

Features

Regulated Converters

- SMD Constant Current LED Driver
- Built-in Class A or Class B EMC Filter
- Wide Input and Output Voltage Range
- Digital PWM and Analogue Voltage Dimming
- Short Circuit and Overtemperature Protected
- Low Cost
- EN/RAILWAYS Certified
- 5 Year Warranty

Description

The RCD-24-xxx/PL series is a step-down constant current source designed for driving high power LEDs. The converter uses a pinless SMD open frame design to reduce cost and size. Output currents available are 300mA, 350mA, 500mA, 600mA, 700mA and 1000mA with either Class A (Suffix /A) or Class B (suffix /B) built-in EMC filtering. Despite its compact size, the RCD-PL 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 ambient operating temperature and is designed for strip lighting, wall washers and fluorescent tube replacement designs, where a low profile and narrow width are demanded.

Selection Guide

Part Number	Input Range (VDC)	Output Current (mA)	Output Voltage (Vmin-Vmax)	Dimming Control	Mounting Style
RCD-24-0.30/PL*	4.5-36V	0-300	2-35	Digital + Analogue	Pinless SMD
RCD-24-0.35/PL*	4.5-36V	0-350	2-35	Digital + Analogue	Pinless SMD
RCD-24-0.50/PL*	4.5-36V	0-500	2-35	Digital + Analogue	Pinless SMD
RCD-24-0.60/PL*	4.5-36V	0-600	2-35	Digital + Analogue	Pinless SMD
RCD-24-0.70/PL*	4.5-36V	0-700	2-35	Digital + Analogue	Pinless SMD
RCD-24-1.00/PL/A	6-36V	0-1000	2-32	Digital + Analogue	Pinless SMD

* /A for EMC Class A input Filter

add -R for Tape and Reel Packaging

e.g. RCD-24-0.35/PL/B-R

* /B for EMC Class B input Filter

Note: RCD-24-1.00/PL/A only available with Class A Filter

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

Input Voltage (absolute maximum)	40VDC max	
Recommended Input Voltage	6V min. / 24V typ. / 36VDC max	
Input Filter	Suffix /A	Capacitor
	Suffix /B	Class B with Pi Filter
	RCD-24-1.00/PL/A	Class A with Pi Filter
Output Current Accuracy (Vin=24V)	300-700mA	±2% typ, ±3% max
	1000mA	±3% typ, ±5% max
Internal Power Dissipation	Worst case load of 5 LEDs (300-700mA)	700mW max.
	Worst case load of 8 LEDs (1000mA), Vin=36V	1.6W typ.
Output Current Stability	Vin = 36V, Vout = 1-9 LEDs (300-700mA)	±1% max
	Vin = 36V, Vout = 1-8 LEDs (1000mA)	± 1.5% max.
Output Ripple and Noise (20MHz BW)	Vin=36V, Vout = 1-9 LEDs (300-700mA)	300mVp-p max
	Vin=36V, Vout = 1-8 LEDs (1000mA)	
Temperature Coefficient	-40°C to +85°C ambient	±0.015%/°C max
Maximum Capacitive Load	100µF	
Operating Frequency	300-1000mA	212kHz min/ 250kHz typ/ 280kHz max
Efficiency at Full Load	300-700mA	96% typ.
	Vin=36V, Vout=8 LEDs (1000mA)	94% typ.
Short Circuit Protection	Regulated at rated output current	
Operating Temperature Range	300/350mA	-40°C to +85°C
	500mA	-40°C to +80°C
	600/700mA	-40°C to +75°C
	1000mA	-40°C to +65°C
Storage Temperature Range	-55°C to +125°C	
Relative Humidity	5% to 95% RH, non-condensing	

continued on next page

LIGHTLINE

DC/DC-Converter

with 5 year Warranty

RECOM

Constant Current LED Driver



E358085

EN-50121-3-2 Certified

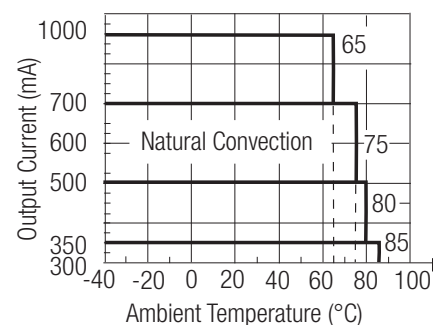
EN-60950-1 Certified

UL-60950-1 Certified

RCD-24/PL

Derating-Graph

(Ambient Temperature)



