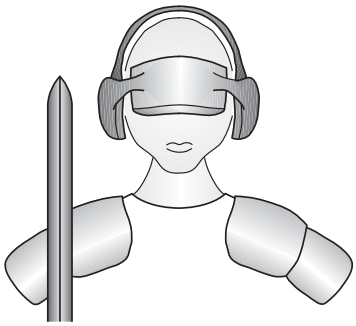
LED-Warrior05

HB LED driver module for low voltage input



Code Mercenaries

1. Features

- Input voltage 7 - 30V
- Constant current output 200mA or 350mA
- Low current ripple version for OLED (<1% Ipp)
- Maximum output power 10W
- Standard variants for 200mA and 350mA
- Custom versions up to 500mA output
- Capable of driving 1..5 white LEDs
- Input transients up to 40V <0.5s
- Up to 96% efficiency
- PWM control input for dimming
- Standby current max. 3.5mA
- Optimized for point-of-load regulation
- Connection options: Crimp, plug, solder
- Surface mounting possible

1.1 Variants

LED-Warrior05 is available in standard variants for 200mA and 350mA output current. The 200mA variant is a low current ripple version optimized for driving OLED with <1% Ipp.
Input and output connections are available with the following options:
Input crimp, output crimp
Input crimp, output plug
Input crimp, output solder
Input solder, output solder

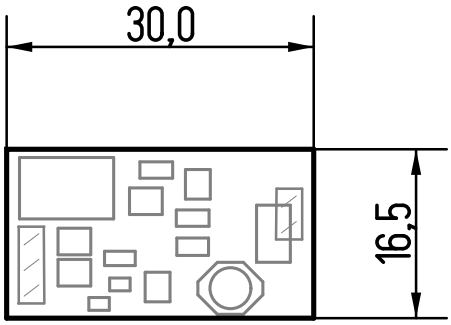
1.2 Custom variants

Custom output current versions are available on request. Output connectors can be modified. Thermally conductive adhesive pad for mounting can be added. Minimum order quantities may apply.

2. Functional overview

LED-Warrior05 is a point-of-load regulator for LED lighting applications. By providing a highly efficient constant current regulation off a DC source LED-Warrior05 is perfectly suited for applications that require low DC levels for safety reasons, driving multiple LED groups in one luminaire, mobile or in-vehicle lighting, and to refit existing low voltage halogen installations.

3. Mechanical dimensions



Dimensions in mm
Height at thickest point: 6.5mm
Tolerances:
Outer contour: ±0.2mm

When mounting on a conductive surface make sure to add spacers or an insulating layer under the module to avoid short circuits

3.1 Crimp Connectors

The crimp connectors used on the LW05 require a special crimping tool. Crimping tools can be pruchased separately.
The connectors are of the AVX/ELCO 00 9175 family. Wires with insulation diameter 0.7 to 1mm fit into the connectors.

3.2 SMD Mounting

LW05 may be mounted as a SMD part. For details please contact our support.

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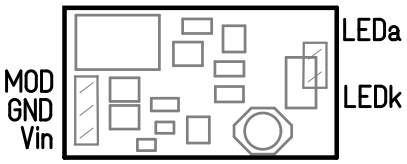
3.3 Pin Descriptions



Vin
Supply voltage positive input. Apply a DC voltage of 7V to 30V here. The input is protected with a fuse and a diode to prevent damage from reversed power supply and safely disconnect the power in case of a failure.

GND
Supply voltage negative input and ground reference for MOD input.

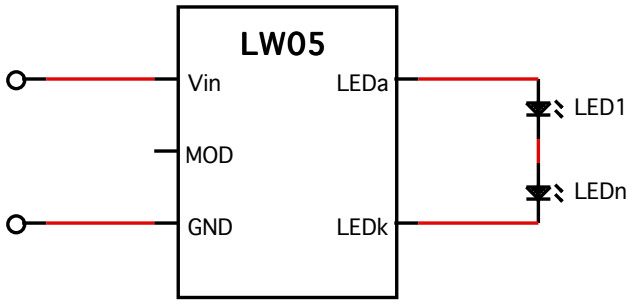
LEDa
Positive output for LED, connect the anode of the first LED of the string to this pin.

LEDk
Negative output for LED, connect the cathode of the last LED of the string to this pin. This pin is not identical to GND!

MOD
PWM input. Pulling this pin high shuts off the output. Feeding a PWM signal with up to 1kHz can be used to control the brightness of the connected LEDs. Pulling the pin high permanetly puts LW05 in a standby mode. This pin can be left unconnected if no brightness control is required.

4. Connecting the LEDs

The maximum number of LEDs that can be driven by LED-Warrior05 depends on the supply voltage and the combined forward voltage of the LEDs.
Input voltage needs to be about 2.5V higher than the total forward voltage of the LED string for proper operation.



