

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 = ≤ 0.15 V (applied to control pin) LDU08 & 24: Quiescent input current is 25 μA max, LDU48: Quiescent input current is 100 μA max |
| Remote On/Off Signal Current | • 1 mA max |

Dimming

| | |
|----------------------|---------------|
| PWM | |
| 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% |
|----------------------|---------------|

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°C to $+85^{\circ}\text{C}$, LDU24: -40°C to $+85^{\circ}\text{C}$, LDU24 1000 mA unit: -40°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°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

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

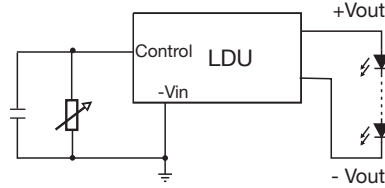
- (A) 150 mA, 250 mA, 300 mA, 350 mA
- (B) 500 mA, 600 mA, 700 mA
- (C) 1000 mA

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 μF.



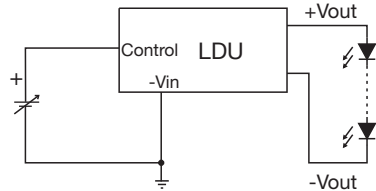
The output current can be determined using the equation:

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:

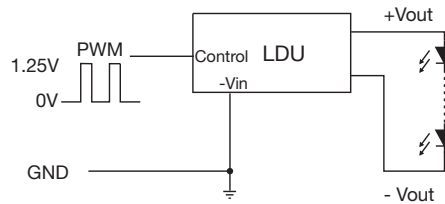
$$I_{out} = \frac{I_{out\ nom} \times Control}{1.25}$$

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 |