

hardware > Will these LEDs work?**Will these LEDs work?**

posted by surreal ([surreal](#)) on 05.07.2007 12:43

hello,

i am not completely sure what specs i should be looking for with reverse voltage and forward and voltage drop...

so will these LEDs work? they are the cheapest 3mm white LEDs that i could find. i don't like going cheap but the others are a buck a pop.

<http://www.coolerguys.com/840556011262.html>

Re: Will these LEDs work?

posted by arne (guest) on 05.07.2007 14:18

Yes it would be nice if we could get som spesifications on the leds minimum.maximum values...

My two kits are in the mail juhu!!

a

Re: Will these LEDs work?

posted by tonedft ([tonedft](#)) on 05.07.2007 15:32

I'm going to Jameco today and am trying to sort this out.

In this thread

<http://forum.monome.org/topic/943#new>

tehn says the LEDs in the 'new units' are Jameco 33307

<http://www.jameco.com/webapp/wcs/stores/servlet/ProductDisplay?langId=-1&storeId=10001&catalogId=10001&productId=3333>

The spec sheet for the LED driver is here, check page 11 for specs:

<http://datasheets.maxim-ic.com/en/ds/MAX7219-MAX7221.pdf>

but the dang chart doesn't have units, I believe it's kilo-ohms, the resistor in the kit is a 9.69k, so on the spec sheet that's the upper right corner, making for a VLED of 3.5V @ 40mA which is where tehn gets the 3.5V drop for LEDs. That means the LED has 3.5V across it when its on and get 40mA through it. **that's just outside the spec from the Cooler Guys**

The more I look at this I think there's an easier option.

Get a 100kOhm potentiometer (at least 70kOhm)

Buy whatever LEDs you want, pick one with a wide viewing angle and decent brightness (mcd - millicandles).

For the Vd for that diode, check the 7221 spec sheet, set the potentiometer accordingly then tweak it a little bit to adjust the brightness.

Gah... there was a thread with more info, can't find it.

A thread where tehn mentions 1.7Vf (Vd) @ 20mA

<http://forum.monome.org/topic/236#1439>

As the kit stands look for LEDs with a turn on voltage of 3.5V and can take 40mA (too much current blows them out.) Order at least 70, if you get 64 and one or two blow you won't be happy, get extra and experiment a bit.

There's the Jameco catalog here

<ftp://ftp.jameco.com/Archive/Catalog%20272/272Catalog.pdf>

<---- that's a 332 page .pdf give it time to download.

I was going to get surface mount because for me they're easier to work with but SURFACE MOUNT WON'T WORK in the kits, the pads for the LEDs are on the UNDERSIDE of the board. The holes are through plated but I want it to be more solid than that and don't want to much with 64 of them.

So, I'm looking at that Jameco catalog starting on page 50. Two things to look for first.

Under the 'FIG' column at the left, we want "Fig 1"

Under the 'Viewing Angle' on the far right we want something at LEAST 70 degrees or better. 70' is what the current ones were at, don't want to go narrower than that or the LED might look like a dot on the button rather than a glow. tehn would know better, he's played with more of these.

I'm hoping for blue, don't see anything. The tough part is that the type we want have narrower viewing angles.

I hope that helps and I didn't mislead anyone.

Re: Will these LEDs work?

posted by arne (guest) on 05.07.2007 16:53

Thank you! Looking forward to hear the result of youre research today.
a

Re: Will these LEDs work?

posted by tonedeft ([tonedeft](#)) on 05.07.2007 20:36

All this is pending a reality check from tehn, he's done a lot of experiments with LEDs on this babies

OK OK OK... I went to Jameco and the parts I picked above were in the wrong form.

Do yourself a favor and print out the catalog pages of interest, it was a lot easier to find parts with a catalog in front of me.

In the end I came home with 70 Jameco P/N 333358 at the top of page 54 for just \$17, if I don't like them it was a cheap mistake.

I did not want red, green would be OK, I really really wanted blue but no dice, orange is OK, the catalog has it listed as amber, anyway, should be fine and I can replace them later.

So let's look at that catalog page .pdf
first column - Jameco part number, tell them this to get a part

2nd column - cross reference to another part, didn't use that

3rd column - what the part looks like. this is where I screwed up in getting the wrong part, "figure 1" in any section can be different from another section. We want figure 1 as shown at the top of that page.

4th column - color. red is the most ubiquitous, blue is hardest to find.

5th column - lens feature. just some info on what the lens is like, the top of the LED

6th column - LED size. we want 3mm T1 but skip this column, go to 7

7th column - Diameter. This is 1 of 3 places to look. We want one that says 0.119/3 which means the diameter of the lens is 0.119 inches or 3 mm. I believe I read that tehn said 5mm LEDs won't work as well.

8th - dimensions, no big deal, redundant for this part

9th - lead spacing. 0.100" is standard, no big deal

10th - Vf. This is the diode voltage you plug into page 11 of the 7219 LED driver spec sheet. This is the voltage across the LED when it's on.

11th - mcd. millicandles, how bright is the thing? This is the 2nd place to track. It seems monomes have used anything from 100-900mcd in their designs. This also ties into viewing angle.

12th - wavelength - just another description of the color.

13th - viewing angle. this is the 3rd place that's important to look. I wanted 100'+ of viewing angle, I had to settle for 40'. After staring at the catalog for a while it dawned on me that viewing angle and brightness are related. Take a bright light with a narrow angle and make the angle wider, that bright light won't be as bright, it's spread out. So, I think I went with a good average on that one, 40' but really bright.

