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%
- Up to 43W Output Power
- -40°C to +85°C Operation
- Available With Wired Leads
- ***Digital & Analog Dimming!***

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	I_{OUT} = 100 mA to 700 mA	9.0	24.0	36.0	VDC
	I_{OUT} = 900 mA	20.0	24.0	30.0	
Under Voltage Protection, See Note 1	I_{OUT} = 100 mA to 700 mA		6.8		VDC
	I_{OUT} = 900 mA		14.6		
Soft Start Time				50	mS
Input Filter	Internal Capacitor				

Output

Parameter	Conditions	Min.	Typ.	Max.	Units
Output Voltage Range, See Note 2	I_{OUT} = 100 mA to 700 mA	14		48	VDC
	I_{OUT} = 900 mA	25		48	
Output Current	See Model Selection Guide				
Output Current Accuracy				±5	%
Output Power	See Model Selection Guide				
Efficiency	See Model Selection Guide				
Operating Frequency			370		kHz
Ripple & Noise (20 MHz)	See Model Selection Guide				
Temperature Coefficient				±0.03	%/°C
Thermal Impedance	Natural Convection		+17		°C/W
Over Voltage Protection				52.5	VDC
Output Short Circuit	Output Current Cut-Off, Auto Recovery				

Environmental

Parameter	Conditions	Min.	Typ.	Max.	Units
Operating Temperature Range	See Model Selection Guide				
Maximum Case Temperature				+105	°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	See Mechanical Diagram (Page 4)	
Case Material	Non-Conductive Black Plastic (UL94-V0)	
Lead Wire Ratings (Wired Models)	18 AWG	600V/ 105 °C
	20 AWG	600V/ 105 °C
Weight	W/Pins	1.341 Oz (38.0g)
	W/Wires	1.553 Oz (44.2g)

EMI Characteristics (See Note 10)

Parameter	Standard	Criteria	Level
Radiated Emissions	EN55015		
Conducted Emissions	EN55015		
ESD	IEC 61000-4-2	A	±8 kV Air
			±4 kV Contact
			±4 kV Indirect
RS	IEC 61000-4-3	A	3V/m
EFT	IEC 61000-4-4	A	±0.5 kV
Surge	IEC 61000-4-5	A	±1 kV
CS	IEC 61000-4-6	A	±3V rms
PFM	IEC 61000-4-8	A	3A/m

Reliability Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	1.29			MHours
Water Resistance (Wired Version)	IP67				

RoHS

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Model Selection Guide

Model Number	Input Voltage Range (VDC)	Output		Max. Power (W)	Ripple & Noise (mV P-P, Max)	Output Capacitive Load (µF, Max)	Efficiency At FL (%)	
		Voltage	Current					
		Range (VDC)	Max (mA)				Min	Max
LDB24-05-100(Wxy)	9.0 - 36.0	14.0 - 48.0	100	4.8	250	47	83.0	88.0
LDB24-07-150(Wxy)	9.0 - 36.0	14.0 - 48.0	150	7.2	350	100	86.0	91.0
LDB24-12-250(Wxy)	9.0 - 36.0	14.0 - 48.0	250	12.0	450	100	89.0	93.0
LDB24-14-300(Wxy)	9.0 - 36.0	14.0 - 48.0	300	14.4	450	100	89.0	94.0
LDB24-16-350(Wxy)	9.0 - 36.0	14.0 - 48.0	350	16.8	600	100	89.5	94.0
LDB24-24-500(Wxy)	9.0 - 18.0	14.0 - 45.0	500	24.0	650	47	90.0	95.0
	18.0 - 36.0	23.0 - 48.0						
LDB24-28-600(Wxy)	9.0 - 36.0	14.0 - 38.0	600	28.8	650	47	91.0	95.0
	18.0 - 36.0	23.0 - 48.0						
LDB24-33-700(Wxy)	9.0 - 36.0	14.0 - 32.0	700	33.6	700	47	91.5	95.0
	18.0 - 36.0	23.0 - 48.0						
LDB24-43-900(Wxy)	20.0 - 30.0	25.0 - 48.0	900	43.2	700	47	92.0	95.0

