

# 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	<ul style="list-style-type: none"> <li>• LDU08 &amp; 24: 7-30 VDC</li> <li>• LDU48: 7-60 VDC</li> </ul>
Input Filter	<ul style="list-style-type: none"> <li>• Capacitor</li> </ul>
Input Surge	<ul style="list-style-type: none"> <li>• LDU08 &amp; 24: 40 VDC for 0.5 s</li> <li>• LDU48: 65 VDC for 0.5 s</li> </ul>

### Output

Output Voltage	<ul style="list-style-type: none"> <li>• See tables (<math>V_{in}</math> must be at least 2 V greater than <math>V_{out}</math>)</li> </ul>
Output Current	<ul style="list-style-type: none"> <li>• See tables</li> </ul>
Output Current Trim	<ul style="list-style-type: none"> <li>• 25-100%</li> </ul>
Output Current Accuracy	<ul style="list-style-type: none"> <li>• LDU08: <math>\pm 6.0\%</math> max</li> <li>• LDU24: <math>\pm 8.0\%</math> max</li> <li>• LDU48: <math>\pm 8.0\%</math> max</li> </ul>
Ripple & Noise	<ul style="list-style-type: none"> <li>• LDU08: 200 mV pk-pk max</li> <li>• LDU24: 250 mV pk-pk max (except 1000 mA units: 300 mV pk-pk max)</li> <li>• LDU48: See tables measured with 20 MHz bandwidth</li> </ul>
Short Circuit Protection	<ul style="list-style-type: none"> <li>• Current is limited to the rated output</li> </ul>
Temperature Coefficient	<ul style="list-style-type: none"> <li>• LDU08: <math>\pm 0.03\%/^{\circ}\text{C}</math> max</li> <li>• LDU24: <math>\pm 0.08\%/^{\circ}\text{C}</math> max</li> <li>• LDU48: <math>\pm 0.03\%/^{\circ}\text{C}</math> max</li> </ul>
Remote On/Off	<ul style="list-style-type: none"> <li>• On = 0.3-1.25 V or open circuit</li> <li>• Off = <math>\leq 0.15</math> V (applied to control pin)</li> <li>• LDU08 &amp; 24: Quiescent input current is 25 <math>\mu\text{A}</math> max,</li> <li>• LDU48: Quiescent input current is 100 <math>\mu\text{A}</math> max</li> </ul>
Remote On/Off Signal Current	<ul style="list-style-type: none"> <li>• 1 mA max</li> </ul>

### Dimming

<b>PWM</b>	
Output Current Range	<ul style="list-style-type: none"> <li>• 25% to 100%</li> </ul>
Operating Frequency	<ul style="list-style-type: none"> <li>• 1 kHz max</li> </ul>
On Time	<ul style="list-style-type: none"> <li>• 200 ns min</li> </ul>
Off Time	<ul style="list-style-type: none"> <li>• 200 ns min</li> </ul>
Amplitude	<ul style="list-style-type: none"> <li>• 1.25 V max</li> </ul>

### DC Voltage Control

Output Current Range	<ul style="list-style-type: none"> <li>• 25% to 100%</li> </ul>
Control Input	<ul style="list-style-type: none"> <li>• 0.3 to 1.25 V max</li> </ul>

### Variable Resistor

Output Current Range	<ul style="list-style-type: none"> <li>• 25% to 100%</li> </ul>
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### General

Efficiency	<ul style="list-style-type: none"> <li>• See tables</li> </ul>
Switching Frequency	<ul style="list-style-type: none"> <li>• LDU08: 40-380 kHz variable</li> <li>• LDU24: 50-330 kHz variable</li> <li>• LDU48: 20-500 kHz variable</li> </ul>
MTBF	<ul style="list-style-type: none"> <li>• LDU08: &gt;1.6 Mhrs</li> <li>• LDU24: &gt;1.6 Mhrs</li> <li>• LDU48: &gt;950 KHrs to MIL-HDBK-217F at 25 <math>^{\circ}\text{C}</math>, GB</li> </ul>

