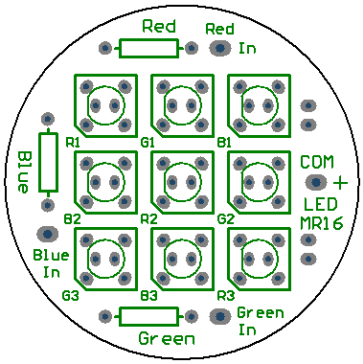
Publisher's Resource Centre
PO Box 83044
34A Avondale Blvd.
Brampton, Ontario
Canada L6T 5N3
www.pcboard.ca

LED MR16
9-LED MR16 Display



LED MR16 – 9-LED

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 MR16***.

The ***LED MR16*** holds the LEDs on a compact 1 7/8" (48mm) diameter board. Designed to fit into standard MR16 down light frames (12v 50W halogen frames) and holds nine 5mm LEDs or nine Super Flux / Piranha 4-pin LEDs, an exclusive unique feature of our board.

A total of three separate inputs have been provided on the ***LED MR16***, allowing for the placement of three colors of LEDs on the board. Red LEDs can be placed at ***R1, R2 & R3***, Blue LEDs at ***B1, B2 & B3***, and Green LEDs at ***G1, G2 & G3***.

Input power to each color is provided at the "***Blue In***", "***Red In***" and "***Green In***" terminals which are all ground connections. The common input, labeled "***COM +***", is where power would be applied to the circuit.

The ***LED MR16*** can also be used with a single color LED – such as white to provide a spotlight effect, simply populate LEDs at each position on the board (***R1, R2 & R3, B1, B2 & B3,*** and ***G1, G2 & G3***) and install the appropriate dropping resistor at the "***Green***", "***Red***" and "***Blue***" resistor locations. You will also need to install jumpers across the two jumper blocks directly above and below the "***COM +***" power input terminal. This will join all three color segments together. Now simply apply a negative power lead to any of the "***Blue In***", "***Green In***" or "***Red In***" terminals and a positive voltage to the ***COM +*** terminal. This setup is very common for white-only or Infrared (IR) LED applications.

The LEDs are wired in three parallel sets of three wired in series, with each set having its own current limiting resistor. A full 9 LEDs running on the board will draw a total of approximately 60mA (20mA for each set of three LEDs).

To power up your board, apply '**-**' (negative) to either of the "***Red In***", "***Green In***" or "***Blue In***" terminals, and apply '**+**' (positive) to the pad labeled "***COM +***".

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 board through resistors located at positions "***Red, Blue & Green***" with each resistor controlling the current to the corresponding LEDs. 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 resistor 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 to 25mA, which is normally the standard for LEDs. The chart below will assist you in determining the correct dropping resistor needed for your specific application.

Resistor Selection Chart

LED Type/Color		White, Green & Purple	Blue	Red & Yellow
LED Forward Voltage		Vf=3.2v	Vf=3.3v	Vf=2.0v
Supply Voltage	14.6v to 15.0v	270-ohm	270-ohm	470-ohm
	14.1v to 14.5v	270-ohm	240-ohm	430-ohm
	13.6v to 14.0v	220-ohm	220-ohm	430-ohm
	13.1v to 13.5v	200-ohm	200-ohm	390-ohm
	12.6v to 13.0v	180-ohm	160-ohm	360-ohm
	12.1v to 12.5v	150-ohm	150-ohm	330-ohm
	11.6v to 12.0v	120-ohm	110-ohm	330-ohm
	11.1v to 11.5v	100-ohm	82-ohm	300-ohm
	10.6v to 11.0v	75-ohm	56-ohm	270-ohm
	10.1v to 10.5v	47-ohm	33-ohm	240-ohm

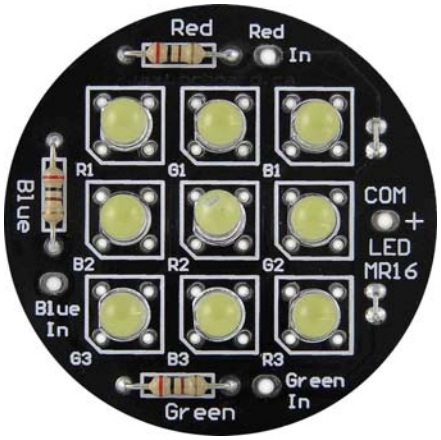
¼ watt Resistor Color Codes

470-ohm (yellow-violet-brown-gold)	430-ohm (yellow-orange-brown-gold)	390-ohm (orange-white-brown-gold)
360-ohm (orange-blue-brown-gold)	330-ohm (orange-orange-brown-gold)	300-ohm (orange-black-brown-gold)
270-ohm (red-violet-brown-gold)	240-ohm (red-yellow-brown-gold)	220-ohm (red-red-brown-gold)
200-ohm (red-black-brown-gold)	180-ohm (brown-gray-brown-gold)	160-ohm (brown-blue-brown-gold)
150-ohm (brown-green-brown-gold)	120-ohm (brown-red-brown-gold)	110-ohm (brown-brown-brown-gold)
100-ohm (brown-black-brown-gold)	82-ohm (gray-red-black-gold)	75-ohm (violet-green-black-gold)
56-ohm (green-blue-black-gold)	47-ohm (yellow-violet-black-gold)	33-ohm (orange-orange-black-gold)

For example, if you were going to run a set of three 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 can result in permanent damage to the LEDs in your circuit. If you use a value larger than is needed, the LEDs will not glow as brightly and no damage will occur.

LED MR16 with 5mm LED



LED MR16 with Piranha / SuperFlux LEDs