

Features

Regulated Converters

Rev.2

- Constant Current Output
- Power LED Driver
- Wide Input Voltage Range
- PWM/Digital Dimming and Analogue Voltage Dimming
- Short Circuit Protected
- 96% Efficiency

Description

The RCD series is a step-down constant current source designed for driving high power white LEDs. Standard output currents available are 300mA, 350mA, 500mA, 600mA and 700mA to make this driver compatible with a wide range of LEDs from many different manufacturers without the need for any external components. Despite its compact size, the RCD series is fully featured with very high efficiency, wide input voltage range, high ambient operating temperature and two means of LED dimming: PWM/digital control and analogue voltage dimming. Both dimming controls are independent and can be combined. The driver is also designed to be as reliable as the LEDs it is driving, even at the full operating temperature of 85°C. A wired version is also available.

Selection Guide

| Part Number | Input Range (VDC) | Output Current (mA) | Output Voltage (V) | Dimming Control | Mounting Style |
|---------------|-------------------|---------------------|--------------------|--------------------|----------------|
| RCD-24-0.30 | 4.5-36V | 0-300 | 2-32 | Digital + Analogue | PCB |
| RCD-24-0.35 | 4.5-36V | 0-350 | 2-32 | Digital + Analogue | PCB |
| RCD-24-0.50 | 4.5-36V | 0-500 | 2-32 | Digital + Analogue | PCB |
| RCD-24-0.60 | 4.5-36V | 0-600 | 2-32 | Digital + Analogue | PCB |
| RCD-24-0.70 | 4.5-36V | 0-700 | 2-32 | Digital + Analogue | PCB |
| RCD-24-0.30/W | 4.5-36V | 300 | 2-32 | none | Wired |
| RCD-24-0.35/W | 4.5-36V | 350 | 2-32 | none | Wired |
| RCD-24-0.50/W | 4.5-36V | 500 | 2-32 | none | Wired |
| RCD-24-0.60/W | 4.5-36V | 600 | 2-32 | none | Wired |
| RCD-24-0.70/W | 4.5-36V | 700 | 2-32 | none | Wired |

Specifications

(typical at 25°C, nominal input voltage, rated output current unless otherwise specified)

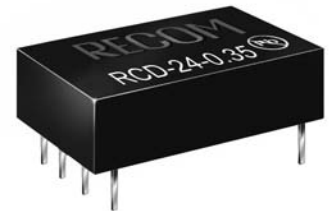
| | | |
|---|---|--------------------|
| Input Voltage (absolute maximum) | 36VDC max. | |
| Recommended Input Voltage | 5V min. / 24V typ. / 36VDC max. | |
| Input Filter | Capacitor | |
| Output Voltage Range | V _{in} =36V | 2V min. / 32V max. |
| Output Current Range | V _{in} - V _{out} >1.5~4V | 300mA-700mA |
| Output Current Accuracy | 300mA-700mA | ±2% typ. |
| Internal Power Dissipation | Load of 5 LEDs | 700mW |
| Output Current Stability | V _{in} =36V, V _{out} =2~32V | ±1% max |
| Output Ripple and Noise (20MHz limited) | V _{in} =36V, V _{out} =2~32V | 120mVp-p max |
| Temperature Coefficient | -40~+85°C ambient | ±0.015%/°C max. |
| Maximum Capacitive Load | 100µF | |
| Operating Frequency | 210 kHz min/ 260kHz typ./ 300kHz max | |
| Efficiency at Full Load | 97% max. | |
| Short Circuit Protection | Regulated at rated output current | |
| Operating Temperature Range (free air convection) | 300mA/350mA | -40°C to +85°C |
| | 500mA | -40°C to +80°C |
| | 600mA | -40°C to +75°C |
| | 700mA | -40°C to +71°C |
| Storage Temperature Range | -55°C to +125°C | |
| Maximum Case Temperature | 100°C | |
| Thermal Impedance | Natural Convection | 55°C/Watt |

continued on next page

INNOLINE
DC/DC-Converter

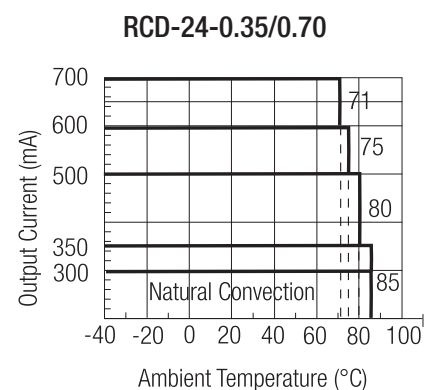
RCD-24 Series

Constant Current Single Output



RECOM

Derating Graph (Ambient Temperature)