Refer to Application Notes

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

Dimensions	31.0 x 11.4 x 6.6mm	
Weight	1.9g	
Packing Quantity	12 pcs per Tube / 400 pcs per Reel	
Reflow Soldering Profile	265°C/10 sec max	
MTBF	25°C	>600 khours
(using MIL HDBK 217F)		

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

Remote ON/OFF	DC/DC ON	Open or 0V < Vr < 0.6V
Threshold Voltages	DC/DC OFF (Standby)	0.6 < Vr < 2.9V
	DC/DC OFF (Full Shutdown)	2.9V < Vr < 6V
Remote Pin Drive Current	Vr = 5V	1mA max
Quiescent Input Current in Shutdown Mode	Vin = 36V	200µA max
Recommended PWM Frequency	For Linear Operation	200Hz
(measured 10%~90% Dimming)	Maximum Frequency	1000Hz

Analogue Dimming Control (leave open if not used)

Input Voltage Range	300-1000mA	-0.3V - 15V
Control Voltage Range Limits (see Graph)	300-1000mA / Full On	0.13V ± 50mV
	300-700mA / Full Off	4.2V ± 150mV
	1000mA / Full Off	4.35V ± 100mV
Analogue Pin Drive Current	300-1000mA / Vc = 5V	0.2mA max.

Environmental

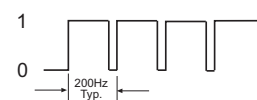
Shock / Vibration	EN61373	
EMC Railways	EN50121-3-2:2006	
Conducted Emissions	300-1000mA (/A Suffix)	EN55022 Class A
	300-700mA (/B Suffix)	EN55022 Class B
Radiated Emissions	EN55022 Class B	
ESD	EN61000-4-2 Criterion A	
Radiated Immunity	EN61000-4-3 Criterion A	
Fast Transient	EN61000-4-4 Criterion A	
Conducted Immunity	EN61000-4-6 Criterion A	

Note:

1. All LED Drivers may not be used without a load. They must be switched on the primary side only. Noncompliance may damage the LED or reduce its lifetime.
2. It is not possible to parallel the drivers to increase the current.

Digital Dimming

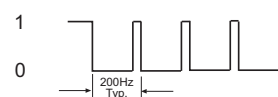
PWM Digital Control Signal



Output Current (LED appears dim)



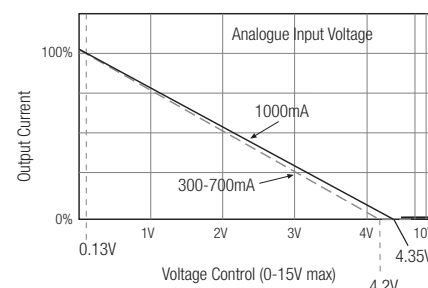
PWM Digital Control Signal



Output Current (LED appears bright)