For wired Models add a "w" to the Model No. (LDB24-28-600W)
For wired Models with a Remote O/F add an "R" to the Model No. (LDB24-28-600WR)
For wired Models with a Dimming Input add a "D" to the Model No. (LDB24-28-600WD)
For Wired Models With Both Options add an "RD" to the Model No. (LDB24-28-600WRD)

NOTES:
1. Models with outputs ranging from 100 mA to 700 mA will typically shut off if the input voltage falls below 6.8 VDC. They turn on again when the input rises above 7.6 VDC. The LDB24-43-900 will typically shut off if the input voltage falls below 14.6 VDC. They turn on again when the input rises above 15.6 VDC.
2. These are "step-up" devices. The output must be kept 5.0V higher than the input. Excessive heating could occur if it is not.
3. A reversed power source could damage the unit.
4. No connection should be made between input ground and the output.
5. 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.
6. 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.
7. Maximum operating temperature is given for ambient, with convection cooling.
8. Exceeding 8V for more than 0.1S on the DIM input may damage the unit.
9. Exceeding the specified maximum output power could cause damage to the unit.
10. The Enable (remote on/off) input, pin 3 should be left open if not used. Specifications for the feature are as follows:

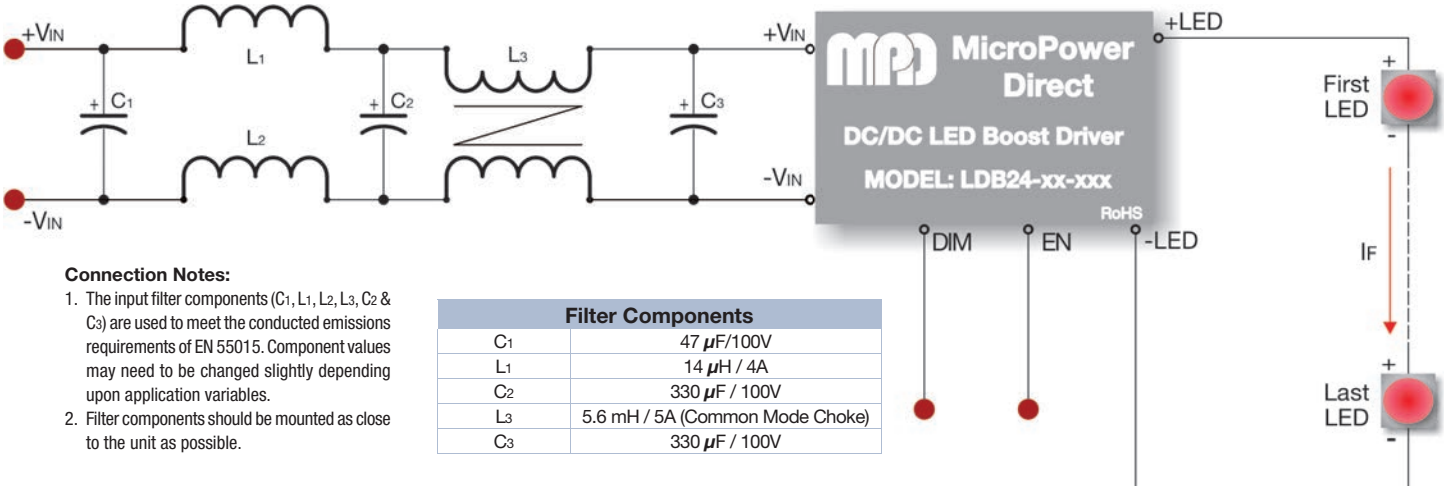
Remote On/Off Control

Parameter	Conditions	Max.	Units
DC/DC On		Open	
DC/DC Off		0.0V	
Remote Pin Drive Current	EN = ≤3V	1.5	µA
Quiescent Input Current (Shutdown Mode)	VIN = 9 to 32V	1.3	mA
	VIN = 32V to 36V	8.0	