4.1 Reducing output ripple

To reduce output ripple and possibly reduce EMC problems a capacitor may be put parallel to the LEDs, preferably connected direct between LEDa and LEDk of the LED-Warrior05.
The 200mA low ripple version already has such a capacitor installed on the module to optimise it for use with OLED.

4.2 EMC

LED-Warrior05 has been designed to produce a minimal level of EM emissions.
As a component LED-Warrior05 can not be EMC approved. It has been tested in the configuration of our AgniLine product and passed with comfortable margin.

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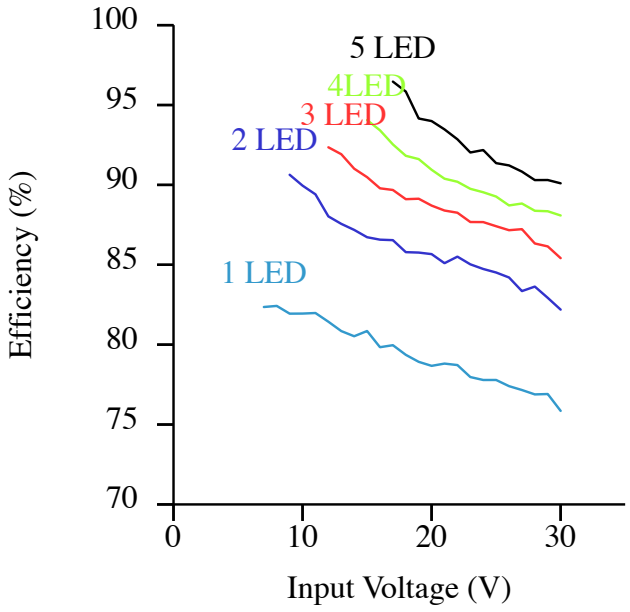
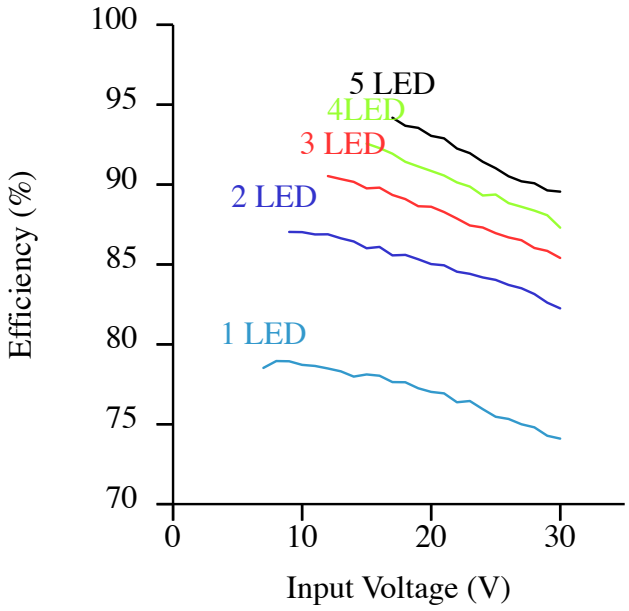
5. Brightness control
The MOD input allows PWM dimming of the LEDs.
By applying a voltage >1V≤Vin the current to the LEDs is shut off. Frequencies up to about 1kHz can be applied to the MOD input, though for good regulator stability it is recommended to not exceed about 500Hz.
Dimming ranges of about 1% to 100% are possible.

6. Regulator efficiency
The regulator efficieny depends on a number of parameters. Since there are a couple constant losses independent of the total power delivered by the regulator the basic rule is that the regulator is more efficient when used at higher power (i.e. more LEDs connected). A lower difference between input and output voltage does also increase the efficiency.

