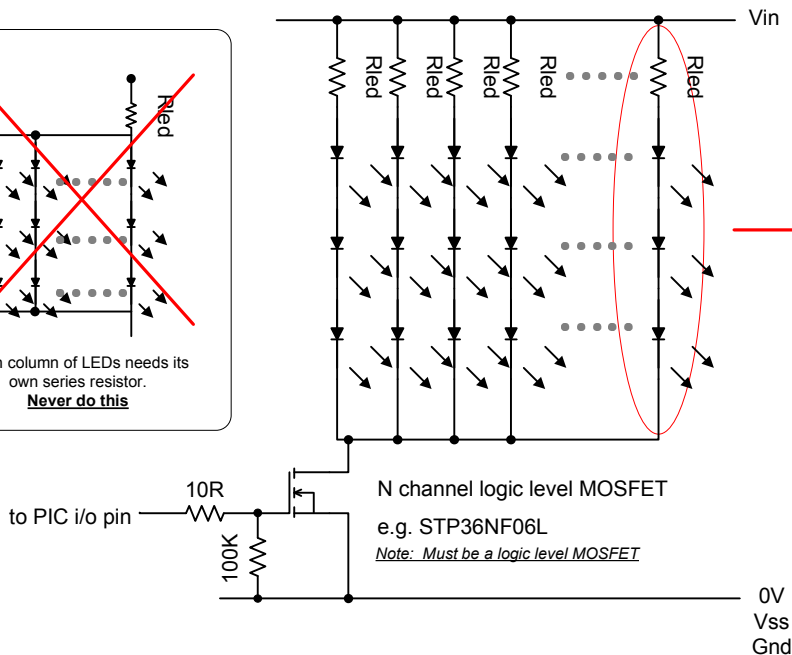
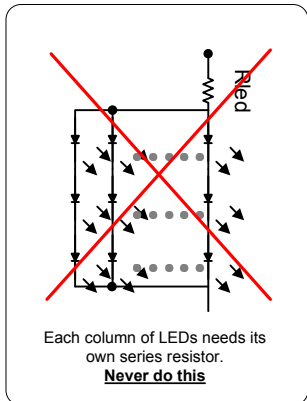


Driving LED Arrays using PIC microcontroller

picprojects.org.uk



Calculate Rled

$$R_{led} = \frac{(V_{in} - V_{f_{led}} \times n)}{I_{f_{led}}}$$

$V_{in} = 12 \text{ volts}$
 $V_{f_{led}} = 3.3 \text{ volts}$
 $I_{f_{led}} = 20 \text{ mA}$
 $n = \text{number of LEDs in series}$

$$R_{led} = \frac{(12 - 3.3 \times 3)}{0.02} = 105R$$

Use nearest E12 resistor = 100R

Power rating for the resistor

$$\text{Power} = I_{f_{led}}^2 \times R_{led}$$

$I_{f_{led}} = 20 \text{ mA}$
 $R_{led} = 100R \text{ (from calculation above)}$

$$\text{Power} = 0.02^2 \times 100 = 0.04W$$

Here you could use an 1/8W or 1/4W resistor

Notes:

- MOSFETs require a minimum voltage at the gate terminal to turn on. Logic level MOSFETs are designed to operate with a gate voltage of 5 volts. Standard MOSFETs will generally operate with 5 volts on the gate terminal but may not be able to handle higher currents. I recommend that if you are buying MOSFETs to build a driver buy a logic level version.

- The input voltage V_{in} needs to be a regulated DC voltage. If you are using a power source that can / will vary then you should calculate the value of the current limiting resistors using the worst case (highest) voltage.

e.g. For use with a 12V automotive system, use a value of 14.5V V_{in} when calculating the resistor values.

- The 100K gate pull-down resistor ensures the MOSFET is turned off when the circuit powers up. At this time the PICs I/O pins are configured as inputs, without the resistor the gate will float and the MOSFET will start to turn on.

Example for a 350mA power LED with 12R resistor

$$I_{f_{led}} = 350 \text{ mA}$$

$$R_{led} = 12R$$

$$\text{Power} = 0.350^2 \times 12 = 1.47W$$

This would require a 2W resistor

Power supply current (example)

3 LEDs per column, 33 columns = 99 LEDs
 $99 \times 20 \text{ mA} = 1.98 \text{ amps}$

Make sure V_{in} Power Supply and MOSFET I_{ds} are suitably rated.

E12 Resistor values from 10R to 820R

10, 12, 15, 18, 22, 27, 33, 39, 47, 56, 68, 82
 100, 120, 150, 180, 220, 270, 330, 390, 470, 560, 680, 820

You can use two resistors in parallel to get a value between two E12 values.

e.g. two 270R resistor in parallel are equivalent to a single 135R resistor

