

LDF24E-XX-XXX Series

Miniature, SMT Constant Current Output DC/DC LED Drivers



Key Features:

- 300 - 700 mA Output Current
- Constant Current Output
- Miniature SMT Case
- PWM & Analog Dimming
- Wide 5.5V to 48V Input Range
- Efficiency to 96%
- 2.0 Mhrs MTBF
- **Low, Low Cost!**



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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		5.5	24.0	48.0	VDC
Max Input Voltage	See Note 1			55.0	VDC
Input Filter	Internal Capacitor				

Output

Parameter	Conditions	Min.	Typ.	Max.	Units
Output Current Accuracy	V _{in} = 24V		±2.0	±3.0	%
Output Current Stability	V _{in} = 48V			±1.0	%
Output Capacitive Load				1,000	µF
Ripple & Noise				120	mV P-P
Temperature Coefficient				±0.015	%/°C
Output Short Circuit	Continuous				

Environmental

Parameter	Conditions	Min.	Typ.	Max.	Units
Operating Temperature Range, Ambient	300 mA, 350 mA Output Models	-40	+25	+85	°C
	All Other Models	-40	+25	+71	
Operating Temperature Range, Case	Case			+100	°C
Storage Temperature Range		-55		+125	°C
Cooling	Free Air Convection				
Humidity	RH, Non-condensing			95	%
Lead Temperature	1.5 mm From Case For 10 Sec			260	°C

Physical

Case Size	0.94 x 0.54 x 0.295 Inches (23.86 x 13.70 x 7.50 mm)				
Case Material	Non-Conductive Black Plastic (UL94-V0)				
Weight	0.212 Oz (6.0g)				

Remote On/Off Control

Parameter	Conditions	Min.	Typ.	Max.	Units
DC/DC On				Open Or 2.8 VDC < 6.0 VDC	
DC/DC Off				<0.6 VDC	
Remote Pin Drive Current	V _{cont} = 5.0 VDC			1	mA
Quiescent Input Current (Shutdown Mode)	V _{in} = 24V, V _{cont} = <0.6 VDC		400		µA

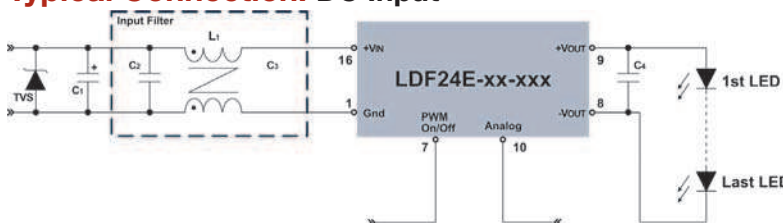
PWM Dimming

Parameter	Conditions	Min.	Typ.	Max.	Units
Operation Frequency		0.2		10	kHz

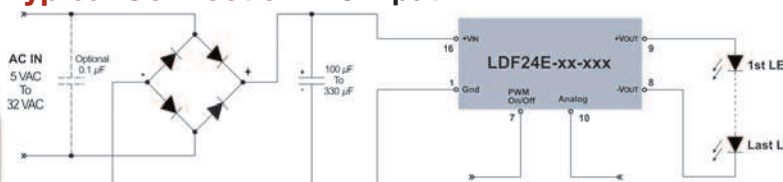
Reliability Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	2.0			MHours

Typical Connection: DC Input



Typical Connection: AC Input



Connection Notes:

1. Input filter components (C₁, L₁ & C₂) are used to help meet the conducted emissions requirements (EN 55022 B) for the unit. Recommended values are:
C₂ - 2.2 µF
L₁ - 1.25 mH
C₃ - 1.0 µF
Other components added to the circuit include an input storage capacitor to help prevent problems due to input line sags and an output capacitor to improve performance. Recommended values are:
C₁ - 470 µF
C₄ - 1.0 µF
2. To comply with EN61000-4-5, a TVS should be installed before the input filter components. A SMCG51 is recommended.