Operating Temperature Range

Model Number	Input Voltage Range (VDC)	Operating Temp. Range	
		Min (ºC)	Max (ºC)
LDB24-05-100	9.0 - 36.0	-40	+85
LDB24-07-150	9.0 - 36.0	-40	+85
LDB24-12-250	18.0 - 36.0	-40	+85
	9.0 - 18.0	-40	+80
LDB24-14-300	18.0 - 36.0	-40	+85
	9.0 - 18.0	-40	+80
LDB24-16-350	18.0 - 36.0	-40	+85
	9.0 - 18.0	-40	+75
LDB24-24-500	18.0 - 36.0	-40	+80
	9.0 - 18.0	-40	+70
LDB24-28-600	18.0 - 36.0	-40	+75
	9.0 - 18.0	-40	+70
LDB24-33-700	18.0 - 36.0	-40	+75
	9.0 - 18.0	-40	+70
LDB24-43-900	20.0 - 30.0	-40	+60

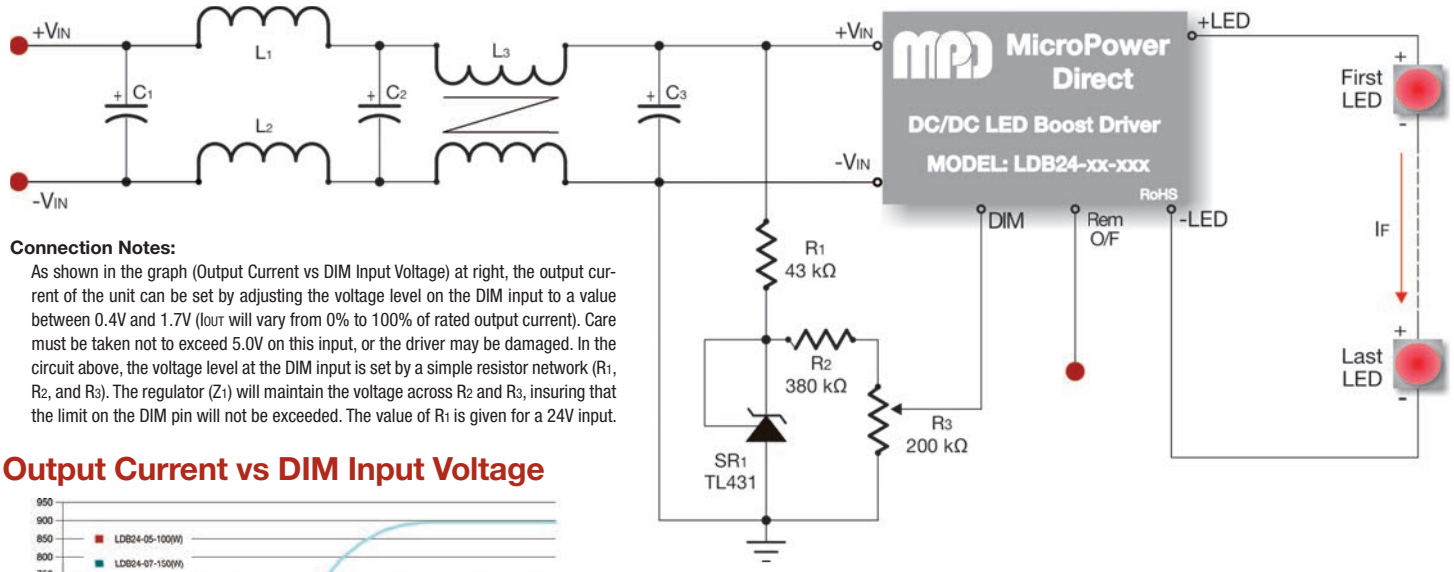
Input EMI/Protection



Connection Notes:
1. The input filter components (C1, L1, L2, L3, C2 & C3) are used to meet the conducted emissions requirements of EN 55015. Component values may need to be changed slightly depending upon application variables.
2. Filter components should be mounted as close to the unit as possible.

