LED-driver----------max7219

The LED driver max7219 (by maxim) enable you to control easily a 8x8 LED Matrix or a eight character (7-segment) numeric LED display with just three digitalOut Pins from the Arduino.
That means you can control for example a 64 LEDs in a 8x8 Matrix with no need to take care of updating/running the matrix on your own, the MAX7219 will do this job for you.
You just have to tell him which LED he should light up. Furthermore you can easily change the intensity of the hole matrix, but unfortunately the max7219 can not light different LEDs with different intensities.
This three digitalOut Pins coming form the Arduino will provide the clock Signal (mark between every bit), the load Signal (mark between every command) and the dataIn Signal (information/command coming form the Arduino).

Controlling the Matrix

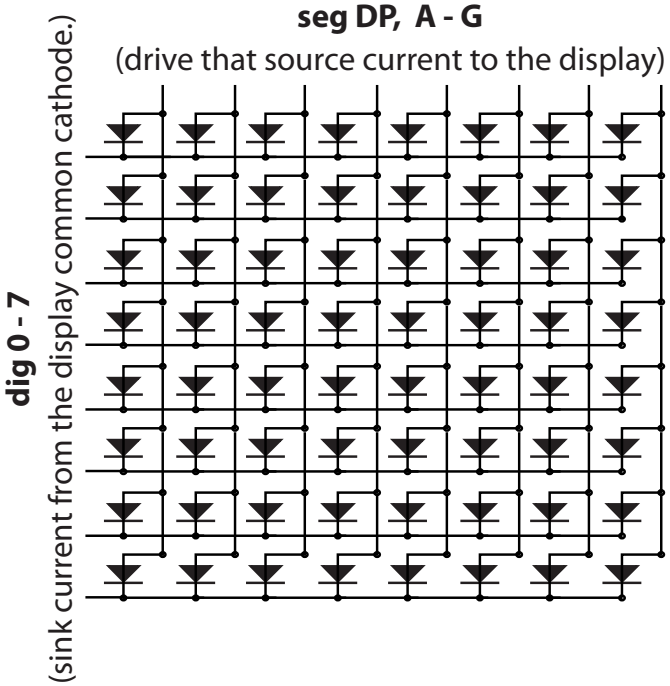
The Matrix is structured in registers (named “reg” in the code) and columns (named “col” in the code). With reg you setting the line in which you would like to change a LED and with col you can turn on or off the different LEDs in this line.

For the right wiring you need to have a look at the pins of the max7219. The 8 registers are the DigO-7 pins and the columns are the Seg Dp, A-G pins at the max7219 (keep in mind the order of the segments start with DP, then comes A to G)

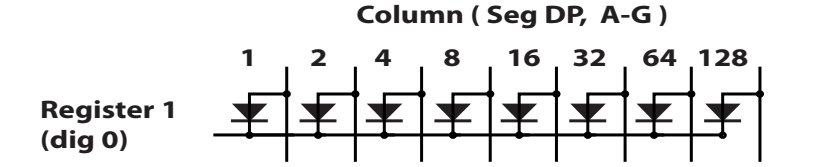
If you just use one max7219, you can use the function “maxSingle(register (1-8), column (0-255))” to control the max7219.

You can call the 8 different register with the numbers 1 to 8. (1 equals the first line, 2 the second, and so on).

The columns are representing the 8 LEDs in every Register. Each of this column are connected to a binary number (the first LED is 1, the second LED is 2, the third LED is 4, the fourth is 8 and so on up to the eighth LED which is 128)



You have to add together the numbers of the LEDs (columns) which should light up in this Register. Accordingly you always have to write a number between 0 (no LED is on) and 255 (all the LEDs are on). For example if the third and the last LED should light up you have to write 132 (4 + 128 = 132).



If led the fourth and the eighth Led should be on

col = 0 + 0 + 0 + 8 + 0 + 0 + 0 + 128 = 136

At the max7219 you can just call (change) one register at the same time. If you want to change two or more LEDs in two different registers, you have to call at first register do the change and then call the second register and do the change there. If you do this with out a delay in between nobody will notice that you changed one before the other.

