

# Features

## LED DRIVER

- 60W Class II AC-DC LED Power Supply
- Dual Mode CV or CC Output
- Power Factor Corrected
- Universal Input Voltage Range
- User Adjustable Current Limit (/OF)
- Thermal Feedback Dimming (/TOF)
- Waterproof Enclosure (/IP67)
- cUL/UL8750 Certified, CE Marked
- Class 2 Power Unit UL1310
- High Efficiency
- Long 5 Year Warranty

### Description

The RACD60 is a compact universal input voltage 60W constant current power module suitable for driving high power LEDs. The LED driver has a dual mode of operation: - CV mode: at loads below the preset current limit, the RACD60 behaves as a fixed voltage source. CC mode: at loads above the preset current limit, the RACD60 behaves as a fixed current source. Thus the same power supply can be used with both CV and CC LED modules. The RACD60 series have a universal input voltage range with active power factor correction and are fully protected against output short circuit, overload and over-temperature. Three versions are available: a low cost open-frame with either internal (/OF) or external user-adjustable current limit (/TOF), and a sealed IP67 potted version (/IP67) with factory set output currents for outdoor or high humidity applications.

### Selection Guide

| Part Number  | Output Voltage Range (min - max) | Output Current Range (min - max) | Factory Set Current Limit | Efficiency (230VAC) Typ. | Output Power Range |
|--------------|----------------------------------|----------------------------------|---------------------------|--------------------------|--------------------|
| RACD60-4200* | 11 - 13.5V                       | 3570 - 4200mA                    | 4.2A                      | 85%                      | 40-60W             |
| RACD60-2400* | 17 - 24V                         | 2150 - 2500mA                    | 2.4A                      | 87%                      | 30-60W             |
| RACD60-2100* | 21 - 28V                         | 1400 - 2140mA                    | 2.1A                      | 89%                      | 30-60W             |
| RACD60-1400* | 21 - 28V                         | 1400 - 2140mA                    | 1.4A                      | 89%                      | 30-60W             |
| RACD60-1050* | 38 - 54V                         | 700 - 1100mA                     | 1.0A                      | 89%                      | 27-60W             |
| RACD60-700*  | 38 - 54V                         | 700 - 1100mA                     | 0.7A                      | 89%                      | 27-60W             |

\* use suffix /OF for open frame version (standard) - output current limit adjustable with on-board trimmer

\* use suffix /TOF for open frame version with thermal feedback - output current limit externally adjustable.

\* use suffix /IP67 for waterproof potted version - fixed output currents only

ordering examples:

RACD60-700/OF= open frame, adjustable current limit preset to 700mA.

RACD60-1050/TOF=open frame, 1050mA, adjustable 700-1050mA with ext. voltage or PWM signal.

RACD60-1400/IP67 = enclosed IP67 waterproof, non-adjustable 1400mA output.

Note: all currents within range are available - use RACD60-xxxx/IP67 where xxxx is the desired fixed current

e.g. RACD60-900/IP67 = enclosed IP67 waterproof, non-adjustable 900mA output.

### Specifications (typical at 25°C and after warm up time unless otherwise specified)

|                             |                            |                     |
|-----------------------------|----------------------------|---------------------|
| Input Voltage Range         | All Versions               | 90-264VAC           |
| Rated Power                 |                            | 60 Watts max.       |
| Input Frequency Range       | All Versions               | 50/60 Hz            |
| Power Factor Correction     | Full Load, 115VAC/230VAC   | > 0.9               |
| THD                         | Full Load, 115VAC          | 17% max.            |
|                             | Full Load, 230VAC          | 20% max.            |
| Input Current (full load)   | 115VAC/230VAC              | 0.8A / 0.4A max.    |
| Inrush Current (cold start) | 115VAC/230VAC              | 25A / 50A max.      |
| Leakage Current             | 230VAC/63Hz                | <0.7mA max.         |
| Input Fuse                  | Built-in                   | 3.15A Slow Blow     |
| Output Current Accuracy     | Full load                  | ±5%                 |
| Output Current Adjust       | Preset Potentiometer (/OF) | 75% to 100% approx. |
|                             | External Voltage (/TOF)    |                     |
| Line Voltage Regulation     | LL to HL at Full Load      | ±4% typ.            |
| Load Voltage Regulation     | 60% to 100% Load           | ±5% typ.            |
| Minimum Load Current        |                            | see table           |
| Operating Frequency         | All Versions               | 65kHz typ.          |