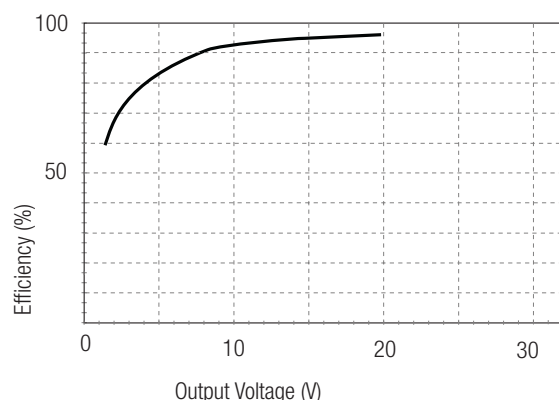


Analogue Dimming

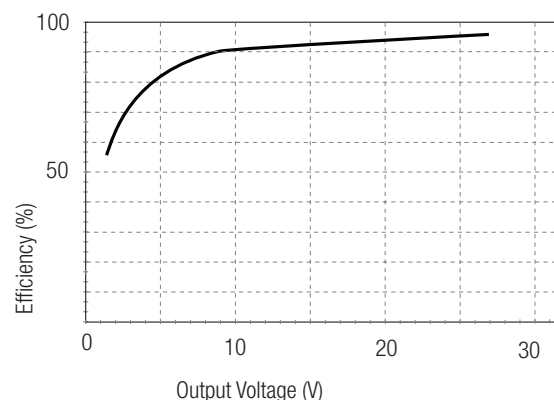


Typical Characteristics

Vin = 24V, Iout = 300~1000mA

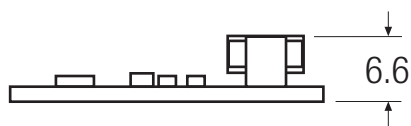


Vin = 32V, Iout = 300~1000mA



Package Style and Pinning

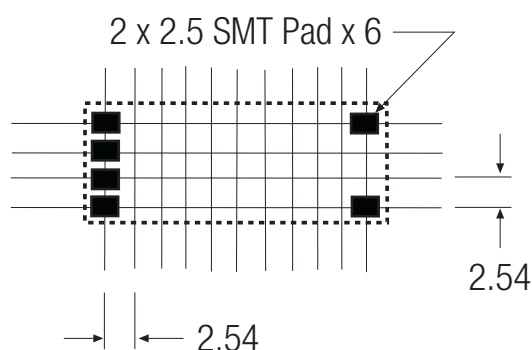
Class A Version



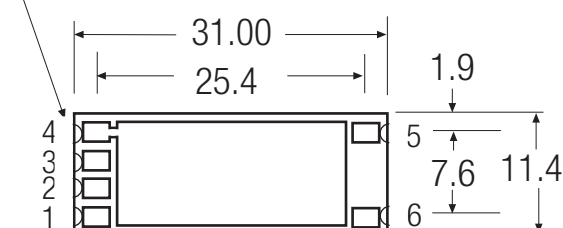
**Class A (1.00A-Version)
Class B Version**



PCB Layout Top View



1 mm half Via x 6



Bottom View

RCD-24-PL Series		
Pad #	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

Features LED DRIVER

- 70W Buck LED Driver
- Constant Current Output (350 to 1200mA)
- Digital PWM and Analogue Voltage Dimming
- High Efficiency to 96%
- EN, UL and RAILWAYS Certified
- Metal or Plastic Case Version
- IP67 Rated for /W, Plastic Case Version

Description

The RCD-48 series is a step-down constant current source designed for driving high power LED applications. Four output currents are available. The maximum output voltage is 56V. The buck drivers have digital PWM and/or analogue voltage dimming control and are special featured with very high efficiency. Typical applications are 48V bus lighting solutions or high voltage LED arrays (e.g. high bay lights).

Selection Guide

Part Number	Input Range (VDC)	Output Current (mA)	Output Voltage (VDC)	Dimming Control	Efficiency Typ. (%)
RCD-48-0.35*	9-60	0-350	2-56	Digital + Analogue	96
RCD-48-0.50*	9-60	0-500	2-56	Digital + Analogue	96
RCD-48-0.70*	9-60	0-700	2-56	Digital + Analogue	96
RCD-48-1.00*	9-60	0-1000	2-56	Digital + Analogue	96
RCD-48-1.20/M	9-60	0-1200	2-56	Digital + Analogue	96

*add suffix "/W" for wired version with Vref output and analogue + PWM dimming control (seven wires)

Note: Add suffix "/M" for metal case (RCD-48-1.20/M only). No metal case with wires available.

Standard version (no suffix) and wired version (suffix /W) only in plastic case.

