



# LN15000A

LOW-NOISE 15W SINGLE DC/DC CONVERTER

US Patent 5,777,519

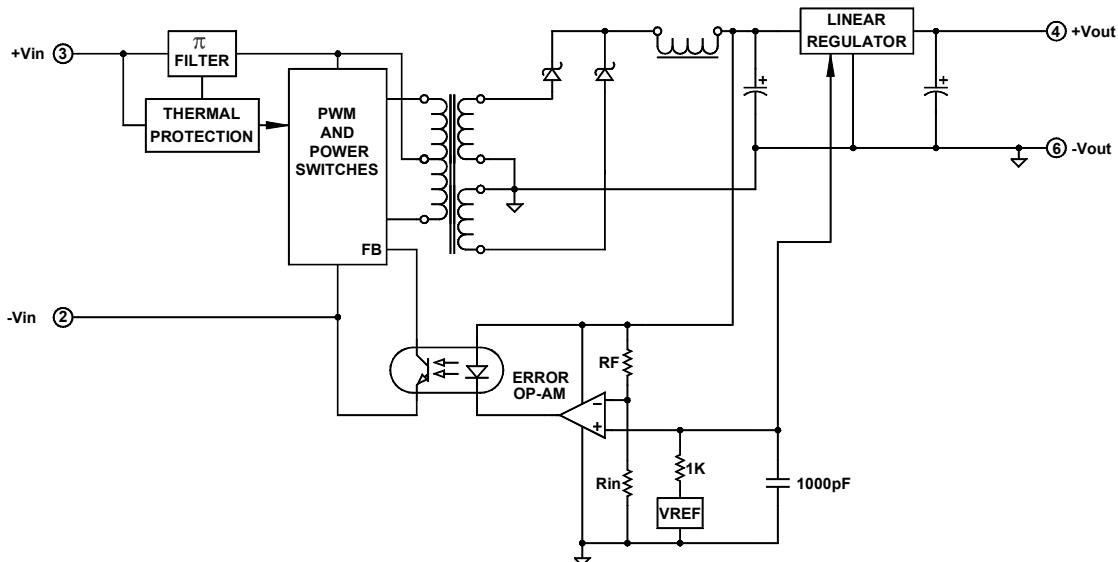
## Key Features

- Less than 5mV output noise
- 79% efficiency
- Six-sided shielding
- Soft start
- Short circuit and thermal protection
- 750 $\mu$ A 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<sub>IN</sub> and provide 5V<sub>OUT</sub>@3A. The converter incorporates low-switching noise techniques at its input and output sections. Low dropout linear regulators reduce the output noise to 5mV<sub>pp</sub> 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 <sub>IN</sub>		30		mA
Full Load Input Current <sup>1</sup>			1580		mA
Input Filter	$\pi$				
Reflected Ripple <sup>2</sup>			40		mA <sub>PP</sub>
Reverse Polarity Input Current	External series-blocking diode			12	A
Input Surge Current (20 $\mu$ S Spike)				10	A
Short Circuit Current Limit			150		% I <sub>IN</sub>
Undervoltage Shutdown			8		Vdc
Off State Current, 12V <sub>IN</sub>			750		$\mu$ A

### OUTPUT SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Voltage and Current Ratings			5		Vdc
Output Voltage Accuracy, Single			$\pm 1$		%
Ripple & Noise			0.05	0.1	%V <sub>PP</sub> of V <sub>OUT</sub>
Line Regulation, Single	Minimum V <sub>IN</sub> to maximum V <sub>IN</sub>		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 <sub>OUT</sub> )	50% FL to FL to 50% FL, See Figure 1		5		$\mu$ S
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 <sup>9</sup>		$\Omega$
Isolation Capacitance			80		pF
Switching Frequency			100		kHz

### ENVIRONMENTAL SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Operating Temperature, Industrial (Ambient) <sup>*</sup>	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 <sub>DISS</sub>
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				
EM/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**

