

Features

Regulated Converters

Rev.4

- 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 350mA, 500mA, 700mA, 1000mA and 1200mA 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 up to 85°C. A wired version is also available (W option).

Selection Guide

Part Number	Input Range (VDC)	Output Current (mA)	Output Voltage (VDC)	Dimming Control	Mounting Style
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-24-0.70	4.5-36V	0-700	2-32	Digital + Analogue	PCB
RCD-24-1.00	5-36V	0-1000	2-30	Digital + Analogue	PCB
RCD-24-1.20	5-36V	0-1200	2-30	Digital + Analogue	PCB
RCD-24-0.35/W	4.5-36V	0-350	2-32	none	Wired
RCD-24-0.50/W	4.5-36V	0-500	2-32	none	Wired
RCD-24-0.70/W	4.5-36V	0-700	2-32	none	Wired
RCD-24-1.00/W	5-36V	0-1000	2-30	none	Wired
RCD-24-1.20/W	5-36V	0-1200	2-30	none	Wired

Other output currents available on request. Please contact Recom Technical Support.

Specifications (typical at 25°C, nominal input voltage, unless otherwise specified)

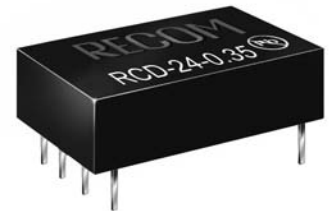
Input Voltage (absolute maximum)	36VDC max.	
Recommended Input Voltage	5V min. / 24V typ. / 36VDC max.	
Input Filter	Capacitor	
Output Voltage Range	V _{in} =36V	2V min. / 32V max.
Output Current Range	V _{in} - V _{out} >1.5~4V	300mA-1200mA
Output Current Accuracy	350mA-1000mA	±2% typ.
	1200mA	±3% typ.
Internal Power Dissipation	Load of 5 LEDs	800mW max.
Output Current Stability	V _{in} =36V, Load=1-9 LEDs	±1% max.
Output Ripple and Noise (20MHz limited)	350mA-1000mA	120mVp-p max.
V _{in} =36V, Load=1-9 LEDs	1200mA	200mVp-p max.
Temperature Coefficient	-40~+85°C ambient	±0.015%/°C max.
Maximum Capacitive Load	100µF	
Operating Frequency	350mA-700mA	210 kHz min./ 260kHz typ./ 300kHz max.
	1000mA - 1200mA	350 kHz min./ 450kHz typ./ 550kHz max.
Efficiency at Full Load	96% max.	
Short Circuit Protection	Regulated at rated output current	
Operating Temperature Range (free air convection)	350mA	-40°C to +85°C
	500mA	-40°C to +80°C
	700mA - 1000mA	-40°C to +71°C
	1200mA	-40°C to +65°C
Storage Temperature Range	-55°C to +125°C	
Maximum Case Temperature	100°C	
Thermal Impedance	Natural Convection	55°C/Watt

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INNOLINE
DC/DC-Converter

RCD-24 Series

Constant Current Single Output

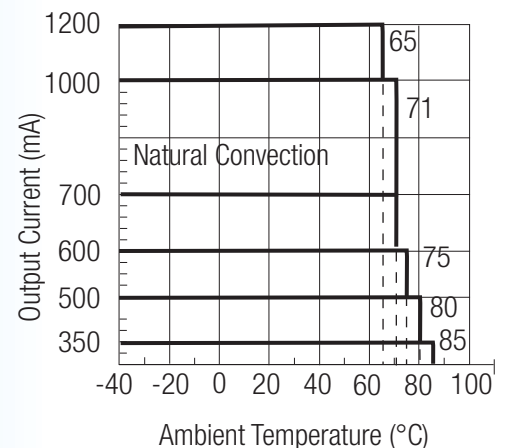


RECOM

Derating Graph

(Ambient Temperature)

RCD-24-0.35/1.20



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	350mA-700mA	Open or $0V < V_r < 0.6V$
Threshold Voltages	DC/DC OFF (Standby)	1000mA - 1200mA	Open or $0V < V_r < 0.8V$
		350mA-700mA	$0.6V < V_r < 2.9V$
	DC/DC OFF (Shutdown)	1000mA - 1200mA	$1.4V < V_r < 2.2V$
		350mA-700mA	$2.9V < V_r < 6V$
		1000mA - 1200mA	$2.2V < V_r < 15V$
Remote Pin Drive Current	$V_r = 5V$		1mA max.