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

Operating Input Voltage Range		9-60VDC
Absolute Maximum Input Voltage		65VDC max.
Output LED String Voltage Range		2V min. / 56V max.
(depend on the input voltage, defined by the output impedance, see Safe Operating Area)		
Input Filter		Capacitor
Output Current Accuracy		±3% typ. / ±5% max.
Internal Power Dissipation (Vin=60V, Vout=56V)	350mA	0.8W typ.
	500mA	1.0W typ.
	700mA	1.1W typ.
	1000mA	1.3W typ.
	1200mA	1.4W typ.
Output Current Stability	Vin=60V, Vout=2-56V, Iout=350-1200mA	±1% max.
Output Ripple and Noise (20MHz BW)	Vin=60V, Vout=2-56V, Iout=350-1200mA	300mVp-p max.
Maximum Capacitive Load		100µF max.
Switching Frequency		50kHz min. / 1000kHz max.
Efficiency at Full Load		96% typ.
PWM DIMMING CONTROL & REMOTE ON/OFF CONTROL		
Input Voltage Range		5V typ. / 10V max.
Threshold Voltage	Device ON	0.5V max.
	Device OFF	2.0V min.
PWM Frequency	For Linear Operation	200Hz max.
	Frequency Limit	1000Hz max.
ANALOGUE DIMMING CONTROL (Leave open if not used - do not tie to +Vin)		
Input Voltage Range		0V min. / 10V max.
Control Voltage Range		0V min. / 5.1V max.
<i>Note: The analogue dimming range is from 0% to 100%, but the output can be unstable below 10%, when using the analogue dimming function.</i>		
Analogue Pin Drive Current	Vc=5V	0.2mA max.
Vref Version	Vref Voltage	4.95V
	Vref Output Current	0.5mA
	Vref Output Short Circuit Current	2mA typ.
Ambient Temperature (free air convection)	350mA	-40°C to +80°C
	500mA	-40°C to +80°C
	700mA	-40°C to +75°C
	1000mA	-40°C to +60°C
	1200mA	-40°C to +50°C

Analogue and PWM Dimming Control Note: Leave open if not used - do not tie to +Vin

continued on next page

LIGHTLINE
DC/DC-Converter
with 5 year Warranty

RECOM

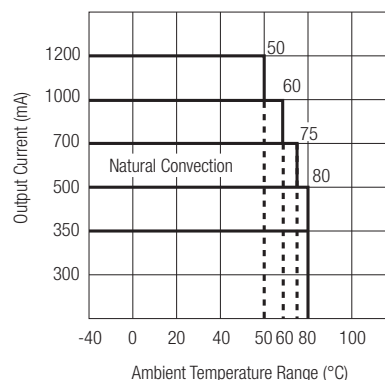
Constant Current Buck LED Driver



EN-50121-3-2 Certified
EN-60950-1 Certified
UL-60950-1 Certified

RCD-48

Derating-Graph (Ambient Temperature)

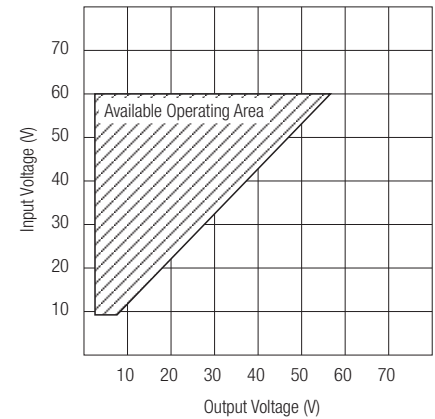


Refer to Application Notes

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

Storage Temperature	-55°C to +125°C	
Case Thermal Impedance	10°C/W typ.	
Soldering Temperature	265°C / 10sec. max.	
Relative Humidity	95% RH	
Input Filter	Capacitor only	
Short Circuit Protection	Continuous, Auto Recovery	
Case Material	Non Conductive Black Plastic Metal Case	
Potting Material	Silicone Potting Material (UL94V-0)	
Case Dimensions	Plastic Case	32.6 x 16.65 x 11.10 mm
	Metal Case	32.6 x 16.0 x 11.2 mm
Package Weight	Pinned (Plastic Case)	13g
	Wired (Plastic Case)	16g
	Pinned (Metal Case)	16g
Packing Quantity	Pinned (Plastic/Metal Case)	29 pcs.
	Wired (Plastic Case)	12 pcs.
MTBF (using MIL-HDBK217F)	+25°C	1700 x 10 ³ hours
(Nominal Vin at Full Load)	Note: Detailed Information see Application Notes chapter "MTBF"	
Safety	Shock / Vibration	EN61373
	EMC RAILWAYS	EN50121-3-2:2006
	Conducted	EN55011
	Radiated	EN55011
	ESD	EN61000-4-2
	Radiated Immunity	EN61000-4-3
	Fast Transient	EN61000-4-4
	Surge	EN61000-4-5
	Conducted Immunity	EN61000-4-6