continued on next Page

**LIGHTLINE**  
AC/DC-Converter  
with 5 year Warranty

**RECOM**

**60 Watt PFC**  
**Single Output**

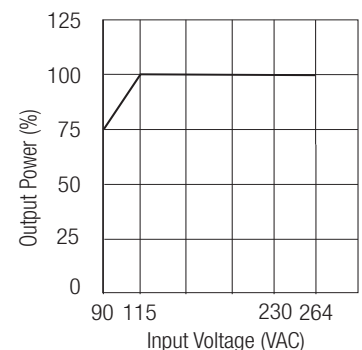


**UL 8750 Certified**  
**cUL 8750 Certified\***  
**EN 61347 Certified**

**RACD60**

\* except 700mA/1100mA Versions

### Input Voltage Derating (Ta=25°C)



Note:

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.

**Refer to Application Notes**

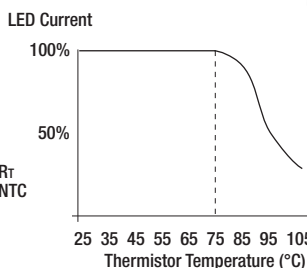
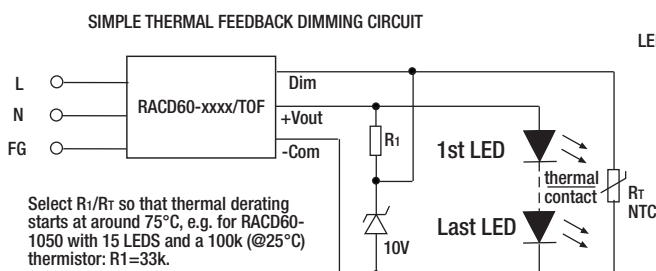
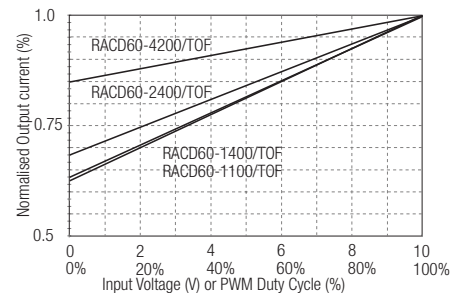
### Specifications (typical at 25°C and after warm up time unless otherwise specified )