Quiescent Input Current in Shutdown Mode	$V_{in} = 36V$	200µA max.
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Maximum PWM Frequency for Linear Operation (measured 10%~90% Dimming)	200Hz
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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

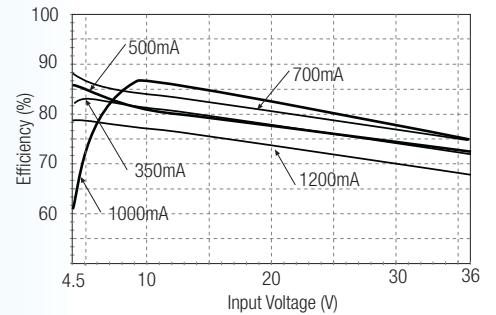
Relative Humidity	5% to 95% RH, non-condensing	
Conducted Emissions	(all series, see note) EN55022	Class B
Radiated Emissions	(all series) EN55022	Class B
ESD	(all series) EN61000-4-2	Class A
Radiated Immunity	(all series) EN61000-4-3	Class A
Fast Transient	(all series) EN61000-4-4	Class A
Conducted Immunity	(all series) EN61000-4-6	Class A

MTBF (RCD-24-0.70, Nominal V_{in} , Full Load)	+25°C	605×10^3 hours
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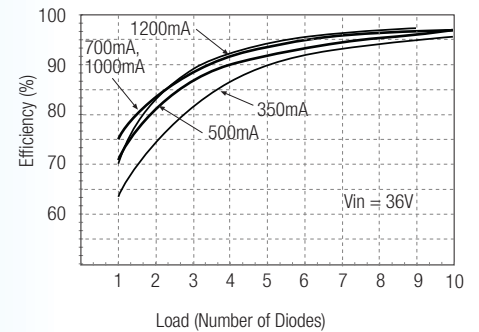
using MIL-HDBK 217F	+71°C	516×10^3 hours
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Note: Requires an input filter to meet EN55022 ClassB conducted emissions, see below.

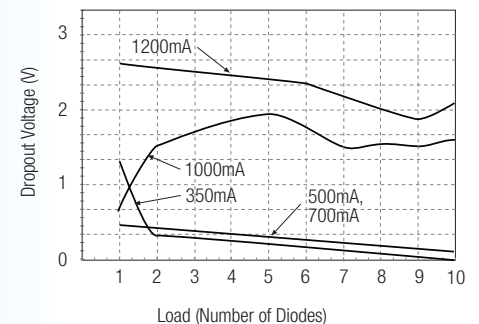
Efficiency/ V_{in}



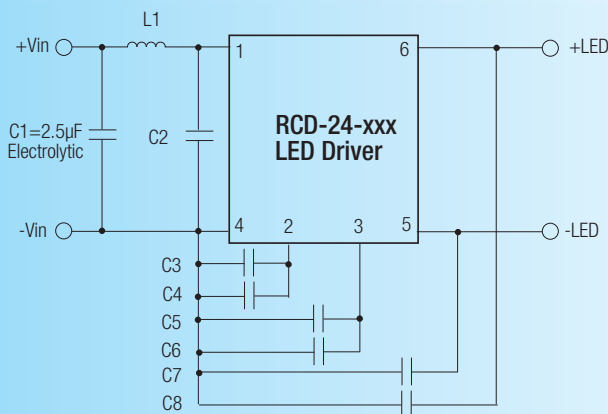
Efficiency/Load



Dropout Voltage/Load



Class B Filter Suggestion



Class B Filter Component Values

RCD-24-0.35 - RCD-24-0.7

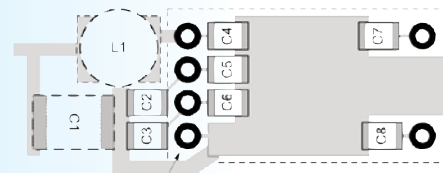
Analogue Dimming not used: $L1 = 47\mu H$, $C2/C3 = 10nF$, other caps not required.

Analogue Dimming used: $L1 = 120\mu H$, $C2/C7 = 10nF$, other caps not required.

RCD-24-1.0 - RCD-24-1.2

$L1 = 220\mu H$, $C3/C5 = 2.2nF$, $C4/C6/C7/C8 = 100nF$.

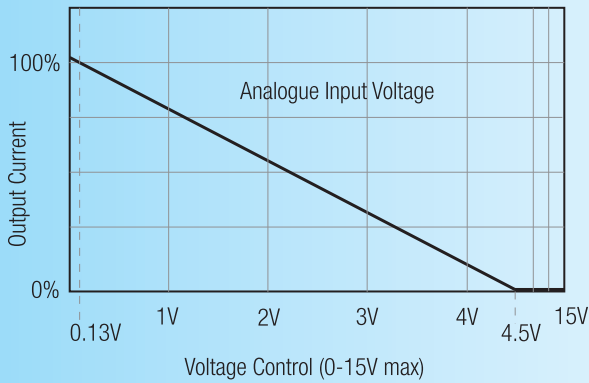
2.5µF Capacitor is electrolytic, all other capacitors are ceramic. For higher current versions, the PCB Layout is important, especially a ground plane underneath the converter (see below)



