PRELIMINARY

Low-Noise LNB15000 DC/DC Converter

5mV Low Noise, High Efficiency 15W,2:1 Input Range

US Patent 5,777,519

Key Features

- Wide input voltage range (2:1)
- Less than 5mV output noise
- Efficiency up to 88%
- Six-sided shielding
- Soft start
- Short circuit protection
- Adjustable output
- 1mA off state current
- 250mV dropout linear regulators
- Dual output tracking linear regulator
- 5µS transient response
- Industry pinouts

Applications

High-Resolution Data Converters

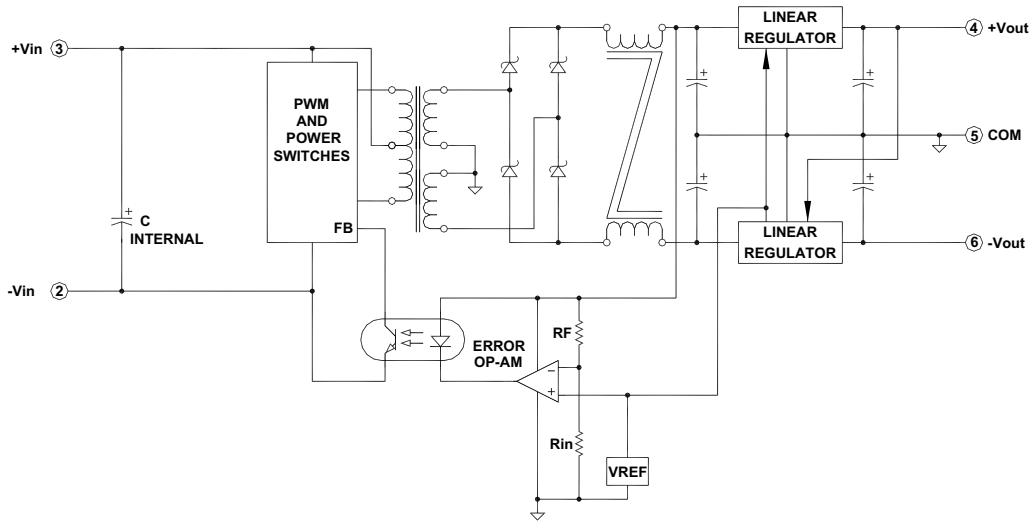
Instrumentation

Test & Measurement

Telecom

Functional Description

The Low-Noise LNB15000 series is a family of high-performance, low-noise, low-cost isolated DC/DC converters consisting of single and dual output models. The converter incorporates low switching noise techniques at its input and output sections. Low dropout linear regulators reduce the output noise to $5mV_{PP}$, while a patented control circuit maintains minimum constant dropout voltage over line, load, temperature and output adjust ranges.



Typical Block Diagram of LNB15000 Dual Output Converter

Electrical Specifications

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

INPUT SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Input Voltage Range	See Model Selection Guide	9.5	12	18	Vdc
Input Filter	LC				
Reverse Polarity Input Current	External series-blocking diode			12	A
Input Surge Current (20µS Spike)				10	A
Input Current			1701		mA
No Load Current			138		mA
Short Circuit Current Limit			150		% I_{IN}
Undervoltage Shutdown, $12V_{in}$ Models		7			Vdc
Off State Current, $12V_{in}$			750		µA
Remote ON/OFF Control, A2 Single Models Only					
Converter ON	Open (Open circuit voltage at Pin 1: 10V Max.)				
Converter OFF		-0.6	0	0.2	Vdc
Logic Input Reference	-Input				
Logic Compatibility	TTL Open Collector or CMOS Open Drain				

OUTPUT SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Output Voltage			5.5		Vdc
Output Current			3.2		A
Output Voltage Accuracy			±1	±1.5	%
Output Voltage Adjustment, Single Only			3	±5	%
Minimum Load		10			% of FL
Ripple & Noise (20 MHz Bandwidth)	See Figure 4, with external capacitor		10		mV_{PP}
Ripple & Noise (20 MHz Bandwidth)	See Figure 4, with extra external capacitor		5		mV_{PP}
Line Regulation, Single and Dual	Minimum V_{IN} to maximum V_{IN}		±.1		%
Load Regulation, Single	NL to FL		±.1		%
Temperature Coefficient @ FL			0.02		%/°C of V_{OUT}
Transient Response Time (to within 0.5% of V_{OUT})	50% FL to FL to 50% FL, See Figure 1				µS
Short Circuit Protection	All outputs, by Hiccup technique				

