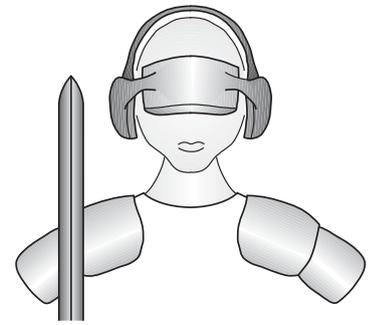


# LED-Warrior07



Code Mercenaries

## IEC62386 to PWM controller one channel

### 1. Features

- IEC62386 to PWM controller
- According to DIN EN 62386-101/-102/-207
- All protocol elements implemented
- Minimal external circuitry
- PWM output at 730 Hz
- PWM ranging from 0.1% to 100%
- Logarithmic and linear dimming curves
- 5 V supply (chip)
- 5.5 V to 40 V supply (modules)
- up to 4 A PWM out on LW07-02MOD

#### 1.1 Variants

LED-Warrior07 is available in DIL8, or SOIC8 packages or as a module.

#### 1.2 LW07-01MOD

The LW07-01MOD is a complete IEC62386 to PWM controller. It provides a positive and a negative PWM signal to control LED drivers.

#### 1.3 LW07-02MOD

The LW07-02MOD is a IEC62386 to PWM driver that can be used with constant voltage LED modules and strips. It drives up to 4 A from a 5.5 V to 40 V DC supply.

#### 1.4 Custom variants

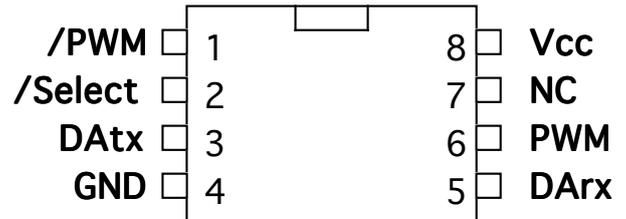
Custom variants are possible.

### 2. Functional overview

LED-Warrior07 is a IEC62386 slave device identifying as a LED luminaire (type 6). The arc power values are translated into a 730 Hz PWM signal that can be used to control LED power supplies.

The complete IEC62386 command set is implemented in LED-Warrior07.

### 3. Pin Descriptions (Chip SOIC-8 or DIL-8)



#### Vcc

5 V supply voltage positive input.

#### GND

Supply voltage negative input.

#### /Select

Input for physical selection. A switch closing to ground may be connected here to perform the physical selection in IEC62386 addressing. Input with internal pull up resistor.

#### PWM

730 Hz PWM signal output. Positive logic. high = power on to lamps. Duty cycle 0.1% to 100%, constant low for off, constant high for maximum. CMOS level output.

#### /PWM

Inverted PWM signal. Negative logic. high = power off on lamps. Duty cycle 0.1% to 100%, constant high for off, constant low for maximum. CMOS level output.

#### DARx

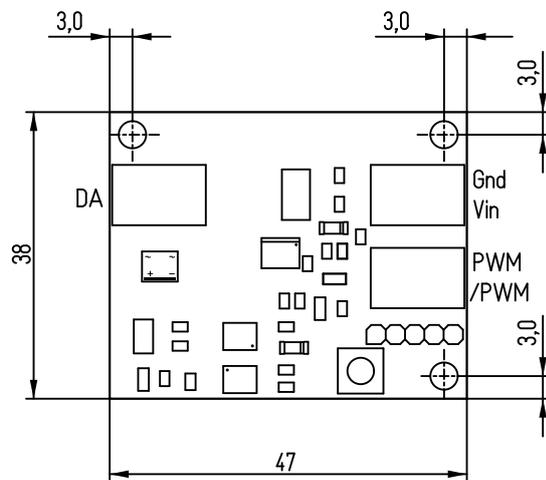
Receive data input from IEC62386 bus. Connect a IEC62386 bus receiver to this pin. Positive logic, high = high level on bus. High impedance input.

#### DAtx

Transmit data output to IEC62386 bus. Connect a IEC62386 bus driver to this pin. Positive logic, high = high level on bus. Open drain output with internal pull up resistor for high.

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## 3.1 Mechanical dimensions (LW07-01MOD)



Dimensions in mm  
 Height at thickest point: < 6.5 mm  
 Tolerances:  
 Outer contour:  $\pm 0.2$ mm

## 3.2 Pin Descriptions (LW07-01MOD)

### DA

Two lines for the IEC62386 bus, not polarity sensitive, connect direct to the IEC62386 bus. The IEC62386 bus is galvanically isolated from the rest of the circuit by opto couplers.

