

LDB24-XXX

Compact, Boost Constant Current DC/DC LED Drivers



Key Features:

- Constant Current Output
- Step Up (Boost) Design
- Wide 9V to 36V Input Range
- Up to 48V Output
- Efficiency to 95%
- 7 to 32W Output Power
- -40°C to +85°C Operation
- **Digital & Analog Dimming!**

Models Available
with Wire Leads
(IP67 Rated)



MicroPower Direct

292 Page Street
Suite D
Stoughton, MA 02072
USA

T: (781) 344-8226
F: (781) 344-8481
E: sales@micropowerdirect.com
W: www.micropowerdirect.com



Electrical Specifications

Specifications typical @ +25°C, nominal input voltage & rated output current, unless otherwise noted. Specifications subject to change without notice.

Input

Parameter	Conditions	Min.	Typ.	Max.	Units
Input Voltage Range		9.0	24.0	36.0	VDC
Max Input Voltage	0.1 Sec. Max			38.0	VDC
Under Voltage Protection			7.6		VDC
Soft Start Time				50	mS
Input Filter	Internal Capacitor				

Output

Parameter	Conditions	Min.	Typ.	Max.	Units
Output Voltage Range	$V_{OUT} - V_{IN} \geq 5V$	14		48	VDC
Output Current	See Model Selection Guide				
Output Current Accuracy			±5		%
Output Power	See Model Selection Guide				
Efficiency	See Model Selection Guide				
Capacitive Load	150, 250, 300 & 350 mA Models		100		μF
	500, 600 & 700 mA Models		47		
Operating Frequency			370		kHz
Ripple & Noise (20 MHz)	See Model Selection Guide				
Temperature Coefficient				±0.03	%/°C
Thermal Impedance	Natural Convection		+17		°C/W
Output Short Circuit	Output Current Cut-Off, Auto Recovery				

Environmental

Parameter	Conditions	Min.	Typ.	Max.	Units
Operating Temperature Range, Ambient	See Model Selection Guide				
Operating Temperature Range, Case				+102	°C
Storage Temperature Range		-55		+125	°C
Cooling	Free Air Convection				
Humidity	RH, Non-condensing			95	%
Lead Temperature (Solder)	1.5 mm From Case For 10 Sec			260	°C

Physical

Case Size	2.03 x 1.03 x 0.62 Inches (51.50 x 26.10 x 15.80 mm)				
Case Material	Non-Conductive Black Plastic (UL94-V0)				
Weight	1.341 Oz (38.0g)				

Remote On/Off Control

Parameter	Conditions	Min.	Typ.	Max.	Units
DC/DC On					Open
DC/DC Off					0.0V
Remote Pin Drive Current	$EN = \leq 3V$			1.5	μA
Quiescent Input Current (Shutdown Mode)	$V_{IN} = 9$ to $32V$			1.3	mA
	$V_{IN} = 32V$ to $36V$			8.0	

Analog Dimming

Parameter	Conditions	Min.	Typ.	Max.	Units
Absolute Maximum Rating	At DIM Input	0.4		5.0	VDC
Control Voltage Range	ON	0.4		1.7	VDC
Output Current Adjustment		0.0		100	%
Control Voltage Range	Off	0.0		0.30	VDC
Drive Current	$V_{DIM} = 0.40$ to $1.7V$			1.5	μA

PWM Dimming

Parameter	Conditions	Min.	Typ.	Max.	Units
Operation Frequency	Recommended Maximum	0.100		100	kHz
On Control Voltage		0.40		5.0	VDC
Off Control Voltage		0.00		0.30	VDC

EMC Compliance

EMI/RFI	Radiated/Conducted	EN 55022 (CISPR22) Class B			
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Reliability Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	1.29			MHours