GENERAL SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Efficiency			87		%
Isolation Voltage (1 min.)			1500		Vdc
Isolation Resistance			10^9		Ω
Isolation Capacitance			80		pF
Switching Frequency			160		kHz

ENVIRONMENTAL SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Operating Temperature, Industrial (Ambient)*		-40		+75	°C
Operating Temperature, Extended (X)	See Ordering Guide (Please contact factory)	-55		+85	°C
Storage Temperature Range		-55		+125	°C
Maximum Operating Case Temperature				105	°C
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)		$1×10^6$		hours

PHYSICAL CHARACTERISTICS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Dimensions (L×W×H)	2.00×1.00×0.445 in. (50.80×25.40×11.43mm)				
Weight	1.04 oz. (30g)				
Case Material	Coated metal				
Shielding Connection, $12V_{IN}$	-Input (Pin 3)				

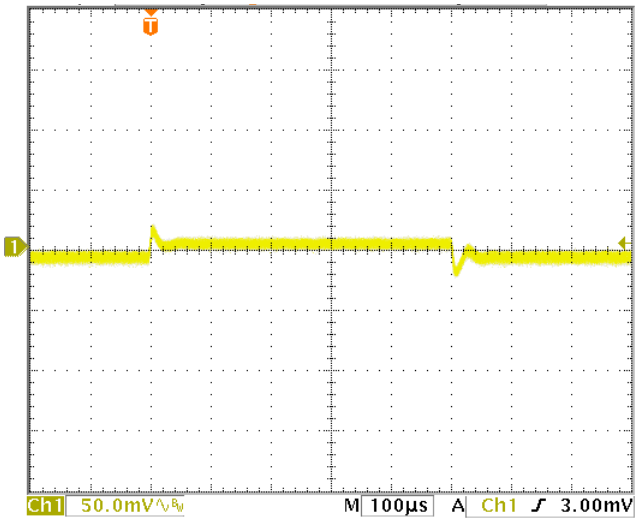


FIGURE 1. Transient response of LNB15000 from Full load to Half Load

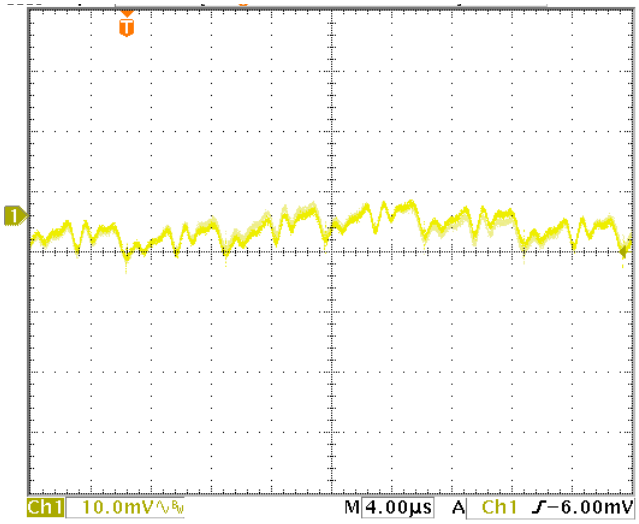


FIGURE 2. Typical output ripple of LNB15000 as shown in Figure 4.

OUTPUT VOLTAGE ADJUSTMENT

For single models, the output reference voltage is referenced to the output ground pin 6. To trim the output voltage high, connect a 1% resistor (0kΩ–200kΩ range) between GND(Pin 6) and V_{OUT} Adjust (Pin 5) for the singles. To trim the output voltage low, connect a 1% resistor (50kΩ–500kΩ range) between $+V_{OUT}$ (Pin 4) and V_{OUT} Adjust (Pin 5) for the singles.

Avoid using a low resistance potentiometer or a high temperature coefficient such as wound wire.

[1] Contact factory for -55° to +85°C operating temperature range.
[2] 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 (12, 24 and $48V_{IN}$).
[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.