Specifications -Continued

| | | |
|------------------------|------------------------------|--|
| Case Material | Non Conductive Black Plastic | |
| Potting Material | Epoxy (UL94-V0) | |
| Dimensions | 22.1 x 12.6 x 8.5mm | |
| Weight | 4.5g | |
| Wave Soldering Profile | Max. 265°C/10 sec. | |

PWM Dimming and ON/OFF Control (Leave open if not used)

| | | |
|---|----------------------------|---------------------------|
| Remote ON/OFF | DC/DC ON | Open or $0V < V_r < 0.6V$ |
| | DC/DC OFF (Standby) | $0.6 < V_r < 2.9V$ |
| | DC/DC OFF (Shutdown) | $2.9V < V_r < 6V$ |
| Remote Pin Drive Current | $V_r = 5V$ | 1mA max. |
| Quiescent Input Current in Shutdown Mode | $V_{in} = 36V, V_r > 2.9V$ | 200µA max. |
| Maximum PWM Frequency for Linear Operation (measured 10%~90% Dimming) | 200Hz | |

Analogue Dimming Control (leave open if not used)

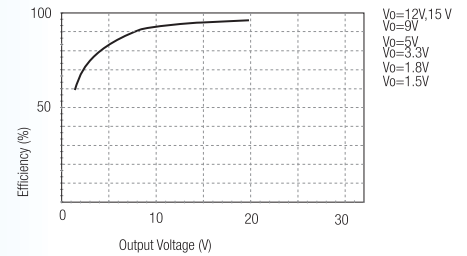
| | | |
|--|------------|------------------|
| Input Voltage Range | 0 - 15V | |
| Control Voltage Range Limits (see Graph) | Full On | $0.13V \pm 50mV$ |
| | Full Off | $4.5V \pm 50mV$ |
| Analogue Pin Drive Current | $V_c = 5V$ | 0.2mA max. |

Environmental

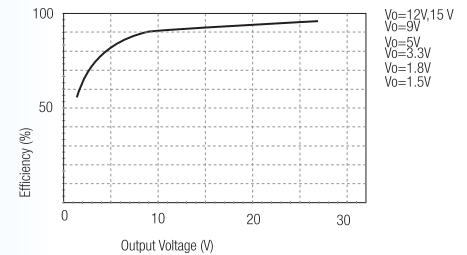
| | | | |
|--|------------------------------|-----------------------------|---------|
| Relative Humidity | 5% to 95% RH, non-condensing | | |
| Conducted Emissions | (all series, see note) | EN55022 | Class B |
| Radiated Emissions | (all series except 700mA) | EN55022 | Class B |
| ESD | (all series) | EN61000-4-2 | Class A |
| Radiated Immunity | (all series) | EN61000-4-3 | Class A |
| Fast Transient | (all series) | EN61000-4-4 | Class A |
| Conducted Immunity | (all series) | EN61000-4-6 | Class A |
| MTBF (RCD-24-0.70, Nominal V_{in} , Full Load) | +25°C | 605 x 10 ³ hours | |
| | +71°C | 516 x 10 ³ hours | |

Note: Requires an input filter to meet EN55022 ClassB conducted emissions, see below.

