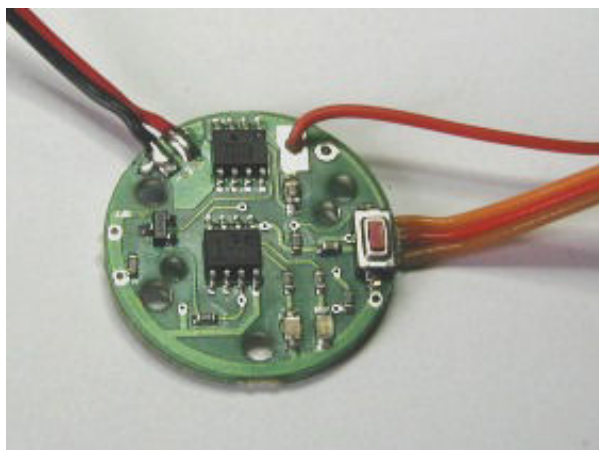




Power LED Driver

Board for driving high power LED (1W) with your RC system



1. Overview

Power LED driver is an electronic board designed to drive high power LED controlled by a channel of your RC receiver system.

It can be connected to a dedicated channel or it can be used in parallel with an existing function.

It is possible to select the activation level of the selected channel for board activation (so multiple boards can be connected on the same channel and will react at different command positions) and it is also possible to select one of the following operation modes:

- Output on and off.
- Normal blink: it is possible to program either on and off time.
- Strobe mode: the on time is fixed at 0.02 seconds and the off period can be programmed.

In each mode it is also possible to enable or disable the **'Soft-off'** function to reproduce the slow switch off typical of bulb lamps.

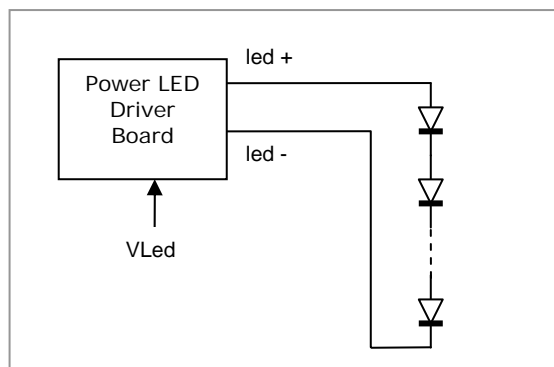
2. Connections

The number of leds that can be connected to the board output varies according with the voltage used to power leds and led type.

The boards will supply a regulated current of 350 mA and can handle a voltage of 12V max.

If more than one led is to be connected, the connection must be in series mode (see diagram) and all used leds must be of the same type.

The total led forward voltage (V_f) that must be considered to select the most appropriate led voltage is the sum of the forward voltage of all leds.

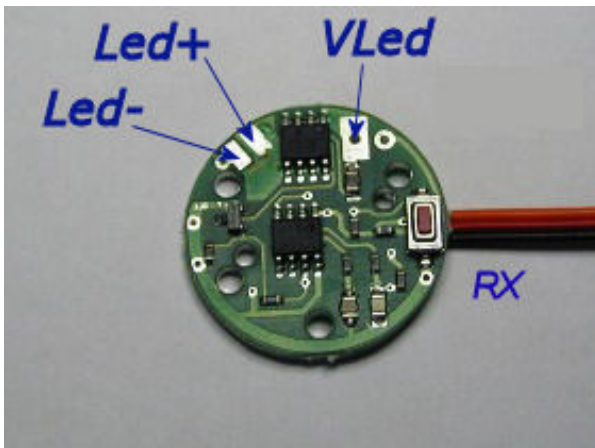


Multiple LED connection diagram.

To avoid board over-heating the led supply voltage (V_{Led}) must be as close as possible to the led forward voltage; all the excess voltage will generate heating that must be dissipated by the driver board.

For a single white led (V_f approx. 3.6V) a single LiPo cell is perfect, while if you are using red led (V_f approx. 2V) the same single cell is too much and it is better to connect 2 led to a single cell.

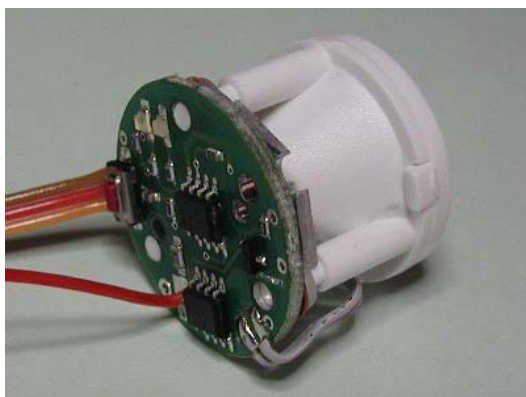
The board can handle a maximum voltage of 12V, so it is possible to connect 4 white leds or 6 red leds.



Led+	Anode (positive terminal) of the led (or led array)
Led-	Cathode (negative terminal) of the led (or led array).
VLed	Positive power supply for the led; if a separate battery is used, connect the two battery GND terminals to have a common ground.
RX	Receiver connection

The board can be fitted in the back of the Led Head-lamp and can be fixed with a small drop of glue.

Be sure that the back of the led radiator doesn't touch the board to avoid short circuits.



3. Programmable functions

The board can be user-programmed to adapt to the RC system and to select the required function mode; in the two blink modes the blink on and off periods can be adjusted. The board will keep in memory the data until the next programming.