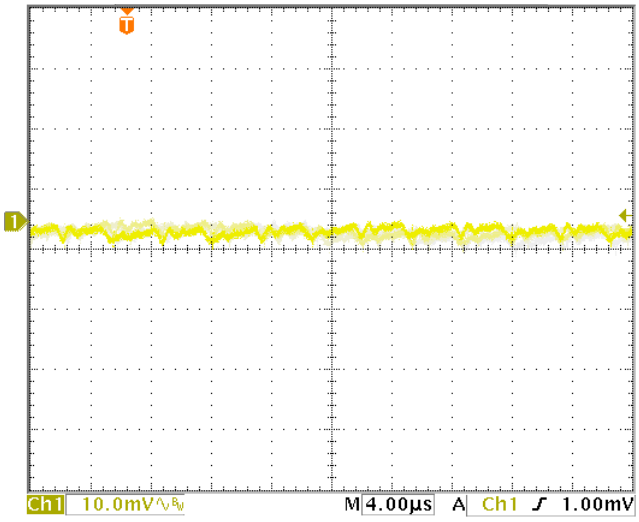
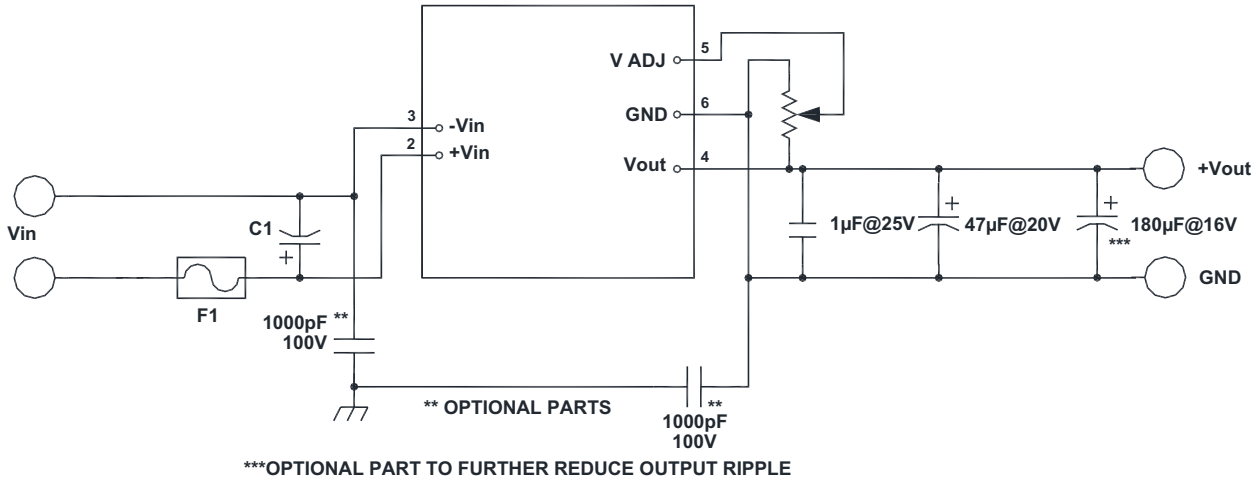


FIGURE 3. Typical output ripple of LNB15000 as shown in Figure 4 with an additional 180uF@16V low esr capacitor.



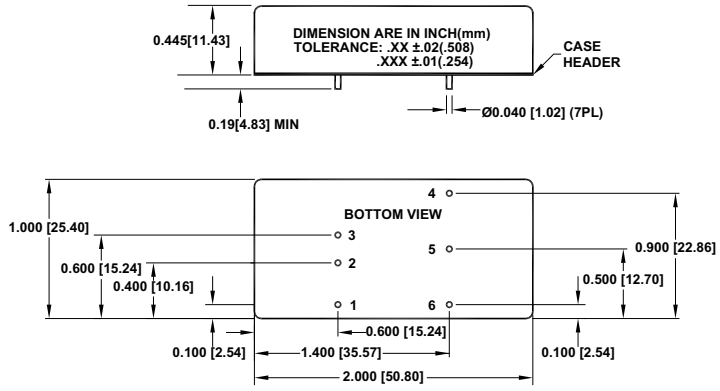
***OPTIONAL PART TO FURTHER REDUCE OUTPUT RIPPLE

Typical Values

V_{IN}	F1 (A)	C1 (Low ESR) (µF)	L1 (µH)	C2 (µF)	C Internal (µF)
12	2	47@25V	0.6	47@25V	33@25V

FIGURE 4. Typical connection diagram of LNB15000 Single DC/DC Converter

MECHANICAL SPECIFICATIONS



Pin	Function
	SINGLE
1	ON/OFF
2	$-V_{IN}$
3	$+V_{IN}$
4	$+V_{OUT}$
5	V_{OUT} ADJ
6	GND

PRELIMINARY