Safe Operating Area

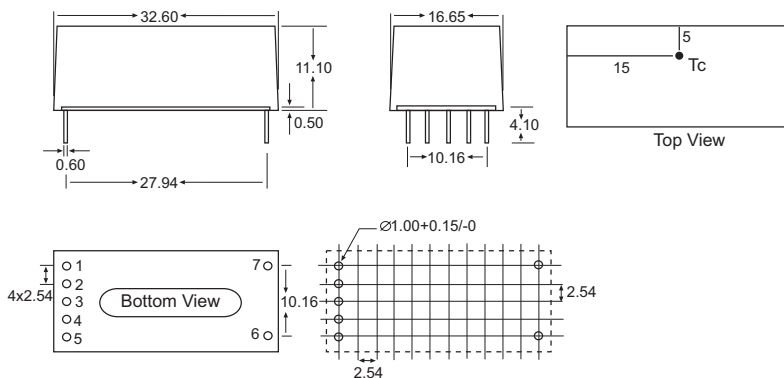


Note:

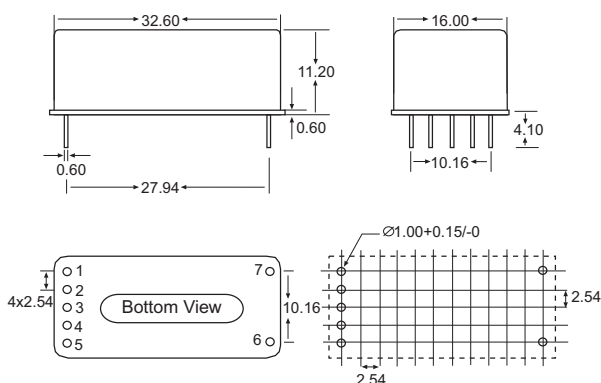
1 All LED Drivers may not be used without a load. They must be switched on the primary side only. Noncompliance may damage the LED or reduce its lifetime.

Package Style and Pinning

Through Hole Case (Plastic)



Through Hole Case (Metal)

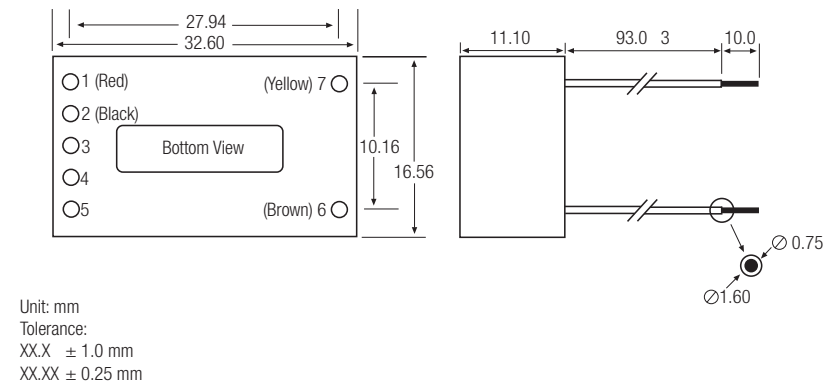


Pin Connections		RCD-48-x.xx
Pin#	Function	Comments
1	+Vin	DC Supply
2	GND	Do not connect to -Vout
3	Vref	Vref Voltage 5V typ.
4	PWM/ON/OFF	Leave open if not used
5	Analogue Dimming	Leave open if not used
6	-Vout	LED Cathode Connection
7	+Vout	LED Anode Connection