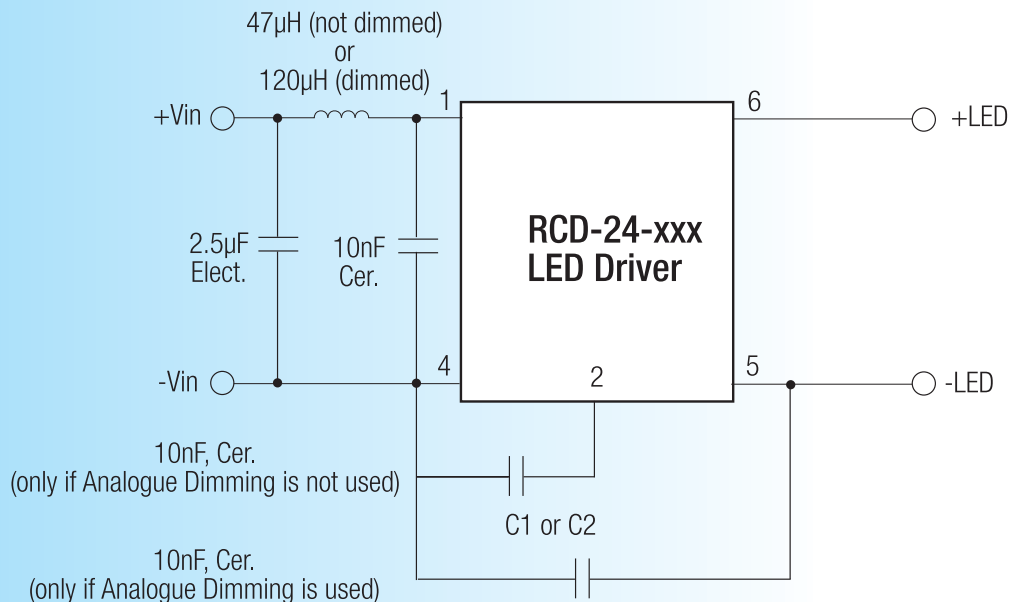
V_{in} = 24V, I_{out} = 300-700mA



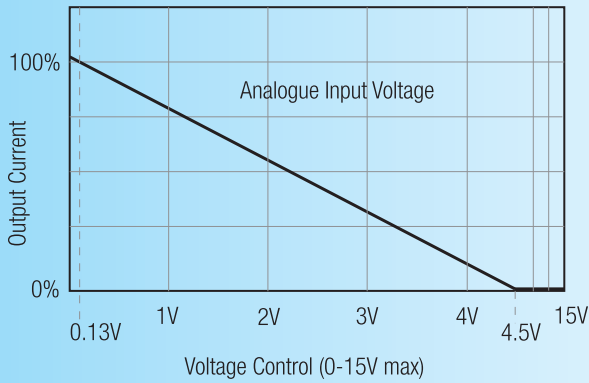
V_{in} = 32V, I_{out} = 300-700mA



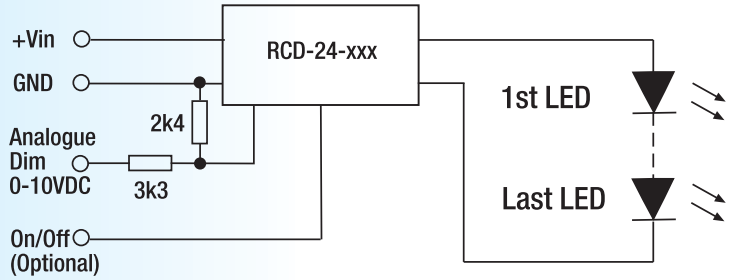
Class B Filter Suggestion



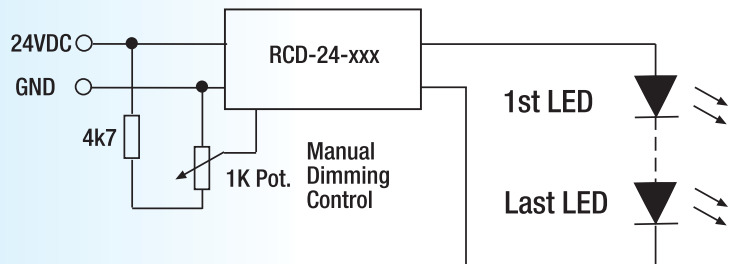
Analogue Dimming Control and Application Circuit Examples