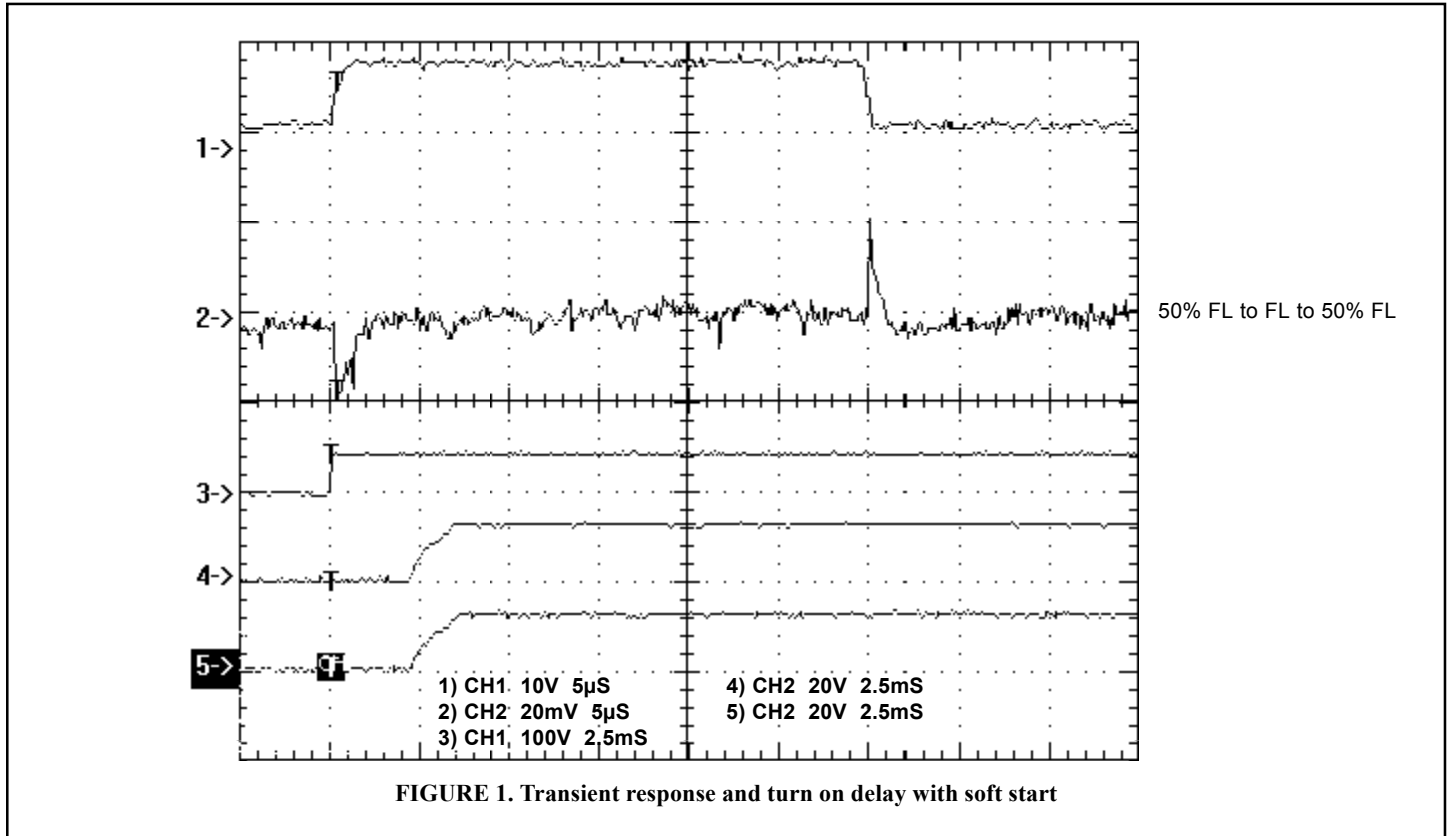
PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Dimensions (L×W×H)	2.00×2.00×0.395 in. (50.80×50.80×10.03mm)				
Weight	2 oz. (58g)				
Case Material	Coated metal				
Shielding Connection, 12V <sub>IN</sub>	-Input (Pin 3)				

<sup>1</sup> The maximum input current at any given input range measured at minimum input voltage is given as 1.6\*I<sub>NOMINAL</sub>. Nominal input current is the typical value measured at the input of the converter under full-load room temperature and nominal input voltage (12V<sub>IN</sub>).

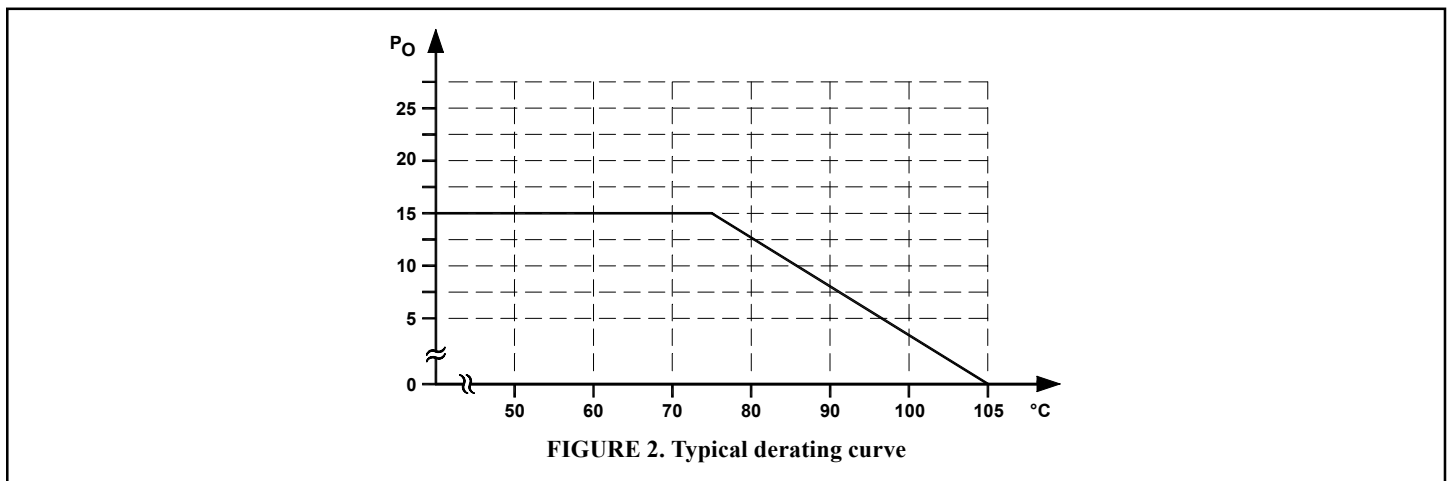
<sup>2</sup> Measured with 100µF external capacitor at the input pins.

