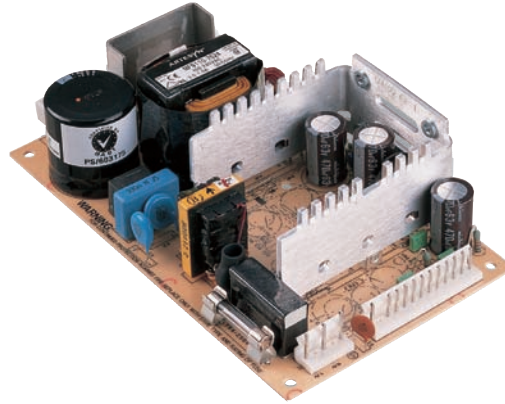


## NFS110 Series

### Single & Quad output

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



Rev. 11.2.09\_69  
NFS110 Series  
1 of 5



### 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<br>5.1 V single output<br>12 V single output<br>15 V single output<br>24 V single output | 3.0%<br>3.0%<br>12 - 14 V<br>15 - 18 V<br>24 - 30 V                                   |
| Line regulation:               | LL to HL, FL<br>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<br>5.1 V single output<br>12 V single output<br>15 V single output<br>24 V single output  | 6.25 V ± 0.75 V<br>6.25 V ± 0.75 V<br>15.75 V ± 1.0 V<br>22 V ± 1.5 V<br>33 V ± 2.5 V |
| Output power limit:            | Primary power limited                                                                                          | Pin max. 160 W<br>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<br>120 - 370 Vdc                                                         |
| Input frequency range:         |                                                                                                                | 47 - 440 Hz                                                                           |
| Input surge current:           | 230 Vac                                                                                                        | 35 A                                                                                  |
| Safety ground leakage current: | 110 Vac, 50 Hz<br>230 Vac, 50 Hz                                                                               | 0.2 mA, max.<br>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<br>110 Vac @ 110 W<br>230 Vac @ 80 W<br>230 Vac @ 100 W    | 35 ms<br>17 ms<br>140 ms<br>100 ms                       |
| Efficiency:                               | Multiple outputs<br>+5.1 V single<br>12 V and 15 V singles<br>24 V single | 70% typical<br>70% typical<br>72% typical<br>75% typical |
| Isolation voltage:                        | Input/output<br>Input/chassis                                             | 3000 Vac<br>1500 Vac                                     |
| Approvals and standards:<br>(see note 12) | VDE0805, EN60950, IEC950, IEC1010, UL1950, CSA C22.2 No. 950              |                                                          |
| Weight:                                   | Singles<br>Multiple outputs                                               | 550 g (19.4 oz)<br>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:<br>(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 ( $I_A$ )               | 8 A                | 20 A                | 10 A               | 50 mV                 | ± 2.0%                          | NFS110-7602PJ <sup>(6, 14)</sup>     |
| +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%                          |                                      |
| +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

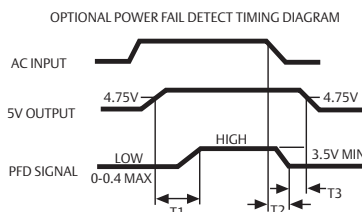
- 1 Convection cooled, 80 W maximum.
- 2 Peak outputs lasting less than 60 seconds with duty cycle less than 10%. Total peak power must not exceed 110 W.
- 3 Forced air, 20 CFM at 1 atmosphere, 110 W maximum.
- 4 Figure is peak-to-peak. Output ripple is measured across a 50 MHz bandwidth using a 12 inch twisted pair terminated with a 47  $\mu$ F 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:  
 $I_A$  = +5.1 V output current, and  
 $I_B$  = +24 V output current  
The +24 V output will maintain ±5.0% regulation under the following additional condition:  $I_A \leq 5$  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

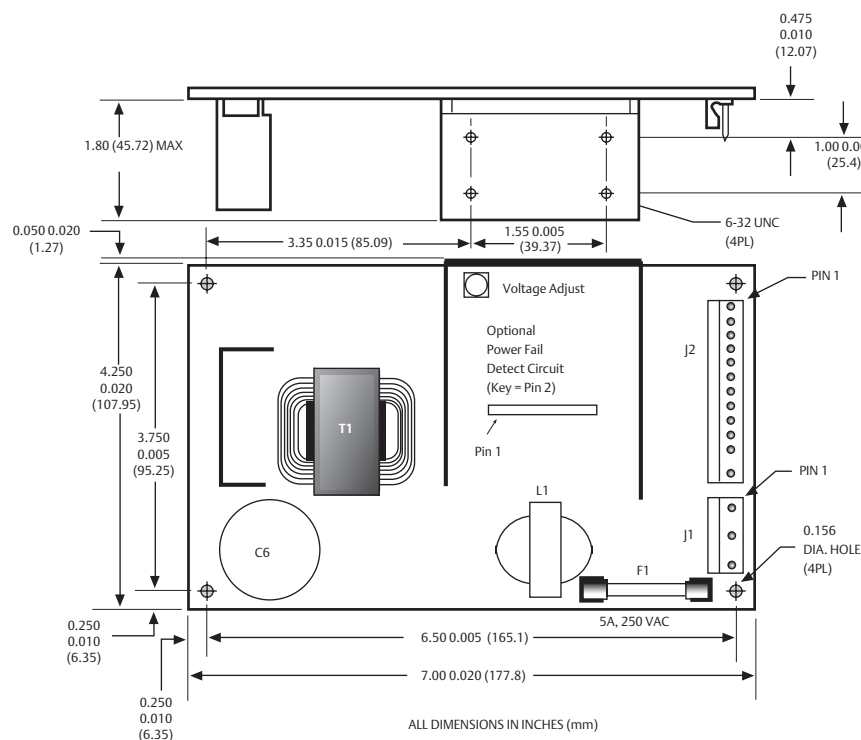
|               |                                                                                                |                                                                                                                            |
|---------------|------------------------------------------------------------------------------------------------|----------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

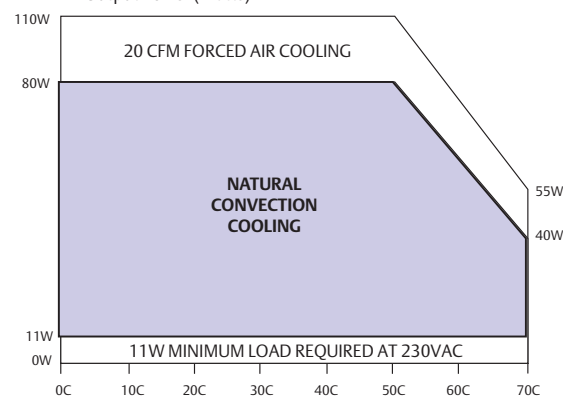


Power fail detect signal (Note 8)  
50ms  $\leq T1 \leq 200$ ms  
T2 will vary with line and load  
T3  $\geq 3$ ms  
Pout: 110W  
PFD output is an open collector which will sink  $\leq 40$ mA in the low state.



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

Output Power (Watts)



## Mechanical Notes:

- Metallic or non-metallic stand-offs (maximum diameter 5.4mm) can be used in all four mounting holes without effecting safety approval.
- The ground pad of the mounting hole near J1, allows system grounding through a metal stand-off to the system chassis.
- The heat sink is grounded, and allows system grounding by mechanical connection to the system chassis.
- The supply must be mechanically supported using the PCB mounting holes and may be additionally supported by the heatsink mounting holes.
- 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.
- 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     | -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          |
| 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

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