|  |   |  |                         |
|--|---|--|-------------------------|
| Efficiency at Full Load                                |   | see table  |                         |
| Isolation Voltage (60Hz RMS)                           | input to output   | 3.75kVAC / 1 minute  |                         |
|  | input to filter ground  | 1880VAC / 1 minute   |                         |
|  | output to filter ground   | 500VAC / 1 minute  |                         |
| Temperature Coefficient                                | All Versions  | ±0.02%/°C typ.   |                         |
| Overload Protection                                    | All Versions  | 105% typ.  |                         |
| Short Circuit Protection                               |   | Continuous, Hiccup, Automatic Restart                                |                         |
| Open Circuit Output Voltage (Zener Diode Clamp)        | 4200mA  | 19VDC  |                         |
|  | 2400mA  | 25VDC  |                         |
| Typical Values   | 2100mA/1400mA   | 29VDC  |                         |
|  | 1050mA/700mA  | 55VDC  |                         |
| Output Current Adjust (/TOF only)                      | External Voltage (1-10V)  | 10.5V max.   |                         |
|  | External PWM (10V)  | 300Hz max.   |                         |
| Operating Temperature Range (refer to derating graphs) | free air convection, with derating                              | -30°C to +70°C   |                         |
|  | Case temperature (/IP67)  | 85°C max.  |                         |
| Storage Temperature Range                              |   | -40°C to +85°C   |                         |
| Humidity   | non-condensing  | 95% RH max.  |                         |
| Environmental Protection                               | Open Frame (/OF, /TOF)  | Indoor Use Only  |                         |
|  | Potted Version (/IP67)  | IP67   |                         |
| PCB Material   |   | Plastic Resin with Fibreglass (UL94V-0)                              |                         |
| Weight   | Open Frame (/OF, /TOF)  | 165g   |                         |
|  | Potted Version (/IP67)  | 200g   |                         |
| Packing Quantity                                       |   | 1pc  |                         |
| EMC  |   | EN 55015, EN61347-1, EN61347-2-13                                    |                         |
| Harmonics  |   | Certified to meet EN 61000-3-2 (Class C, Full load) and EN 61000-3-3 |                         |
| MTBF (using MIL-HDBK-217F, 25°C)                       |   | 583 x 10 <sup>3</sup> hours  |                         |
| Safety Standards                                       | LED Lighting Safety   | Report: E34696   | UL8750                  |
|  | LED Lighting Safety (Canada)                                    | Report: E34696   | cUL8750                 |
|  | Class 2 Power Supply Safety                                     | Report: E34696   | UL1310                  |
|  | Extra Low-Voltage Class 2 Output                                | Report: E34696   | CSA C22.2 No. 223-M91   |
|  | LED equipment for lighting application                          | Report: E34696   | CSA C22.2 No. 250.13-12 |
|  | CE LVD Directive -all models                                    |  | EN61347                 |
| Input/Output Connections                               | /OF Pin Header (suitable matching connector JST VHR or similar) | /IP67 340mm Cable ± 20mm   |                         |

### /TOF Output Current Adjustment

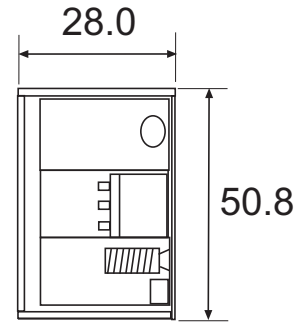
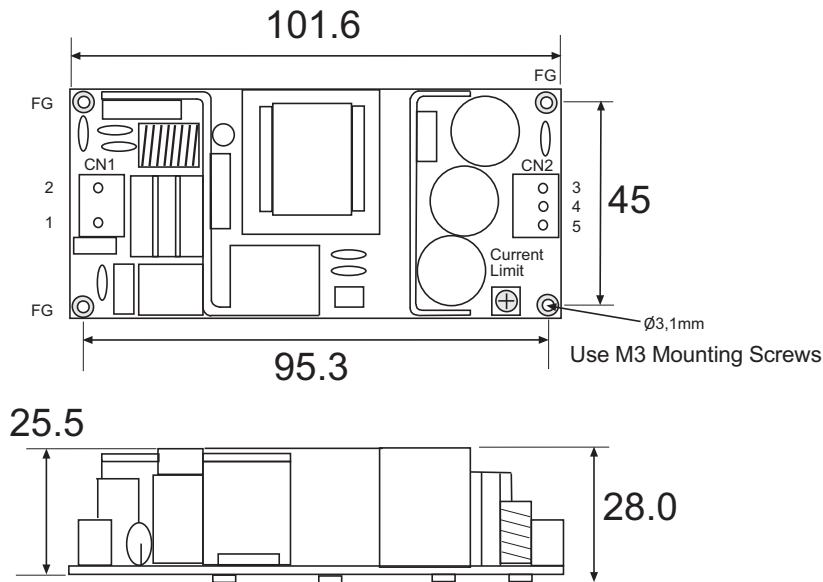
The /TOF offers the possibility to derate the output current with an external voltage or PWM signal.