Filter Components	
C1	47 µF/100V
L1	14 µH / 4A
C2	330 µF / 100V
L3	5.6 mH / 5A (Common Mode Choke)
C3	330 µF / 100V

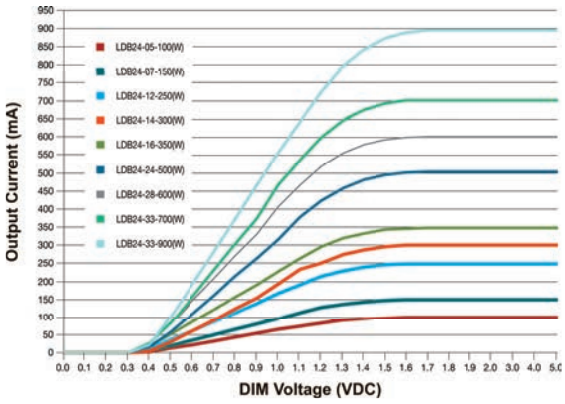
Analog Dimming



Connection Notes:

As shown in the graph (Output Current vs DIM Input Voltage) at right, 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 (I_{OUT} 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 (R_1, R_2, and R_3). The regulator (Z_1) will maintain the voltage across R_2 and R_3, insuring that the limit on the DIM pin will not be exceeded. The value of R_1 is given for a 24V input.

