

# LED Driver

## LDU Series



- Constant Current Output
- LED Drive Current up to 1000 mA
- LED Strings from 2 V to 57 V
- PWM & Analog Dimming Control
- High Efficiency – up to 95%
- Open or Short Circuit LED Protection
- 3 Year Warranty

## Specification

### Input

Input Voltage	• LDU08 & 24: 7-30 VDC LDU48: 7-60 VDC
Input Filter	• Capacitor
Input Surge	• LDU08 & 24: 40 VDC for 0.5 s LDU48: 65 VDC for 0.5 s

### Output

Output Voltage	• See tables ( $V_{in}$ must be at least 2 V greater than $V_{out}$ )
Output Current	• See tables
Output Current Trim	• 25-100%
Output Current Accuracy	• LDU08: $\pm 6.0\%$ max LDU24: $\pm 8.0\%$ max LDU48: $\pm 8.0\%$ max
Ripple & Noise	• LDU08: 200 mV pk-pk max LDU24: 250 mV pk-pk max (except 1000 mA units: 300 mV pk-pk max) LDU48: See tables measured with 20 MHz bandwidth
Short Circuit Protection	• Current is limited to the rated output
Temperature Coefficient	• LDU08: $\pm 0.03\%/^{\circ}\text{C}$ max LDU24: $\pm 0.08\%/^{\circ}\text{C}$ max LDU48: $\pm 0.03\%/^{\circ}\text{C}$ max
Remote On/Off	• On = 0.3-1.25 V or open circuit Off = $\leq 0.15$ V (applied to control pin) LDU08 & 24: Quiescent input current is 25 $\mu\text{A}$ max, LDU48: Quiescent input current is 100 $\mu\text{A}$ max
Remote On/Off Signal Current	• 1 mA max

### Dimming

<b>PWM</b>	
Output Current Range	• 25% to 100%
Operating Frequency	• 1 kHz max
On Time	• 200 ns min
Off Time	• 200 ns min
Amplitude	• 1.25 V max

### DC Voltage Control

Output Current Range	• 25% to 100%
Control Input	• 0.3 to 1.25 V max

### Variable Resistor

Output Current Range	• 25% to 100%
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### General

Efficiency	• See tables
Switching Frequency	• LDU08: 40-380 kHz variable LDU24: 50-330 kHz variable LDU48: 20-500 kHz variable
MTBF	• LDU08: >1.6 Mhrs LDU24: >1.6 Mhrs LDU48: >950 KHrs to MIL-HDBK-217F at 25 $^{\circ}\text{C}$ , GB

### Environmental

Operating Temperature	• LDU08: $-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ , LDU24: $-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ , LDU24 1000 mA unit: $-40^{\circ}\text{C}$ to $+70^{\circ}\text{C}$ , LDU48: See derating curves
Case Temperature	• LDU08 & 24: $+100^{\circ}\text{C}$ max LDU48: $+110^{\circ}\text{C}$ max
Storage Temperature	• $-40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$
Humidity	• Up to 95%, non-condensing
Thermal Impedance	• 35-50 $^{\circ}\text{C}/\text{W}$ model dependant
Ingress Protection Rating	• IP67 (wired versions)

### EMC

Emissions	• EN55022 class B conducted & radiated with external components - see application notes
ESD Immunity	• EN61000-4-2, level 2 Perf Criteria A
Radiated Immunity	• EN61000-4-3, level 2 Perf Criteria A
EFT/Burst	• EN61000-4-4, level 2 Perf Criteria A
Surge	• EN61000-4-5, level 2 Perf Criteria A
Conducted Immunity	• EN61000-4-6, level 2 Perf Criteria A

# Models and Ratings

**LDU08/24 XP**

## With Dimming Control

Output Power	Input Voltage Range	Output Voltage	Output Current	Efficiency	Model Number
8.0 W	7 - 30 V	2 - 28 V	300 mA	95%	LDU0830S300
8.0 W	7 - 30 V	2 - 28 V	350 mA	95%	LDU0830S350
14.0 W	7 - 30 V	2 - 28 V	500 mA	95%	LDU2430S500
17.0 W	7 - 30 V	2 - 28 V	600 mA	95%	LDU2430S600
20.0 W	7 - 30 V	2 - 28 V	700 mA	95%	LDU2430S700
24.0 W	7 - 30 V	2 - 28 V	1000 mA	95%	LDU2430S1000

