LN10028

Low-Noise 10W Single DC/DC Converter

36-72V_{IN}, 5.5V_{OUT} @1.8A

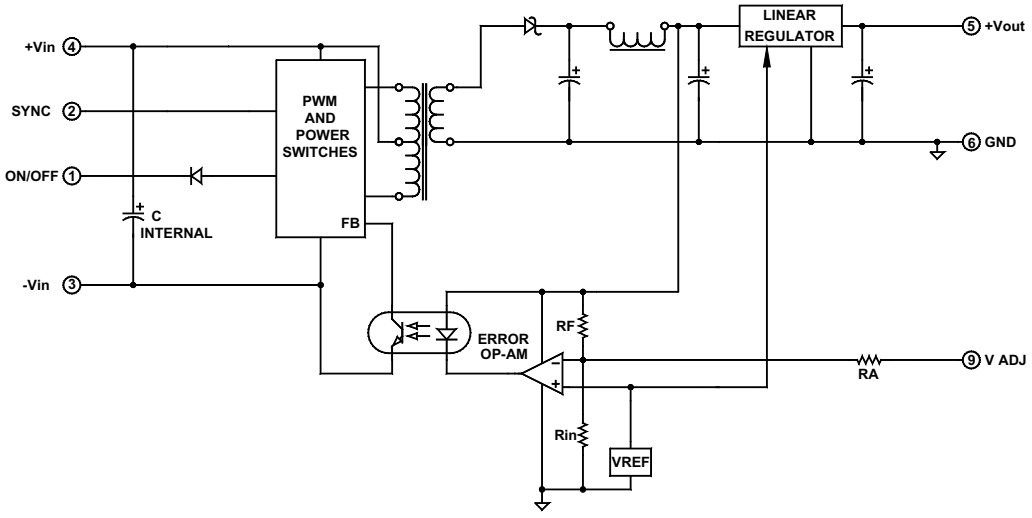
US Patent 5,777,519

Key Features

- 10mV Output ripple
- Six-sided shielding
- Soft start
- Single output
- Short circuit protection
- Adjustable output
- 750µA Off state current
- 250mV Dropout linear regulators
- Industry pinouts
- External clock synchronization of 393KHz

Functional Description

The LN10028 is an isolated, 10W Low Noise single DC/DC converter with an input voltage range from 36V_{IN} to 72V_{IN} and provides 5.5V out@1.8A. The converter's design is based on Beta Dyne's patents and offers low noise with an extended operating temperature range from -40°C to +71°C.



Typical Block Diagram of Single Output Converter

Electrical Specifications

INPUT SPECIFICATIONS

-PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Input Voltage Range		36	48	72	Vdc
Input Filter	Capacitor				
No Load Input Current			15		mA
Full Load Input Current			264		mA
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		4.5			Vdc
Off State Current			750		μA
Remote ON/OFF Control					
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 Colllector or CMOS Open Drain				

OUTPUT SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Output Voltage			5.5		Vdc
Output Voltage Accuracy			±1	±1.5	%
Output Voltage Adjustment			±3	±10	%
Output Current			1800		mA
Ripple & Noise	As shown in Figure 1		10		mV_{PP}
Line Regulation	Minimum V_{IN} to maximum V_{IN}		1		%
Load Regulation	NL to FL		1		%
Temperature Coefficient @ FL			0.02		%/°C of V_{OUT}
Transient Response Time	50% FL to FL to 50% FL		5		μS
Short Circuit Protection	All outputs, by input current limiting				

GENERAL SPECIFICATIONS

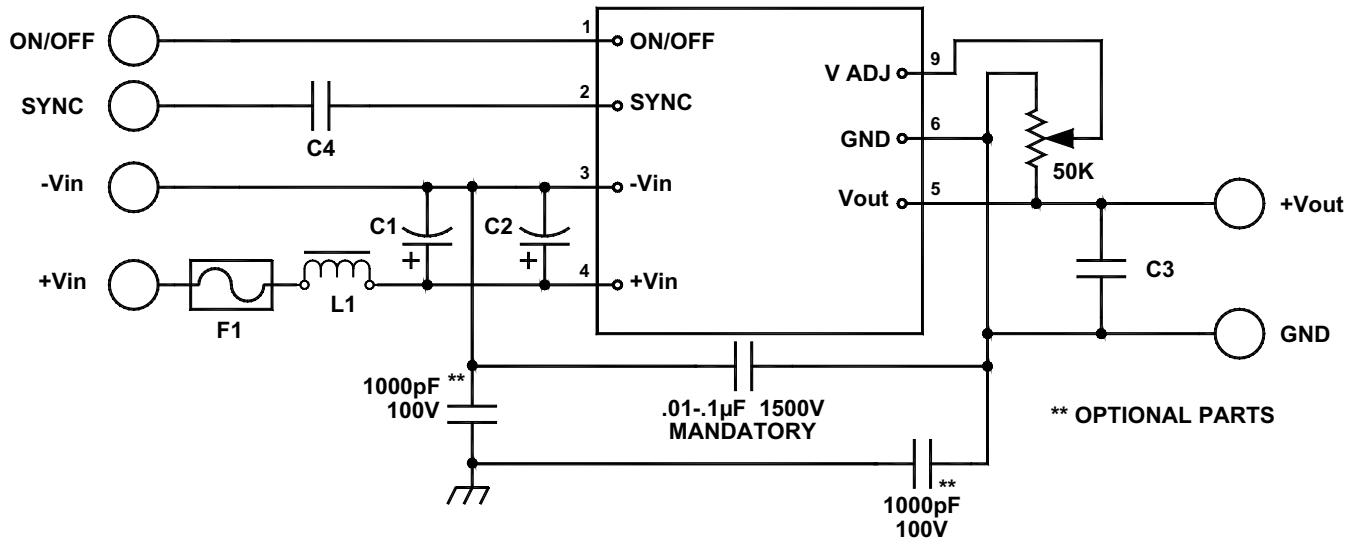
PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Efficiency			78		%
Isolation Voltage (1 min.)			1500		Vdc
Isolation Resistance			10^9		Ω
Isolation Capacitance			80		pF
Switching Frequency			360		kHz
Synchronization Frequency			393		kHz

