

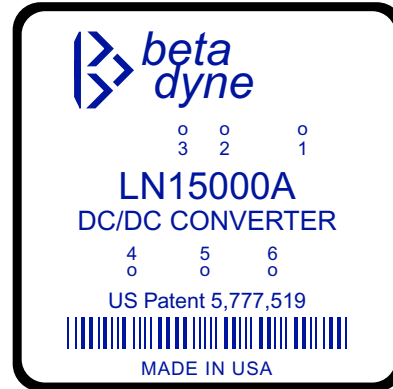


LN15000A

LOW-NOISE 15W SINGLE DC/DC CONVERTER
US Patent 5,777,519

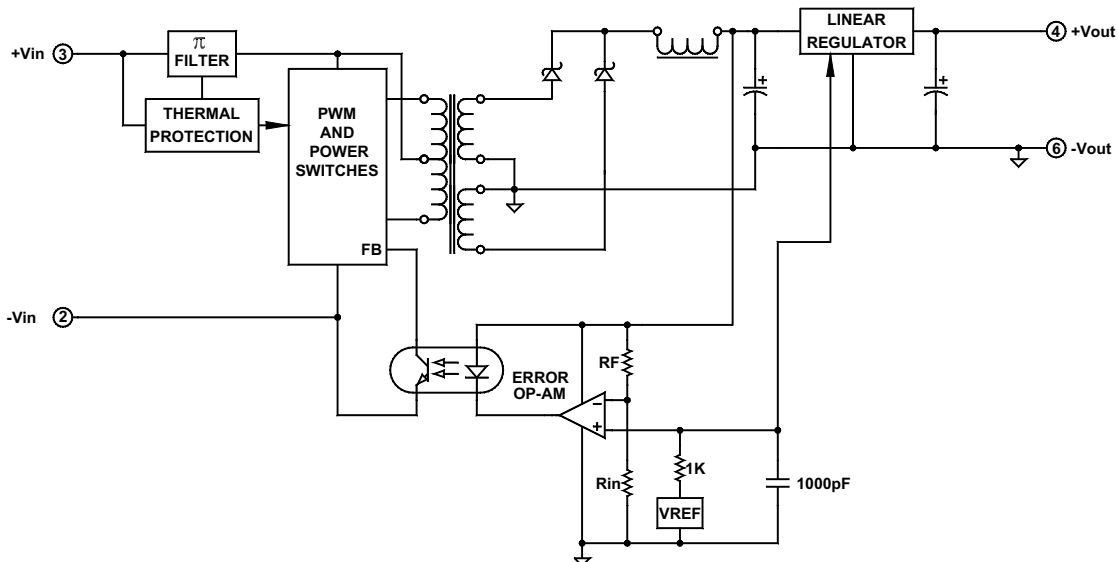
Key Features

- Less than 5mV output noise
- 79% efficiency
- Six-sided shielding
- Soft start
- Short circuit and thermal protection
- 750µA off state current
- Wide input voltage range (2:1)
- 250mV dropout linear regulators
- Industry pinout



Functional Description

The LN15000A is a low-noise 15W single output, isolated DC/DC converter designed to accept 9–18V_{IN} and provide 5V_{OUT}@3A. The converter incorporates low-switching noise techniques at its input and output sections. Low dropout linear regulators reduce the output noise to 5mV_{PP} and a patented control circuit maintains minimum constant dropout voltage over line, load, temperature and output adjust range.



Typical Block Diagram

Electrical Specifications

INPUT SPECIFICATIONS

Unless otherwise specified, all parameters are given under typical +25°C with nominal input voltage and under full output load conditions.

| PARAMETER | CONDITION / NOTE | MIN | TYP | MAX | UNIT |
|----------------------------------|--------------------------------|-----|------|-----|-------------------|
| Input Voltage Range | | 9 | 12 | 18 | Vdc |
| No Load Input Current | 12V | | 30 | | mA |
| Full Load Input Current | | | 1580 | | mA |
| Input Filter | | | | | |
| Reflected Ripple | | | 40 | | mA _{PP} |
| Reverse Polarity Input Current | External series-blocking diode | | | 12 | A |
| Input Surge Current (20µS Spike) | | | | 10 | A |
| Short Circuit Current Limit | | | 150 | | % I _{IN} |
| Undervoltage Shutdown | | | 8 | | Vdc |
| Off State Current, 12V | | | 750 | | µA |