## Wired Versions (No Dimming Control)

Output Power	Input Voltage Range	Output Voltage	Output Current	Efficiency	Model Number
8.0 W	7 - 30 V	2 - 28 V	350 mA	95%	LDU0830S350-W
14.0 W	7 - 30 V	2 - 28 V	500 mA	95%	LDU2430S500-W
20.0 W	7 - 30 V	2 - 28 V	700 mA	95%	LDU2430S700-W
24.0 W	7 - 30 V	2 - 28 V	1000 mA	95%	LDU2430S1000-W

## Wired Version with Dimming Control

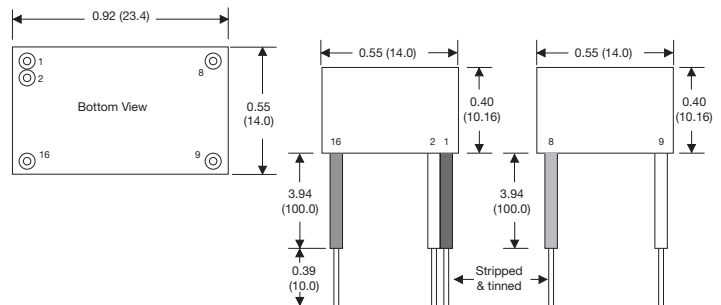
Output Power	Input Voltage Range	Output Voltage	Output Current	Efficiency	Model Number
8.0 W	7 - 30 V	2 - 28 V	350 mA	95%	LDU0830S350-WD
14.0 W	7 - 30 V	2 - 28 V	500 mA	95%	LDU2430S500-WD
20.0 W	7 - 30 V	2 - 28 V	700 mA	95%	LDU2430S700-WD
24.0 W	7 - 30 V	2 - 28 V	1000 mA	95%	LDU2430S1000-WD

## Mechanical Details

### LDU08: 14 Pin DIL



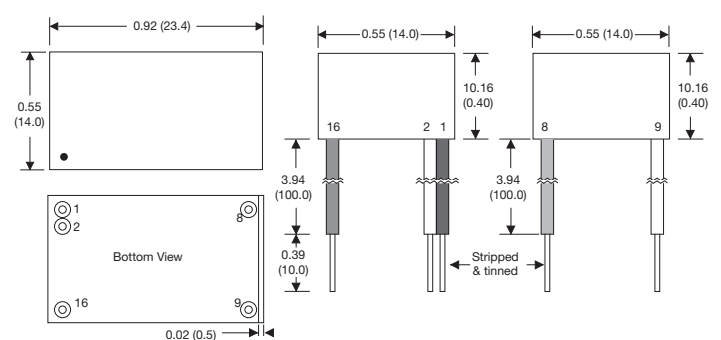
### LDU08 - Wired Versions



### LDU24- 16 Pin DIL



### LDU24 - Wired Versions



## Notes

- All dimensions are in inches (mm)
- Weight: LDU08 - 0.006 lbs (2.6 g) approx.  
LDU08 (wired version) - 0.02 lbs (11.1 g) approx.  
LDU24 - 0.014 lbs (6.2 g) approx.  
LDU24 (wired version) - 0.02 lbs (11.1 g) approx.
- Pin diameter: 0.02±0.002 (0.5±0.05)
- Pin pitch tolerance: ±0.014 (±0.35)
- Case tolerance: ±0.02 (±0.5)

LDU Connections						
LDU08	LDU08-W	LDU08-WD	LDU24	LDU24-W	LDU24-WD	Function
1	1 (Black)	1 (Black)	1 & 2	1 (Black)	1 (Black)	-Vin: -DC supply
2	No Wire	2 (White)	3	No Wire	2 (White)	Control
7	8 (Blue)	8 (Blue)	7 & 8	8 (Blue)	8 (Blue)	-Vout: LED cathode connection
8	9 (Yellow)	9 (Yellow)	9 & 10	9 (Yellow)	9 (Yellow)	+Vout: LED anode connection
14	16 (Red)	16 (Red)	15 & 16	16 (Red)	16 (Red)	+Vin: +DC supply

Note: LDU08: Do not connect Pin 1 (-Vin) to Pin 7 (-Vout).  
LDU24: Do not connect Pins 1 & 2 (-Vin) to Pins 7 & 8 (-Vout).



