Features

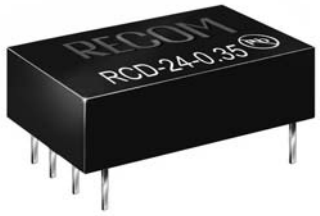
Regulated Converters

- Constant Current Output LED Driver
- Wide Input Voltage Range
- PWM/Digital Dimming and Analogue Voltage Dimming
- Short Circuit and Overtemp. Protected
- IP67 rated for /W Version
- 96% Efficiency

INNOLINE
DC/DC-Converter

RECOM

Constant Current Single Output



EN-60950-1 Certified
UL-60950-1 Pending

RCD-24

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, 700mA, 1A and 1.2A 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. A wired version is also available (/W Option) which has been tested to meet IP67.

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	2-34	Digital + Analogue	PCB or Wired
RCD-24-0.35**	4.5-36V	0-350	2-34	Digital + Analogue	PCB or Wired
RCD-24-0.50**	4.5-36V	0-500	2-34	Digital + Analogue	PCB or Wired
RCD-24-0.60**	4.5-36V	0-600	2-34	Digital + Analogue	PCB or Wired
RCD-24-0.70**	4.5-36V	0-700	2-34	Digital + Analogue	PCB or Wired
RCD-24-1.00**	4.5-36V	0-1000	2-34	Digital + Analogue	PCB or Wired
RCD-24-1.20**	4.5-36V	0-1200	2-34	Digital + Analogue	PCB or Wired

** Add suffix /W for wired version without dimming control (four wires)
** Add suffix /W/X1 for wired version with analogue dimming control (five wires)
** Add suffix /W/X2 for wired version with PWM dimming control (five wires)
** Add suffix /W/X3 for wired version with both analogue and PWM dimming controls (six wires)

Specifications

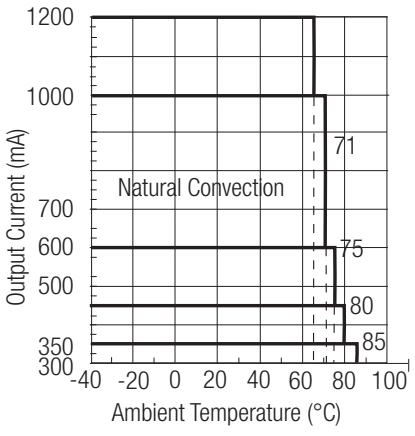
(typical at 25°C, nominal input voltage, rated output current unless otherwise specified)

Input Voltage (absolute maximum)		36VDC max
Recommended Input Voltage		5V min. / 24V typ. / 36VDC max
Input Filter		Capacitor
Output Voltage Range	Vin=36V	2V min. / 32V max
Output Current Range	Vin - Vout >1.3V	300mA-1200mA
Output Current Accuracy	300mA-1000mA 1200mA	±2% typ ±3% typ
Internal Power Dissipation	Worst case load of 5 LEDs	800mW max
Output Current Stability	Vin=36V, Vout =1-9 LEDs	±1% max
Output Ripple and Noise (20MHz limited) Vin=36V, Vout =1-9 LEDs	300mA-1000mA 1200mA	120mVp-p max 200mVp-p max
Temperature Coefficient	-40°C~+85°C ambient	±0.015%/°C max
Maximum Capacitive Load		100µF
Operating Frequency	<1A 1A, 1.2A	210kHz min/ 260kHz typ/ 300kHz max 350kHz 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)	300mA/350mA 500mA 600mA 700mA/1000mA 1200mA	-40°C to +85°C -40°C to +80°C -40°C to +75°C -40°C to +71°C -40°C to +65°C
Storage Temperature Range		-55°C to +125°C

continued on next page

Derating Graph

(Ambient Temperature)