### PWM

Positive logic PWM output, high = lamp on  
 Open collector output with 4k7 pull up to +5V.  
 Galvanically isolated from IEC62386 bus.

### /PWM

Negative logic PWM output, low = lamp on  
 Open collector output with 4k7 pull up to +5V.  
 Galvanically isolated from IEC62386 bus.

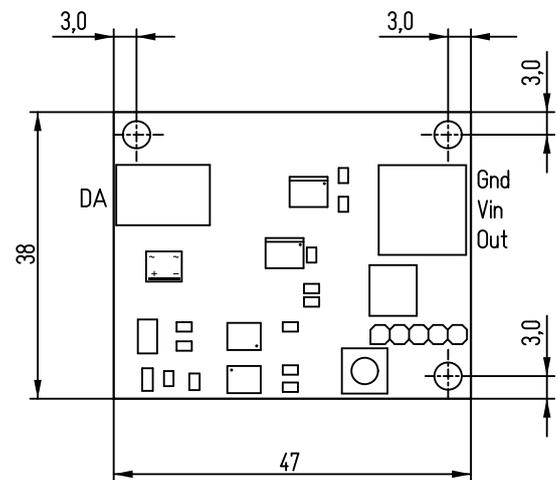
### Vin

Positive supply voltage 5.5 to 40 V.  
 Galvanically isolated from IEC62386 bus.

### GND

Ground supply voltage.  
 Galvanically isolated from IEC62386 bus.

## 3.3 Mechanical dimensions (LW07-02MOD)



Dimensions in mm  
 Height at thickest point: < 6.5 mm  
 Tolerances:  
 Outer contour:  $\pm 0.2$ mm

## 3.4 Pin Descriptions (LW07-02MOD)

### DA

Two lines for the IEC62386 bus, not polarity sensitive, connect direct to the IEC62386 bus. The IEC62386 bus is galvanically isolated from the rest of the circuit by opto couplers.

### Load

PWM output. Provides a chopped Ground to directly drive constant voltage LED assemblies. Connect the cathode end of the LEDs here and the anode to the positive power supply. Up to 4 A.  
 Galvanically isolated from IEC62386 bus.

### Vin

Positive supply voltage 5.5 to 40 V.  
 Galvanically isolated from IEC62386 bus.

### GND

Ground supply voltage.  
 Galvanically isolated from IEC62386 bus.

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## 4. Implemented IEC62386 commands

LED-Warrior07 implements all IEC62386-102:2009 commands.

It also implements the relevant commands for type 6 control gear according to IEC62386-207:2009.

Since LED-Warrior07 can not measure the lamp current, power, or temperature the following commands have no effect:

Command 224: Reference System Power

Command 225: Enable Current Protector

Command 226: Disable Current Protector

Due to the corresponding functions not being implemented the following commands always return a negative answer:

Command 241: Query Failure Status

Command 242: Query Short Circuit

Command 243: Query Open Circuit

Command 244: Query Load Decrease

Command 245: Query Load Increase

Command 246: Query Current Protector Active

Command 247: Query Thermal Shut Down

Command 248: Query Thermal Overload

Command 249: Query Reference Running

Command 250: Query Ref Measurement Fail

Command 251: Query Current Protector Enabled

Command 237: Query Gear Type

Returns DC supply possible, all other flags negative (=0)

Command 239: Query Possible Operating Modes

Returns PWM possible, all other flags negative (=0) since the actual implementation of the driver stage is unknown to the LW07.

Command 240: Query Features

Returns zero flags for all features, except physical selection, which is supported via the /Select input.

### 4.1 IEC62386 memory banks

LED-Warrior07 implements IEC62386 memory banks 0 and 1. Both banks use the default length with no vendor or OEM specific additional information.

Bank 1 can be written by the OEM as defined by the IEC62386 standard.

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## 5. Absolute maximum ratings (Chip)

Supply voltage (V <sub>cc</sub> relative to GND):	-0.5V to +6V
Input voltage into any pin (relative to GND):	GND - 0.5V to V <sub>cc</sub> + 0.5V
Input current into any pin:	-25 to +50mA
Storage temperature:	-55°C to +100°C
ESD:	2000V human body model

Absolute maximum ratings must not be exceeded or permanent damage to the LED-Warrior07 may result.

