, outputs may go outside of total regulation limits. Peak total power must not exceed 60W.
- 4 50MHz bandwidth, peak-to-peak, measured differentially.
- 5 Total regulation is defined as the static output regulation at 25°C, including initial tolerance, load currents within stated limits, and output voltages adjusted to their factory settings. Also,  $0.25 \leq I_A / I_B \leq 5.0$  to maintain stated regulation.
- 6 A minimum load of 0.5A is required on the +5V output to obtain full current from the negative output.
- 7 Single output models have floating outputs which may be referenced as either positive or negative.
- 8 Derating curve is application specific for ambient temperatures >50°C, for optimum reliability no part of the heatsink should exceed 120°C and no semiconductor case temperature should exceed 130°C.
- 9 Caution: Allow a minimum of 1 second after disconnecting the power when making thermal measurements.
- 10 Although the minimum output current of the NFS40-79XX is 0A, a 4W minimum load is required to achieve design MTBF.
- 11 Three orthogonal axes, sweep at 1 octave/min, 5 minute dwell at four major resonances.
- 12 This product is only for inclusion by professional installers within other equipment and must not be operated as a stand alone product.

## AC mating connector

Molex 09-50-3031 or equivalent with Molex 08-50-0105 or equivalent crimp terminal.

## DC mating connector

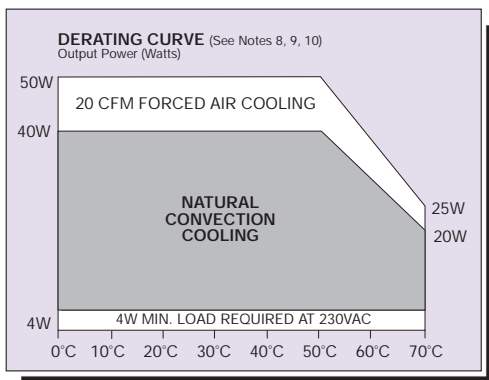
Molex 09-91-0600 or equivalent with Molex 08-50-0164 or equivalent crimp terminal.

## PIN CONNECTIONS

J1	-7908, 7928	-7901	SINGLES
Pin 1	AC Line	AC Line	AC Line
Pin 2	AC Neutral	AC Neutral	AC Neutral
J2			
Pin 1	+12V	+15V	+Vout
Pin 2	+5.1V	+5.1V	+Vout
Pin 3	+5.1V	+5.1V	+Vout
Pin 4	Return	Return	Return
Pin 5	Return	Return	Return
Pin 6	-12V	-15V	Return
P1			
Pin 1	Safety Earth Ground		

## Safety approvals and use authorisation

The NFS40-79XX models listed above are approved to UL2601, CSA22.2 No. 125 and IEC601/VDE0750 standards. The NFS40-79XX series is for use in ordinary, patient-connect applications under the UL2601 and CSA C22.2 No. 125 standards, and is authorised for use in non-critical, non-patient-connect applications under the IEC601 standards.



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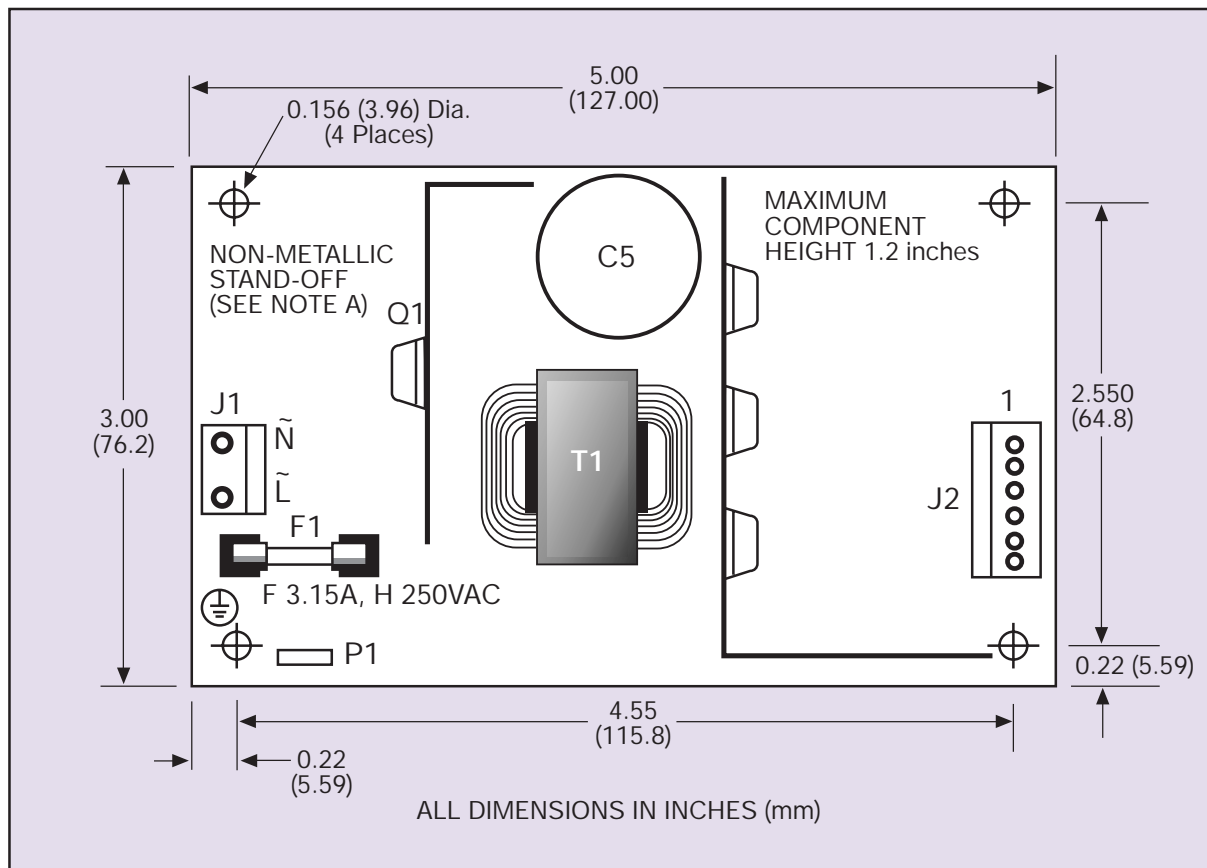
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## Mechanical Notes

- A In order to meet safety requirements, a non-metallic stand-off is mandatory for one hole as specified in the mechanical drawing.
- B The ground pad of the mounting hole near P1 allows system grounding through a metal stand-off.
- C The NFS40 heatsink must be grounded in order to meet safety requirements. The heatsink can be grounded by connecting the ground pad of the mounting hole near the output connector with the ground pad of the mounting hole near P1. Use metal standoffs attached to a common metal chassis. This connection also significantly attenuates common mode noise.
- D A standard L-bracket and cover is available for mounting which contains all screws, connectors and necessary mounting hardware. Order part number 'NFS40 COVER KIT'.



## International Safety Standard Approvals



VDE0750/IEC601/EN60601-1 File No. 10401-3336-1044  
Licence No. 2559



UL2601 File No. E147937



CSA C22.2 No. 125 File No. LR41062C

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