### Environmental

Operating Temperature	<ul style="list-style-type: none"> <li>• LDU08: <math>-40^{\circ}\text{C}</math> to <math>+85^{\circ}\text{C}</math>,</li> <li>• LDU24: <math>-40^{\circ}\text{C}</math> to <math>+85^{\circ}\text{C}</math>,</li> <li>• LDU24 1000 mA unit: <math>-40^{\circ}\text{C}</math> to <math>+70^{\circ}\text{C}</math>,</li> <li>• LDU48: See derating curves</li> </ul>
Case Temperature	<ul style="list-style-type: none"> <li>• LDU08 &amp; 24: <math>+100^{\circ}\text{C}</math> max</li> <li>• LDU48: <math>+110^{\circ}\text{C}</math> max</li> </ul>
Storage Temperature	<ul style="list-style-type: none"> <li>• <math>-40^{\circ}\text{C}</math> to <math>+125^{\circ}\text{C}</math></li> </ul>
Humidity	<ul style="list-style-type: none"> <li>• Up to 95%, non-condensing</li> </ul>
Thermal Impedance	<ul style="list-style-type: none"> <li>• 35-50 <math>^{\circ}\text{C}/\text{W}</math> model dependant</li> </ul>
Ingress Protection Rating	<ul style="list-style-type: none"> <li>• IP67 (wired versions)</li> </ul>

### EMC

Emissions	<ul style="list-style-type: none"> <li>• EN55022 class B conducted &amp; radiated with external components - see application notes</li> </ul>
ESD Immunity	<ul style="list-style-type: none"> <li>• EN61000-4-2, level 2 Perf Criteria A</li> </ul>
Radiated Immunity	<ul style="list-style-type: none"> <li>• EN61000-4-3, level 2 Perf Criteria A</li> </ul>
EFT/Burst	<ul style="list-style-type: none"> <li>• EN61000-4-4, level 2 Perf Criteria A</li> </ul>
Surge	<ul style="list-style-type: none"> <li>• EN61000-4-5, level 2 Perf Criteria A</li> </ul>
Conducted Immunity	<ul style="list-style-type: none"> <li>• EN61000-4-6, level 2 Perf Criteria A</li> </ul>

**Models and Ratings**

**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**

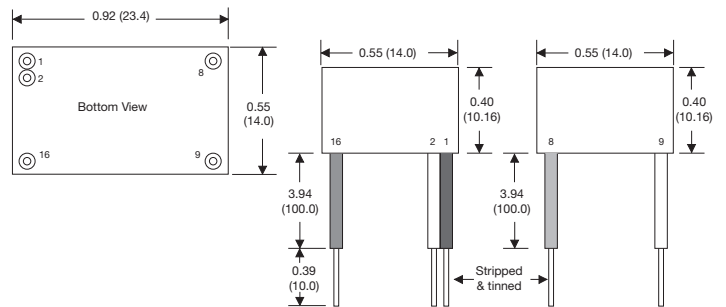
Output Power	Input Voltage Range	Output Voltage	Output Current	Efficiency	Model Number
8.0 W	7 - 30 V	2 - 28 V	350 mA	95%	LDU0830S350-WD
14.0 W	7 - 30 V	2 - 28 V	500 mA	95%	LDU2430S500-WD
20.0 W	7 - 30 V	2 - 28 V	700 mA	95%	LDU2430S700-WD
24.0 W	7 - 30 V	2 - 28 V	1000 mA	95%	LDU2430S1000-WD