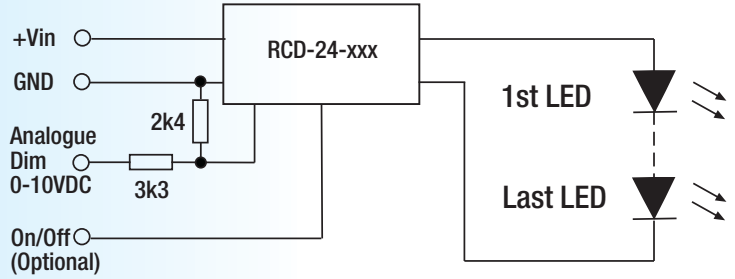
Pin 1

Bottom view

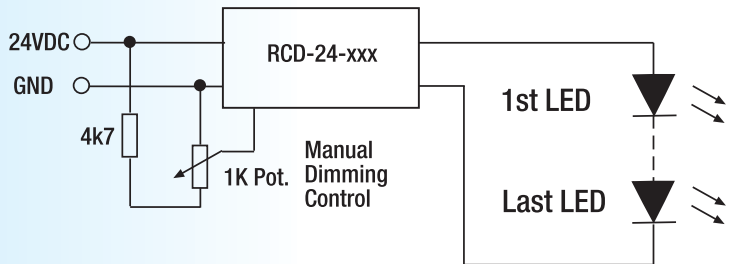
Analogue Dimming Control and Application Circuit Examples



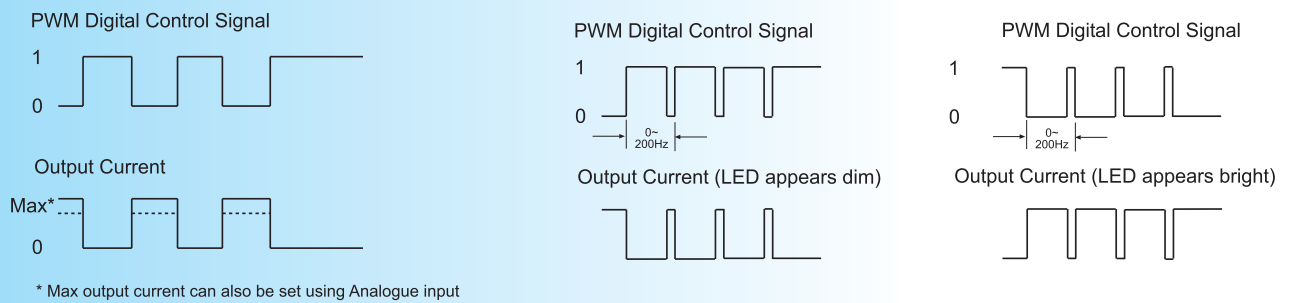
LED DRIVER with 0-10V Interface



LED DIMMER for up to 7 white LEDs

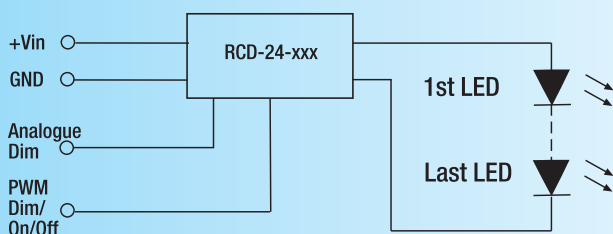


Digital Dimming Control

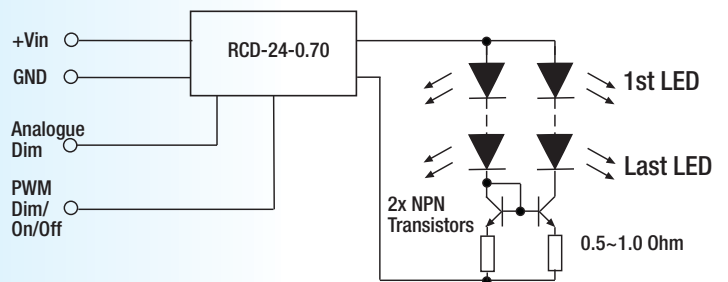


Standard Application Circuits

LED DRIVER



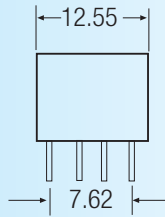
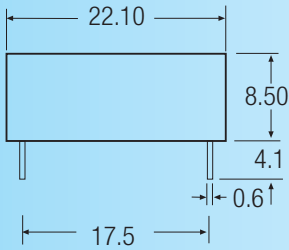
MULTIPLE LED DRIVER (up to 20 LEDs)



Driving Two Strings of 350mA LEDs with one 700mA Driver using a current mirror

Package Style and Pinning

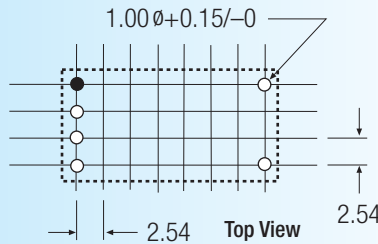
PCB Mounting Style



Leave at least 1 mm gap around case on pcb for adequate cooling



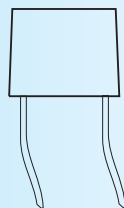
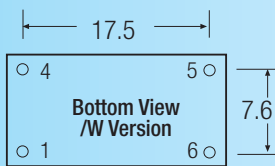
Recommended Footprint Details



Pin Connections		RCD-24 Series
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

Wired Mounting Style - Standard Option. For other options call Recom Technical Support



Wire Connections		RCD-24/W Series
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