### 5.1 Operating specifications (Chip)

Supply voltage (V <sub>cc</sub> relative to GND):	4.5V to 5.25V
Operating temperature:	-40°C to +85°C
Supply current:	8mA max.
Internal pull up resistors:	min. 4kΩ max. 8kΩ typ. 5.6kΩ
Input low voltage:	max. 0.8V
Input high voltage:	min. 2.1V
PWM, /PWM low sink current:	min. 25mA
PWM, /PWM high source current:	min. 10mA

### 5.2 Absolute maximum ratings (Modules)

Supply Voltage (V <sub>in</sub> relative to GND):	0V to +45V
Input current (supply voltage):	max. 50mA
Bus input voltage (differential):	max. 50V
Storage temperature:	-55°C to +100°C
ESD:	2000V human body model

Absolute maximum ratings must not be exceeded or permanent damage to the LED-Warrior07 may result.

### 5.3 Operating specifications (LW07-01MOD)

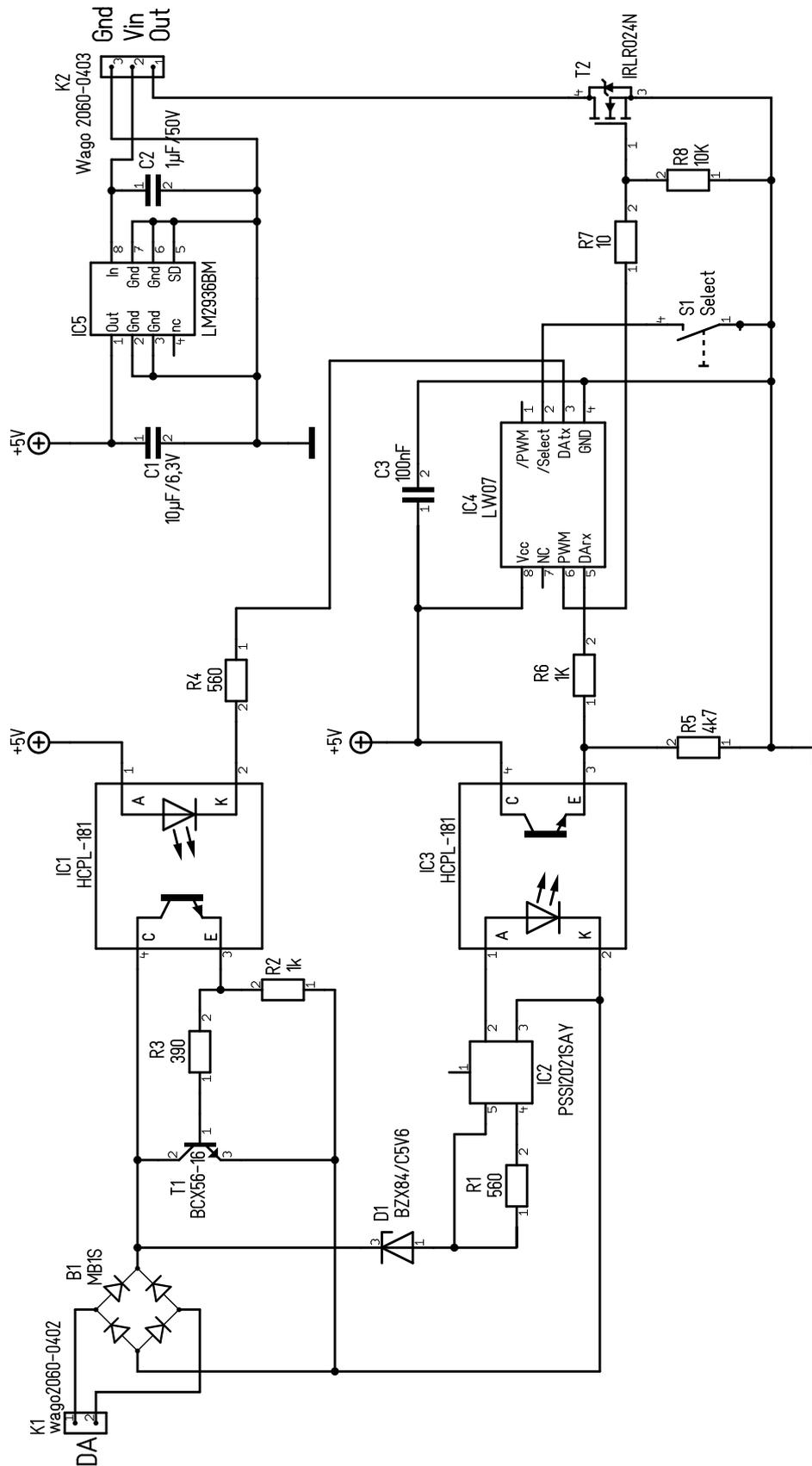
Supply Voltage (V <sub>in</sub> relative to GND):	5.5V to +40V
Operating temperature:	-40°C to +85°C
Bus input voltage (differential):	max. 24V
Supply current:	max. 25mA
PWM, /PWM low sink current:	max. 25mA
PWM, /PWM high pull up resistance to 5V:	4k7Ω