4. State led indicators

On the board there are two state leds (one green and one red) used to display the current board state and to identify different programming steps.

At power-on one of four different conditions can happens:

State Led indication	Condition
Fast blink of red led	1. Memory error or corrupted data.
Four red led blinks (see details at section 6).	2. Programming procedure started.
green led solid on for two seconds and then one blink every two seconds	3. Normal working state.
green led solid on waiting for command in off position	4. RC command in on position.

5. Function modes

The board has three selectable function modes and one function (**Slow-off**) that can be applied at each mode.

In all modes the green led gives the state of the rc-command: when it is solid on the command is 'on', otherwise it will blink with a short lamp every two seconds to signal that everything is working well.

When the command is in 'off' position the output led is always switched off; when it is in 'on' the output led will switch on in one of the following function modes:

Mode	Description
1) On-Off	Head-lamp mode: the output led is switched on.
2) Normal blink	The output led will blink at adjustable rate (either on and off periods can be programmed).
3) Strobo	The output led blinks with a short on period (20 mS) and a programmable off period.



6. Programming procedure

To start the programming sequence, power on the system with the pushbutton pressed.

The first two data to be programmed are the command positions for off and on.

Command programming:



- 1 Immediately after power-on the red led blinks four times: move the command stick (or slide, switch,...) in off position.
- 2 The red led will become solid on for two seconds to indicate that the off position has been stored.
- 3 During the next 4 green blinks the command must be moved to the on position.
- 4 The green led will become solid on for two seconds to indicate that the on position has been stored.

If the red led starts to blink fast, an error is found: please check that the two off and on command are not in the same position or in two too close positions; switch off and restart the programming procedure.

For the next functions the programming logic is simple: each function is identified by a number of blinks (1,2 or 3) repeated four times; when the red led blinks the function is disabled, while when the green led blinks the function is active.

Pushing the programming pushbutton will toggle the current function state from enabled to disabled and vice-versa; if the function is already in the desired state, simply wait for next function start after the four blinks repetition.

The first function to be programmed (1 blink repeated 4 times) is the **'Soft.off'** mode, that will gradually switch off the output led to simulate the incandescent lamps switch-off mode.

The second function (2 blinks repeated 4 times) is the blink/on-off function mode selection; if the on-off mode is selected (red led blinking), the programming procedure is terminated as no more data are required.

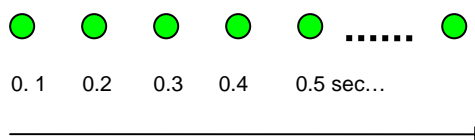
If the blink mode is selected (green led blinking) the next function (3 blinks repeated 4 times) allows to select which blink mode: normal or strobo.

The last two functions are the off and on blink period; if the strobo mode is selected the on period programming is not necessary and only the off period must be entered.

The time programming for on and off period is done by counting a sequence of quick blinks and pushing the programming pushbutton when the desired count has been reached.

To avoid confusion on which time you are programming, the red led identifies the 'off' time, while the green led identifies the 'on' time.

Each blink equals approximately 100mS so to set-up a 2 seconds interval it is necessary to count 20 blinks.



At the end of the programming procedure the green led will be solid on for two seconds to indicate that all parameters have been successfully stored.

The programming procedure is terminated and the board must be powered off and on again for the new set-up to take effect.



7. Programming example

The board must be programmed with normal blink mode and 'Soft-off' and must switch on when the the throttle is on. The blink rate is 1 sec on and 4 sec off; the 'Soft-off' is already active.

User	Power LED board	
Action	State Led	Effect
Connect the board to the throttle channel and power on with the button pressed and the throttle stick at minimum position.	Four red blinks	Programming procedure starts
	Red led solid on	Off position stored
Move the throttle stick up to the on position	Four green blinks	
	Green led solid on	On position stored
Move back the stick at minimum position	One green blink (4x)	Soft-off is already on
	Two red blinks	Blink mode disabled (1)
Push the button on the board	Two green blinks	Blink mode enabled.
	Three green blinks	Strobo mode enabled
Push the button on the board	Three red blinks	Strobo mode disabled

(1) If the on/off mode is selected, the programming procedure will end at this point.

The function mode is now selected and the on (1 sec., 10 green blinks) and off periods (4 sec., 40 red blinks) must be entered.

User	Power LED board	
Action	State Led	Effect
	Green led solid on for 1 sec.	'On' period count will start. (2)
Push the button after 10 blinks.	Green quick blinks	'On' period counting
	Red led solid on for 1 sec.	'Off' period count will start. (3)
Push the button after 40 blinks.	Red quick blinks	'Off' period counting
	Green led solid on for 2 sec.	Data saved in memory
	Leds off	Procedure end.

(2) In the 'strobo' mode the 'on' period programming will be skipped and the procedure jumps to the 'off' period programming (3).

The programming procedure is terminated and the board must be powered off and on again for the new set-up to take effect.

Table of state led indication while programming:

Mode	State led	Function state
Soft off	●	Disabled - the output led will switch off immediately.
	●	Enabled - the output led will switch off slowly (approx. 1.5 sec.)
Blink mode	● ●	Disabled - the output led will be on or off according with the command position.
	● ●	Enabled - the output led will blink when command is on.
Strobo mode	● ● ●	Disabled – normal blink mode selected.
	● ● ●	Enabled – strobo mode selected.