Thermal feedback derating is an effective way to reduce the LED current at high temperatures to avoid over-stressing the LED.



Package Style and Pinning

**RACD60-xxxx/OF and RACD60-xxxx/TOF**



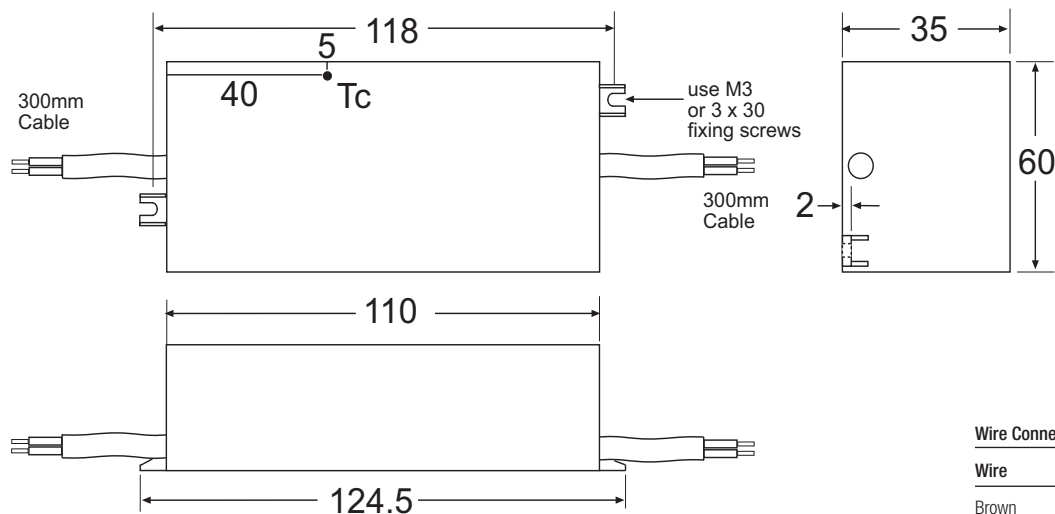
Pin Connections

| Pin # | /OF        | /TOF             |
|-------|------------|------------------|
| 1     | VAC in (L) | VAC in (L)       |
| 2     | VAC in (N) | VAC in (N)       |
| 3     | NC         | Thermal feedback |
| 4     | +VDC Out   | +VDC Out         |
| 5     | -VDC Out   | Com              |

Filter Ground connection via mounting holes  
Dimension Tolerance  $\pm 0.25\text{ mm}$

Package Style and Pinning

**RACD60-xxxx/IP67**

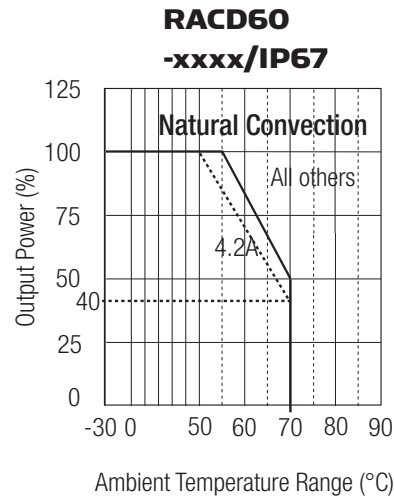
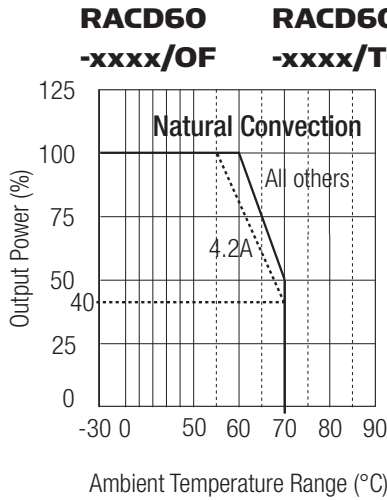