### 5.4 Operating specifications (LW07-02MOD)

Supply Voltage (V <sub>in</sub> relative to GND):	5.5V to +40V
Operating temperature:	-40°C to +85°C
Bus input voltage (differential):	max. 24V
Supply current:	max. 25mA
Load sink current:	max. 4 A

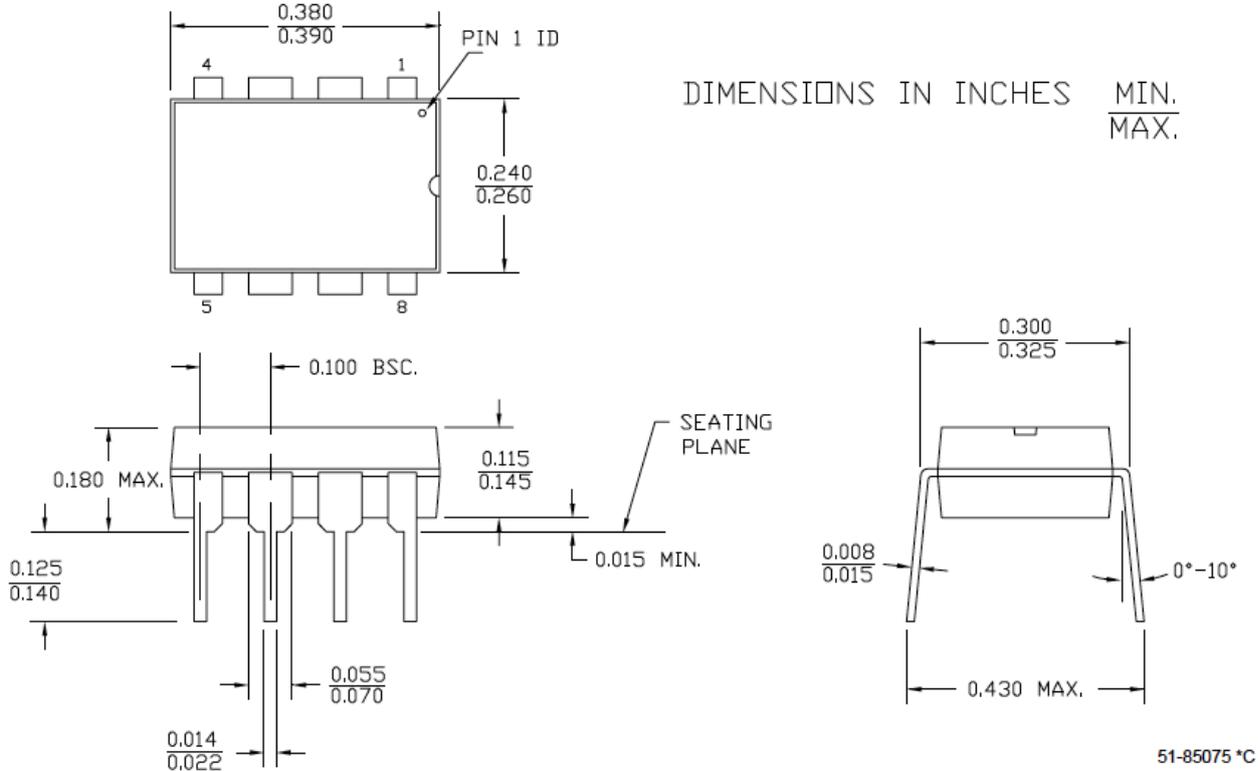
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## 6. Application circuit (actual LW07-02MOD circuit)