OUTPUT SPECIFICATIONS

| PARAMETER | CONDITION / NOTE | MIN | TYP | MAX | UNIT |
|---|--|-----|------|-----|--------------------------------------|
| Voltage and Current Ratings | | | 5 | | Vdc |
| Output Voltage Accuracy, Single | | | ±1 | | % |
| Ripple & Noise | | | 0.05 | 0.1 | %V _{PP} of V _{OUT} |
| Line Regulation, Single | Minimum V _{IN} to maximum V _{IN} | | 0.05 | 0.1 | % |
| Load Regulation, Single | NL to FL | | 0.05 | 0.1 | % |
| Temperature Coefficient @ FL | | | 0.02 | | %/°C |
| Transient Response Time (to within 0.5% of V _{OUT}) | 50% FL to FL to 50% FL, See Figure 1 | | 5 | | µS |
| Short Circuit Protection | All outputs, by input current limiting | | | | |
| Output Short Circuit Duration | Continuous | | | | |

GENERAL SPECIFICATIONS

| PARAMETER | CONDITION / NOTE | MIN | TYP | MAX | UNIT |
|----------------------------|------------------|-----|-----------------|-----|------|
| Efficiency | | | 79 | | % |
| Isolation Voltage (1 min.) | | | 1500 | | Vdc |
| Isolation Resistance | | | 10 ⁹ | | Ω |
| Isolation Capacitance | | | 80 | | pF |
| Switching Frequency | | | 100 | | kHz |

ENVIRONMENTAL SPECIFICATIONS

| PARAMETER | CONDITION / NOTE | MIN | TYP | MAX | UNIT |
|--|--|-----|---------|------|----------------------|
| Operating Temperature, Industrial (Ambient)* | See Figure 2 | -40 | | +75 | °C |
| Operating Temperature, Extended (X) | (Please contact factory) | -55 | | +85 | °C |
| Storage Temperature Range | | -55 | | +125 | °C |
| Thermal Resistance | | | 3.5 | 4 | °C/W _{DISS} |
| Maximum Operating Case Temperature | | | | 105 | °C |
| Thermal Turn Off, Case Temperature | | 95 | 100 | 115 | °C |
| Thermal Hysteresis | | | 20 | | °C |
| Derating | See Figure 2 | | | | |
| Humidity | Up to 95% non-condensing | | | | |
| Cooling | Free-air convection | | | | |
| EMI/RFI | Six-sided continuous shielded metal case | | | | |
| MTBF | per MIL-HNBK-217F (Ground benign, +25°C) | | 625,000 | | hours |

* See footnotes 2, 3 and 4

PHYSICAL CHARACTERISTICS

| PARAMETER | CONDITION / NOTE | MIN | TYP | MAX | UNIT |
|---|---|-----|-----|-----|------|
| Dimensions (L×W×H) | 2.00×2.00×0.395 in. (50.80×50.80×10.03mm) | | | | |
| Weight | 2 oz. (58g) | | | | |
| Case Material | Coated metal | | | | |
| Shielding Connection, 12V _{IN} | -Input (Pin 3) | | | | |

¹ The maximum input current at any given input range measured at minimum input voltage is given as 1.6*I_{NOMINAL}. Nominal input current is the typical value measured at the input of the converter under full-load room temperature and nominal input voltage (12V_{IN}).

² Measured with 100µF external capacitor at the input pins.

³ Adequate insulation is to be provided to the converters at the end usage as per applicable requirements.

⁴ Temperature rise on the case of the converters is to be considered during the end usage as per applicable requirements.

