

# 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</li> <li>(<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</li> <li>• (except 1000 mA units: 300 mV pk-pk max)</li> <li>• LDU48: See tables</li> <li>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</li> <li>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)

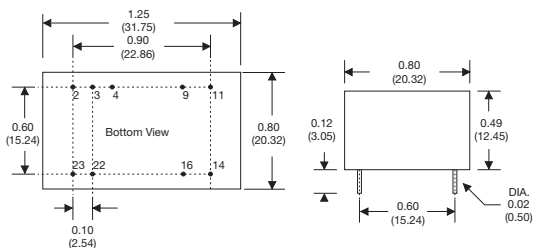
Output Power	Input Voltage Range	Output Voltage	Output Current	Ripple & Noise (pk-pk)	Efficiency	Model Number
9.0 W	7 - 60 V	2 - 57 V	150 mA	150 mV	97%	LDU4860S150-W
14.0 W	7 - 60 V	2 - 57 V	250 mA	200 mV	97%	LDU4860S250-W
17.0 W	7 - 60 V	2 - 57 V	300 mA	250 mV	97%	LDU4860S300-W
20.0 W	7 - 60 V	2 - 57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

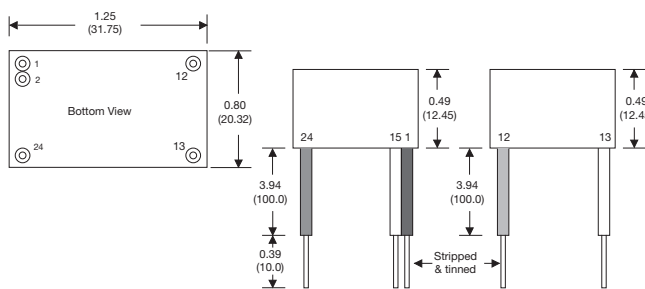
Output Power	Input Voltage Range	Output Voltage	Output Current	Ripple & Noise (pk-pk)	Efficiency	Model Number
9.0 W	7 - 60 V	2 - 57 V	150 mA	150 mV	97%	LDU4860S150-WD
14.0 W	7 - 60 V	2 - 57 V	250 mA	200 mV	97%	LDU4860S250-WD
17.0 W	7 - 60 V	2 - 57 V	300 mA	250 mV	97%	LDU4860S300-WD
20.0 W	7 - 60 V	2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

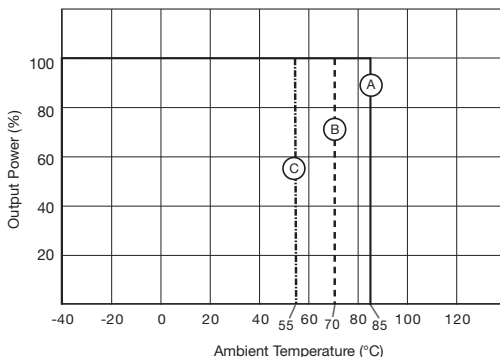


LDU48 Connections			
LDU48	LDU48-W	LDU48-WD	Function
2 & 3	1 (Black)	1 (Black)	-Vin: -DC supply
4	No Wire	15 (White)	Control
9 & 11	12 (Blue)	12 (Blue)	-Vout: LED cathode connection
14 & 16	13 (Yellow)	13 (Yellow)	+Vout: LED anode connection
22 & 23	24 (Red)	24 (Red)	+Vin: +DC supply

### 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)

## Derating Curve for LDU48



### LDU48 Models

- (A) 150 mA, 250 mA, 300 mA, 350 mA
- (B) 500 mA, 600 mA, 700 mA
- (C) 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:

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

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:

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

**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:

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



**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