ENVIRONMENTAL SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Operating Temperature		-40		+71	°C
Storage Temperature Range		-55		+125	°C
Humidity	Up to 95% non-condensing				
Cooling	Free-air convection				
EMI/RFI	Six-sided 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(LxWxH)	2.00 x 1.00x0.395 in(50.80x25.40x10.33mm)				
Weight	1.04 oz. (30g)				
Case Material	Coated Metal				
Shielding Connection	$+V_{in}$ (Pin4)				



Part list for Figure 1:
L1= 2.2µH
C1= 47µF@100V Electrolytic
C2= 2.2µF@100V Ceramic
C3= 10µF@25V Ceramic
C4= 220pF-100pF Ceramic
F1= 1A Slow Blow Fuse

FIGURE 1. Typical connection diagram of LN10028

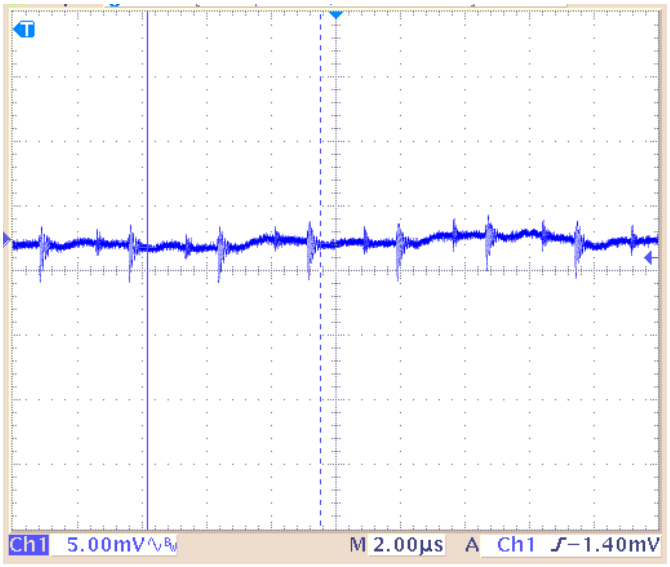


FIGURE 4. Typical output ripple of LN10028, V_{IN}=48V, V_{OUT}=5.5V@1.80A as shown if Figure3.

OUTPUT VOLTAGE ADJUSTMENT

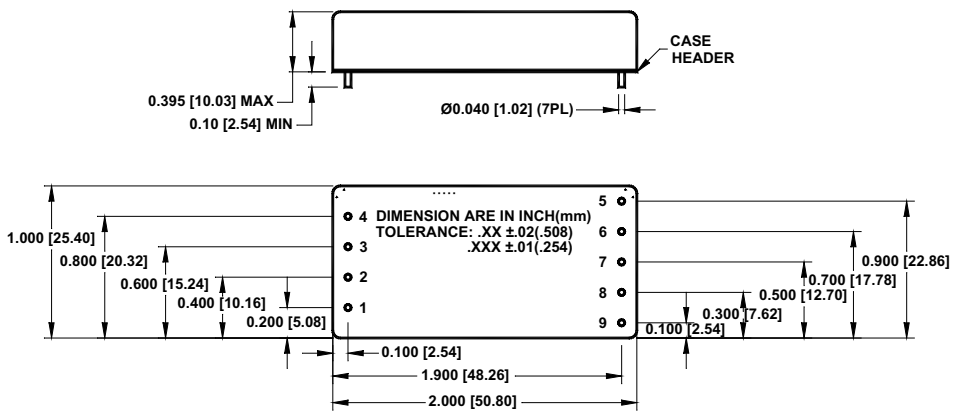
For both single and dual models, the output reference voltage is referenced to the output ground: Pin 6 for singles and Pin 8 for duals. To trim the output voltage high, connect a 1% resistor (0kΩ–200kΩ range) between $-V_{OUT}$ (Pin 6) and V_{OUT} Adjust (Pin 9) for the singles, and COM (Pin 8) and V_{OUT} Adjust (Pin 5) for the duals. To trim the output voltage low, connect a 1% resistor (50kΩ–500kΩ range) between $+V_{OUT}$ (Pin 5) and V_{OUT} Adjust (Pin 9) for the singles,

With the wiper connected to the V_{OUT} Adjust pin, a variable resistor (potentiometer) can also be used for V_{OUT} adjustment by connecting each end to $+V_{OUT}$ and $-V_{OUT}$ for the singles, and $+V_{OUT}$ and COM for the duals. A potentiometer between 50kΩ–100kΩ can be used. Avoid using a low resistance potentiometer or a high temperature coefficient such as wound wire.

EXTERNAL SYNCHRONIZATION

This series of converters can be synchronized to an external system clock of 393kHz -2% to 10%. The external clock is AC-coupled to the input SYNC terminal (Pin 2) through a coupling capacitor from 220pF to 1000pF. The required amplitude is 3.3V to 5V and its duty cycle is 50% ±20%. Please refer to *Application Note DC-005: Synchronization* for more information.

MECHANICAL SPECIFICATIONS



Pin	Function
	SINGLE
1	ON/OFF
2	SYNC
3	$-V_{IN}$
4	$+V_{IN}$
5	$+V_{OUT}$
6	GND
7	No Pin
8	No Pin
9	V_{OUT} ADJ