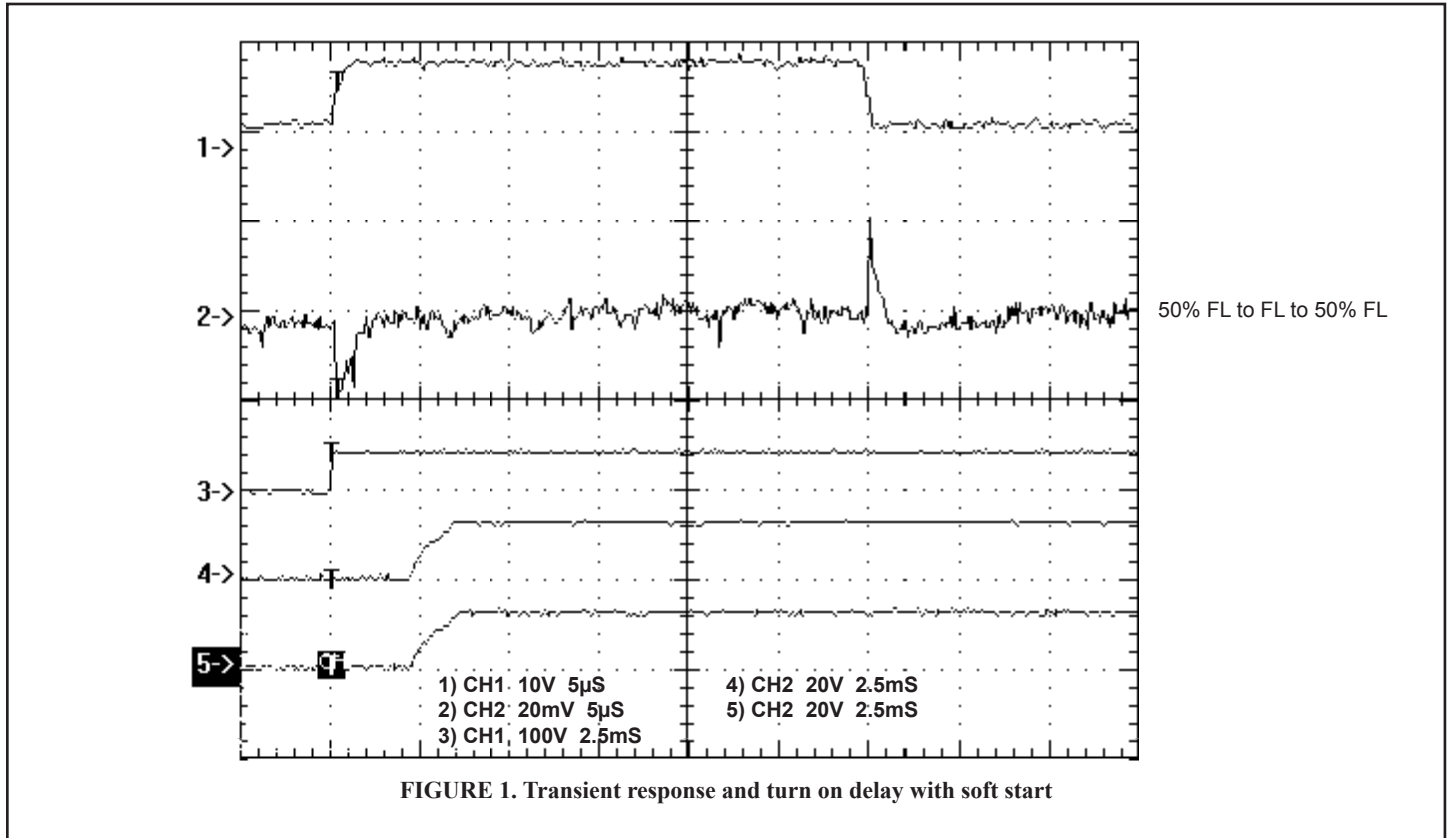


FIGURE 1. Transient response and turn on delay with soft start

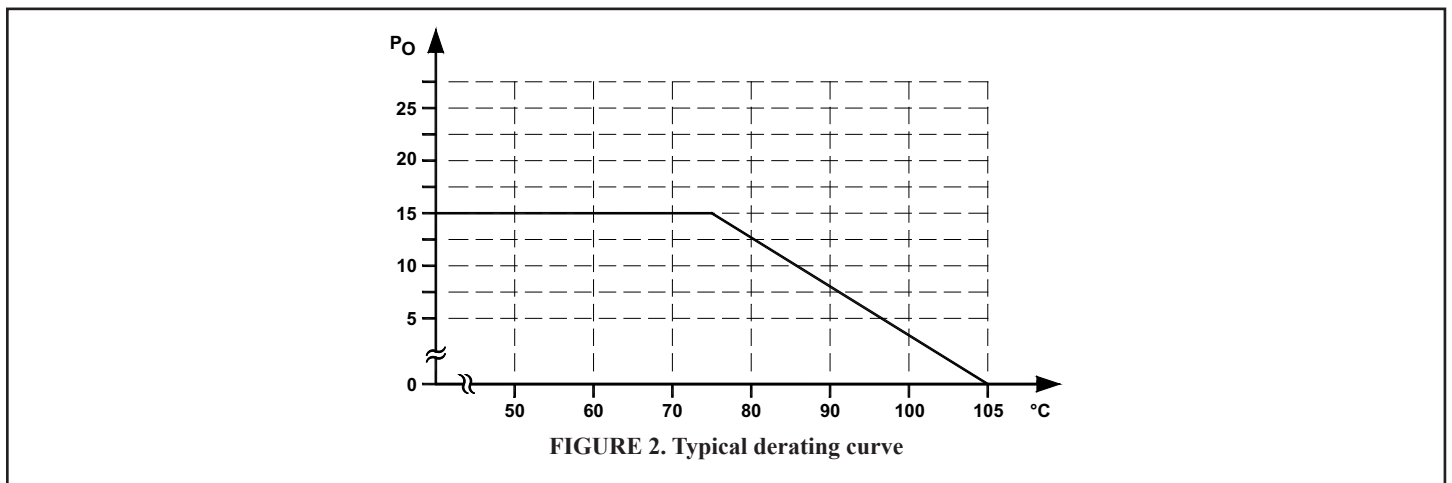


FIGURE 2. Typical derating curve

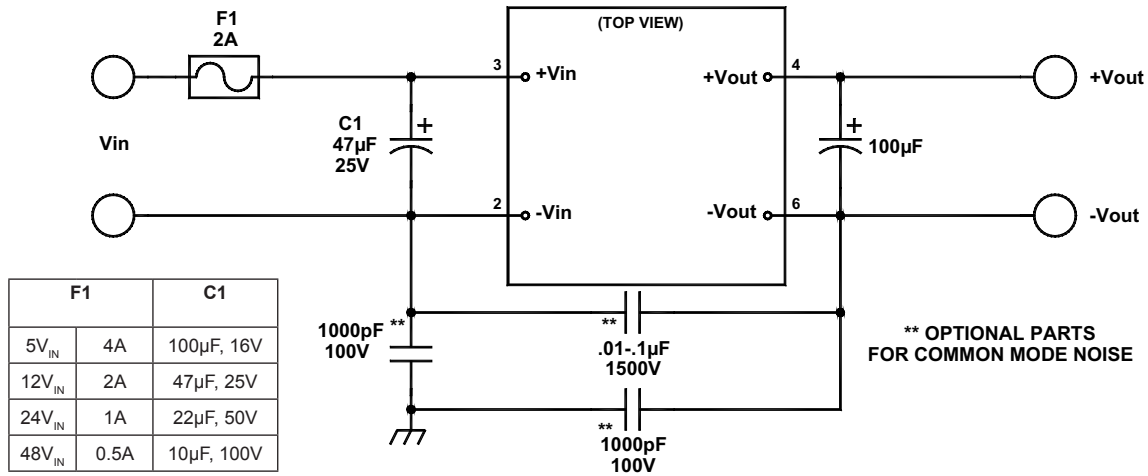
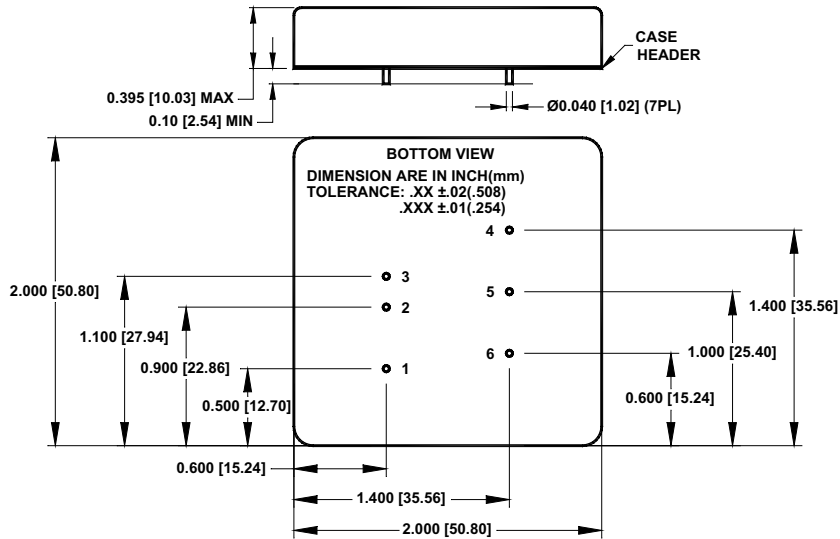


FIGURE 3. Typical connection diagram

MECHANICAL SPECIFICATIONS
A1/A2 CASE



| Pin | Function |
|-----|-------------------|
| | SINGLE |
| 1 | No Pin |
| 2 | -V _{IN} |
| 3 | +V _{IN} |
| 4 | +V _{OUT} |
| 5 | No Pin |
| 6 | -V _{OUT} |