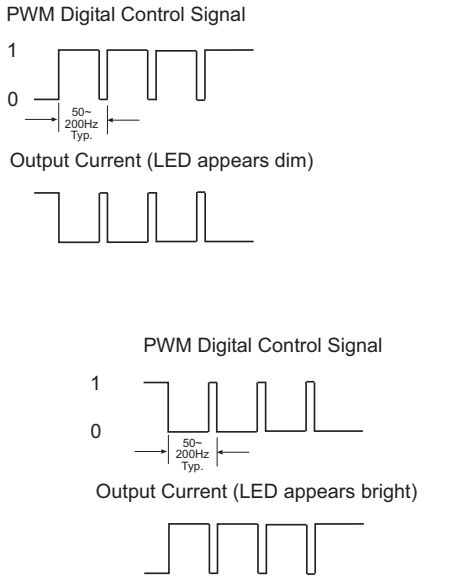


Specifications -Continued

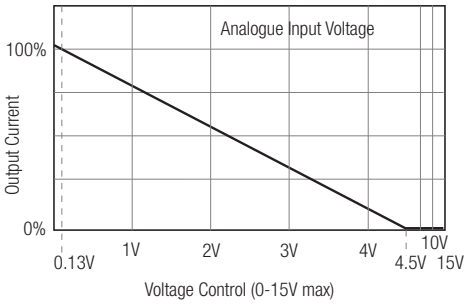
Maximum Case Temperature			100°C
Overtemperature Shutdown		Internal IC Temperature	150°C typ.
(Auto-restart after cool down)		Temperature Hysteresis	20°C typ.
Thermal Impedance		Natural Convection	55°C/Watt
Case Material			Non Conductive Black Plastic
Potting Material			Epoxy (UL94-V0)
Dimensions			22.1 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	300mA-700mA	Open or 0V<Vr<0.6V
Threshold Voltages		1000mA-1200mA	Open or 0V<Vr<0.8V
	DC/DC OFF (Standby)	300mA-700mA	0.6<Vr<2.9V
		1000mA-1200mA	1.4<Vr<2.2V
	DC/DC OFF (Shutdown)	300mA-700mA	2.9V<Vr<6V
		1000mA-1200mA	2.2V<Vr<15V
Remote Pin Drive Current		Vr=5V	1mA max
Quiescent Input Current in Shutdown Mode		Vin=36V	200µA max
Maximum PWM Frequency		For Linear Operation	20 -200Hz
(measured 10%~90% Dimming)		Maximum Frequency	2000Hz
Analogue Dimming Control (leave open if not used)			
Input Voltage Range			-0.3V - 15V
Control Voltage Range Limits		Full On	0.13V ± 50mV
(see Graph)		Full Off	4.5V ± 50mV
Analogue Pin Drive Current		Vc=5V	0.2mA max.
Environmental			
Relative Humidity			5% to 95% RH, non-condensing
/W Versions			IP67
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 Vin, Full Load)		+25°C	605 x 10³ hours
using MIL-HDBK 217F		+71°C	516 x 10³ hours

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

Digital Dimming

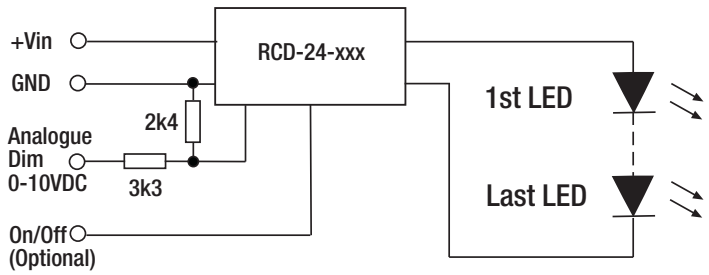


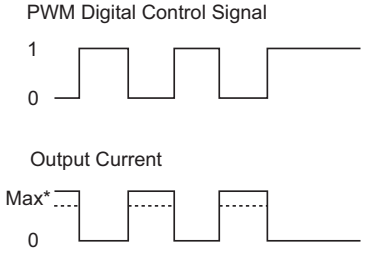
Analogue Dimming



Typical Application Circuit

LED DRIVER with 0-10V Interface

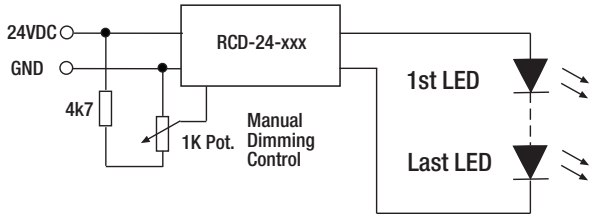




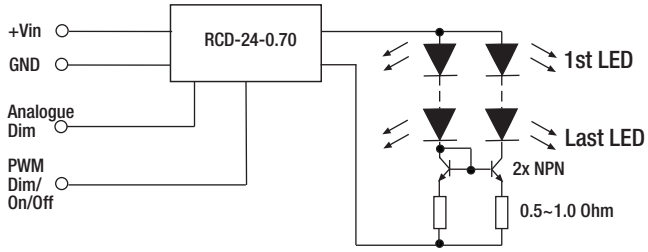
* Max output current can also be set using Analogue input