# Models and Ratings

## With Dimming Control

Output Power	Input Voltage Range	Output Voltage	Output Current	Ripple & Noise (pk-pk)	Efficiency	Model Number
9.0 W	7 - 60 V	2 - 57 V	150 mA	150 mV	97%	LDU4860S150
14.0 W	7 - 60 V	2 - 57 V	250 mA	200 mV	97%	LDU4860S250
17.0 W	7 - 60 V	2 - 57 V	300 mA	250 mV	97%	LDU4860S300
20.0 W	7 - 60 V	2 - 57 V	350 mA	300 mV	97%	LDU4860S350
29.0 W	7 - 60 V	2 - 57 V	500 mA	400 mV	97%	LDU4860S500
34.0 W	7 - 60 V	2 - 57 V	600 mA	450 mV	97%	LDU4860S600
40.0 W	7 - 60 V	2 - 57 V	700 mA	500 mV	97%	LDU4860S700
48.0 W	7 - 60 V	2 - 48 V	1000 mA	800 mV	97%	LDU4860S1000

## Wired Versions (No Dimming Control)

Output Power	Input Voltage Range	Output Voltage	Output Current	Ripple & Noise (pk-pk)	Efficiency	Model Number
9.0 W	7 - 60 V	2 - 57 V	150 mA	150 mV	97%	LDU4860S150-W
14.0 W	7 - 60 V	2 - 57 V	250 mA	200 mV	97%	LDU4860S250-W
17.0 W	7 - 60 V	2 - 57 V	300 mA	250 mV	97%	LDU4860S300-W
20.0 W	7 - 60 V	2 - 57 V	350 mA	300 mV	97%	LDU4860S350-W
29.0 W	7 - 60 V	2 - 57 V	500 mA	400 mV	97%	LDU4860S500-W
34.0 W	7 - 60 V	2 - 57 V	600 mA	450 mV	97%	LDU4860S600-W
40.0 W	7 - 60 V	2 - 57 V	700 mA	500 mV	97%	LDU4860S700-W
48.0 W	7 - 60 V	2 - 48 V	1000 mA	800 mV	97%	LDU4860S1000-W

## Wired Version with Dimming Control

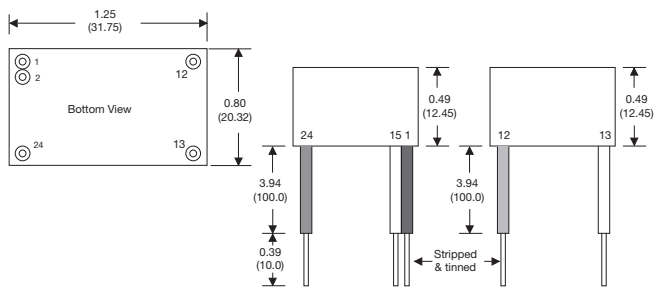
Output Power	Input Voltage Range	Output Voltage	Output Current	Ripple & Noise (pk-pk)	Efficiency	Model Number
9.0 W	7 - 60 V	2 - 57 V	150 mA	150 mV	97%	LDU4860S150-WD
14.0 W	7 - 60 V	2 - 57 V	250 mA	200 mV	97%	LDU4860S250-WD
17.0 W	7 - 60 V	2 - 57 V	300 mA	250 mV	97%	LDU4860S300-WD
20.0 W	7 - 60 V	2 - 57 V	350 mA	300 mV	97%	LDU4860S350-WD
29.0 W	7 - 60 V	2 - 57 V	500 mA	400 mV	97%	LDU4860S500-WD
34.0 W	7 - 60 V	2 - 57 V	600 mA	450 mV	97%	LDU4860S600-WD
40.0 W	7 - 60 V	2 - 57 V	700 mA	500 mV	97%	LDU4860S700-WD
48.0 W	7 - 60 V	2 - 48 V	1000 mA	800 mV	97%	LDU4860S1000-WD