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

<sup>4</sup> 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**

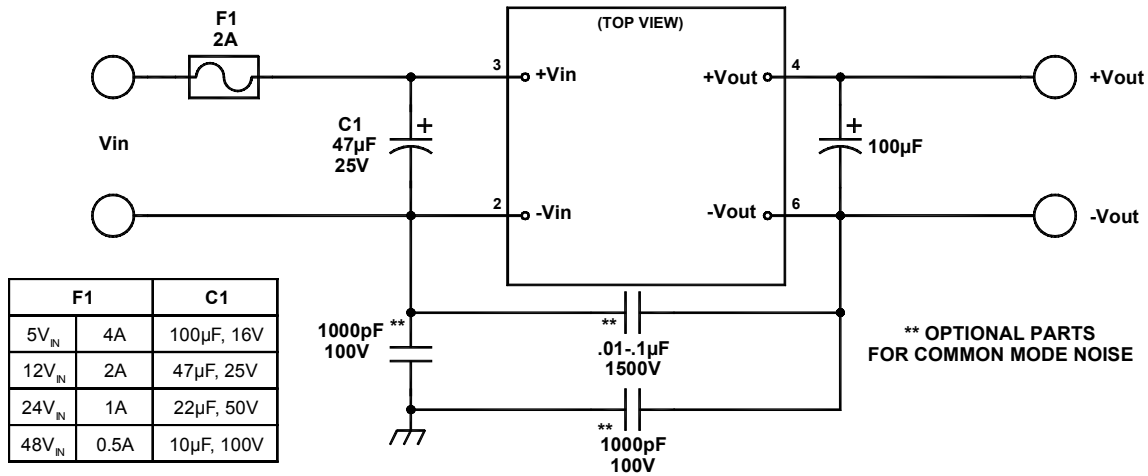
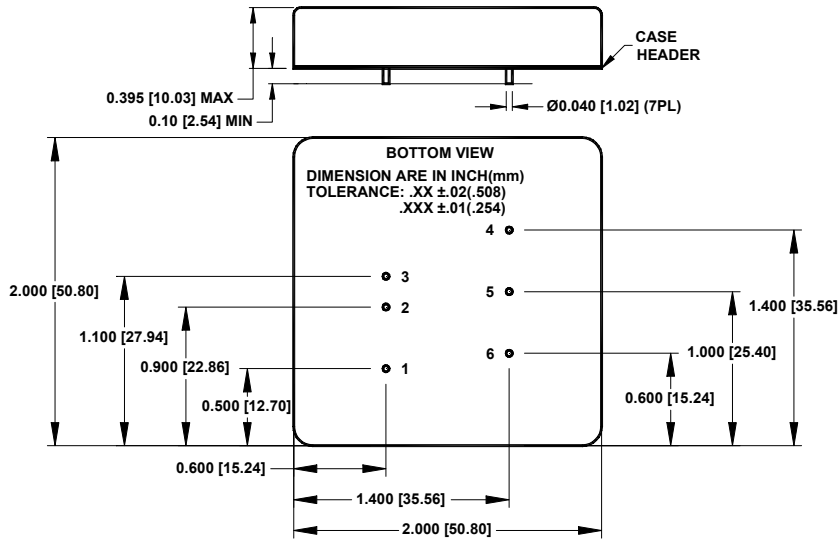


FIGURE 3. Typical connection diagram

**MECHANICAL SPECIFICATIONS**  
A1/A2 CASE



Pin	Function
	<b>SINGLE</b>
1	No Pin
2	-V <sub>IN</sub>
3	+V <sub>IN</sub>
4	+V <sub>OUT</sub>
5	No Pin
6	-V <sub>OUT</sub>