Wire Connections

| Wire  | Function   |
|-------|------------|
| Brown | VAC in (L) |
| Blue  | VAC in (N) |
| Red   | +VDC Out   |
| Black | -VDC Out   |

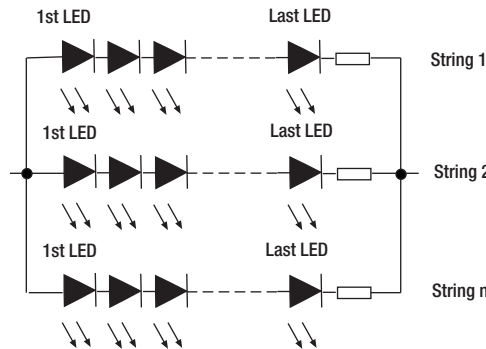
Dimension Tolerance  $\pm 0.25\text{ mm}$

**Derating Graphs**



**Application Information**

LEDs are typically wired in series to make a string of LEDs and then the strings can be wired in parallel to generate enough light. If only two or three strings are wired in parallel then it is recommended to add resistors (e.g. 0.5R) to each string to help balance out the LED currents in each string. All strings must share a common heatsink for better current matching.



A typical 1W high brightness white LED has a forward voltage of around 3.3V at its operating temperature and draws 350mA. Thus each LED actually draws about 1.15W. Similarly, 3W white LEDs have usually the same forward voltage but can be run at 700mA or more. Using the LED datasheet specification, the optimum LED arrangement and the best driver for each application can be worked out.

The tables below show some examples. Other LED combinations may have different forward voltages at their recommended operating currents.

| 1W LEDs | LED Arrangement | AC/DC Driver |
|---------|-----------------|--------------|
| 24      | 2 Strings of 12 | RACD60-700   |
| 26      | 2 Strings of 13 | RACD60-700   |
| 28      | 4 Strings of 7  | RACD60-1400  |
| 30      | 3 Strings of 10 | RACD60-1050  |
| 33      | 3 Strings of 11 | RACD60-1050  |
| 35      | 5 Strings of 7  | RACD60-2100  |
| 35      | 7 Strings of 5  | RACD60-2400  |
| 36      | 3 Strings of 12 | RACD60-1050  |
| 39      | 3 Strings of 13 | RACD60-1050  |
| 42      | 3 Strings of 14 | RACD60-1050  |
| 42      | 7 Strings of 6  | RACD60-2400  |
| 42      | 14 Strings of 3 | RACD60-4200  |
| 45      | 3 Strings of 15 | RACD60-1050  |

| 3W LEDs | LED Arrangement | AC/DC Driver |
|---------|-----------------|--------------|
| 12      | 12 in series    | RACD60-700   |
| 14      | 2 Strings of 7  | RACD60-1400  |
| 18      | 3 Strings of 6  | RACD60-2100  |
| 18      | 6 Strings of 3  | RACD60-4200  |

| High Power LEDs | LED Arrangement | AC/DC Driver |
|-----------------|-----------------|--------------|
| Cree CXA2011    | Single Array    | RACD60-1050  |
| Cree XM-L       | 6 in series     | RACD60-2100  |
| Lumiled Rebel   | 13 in series    | RACD60-700   |
| Osram Dragon    | 14 in series    | RACD60-1050  |
| Bridgelux RS    | Single Array    | RACD60-2100  |
| Helieon         | Single Module   | RACD60-1400  |

The product information and specifications are subject to change without prior notice. All products are designed for non-safety critical commercial and industrial applications. The Buyer agrees to implement safeguards that anticipate the consequences of any failures that might cause harm, loss of life and/or damage property.