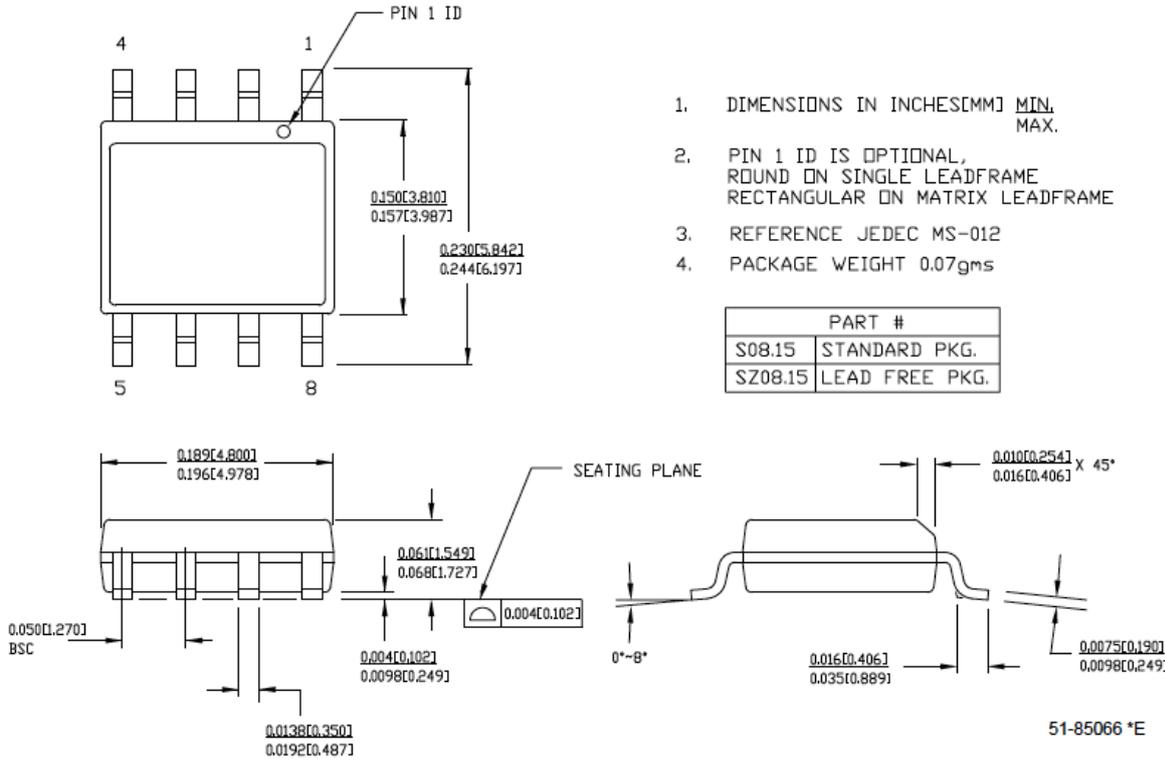


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## 7. Package dimensions DIL 8



## 7.1 Package dimensions SOIC8



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## 8. Ordering information

Partname	Order Code	Package	MOQ	Description
LED-Warrior07-S	LW07-S	SOIC-8	97	Single chip IEC62386 to PWM LED controller
LED-Warrior07-P	LW07-P	DIL 8	1	Single chip IEC62386 to PWM LED controller
LED-Warrior07-01MOD	LW07-01MOD	Module	1	IEC62386 to PWM controller module
LED-Warrior07-02MOD	LW07-02MOD	Module	1	IEC62386 to PWM power driver module

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

### 8.1 Packaging info

SOIC-8 chips are packaged in tubes of 97 units each. The SOIC-8 chips are not individually marked and are sold only in full tubes.

DIL-8 chips are packaged in tubes with 53 chips each.

The modules are packaged in single units.

### 8.2 Shipping version

LED-Warrior07 is currently shipping in version V1.0.0.5

#### 8.2.1 Revision History

V1.0.0.5 - Fixed an internal race condition that could lead to lost receive packets if a very narrow timing window was met.

V1.0.0.4 - Fixed Reset Command. It did clear the short address.

V1.0.0.3 - Fixed Reset command. Actual Power was not reset to 254.

Reduced max. recommended operating voltage for modules to 40 V.

V1.0.0.2 - Fixed writing to persistent memory. Write was delayed indefinitely if the bus power failed. (never publically released)

V1.0.0.1 - Fixed Step Down command.

V1.0.0.0 - Initial shipping version.

### 8.3 FCC / CE

The LED-Warrior07 is sold as a chip or module to be integrated into a device. As such it can not be FCC or CE approved.

Code Mercenaries has exerted greatest care in designing this chip and 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.

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