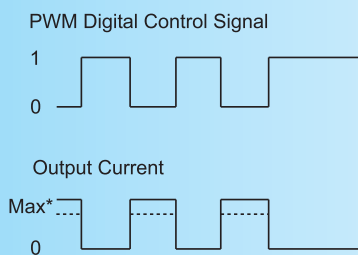
LED DRIVER with 0-10V Interface



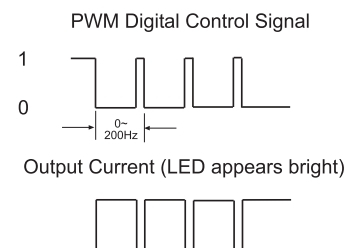
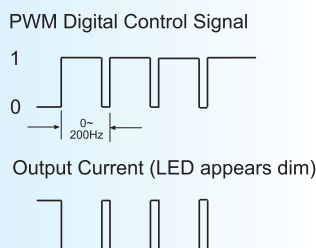
LED DIMMER for up to 7 white LEDs



Digital Dimming Control

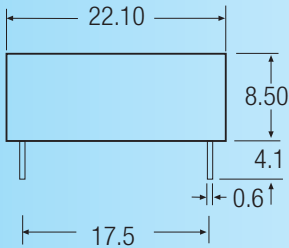


* Max output current can also be set using Analogue input

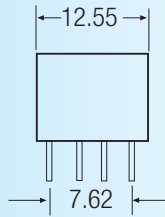


Package Style and Pinning

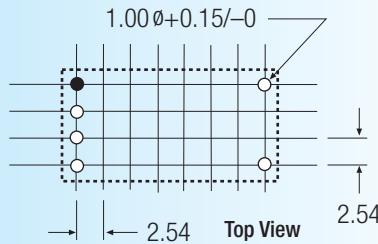
PCB Mounting Style



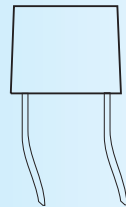
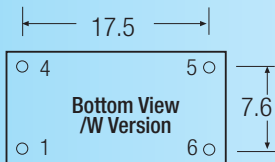
Leave 1 mm space around case on pcb



Recommended Footprint Details



Wired Style



| Pin # | Out | Comments |
|-------|------------------|-------------------------|
| 1 | +Vin | DC Supply |
| 2 | Analogue Dimming | Leave open if not used |
| 3 | PWM/ON/OFF | Leave open if not used |
| 4 | GND | Do not connect to -Vout |
| 5 | -Vout | LED Cathode Connection |
| 6 | +Vout | LED Anode Connection |

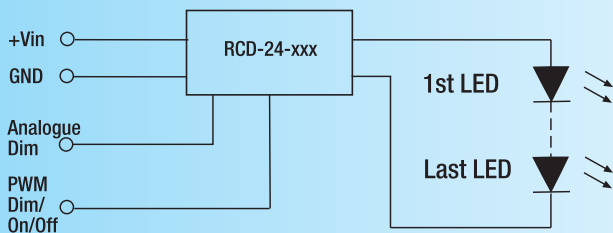
XX.X ± 0.5 mm
XX.XX ± 0.25 mm
Pin Tolerance ± 0.1 mm

| Wire # | Out | Comments |
|------------|-------|-------------------------|
| 1 (Red) | +Vin | DC Supply |
| 4 (Black) | GND | Do not connect to -Vout |
| 5 (Brown) | -Vout | LED Cathode Connection |
| 6 (Yellow) | +Vout | LED Anode Connection |

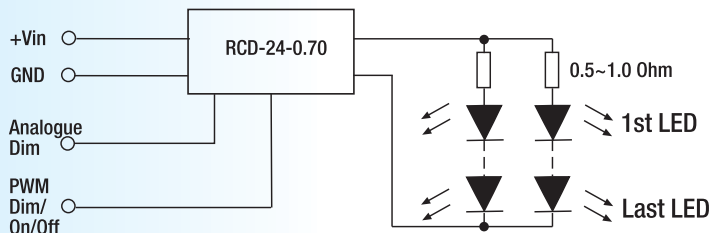
Wire length = 100mm + 10mm stripped & tinned = 110mm total
Wire outside diameter = 1.6mm
Wire core diameter = 0.75mm
Wire is UL/CSA listed/ 22AWG / 300V Rated

Standard Application Circuits

LED DRIVER



MULTIPLE LED DRIVER (up to 20 LEDs)



Driving Two Strings of 350mA LEDs with one 700mA Driver.