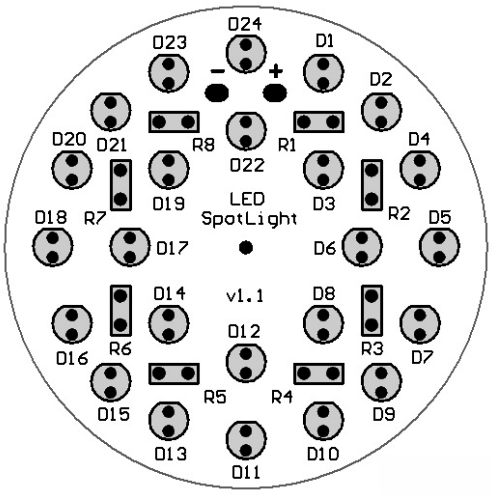
Publisher's Resource Centre
PO Box 83044
34A Avondale Blvd.
Brampton, Ontario
Canada L6T 5N3
www.pcboard.ca

LED SpotLight
24-LED SpotLight

LED SpotLight – 24-LED SpotLight

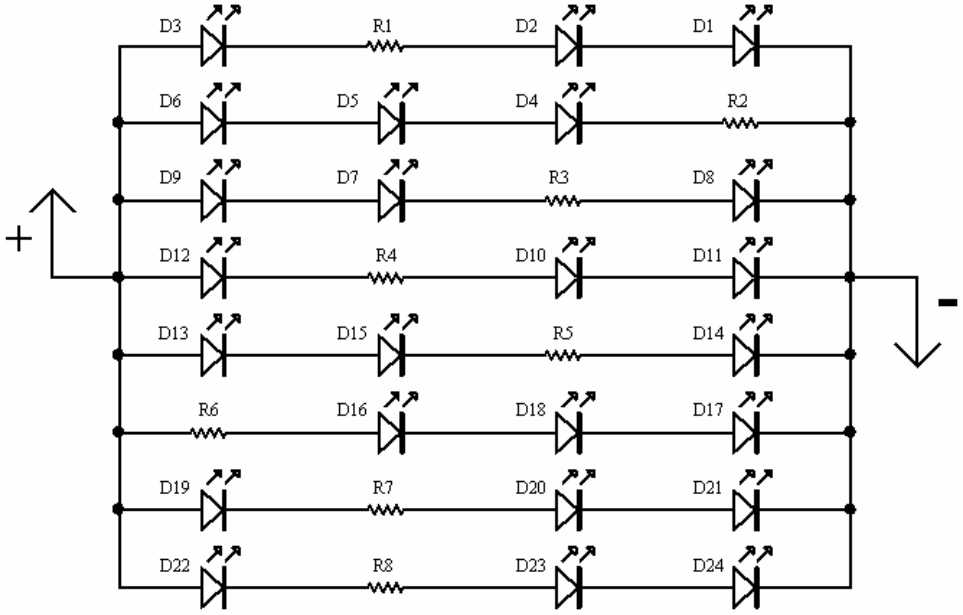


Light Emitting Diodes (LEDs) are an attractive, economical and convenient option for lighting applications. Available in a wide variety of colors, styles, sizes and intensities, LEDs provide for inexpensive, highly-efficient, low-voltage, reliable lighting solutions. Applications range from lighting in aquariums, recreational vehicles, marine & aircraft to computer case mods, under-vehicle lighting, emergency/security lighting and accent-lighting in the kitchen and around your home – the options are endless.

One challenge with LEDs is the mounting of the displays. We produce several innovative solutions, including the ***LED SpotLight***, which holds 24 LEDs in a circular pattern on a compact 2 3/8" (60mm) diameter board.

The design of the ***LED SpotLight*** allows for all 24 LEDs (located at ***D1*** to ***D24***) to be powered from the common power input area just below ***D24***.

Located in the centre of the board is a hole which can be enlarged and for specialized mounting needs. This hole can also be used to position a camera lens to use the board as a ring light in macro-photography or filling the board with IR LEDs for the positioning of a low-light night vision camera.



The schematic shows the LEDs wired in sets of three with each set having its own current limiting resistor. A full 24 LEDs running on the board will draw a total of approximately 160mA.

LEDs do require care in controlling the maximum current through the circuit – this is known as Current limiting. Current limiting is the process of restricting or controlling the total current draw of a circuit with the use of resistors.

Current limiting is accomplished on the ***LED SpotLight*** by eight resistors located at positions ***R1*** to ***R8*** on the board. Different colors of LEDs can be included on the board, but you must always ensure to not exceed the maximum current (known as the *forward current*) which is usually around 20mA to 25mA.

The value of the current limiting resistors is determined by the supply voltage to the circuit, the voltage drop across each LED and the current desired through the circuit. As a rule, keep the current through each leg of the circuit to approximately 20mA, which is normally the standard for 5mm LEDs. The following chart will assist you in determining the correct dropping resistor needed for your specific application.

Resistor Selection Chart

LED Type/Color		Blue	UV & Green	White & Pink	Red & Yellow
LED Forward Voltage		Vf=3.7v	Vf=3.5v	Vf=3.0v	Vf=2.0v
Supply Voltage	13.5v to 14.0v	150-ohm	150-ohm	220-ohm	330-ohm
	13.0v to 13.4v	120-ohm	150-ohm	200-ohm	330-ohm
	12.5v to 12.9v	100-ohm	120-ohm	200-ohm	330-ohm
	12.0v to 12.4v	68-ohm	100-ohm	150-ohm	270-ohm
	11.5v to 11.9v	43-ohm	168-ohm	120-ohm	270-ohm

Resistor Color Codes

330-ohm (orange-orange-brown-gold)	270-ohm (red-violet-brown-gold)	220-ohm (red-red-brown-gold)
200-ohm (red-black-brown-gold)	150-ohm (brown-green-brown-gold)	120-ohm (brown-red-brown-gold)
100-ohm (brown-black-brown-gold)	68-ohm (blue-grey-black-gold)	43-ohm (yellow-orange-black-gold)

For example, if you were going to run a set of White LEDs in an automobile, the normal battery voltage of a car is approximately 13.8v. Based on the chart, the supply voltage is between 13.5v and 14.0v and the White LED option shows you would require a 220-ohm dropping resistor.

It is important that you use the correct current limiting resistor, as using a value too low could result in permanent damage to the LEDs by allowing too much current flow. If you use a value larger than is needed, no damage will occur, but the LEDs will not glow as brightly which may be desirable depending on your application.

The current limiting resistors need to be placed on the board in positions ***R1*** to ***R8***. Refer to the pictorial image of the board showing the positions of the eight resistors. The resistors will need to stand vertically on the board to fit.

Power is applied to the board through the '**+**' (positive) and '**-**' (negative) solder pads located just below D24 and above D22.