Cascading

It is possible to cascade several max7219. You just have to connect all the max7219 clock and load pins to the clock and load pins at your arduino. And connect the DataOut of the first max7219 to the DataIn of the second max7219 and so one.

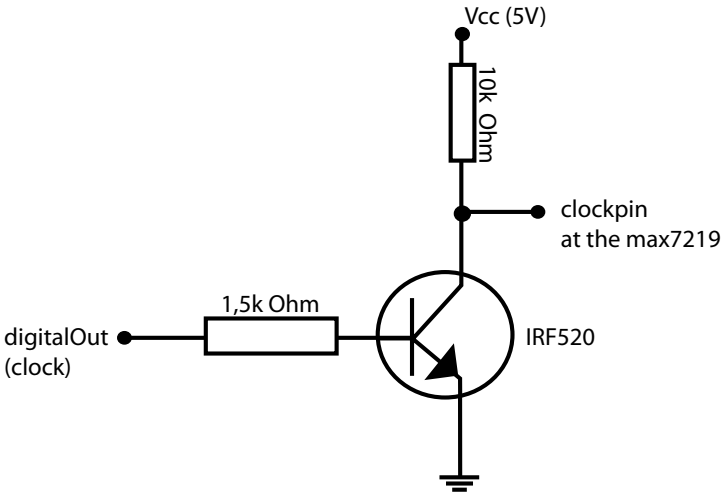
In the code example you will find two functions for working with more then one max7219

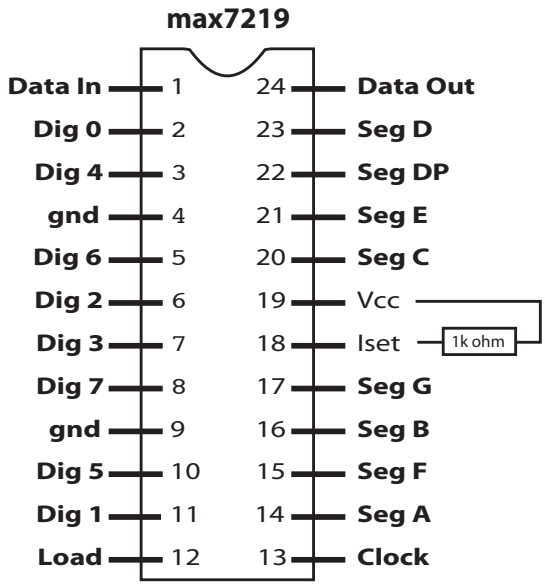
*If all the max7219 your are using, should do the same thing you can use this function
„maxAll(register (1-8), column (0-255))“

*If you just want to change some LEDs at one of several max7219 you can us this function
„maxOne(Max7219 you wane controll (1== the first one), register (1-8), column (0-255))“

Power supply

while using one power supply for more then one max7219 or just using a crappie (noisy) power supply, you should connect a 10uF electrolytic and a 0.1uF ceramic capacitor between V+ and GND as close as possible to each chip. You should as well keep the wires between the max7219 and the LED matrix as short as possible.
If you want to use a couple of max7219s you maybe have to amplify the load and clock signal. There are several solutions for amplify the signals, you could use a power transistor (IRF520) like in the following schematic.





Pin configuration

DataIn ----- Serial Input (from the Arduino)
Load ------- Tell the max7219 when he should read the information (coming from the arduino)
Clock ------- timing the information (coming from the arduino)
Data Out ------ Signal going to the dataIn of the next max7219 (while Cascading)

Dig 0-7---------- gnd coming from the Matrix (Register1-8)
Seg A-G, DP--- supply voltage to the matrix (col 0-255)

Gnd --- ground (0 V)
Vcc ---- positive supply voltage (5v)
Iset----- set the light intensity for the led matrix