## Mechanical Details

### LDU48 - 24 Pin DIL



### LDU48 - Wired Versions



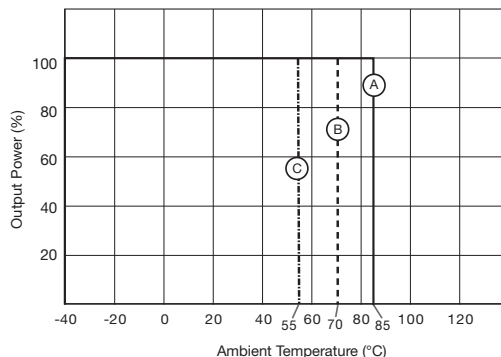
LDU48 Connections			
LDU48	LDU48-W	LDU48-WD	Function
2 & 3	1 (Black)	1 (Black)	-Vin: -DC supply
4	No Wire	15 (White)	Control
9 & 11	12 (Blue)	12 (Blue)	-Vout: LED cathode connection
14 & 16	13 (Yellow)	13 (Yellow)	+Vout: LED anode connection
22 & 23	24 (Red)	24 (Red)	+Vin: +DC supply

### Notes

- All dimensions are in inches (mm)
- Weight: LDU48 - 0.04 lbs (17.7 g) approx.  
LDU48 (wired version) - 0.04 lbs (18.0 g) approx.
- Pin diameter: 0.02±0.002 (0.5±0.05)
- Pin pitch tolerance: ±0.014 (±0.35)
- Case tolerance: ±0.02 (±0.5)

Note: Do not connect pins 1 & 2 (-Vin) to pins 9 & 11 (-Vout)

## Derating Curve for LDU48



### LDU48 Models

- Ⓐ 150 mA, 250 mA, 300 mA, 350 mA
- Ⓑ 500 mA, 600 mA, 700 mA
- Ⓒ 1000 mA

### Notes

For LDU08 & LDU24 please see Operating Temperature Spec.

**Output Current Adjustment by Variable Resistor**

By connecting a variable resistor between control and GND, simple dimming can be achieved. Capacitor is optional for HF noise rejection. Recommended value is 0.22  $\mu$ F.



The output current can be determined using the equation:

For LDU08-24  $I_{out} = \frac{I_{out\ nom} \times R}{(R + 200\ k)}$  For LDU48  $I_{out} = \frac{I_{out\ nom} \times R}{(R + 50\ k)}$

Where the value of R is between 0 and 2 M $\Omega$ , the maximum adjustment range of output current is 25% to 90% (For Vin-Vout, LDU08 & 24: <20 VDC, LDU48: <30 VDC)

**Output Current Adjustment by DC Voltage**

Control Voltage Range: 0.3 V to 1.25 VDC



The output current is given by:

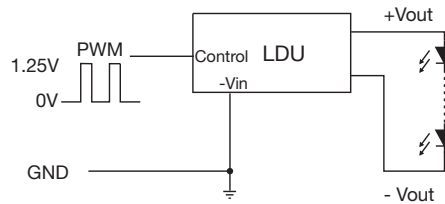
$$I_{out} = \frac{I_{out\ nom} \times Control}{1.25}$$

**Output Current Adjustment by PWM**

**Directly driving control input**

A Pulse Width Modulated (PWM) signal with duty cycle DPWM can be applied to the control pin, as shown:

$$I_{out} = I_{out\ nom} \times D_{pwm} \text{ (} D_{pwm} = \text{PWM duty cycle)}$$



**Input Filter to meet Class B Conducted Emissions**



	LDU08	LDU24	LDU48
C1	10 $\mu$ F	10 $\mu$ F	4.7 $\mu$ F
C2	Not Fitted	Not Fitted	4.7 $\mu$ F
C3	47 $\mu$ F	47 $\mu$ F	Not Fitted
L1	68 $\mu$ H	68 $\mu$ H	47 $\mu$ H

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