**Mechanical Details**

**LDU08: 14 Pin DIL**



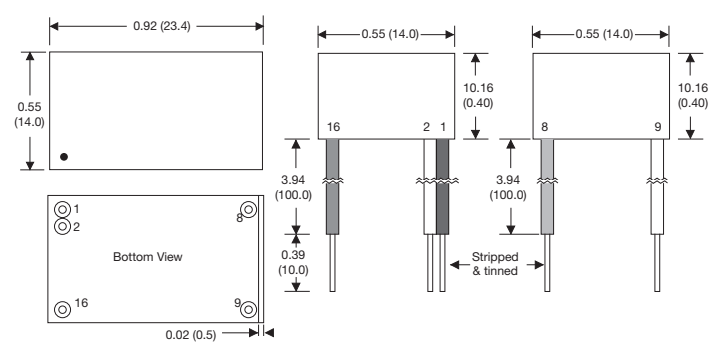
**LDU08 - Wired Versions**



**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)

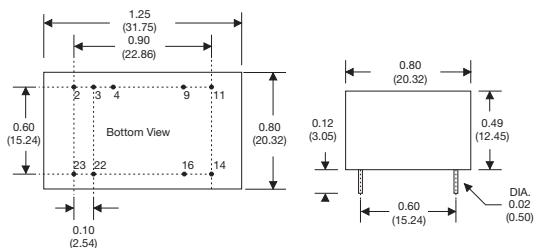
Output Power	Input Voltage Range	Output Voltage	Output Current	Ripple & Noise (pk-pk)	Efficiency	Model Number
9.0 W	7 - 60 V	2 - 57 V	150 mA	150 mV	97%	LDU4860S150-W
14.0 W	7 - 60 V	2 - 57 V	250 mA	200 mV	97%	LDU4860S250-W
17.0 W	7 - 60 V	2 - 57 V	300 mA	250 mV	97%	LDU4860S300-W
20.0 W	7 - 60 V	2 - 57 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

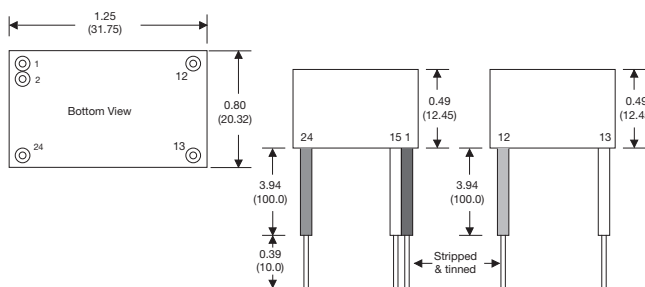
Output Power	Input Voltage Range	Output Voltage	Output Current	Ripple & Noise (pk-pk)	Efficiency	Model Number
9.0 W	7 - 60 V	2 - 57 V	150 mA	150 mV	97%	LDU4860S150-WD
14.0 W	7 - 60 V	2 - 57 V	250 mA	200 mV	97%	LDU4860S250-WD
17.0 W	7 - 60 V	2 - 57 V	300 mA	250 mV	97%	LDU4860S300-WD
20.0 W	7 - 60 V	2 - 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



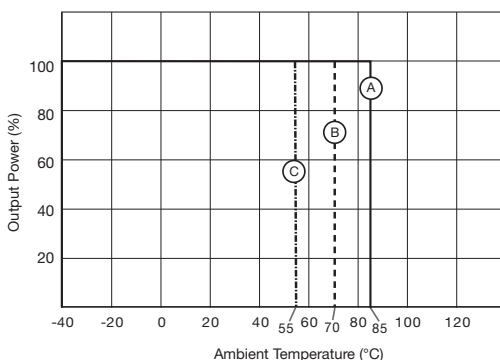
LDU48 Connections			
LDU48	LDU48-W	LDU48-WD	Function
2 & 3	1 (Black)	1 (Black)	-Vin: -DC supply
4	No Wire	15 (White)	Control
9 & 11	12 (Blue)	12 (Blue)	-Vout: LED cathode connection
14 & 16	13 (Yellow)	13 (Yellow)	+Vout: LED anode connection
22 & 23	24 (Red)	24 (Red)	+Vin: +DC supply

### 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

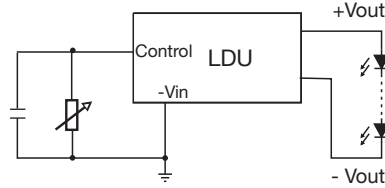
- Ⓐ 150 mA, 250 mA, 300 mA, 350 mA
- Ⓑ 500 mA, 600 mA, 700 mA
- Ⓒ 1000 mA

### 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 μF.



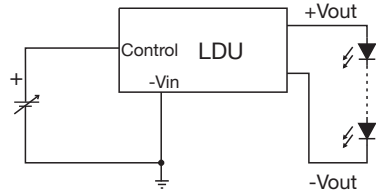
The output current can be determined using the equation:

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 MΩ, 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 μF	10 μF	4.7 μF
C2	Not Fitted	Not Fitted	4.7 μF
C3	47 μF	47 μF	Not Fitted
L1	68 μH	68 μH	47 μH



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