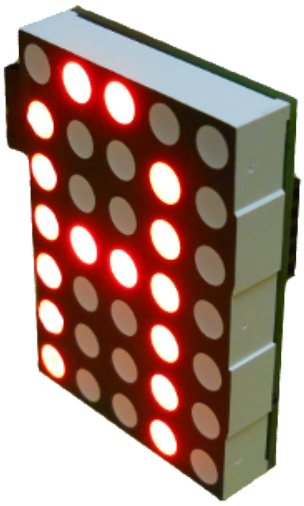
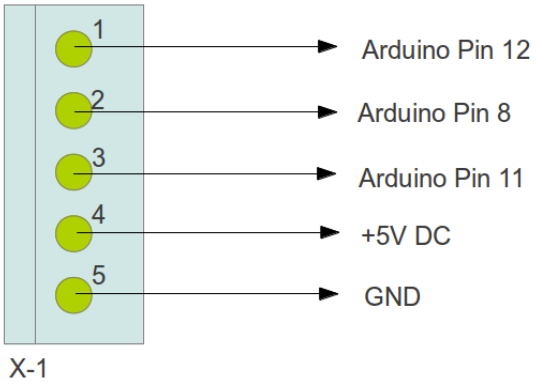
MLD1 Modular LED Display Specs

Spec	Data
Matrix:	5 x 7 2 in tall
LED Color:	Red
Operating Voltage:	4 - 6.5V DC 5V DC Recommended
Average Current Consumption:	~ 150 mA per module
Dimensions:	2.1in x 1.5in x 0.5in (53.5mm x 38.5mm x 12mm)



Using with the Arduino Uno, and Electronics123 Controller Software



Wiring Description

Arduino refers to the controller board running the Electronics123.com, Inc LED Display Controller hex file.

Pin 1 = Clock
Pin 2 = Latch
Pin 3 = Data

Communication and Sending Display Data (without Electronics123 Controller)

The MLD1 uses a set of shift registers to translate serial communication data from a micro-controller into binary on/off data for each of the 35 onboard LEDs. The shift registers (74HC595) multiplex the LED array to allow easy control of many lights from only a few data inputs, this makes controlling the LED display relatively simple.

Lighting Specific LEDs

Two shift registers are used in the MLD1, one to control columns of LEDs and the other to control rows. First the shift registers must be unlatched to allow their data buffers to open. This can be done by setting pin 2 (Arduino Pin 8) to LOW. In order to light any given number of LEDs on the 5 x 7 matrix, two shift cycles are required. The first cycle sets the column, and the second sets the row. The data is represented in binary. In this way, the column select can be done using the following:

Column:	1	2	3	4	5
Value:	1	2	4	8	16

The second shift selects the combination of lights that will light in that column. There are 256 possible combinations. For example, the binary number “1111111” will light all the lights, and the binary number “0000000” will light none of them. A “1” represents a light that will light and a “0” represents one that will not. In this way, “0100010” will light the second light and the sixth light but none of the others will illuminate.

Only one column of lights per module can light at any given time. Because of this, it takes exactly 10 shift cycles or 5 cycle pairs to display a letter that requires all five columns of lights. This is called an update cycle. These cycles must be completed quickly in order to trick the eye, using persistence of vision, into believing that more than one column lights at once. A cycle shift cycle should take no more than 1ms. Therefore the entire display is updated in no more than 10ms.

Chain Communication to Many Modules

Every two shift cycles, or every shift cycle pair, the display modules memory buffers are emptied. The data contained in them is shifted to the output of the module and can be picked up by the next module in the chain. In order to make multiple displays operate at once, an addition shift cycle pair must be added for each module in the chain. Each pair will still only operate one column at a time, however it will operate one column per module in the chain. The data for the final display module must be shifted first so that it passes through all the modules while other shift cycles are occurring. If a display consists of 10 modules, there are 10 shift cycle pairs in a single column display cycle. Therefore, it will take 50 shift cycle pairs or 100 shift cycles to update the display. Each update cycle will pass 10 shift cycle pairs and at any given time one column on each of the 10 display modules will be lit for a total of 10 lit columns.

After every update cycle the latch pin must be set back to a HIGH setting. This allows the memory buffers to lock the data and send it to the display.