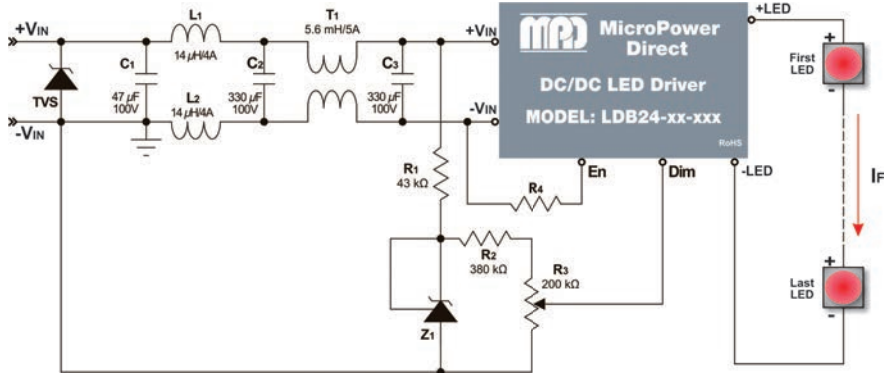
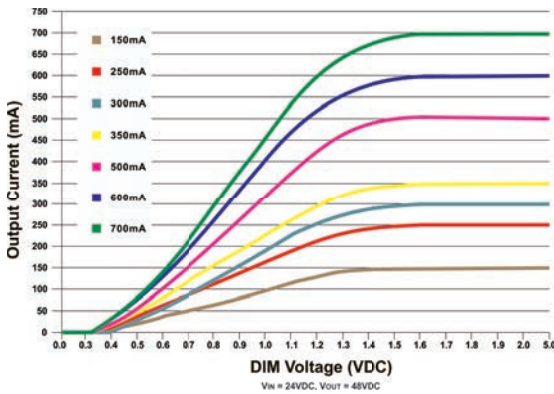
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Model Number	Input	Output		Max. Power (W)	Ripple & Noise (mV P-P, Max)	Efficiency At FL (%)		Operating Temp. Range	
	Voltage Range (VDC)	Voltage Range (VDC)	Current Max (mA)			Min	Max	Min (°C)	Max (°C)
LDB24-07-150	9.0 - 36.0	14.0 - 48.0	150	7.2	350	86	91	-40	+85
	9.0 - 18.0	14.0 - 48.0	250	12.0	450	89	93	-40	+80
LDB24-12-250	18.0 - 36.0	14.0 - 48.0	300	14.4	450	89	94	-40	+85
	9.0 - 18.0	14.0 - 48.0	350	16.8	600	89	94	-40	+75
LDB24-14-300	18.0 - 36.0	14.0 - 48.0	500	24.0	650	90	95	-40	+85
	9.0 - 18.0	14.0 - 45.0	600	28.8	650	91	95	-40	+70
LDB24-16-350	18.0 - 36.0	23.0 - 48.0	600	28.8	650	91	95	-40	+80
	9.0 - 18.0	14.0 - 38.0	700	33.6	700	91	95	-40	+75
LDB24-24-500	18.0 - 36.0	23.0 - 48.0	700	33.6	700	91	95	-40	+75
	9.0 - 18.0	14.0 - 32.0						-40	+70
LDB24-28-600	18.0 - 36.0	23.0 - 48.0						-40	+75
	9.0 - 18.0	14.0 - 32.0						-40	+70
LDB24-33-700	18.0 - 36.0	23.0 - 48.0						-40	+75
	9.0 - 18.0	14.0 - 32.0						-40	+70

NOTES:

- These are "step-up" devices. The output must be kept 5.0V higher than the input. Excessive heating could occur if it is not.
- A reversed power source could damage the unit.
- No connection should be made between input ground and the output.
- The driver has an under voltage shutdown feature that can be used to automatically turn the driver off when a preset input voltage level is reached. This could be useful in applications where a battery supplies the input bus voltage. This connection is illustrated in the connection diagram below.
- Unless output ripple needs to be reduced for a specific application requirement, capacitance should not be added to the output of the driver. Adding output capacitance will delay the start of the unit.
- Maximum operating temperature is given for ambient, with convection cooling.
- Exceeding 8V for more than 0.1S on the DIM input may damage the unit.
- Exceeding the specified maximum output power could cause damage to the unit.
- The remote on/off input (pin 3) should be left open if not used.

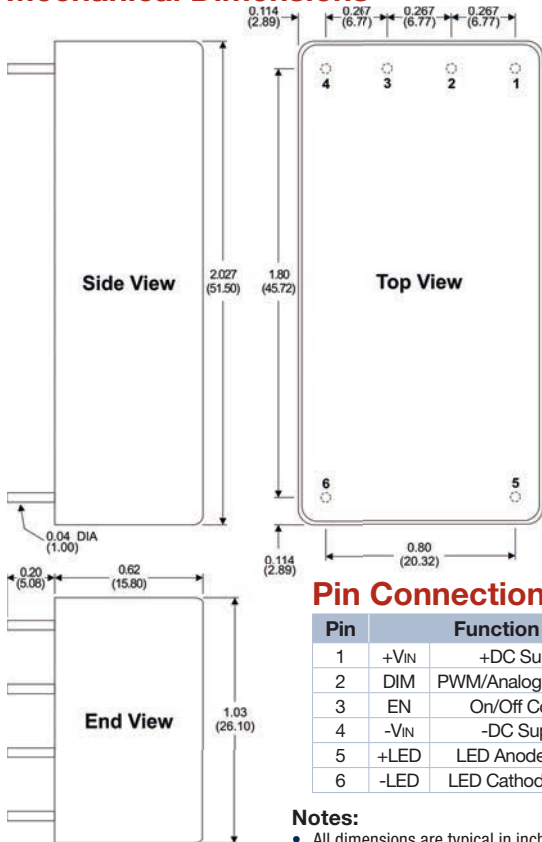
Output Current vs DIM Input Voltage Analog Dimming