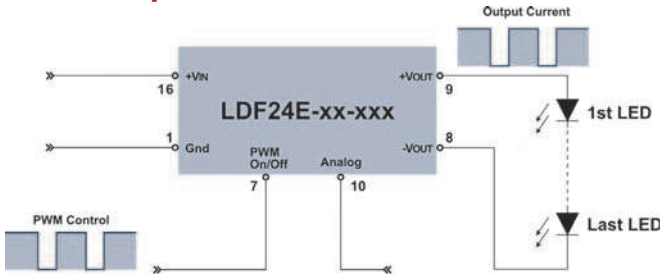
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Model Number	Input		Output		Dimming Control	Efficiency (% Max)
	Voltage (VDC)		Voltage (VDC)	Current (mA)		
	Nominal	Range				
LDF24E-10-300	24	5.5 - 48.0	3.3 - 36.0	0.0 - 300	PWM/Analog	96
LDF24E-12-350	24	5.5 - 48.0	3.3 - 36.0	0.0 - 350	PWM/Analog	96
LDF24E-18-500	24	5.5 - 48.0	3.3 - 36.0	0.0 - 500	PWM/Analog	96
LDF24E-21-600	24	5.5 - 48.0	3.3 - 36.0	0.0 - 600	PWM/Analog	96
LDF24E-25-700	24	5.5 - 48.0	3.3 - 36.0	0.0 - 700	PWM/Analog	96

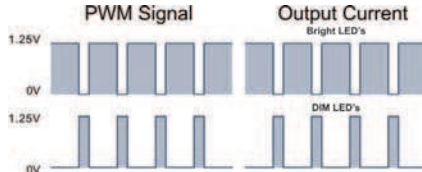
Specification Notes:

1. Exceeding 55V on the unit input could damage the unit.
2. No connection should be made between input ground and the output.
3. These are step-down devices, the maximum output open voltage is equal to the input voltage.
4. When not used, the PWM/Cont input (Pin 3) or should be left open if not used.
5. Exceeding the specified maximum output power could cause damage to the unit.

PWM Output Current Control



Output current may be adjusted by using a pulse width modulated (PWM) signal. By varying the signal duty cycle (as shown at right) the output current is adjusted up or down.



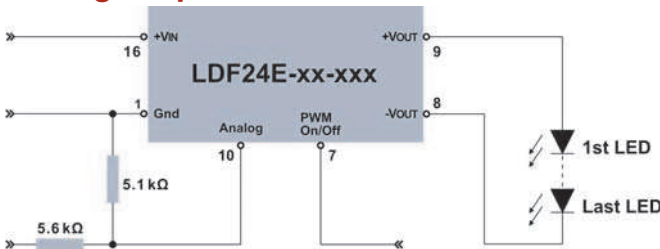
Output current may be calculated by using the formula:

$$I_{OUT} = \frac{(DT - 0.6)}{T} \times I_{RATED}$$

- Where
- I_{OUT} = Required output current
 - I_{RATED} = Full rated output current for the unit
 - D = Pulse width of the he control signal
 - T = Cycle of the control signal

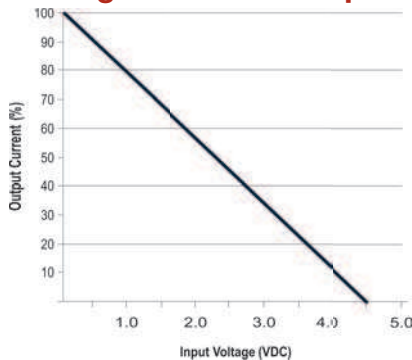
The T_{ON} of the driver signal must be greater than 0.7 mS. An audible noise may be generated during the digital dimming process of the driver, since the control circuit frequency is within the is within the range of human hearing (20 Hz - 20 kHz).

Analog Output Current Control



Analog dimming is accomplished by using a simple resistor divider network, as illustrated above. The output current is varied by changing the voltage level present at Pin 10. The amount variation is shown in chart at right.