Efficiency LW05-200

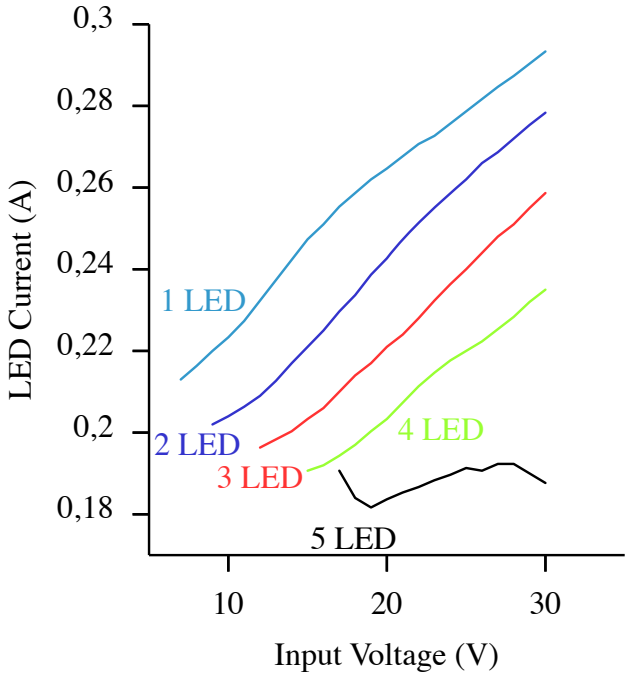


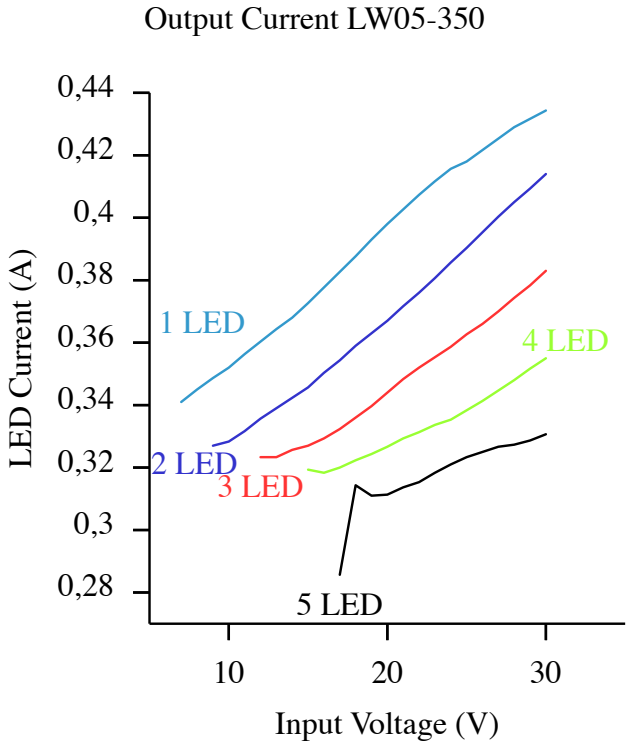
Efficiency LW05-350



6.1 Output current
The output current varies somewhat depending on the forward voltage of LEDs and the input voltage. If a more precise output current is required it can be set by using the MOD input.

Output Current LW05-200





6.2 Reliability

The reliability data is based on data provided by component manufacturers:

Failure Rate (FIT): 1337 * $10^{-9}h^{-1}$

Mean Time to Failure (MTTF): 747943h

7. FCC / CE

The LED-Warrior05 is sold as a module to be integrated into a device. As such it can not be FCC or CE approved.

Code Mercenaries has excerted greatest care in designing this module to minimize RF emission and assure safe and stable operation. Though the use of proper cable materials and correct integration into a device is crucial to assure product safety and interference free operation.

The integrator who assembles the module into a device has to take care for appropriate construction and testing.

8. Absolute maximum ratings

Input Voltage (Vin relative to GND):	-40V to +30V (40V for 0.5sec)
MOD pin input voltage (relative to GND):	-0.3V to Vin
Input Current:	1A

Operating temperature:

LW05-200:	-30°C to +85°C in still air
LW05-350:	-30°C to +85°C in still air

Absolute maximum ratings must not be exceeded or permanent damage to the LED-Warrior05 may result.

8.1 Thermal precautions

When operating at elevated ambient temperature, vertical mounting in an air volume sufficiently large to allow convection is recommended to reduce surface temperature of the regulator. Additional cooling measures can help to further reduce the regulator temperature and increase long term reliability.
No part of the module surface may exceed 125°C during operation at any time.

8.2 Electrical Characteristics

Input Voltage (Vin): 7V to 30V
Standby current (MOD high): max. 3.5mA

8.3 Failure modes

The most common failure mode seen when the regulator is destroyed due to overtemperature, overcurrent, or overvoltage is an internal short circuit that causes the fuse to disconnect. The fuse has the ability to disconnect failure currents up to 50A and starts to trip at 1A.

8.4 Recommended safety measures

Materials with low flash points must be kept away from the regulator. The surface temperature of parts of the regulator may reach up to 125°C surface temperature when used at elevated ambient temperatures and maximum power.

9. Ordering information

Partname	Order Code	Color code	Description
LED-Warrior05-200	LW05-200LRSS	Red	200mA regulator, low ripple, input solder, output solder
LED-Warrior05-200	LW05-200LRCC	Red	200mA regulator, low ripple, input crimp, output crimp
LED-Warrior05-350	LW05-350SS	Orange	350mA regulator, input solder, output solder
LED-Warrior05-350	LW05-350CS	Orange	350mA regulator, input crimp, output solder
LED-Warrior05-350	LW05-350CP	Orange	350mA regulator, input crimp, output plug
LED-Warrior05-350	LW05-350CC	Orange	350mA regulator, input crimp, output crimp

The modules listed here are standard products. Customized modules are available on request.

9.1 Packaging info

The modules are packaged in boxes of 30 units each.

9.2 Identifying current values

LED-Warrior05 modules are marked with a color dot to identify the current value of the module. The color dot also serves to identify that the module has been tested and is OK.
The color dot can be found on the input filter (black square part next to input connector) of the module. Color codings can be found in the ordering information table.

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