Connection Notes:

- The input filter components (C1, L1, L2, T1, C2 & C3) are used to meet the conducted emissions requirements of EN 55022 class B. With the addition of the filter, the unit should also meet the levels of EN 55015. Component values may need to be changed slightly depending upon application variables.
- To comply with EN61000-4-5, a TVS should be installed before the input filter components. The TVS max clamping voltage (@max peak pulse current I_c) must be $\leq 38V$.
- As shown in the graph (Output Current vs DIM Input Voltage) above, the output current of the unit can be set by adjusting the voltage level on the DIM input to a value between 0.4V and 1.7V (load will vary from 0% to 100% of rated output current). Care must be taken not to exceed 5.0V on this input, or the driver may be damaged. In the circuit above, the voltage level at the DIM input is set by a simple resistor network (R1, R2, and R3). The regulator (Z1) will maintain the voltage across R2 and R3, insuring that the limit on the DIM pin will not be exceeded. The value of R1 is given for a 24V input.
- The resistor R4 is used to set the "undervoltage protection" level (if used). Contact the factory for more information.

Mechanical Dimensions



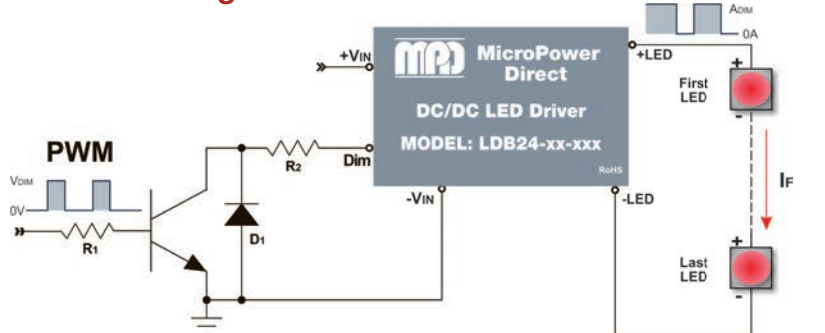
Pin Connections

Pin	Function
1	+VIN +DC Supply
2	DIM PWM/Analog Dimming
3	EN On/Off Control
4	-VIN -DC Supply
5	+LED LED Anode Conn.
6	-LED LED Cathode Conn.

Notes:

- All dimensions are typical in inches (mm)
- Tolerance x.xx = ± 0.02 (± 0.50)

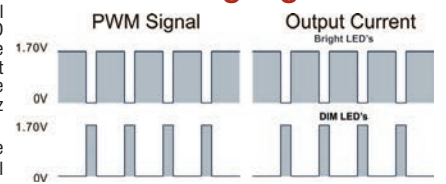
PWM Dimming



Connection Notes:

- Output current can also be adjusted by using a pulse width modulated (PWM) signal. By varying the signal duty cycle (as shown at right) the on time of the LED is varied. This changes the apparent brightness of the LED, because the human eye will "average" the amount of light in the pulsed output. To avoid visible flicker, the PWM signal should be greater than 100 Hz (>200 Hz is recommended).
- The pulse amplitude of the PWM signal should not be set to a level that produces a peak output current level that exceeds the rated operating current of the LED's being powered. The "V_{DM}" used for the peak amplitude in the circuit above is the control voltage at the DIM input that will provide the optimum drive current for the LED lamps. This level can be approximated from the graph above right.
- The DIM input is shown being driven by an open collector transistor. The resistor and diode (D1, R2) suppress high amplitude spikes that may be caused by the collector-emitter capacitance of the transistor. These could cause errors in the driver output current or erratic operation. The DIM input can also be driven by an open drain source such as a typical microcontroller output.

PWM Dimming Signals



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