More Application Circuit Examples

LED DIMMER for up to 7 white LEDs



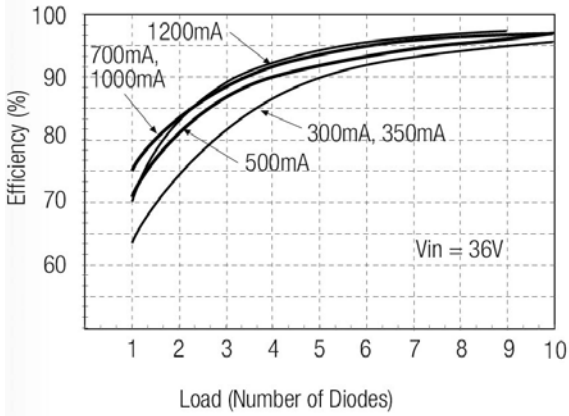
MULTIPLE LED DRIVER (up to 20 LEDS)



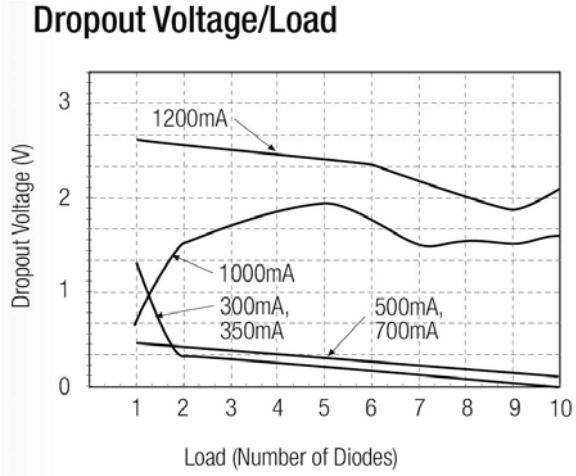
Driving Two Strings of 350mA LEDs with one 700mA Driver using a current mirror

Typical Characteristics

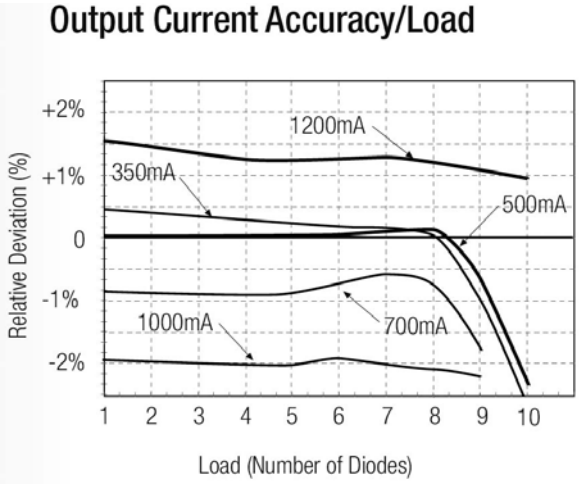
Efficiency/Load



Dropout Voltage/Load



Output Current Accuracy/Load



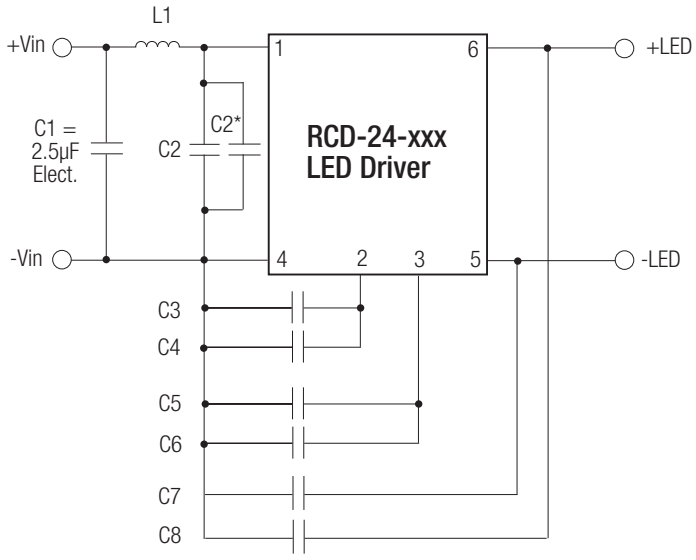
Class B Filter Suggestion

RCD-24-0.30 - RCD-24-0.70
No dimming or PWM dimming only:
L1 = 47µH
C2 = C3 = 10nF MLCC
Other caps not required