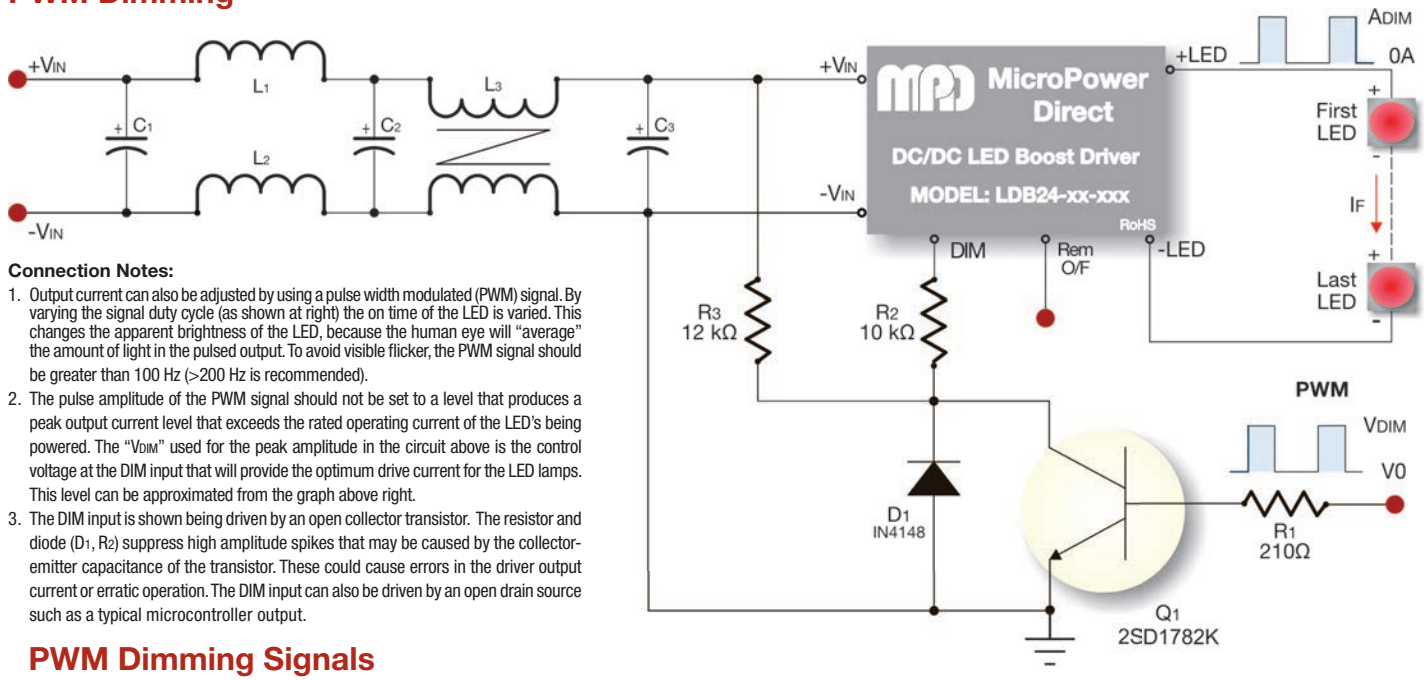
Output Current vs DIM Input Voltage



Analog Dimming Specifications

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

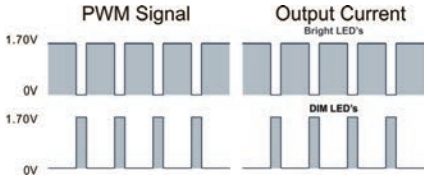
PWM Dimming



Connection Notes:

1. 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).
2. 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_{DIM}" 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.
3. The DIM input is shown being driven by an open collector transistor. The resistor and diode (D_1, R_2) 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.

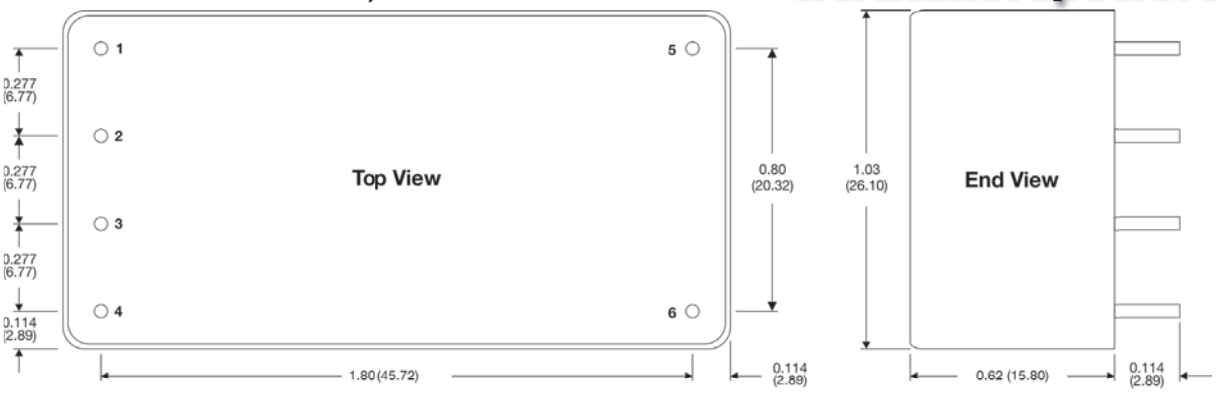
PWM Dimming Signals

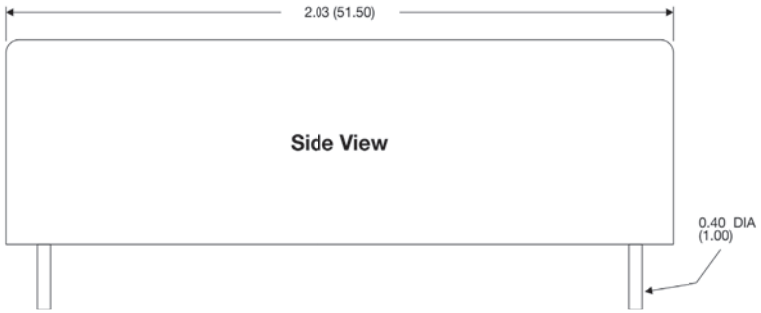


PWM Dimming Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
Operation Frequency	Recommended Maximum	0.10		100	kHz
On Control Voltage		0.40		5.0	VDC
Off Control Voltage		0.00		0.30	VDC