Unit: mm
Tolerance:
XX.X ± 0.5 mm
XX.XX ± 0.25 mm

Package Style and Pinning

Wired Version (Plastic)

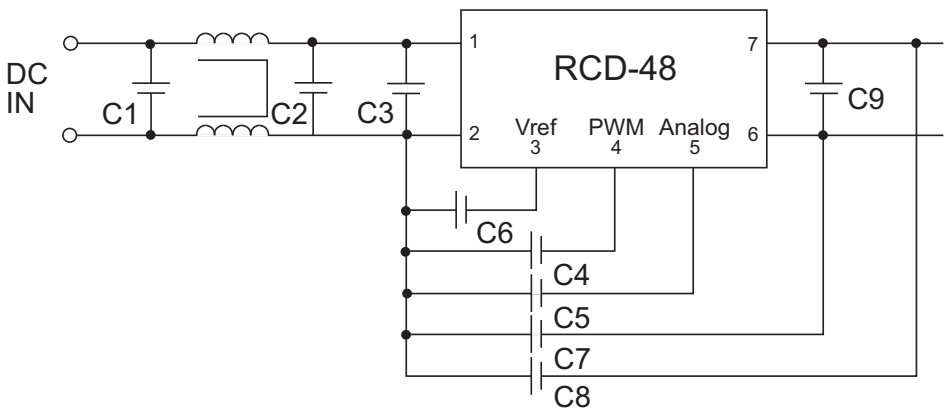


Wire Connections	Function	RCD-48-x.xx/W
Pin#		Wire color
1	+Vin	Red
2	GND	Black
3	Vref	Yellow
4	PWM/ON/OFF	Blue
5	Analogue Dimming	Green
6	LED-	Brown
7	LED+	Yellow

Wires: UL/CSA approved (22AWG/300V)

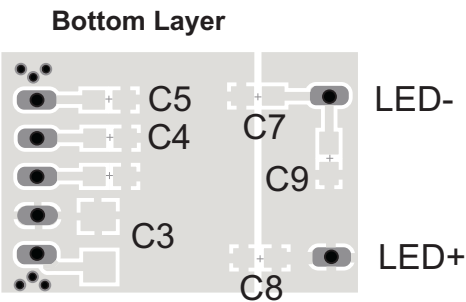
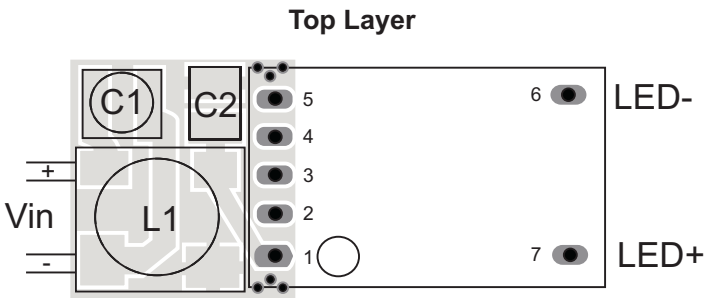
EMI Filter Suggestions

Class B



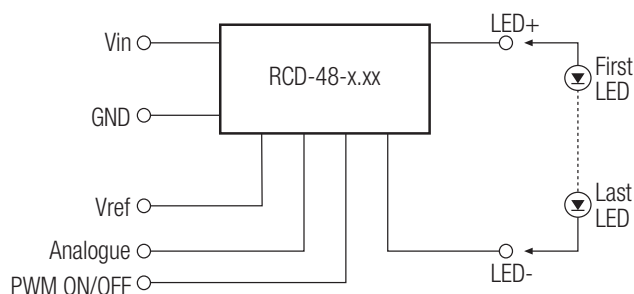
L1	1mH (e.g. WE744272102)
C1	10µF
C2	1µF
C3	100nF close to Pins
C4 - C9	10nF

