Design Philosophy

The design philosophy behind our LED Drivers is as simple as Ohm's Law.

Ignoring multiplexing (if used) your normal LED has an operating voltage of between around 2.0 and 3.5 vdc with a current draw of around 10 to 20 ma per LED. If you take, say, nine LEDs and put them in parallel the current draw would be up to 180 ma. Now, if you take these same nine LEDs and put them in series instead of parallel and use a voltage of around 20 vdc, the current draw is a much more manageable 20 ma..... the same as one LED.

So why would you want to put nine LEDs in series? OK, let's take an 8x8 LED matrix and we want it to be big…… really big. What we do, in place of one LED we put nine LEDs in series. In other words, instead of having a 8x8 matrix with 64 LEDs (8 x 8=64), we now have a super-sized matrix with 576 LEDs (9 x 64=576). In fact, this is the exact matrix we use for final testing of our LED Drivers.

The Driver Shield gets the 5vdc operating voltage from the Arduino that it's plugged into and the LED operating voltage from an external power supply furnished by the user. Up to 35vdc may be used to power the LED array. The use of this higher voltage means that a lower current can be used to drive a particular LED display. The voltage used is determined by the user and is based on the number and type of LEDs in the series string; in addition, multiplexing may need to be considered. Note that current limiting resistors may be needed at the output terminals for LEDs of different colors.

How to Connect Your High Voltage Driver to an 8x8 LED Matrix

Note: Refer to the enclosed matrix schematic.

Note: Be sure that your sketch is written so that Arduino pin D3 is "LOAD", pin D6 is "DataIn" and pin D7 is "Clock".

Note: As indicated on the enclosed schematic diagram, the pin numbers on header H3 on the Arduino Matrix Driver Shield are the same as the "Digital" numbers on the Arduino, PLUS 1. For example, header H3 pin 7 is pin D6 on the Arduino.

Note: These instructions are for a COMMON CATHODE matrix only.

In this discussion, when looking at the front of the matrix, COLUMN 1 is on the left-hand side and ROW 1 is at the bottom of the matrix. A matrix wired differently

than the enclosed sample schematic may need to have the Controller PCB COLUMNS and ROWS connected differently or have the software modified. It's impossible to give a single wiring diagram since the matrix connections to the HV Driver depend on how your matrix is wired and also how the software you're using is written.

For example, when using the "Matrix Test Program" on our web site, which is written primarily for a 5x7 matrix, with the 8x8 matrix you would wire the various Controllers this way:

When using the Arduino Matrix Driver, this program will spell "Arduino" one word at a time and then gradually light up all the LEDs and then repeat. COLUMN 1 (the left hand column looking at the front of the matrix) goes to TB1-1, column 2 goes to TB1-2 and follows this sequence through column 8 (right hand column), which goes to TB1-8. The same for the ROWS connections: row 1 (the bottom row) goes to TB2-1, row 2 goes to TB2-2 and so on through row 8 (top row), which connects to TB2-8.

The "Matrix Test Program" on our web site may be used for testing purposes.

Connecting the Driver to a high voltage source.

The maximum voltage to be applied must not exceed 35vdc and the minimum voltage must be greater than 5vdc. Be sure to observe the polarity signs at TB3, the high voltage terminals. There is a polarity protection diode for the HV, but be careful anyway. The level of HV voltage to be applied to TB3 depends on a number of things, such as: The number of LEDs in series, the voltage required for each individual LED, the multiplexing speed and duty cycle. This being the case, it's best to use a variable supply to find the optimum voltage level for each matrix.

There are numerous voltage converters that can convert 12vdc or 15vdc from the level of the input voltage up to 35vdc. These devices are offered on eBay and sell for less than $5.00. Of course, you can also use a separate power supply that has a variable voltage output.

Technical Information

The Controller Shield is designed to be used with the Arduino Uno PCB and obtains its operating voltage from the Arduino. A user provided power supply must be used with the shield to power the controlled displays. The minimum controlled display voltage is 5.0 vdc and the maximum voltage is 35 vdc.

The displays to be controlled must meet the following requirements:

The matrix must be a common cathode type
Maximum operating voltage 35 vdc
Minimum operating voltage 5 vdc
Maximum power dissipation (Pd) for the either controller:
1.25 watts at ambient temperature (Ta) of 25 deg C
Max load on any ONE output at Ta of 25 deg C (the other seven outputs idle): 500 ma at 35 vdc (minimum voltage of 5.0 vdc)

Some typical simultaneous loadings at Ta 25 deg C:

Output 1: 100 ma
Output 2: 100 ma
Output 3: 100 ma
Output 4: 225 ma
Output 5: 50 ma
Output 6: 50 ma
Output 7: 25 ma
Output 8: 25 ma

Note: Resistors may needed between the Controller and the LED display when mixing LED colors.