Mechanical Dimensions, PC Mount Unit





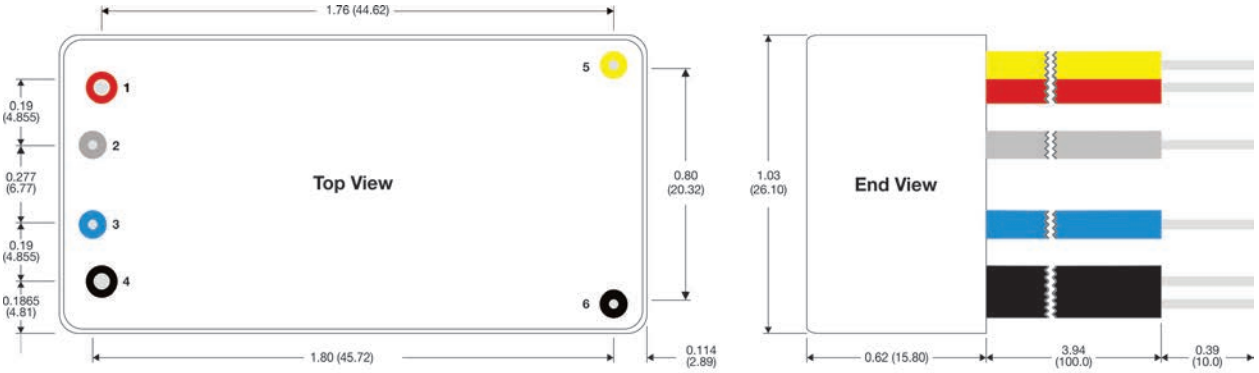
Pin Connections

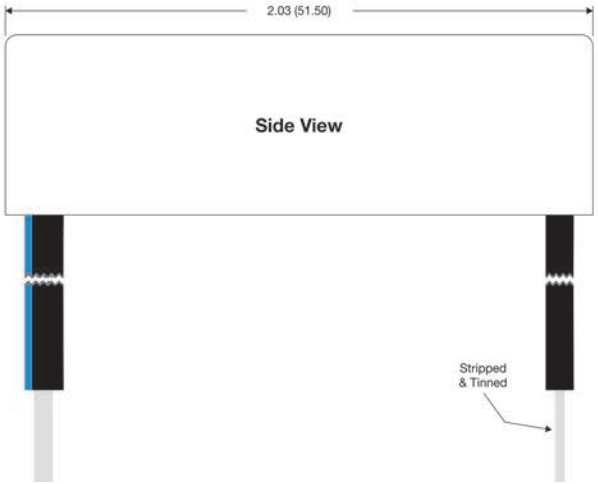
Pin	Function	
1	+VIN	+DC Supply
2	DIM	PWM/Analog Dimming
3	EN	On/Off Control
4	-VIN	-DC Supply
5	+LED	LED Anode Conn.
6	-LED	LED Cathode Conn.

Notes:

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

Mechanical Dimensions, Wired Unit





Wire Connections

Wire	Function	
1 (Red)	+VIN	+DC Supply
2 (White)	DIM	PWM/Analog Dimming
3 (Blue)	EN	On/Off Control
4 (Black)	-VIN	-DC Supply
5 (Yellow)	+LED	LED Anode Conn.
6 (Black)	-LED	LED Cathode Conn.

Notes:

- All dimensions are typical in inches (mm)
- Wires 1, 4, 5, 6 - 22 AWG/600V
- Wires , 2, 3 - 18 AWG/600V
- Tolerance x.xx = ±0.02 (±0.50)