Filter Suggestion

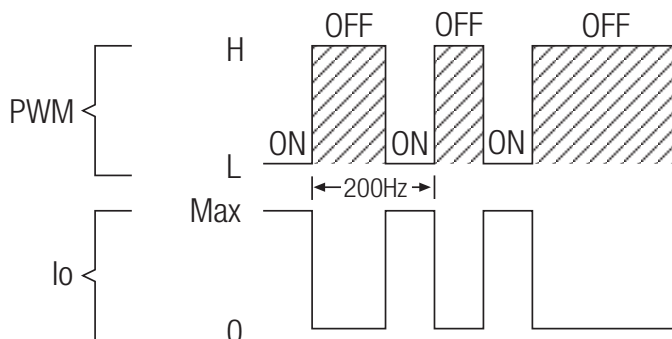


Standard Application

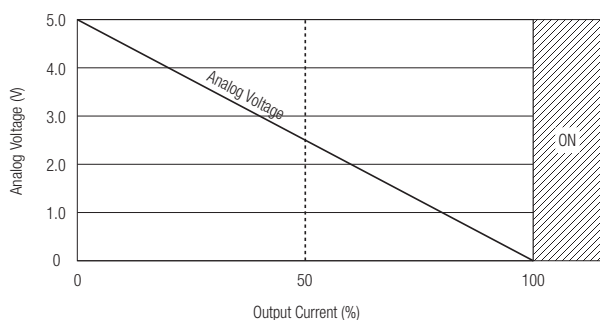
Single String Application



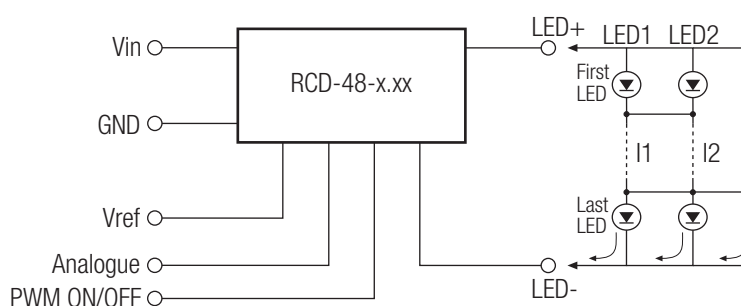
PWM Dimming Controlled



Dimming Controlled by Analog Voltage

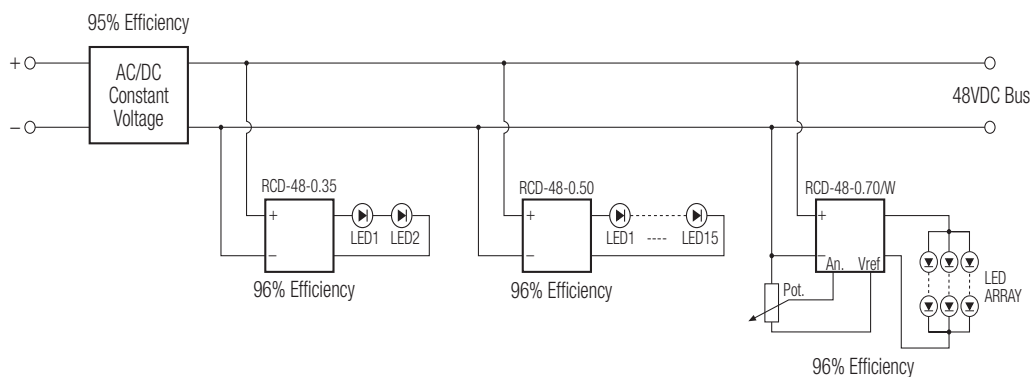


Lighting/Backlighting Wall Application



RCD-48

High Efficiency Lighting



Note:

It is not possible to parallel the drivers to increase the current.

The product information and specifications are subject to change without prior notice. RECOM products are not authorized for use in safety-critical applications (such as life support) without RECOM's explicit written consent. A safety-critical application is defined as an application where a failure of a RECOM product may reasonably be expected to endanger or cause loss of life, inflict bodily harm or damage property. The buyer shall indemnify and hold harmless RECOM, its affiliated companies and its representatives against any damage claims in connection with the unauthorized use of RECOM products in such safety-critical applications.