

how to control LED array? (follow-up)

Source: <http://sci.tech-archive.net/Archive/sci.electronics.basics/2005-05/msg00786.html>

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 - *Date:* Fri, 27 May 2005 18:27:05 -0500
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Hi – this is a follow-up to this thread:

http://groups-beta.google.com/group/sci.electronics.basics/browse_frm/thread/679679383cd7eab0/cb7e229d9bca99d5

I've been working on finalizing the design. I've drawn up a schematic in Eagle of what I think should work:

<https://netfiles.uiuc.edu/mnoone/www/Electronics/LED-Array.jpg>

This is essentially identical to what John Fields was suggesting, except I've modified some resistor values as I have now chosen LEDs:

<http://cgi.ebay.com/ws/eBayISAPI.dll?ViewItem&item=7513499883> (3.3v forward voltage, 20–30ma typical current)

The design of this array calls for only one column to be on at any given time. The columns are active high, and the rows are active low. The goal is to saturate the transistors. The value for R1–R16 was chosen by dividing the typical base-emitter saturation voltage by the base current, thus $0.85/0.015 = 56.67$, or about 56 ohms. These values were found on page two of both the 2N4401 and 2N4403 datasheets:

<http://www.fairchildsemi.com/ds/2N/2N4401.pdf>
<http://www.fairchildsemi.com/ds/2N/2N4403.pdf>

The value for R16–R24 was chosen by taking $(V+ - 2*VCesat - Vled)/ILED = (5 - 2*0.4 - 3.3)/.03 = .9/.03 = 30$ ohms. A current of 30ma was chosen because only one led on each row will be on at any given time, and as each column will only be on for 1/8 of the time – I feel it is best to use the maximum current allowed.

Oh – lastly, if anyone is curious as to the odd placement of gnd on the row connector and +5v on the column connector (as the layout would probably be nicer the other way around) – I did this as a reminder that the rows are active low and the columns are active high.

So how does everything look? Some of my calculations and final numbers

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differ from the original thread – thus I thought I should check back to see if I'm doing something wrong. Thanks so much,

–Michael J. Noone

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- *Follow-Ups:*
 - ◆ *Re: how to control LED array? (follow-up)*
 - ◇ *From:* John Fields
 - ◆ *Re: how to control LED array? (follow-up)*
 - ◇ *From:* Ban
 - Prev by Date: *Re: electrocution by car battery*
 - Next by Date: *Re: safety of lead free solder*
 - Previous by thread: *PWM in a switching power supply*
 - Next by thread: *Re: how to control LED array? (follow-up)*
 - Index(es):
 - ◆ *Date*
 - ◆ *Thread*