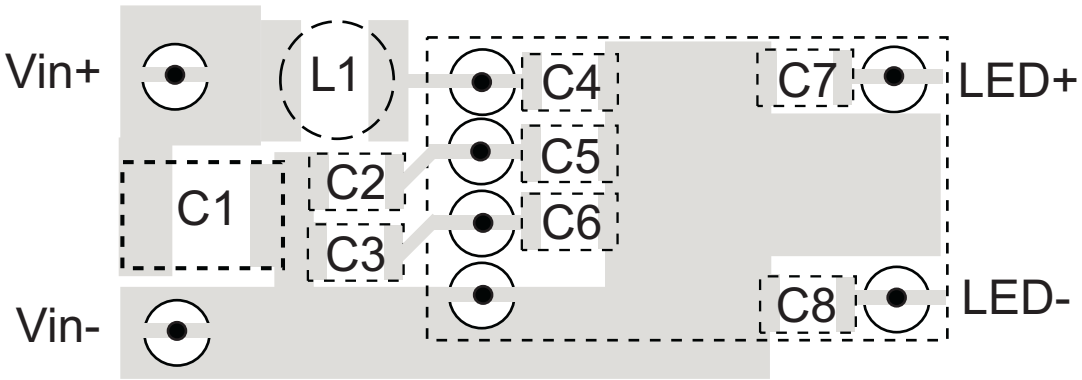
Analogue Dimming used:
L1 = 120µH
C2 = C7 = 10nF MLCC
Other caps not required

RCD-24-1.00 - RCD-24-1.20
L1 = 220µH
C2 = 10nF MLCC
C3 = C5 = 2.2nF MLCC
C4 = C6 = C7 = C8 = 100nF MLCC

C2* = optional 2µ2 MLCC required only if L1 starts to resonate with the back ripple current. Effect depends on L1 supplier and is not due to Recom.



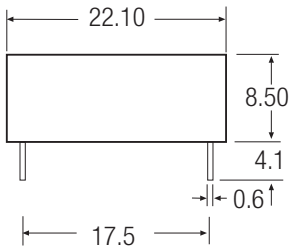
Recommended PCB Layout

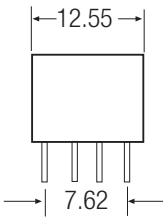


Top View

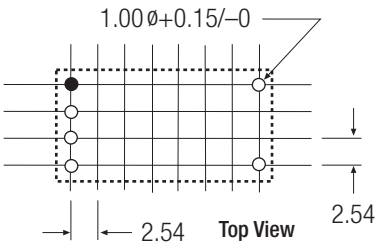
Package Style and Pinning

3rd angle projection





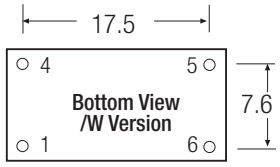
Leave 1 mm space arround case on PCB

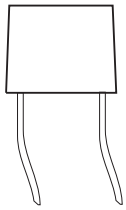


Recommended Footprint Details

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

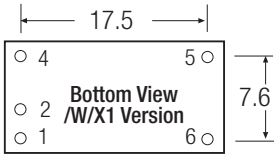
XX.X ± 0.5 mm
XX.XX ± 0.25 mm
Pin Tolerance ± 0.1 mm

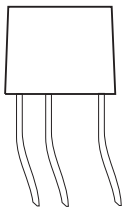


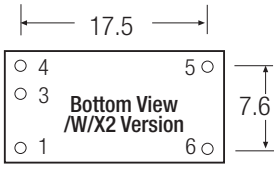


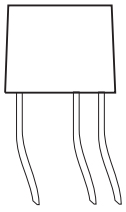
Wire Connections	RCD-24/W Series	
Wire #	**Function**	**Comments**
1 (Red)	+Vin	DC Supply
4 (Black)	GND	Do not connect to -Vout
5 (Brown)	-Vout	LED Cathode Connection
6 (Yellow)	+Vout	LED Anode Connection

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









Wire Connections	RCD-24/W/X Series	
Wire #	**Function**	**Comments**
2 (Green)	Ana Dimming	/X1 or /X3
3 (Blue)	PWM Dimming	/X2 or /X3

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