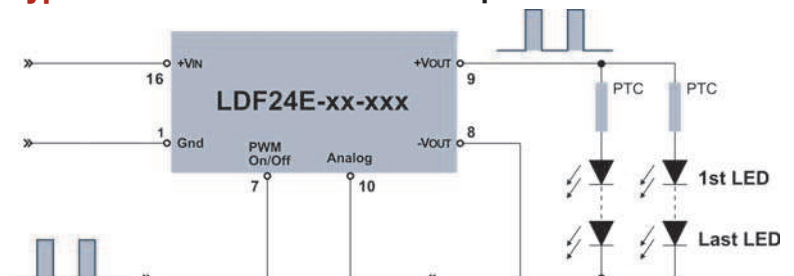
Analog Control vs Output



The maximum voltage level that can be applied to Pin 10 is 15V. Exceeding this may damage the driver.

Analog and PWM control of the driver should not be attempted at the same time. The control pin not being used should be left open.

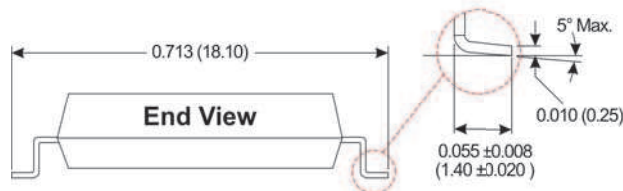
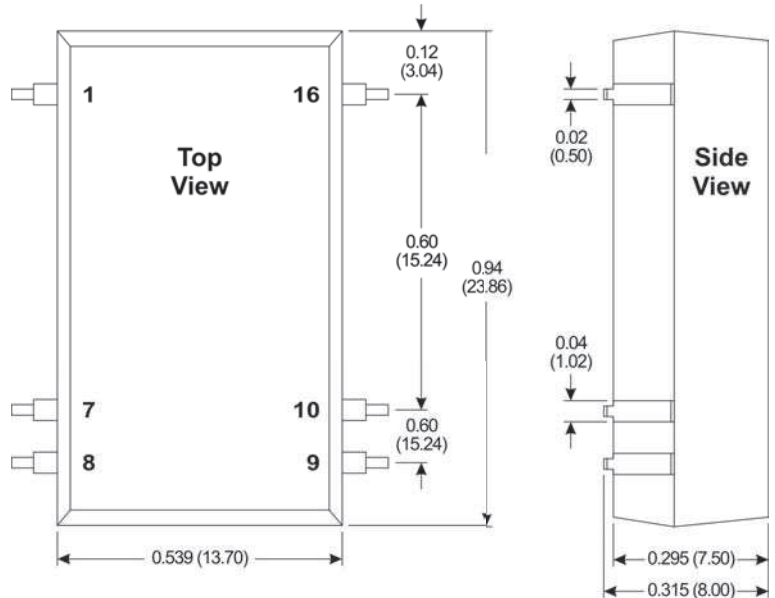
Typical Connection: Parallel Output



Connection Notes:

1. A positive temperature coefficient PTC is connected to each parallel channel for protection.

Mechanical Dimensions



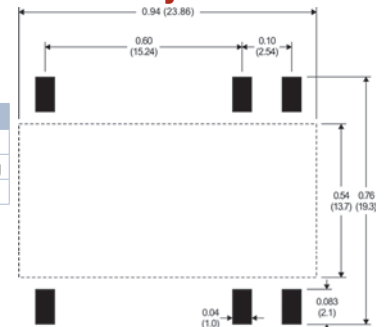
Notes:

- All dimensions are typical in inches (mm)
- Tolerance x.xx = ±0.01 (±0.25)
- Pin 1 is marked by a "dot" or indentation on the top of the unit

Pin Connections

Pin	Function	Pin	Function
1	Gnd	9	+VOUT
7	PWM, On/Off	10	Analog Dimming
8	-VOUT	16	+VIN

Solder Layout



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