So, I'll look up a Vf of 1.7V, check the 7219 page 11 table, set a potentiometer to that resistor value, put it in place of the "iset" resistor (iset means current setting in case you were wondering) and adjust it a LITTLE to get the brightness where I want it. Then take the pot out of the circuit and replace it with the resistance you came up with, OR just leave the pot in there, maybe put a touch of glue on it. Leave it in just to be lazy ;) .

Re: Will these LEDs work?

posted by tonedeft ([tonedeft](#)) on 05.07.2007 20:38

it also occurred to me that people should get a pair of tweezers for soldering in the diodes (not the LEDs).

put a dab of solder on one pad (I do the right side, I'm right handed)
 put the diode on the board near the solder
 grab the diode with the tweezers
 scoot the diode over to the solder while you heat the solder up
 push the diode into the solder, line up the left side
 remove the soldering iron, count to 3
 let go of the tweezers
 solder the left side.

I don't know how I'd do it without tweezers, the diode would stick to the soldering iron.

Re: Will these LEDs work?

posted by colin (guest) on 05.07.2007 20:55

Whether or not the white leds will work, these are cheaper:

http://cgi.ebay.com/50P-Mega-White-LED-3mm-5000mcd-Free-Ship_W0QQitemZ140133683863QihZ004QcategoryZ66952QrdZ1QQcmd

http://cgi.ebay.com/100x-White-3mm-LED-5000mcd-Lamp-Light-Free-Resistors_W0QQitemZ300127020303QihZ020QcategoryZ6695

eBay in general has the best deals on LEDs.

http://business.search.ebay.com/3mm-white_Industrial-Electrical-Test_W0QQcatrefZC12QQfromZR40Qsacatz92074

-Colin

Re: Will these LEDs work?

posted by tonedeft ([tonedeft](#)) on 05.07.2007 21:07

those have 20 degree viewing angles, might be a bit narrow, I'd consult tehn on that call. the brighter they're rated at, the more likely they'll have narrow viewing angles.

my \$0.02, thanks for finding a cheap source.

Re: Will these LEDs work?

posted by surreal ([surreal](#)) on 05.07.2007 22:30

i still know nothing.

what is a good way to figure out whether LEDs will work as is? what can i read to understand how all these specs matter? normally if i look at sets of numbers long enough they begin to make sense. that is not happening here. no one wants to present data on their LEDs in a uniform manner.

i am tempted to just get the same ones in the normal monome even though that isnt my vision. (i know tehn said they discontinued the part but he is finding a replacement)

i ...just want some white LEDs man. LoL.why do people insist on SUPER BRIGHT white leds ? nothing seems below 4000mcd.

Re: Will these LEDs work?

posted by tonedeft ([tonedeft](#)) on 05.07.2007 22:54

if it's the brightness, just turn down the current going through the LED by using a smaller value for the iset resistor that goes on the logic board.

you want a white, low brightness LED?? Let me know, I'll look through the Jameco catalog and recommend one, I took today and tomorrow off of work.

Re: Will these LEDs work?

posted by tehn ([tehn](#)) on 05.07.2007 23:48

keep it simple, guys. this isn't as complicated as it sounds. there are lots of parameters for leds, but it's really just this:

what color? (nm value, google "visible spectrum")

what size? (you want T1 = 3mm)
 how bright? (higher mcd = brighter)

seriously, that's it pretty much.

on print version of the Jameco catalog, all of the standard and medium brightness LEDs that are T1 (3mm) will work just fine. Some of the super-brights might also work.

here are some suggested part numbers:

yellow: 3333294
 red: 333260
 green: 114681

note that 137411 has a Vf of 4.8, this won't work! get LEDs with a Vf at or below 3.5 to be certain, though I'd be curious to have someone test out higher Vf LEDs. just get a few, test them out without soldering them in.

more LEDs, brighter:

red: 333374
 orange: 333358
 blue: 334764

Re: Will these LEDs work?

posted by [tonedef](#) ([tonedef](#)) on 05.07.2007 23:58

(I had e-mail notification turned on)

tehn-
 I've been psyching myself out over viewing angle, does it matter? The aesthetic aspect of these are important, art, music, science.

Also, the 7219 LED driver and the iset resistor, is it picky about the settings?

I only have this one to play with, what was your experience? With different LEDs there's different current and voltage settings per page 11, how much does it REALLY matter? When you tried different LEDs do you bother to change the iset resistor? One size fits all?

Thanks!

Re: Will these LEDs work?

posted by [tehn](#) ([tehn](#)) on 06.07.2007 16:06

I've put a pot in the iset resistor for testing, but 10k seems safe for pretty much everything.

viewing angle changes slightly how the light gets diffused, but there's a pretty substantial chunk of silicone as a diffuser.

again, I suggest making first a test order, get 8 different LEDs, then choose one for the real thing.

Re: Will these LEDs work?

posted by [mesmer](#) (guest) on 11.07.2007 12:52

Hi,
 I have been testing each LED I place in my circuit before I solder them. I have three AA batteries taped together, with wires sticking out and into a proto-board. If the LED lights up, it's good to go.

The first row, is composed of these, and they light-up good:
http://www.sparkfun.com/commerce/product_info.php?products_id=532
 I see them leaning towards orange, not yellow but I guess it's just an artifact of under-powering them...

I have bought 70 of the following to use on my 40h kit:
http://www.sparkfun.com/commerce/product_info.php?products_id=529

Yet they don't light up. I guess, the three AA reduced to (3.4 V) through resistor network has not enough juice??

The big question is Will the above BLUE superbright LEDs Work?
 The small print question is the following clause:
 The LED driver on the monome can theoretically supply each LED with 3.5V,
 My chosen LED has a nominal mystery value of 3.4V. 3.4<3.5 so this should work. Is this the correct analysis or am I comparing oranges and apples?

sorry for the overcomplexification of things: It's just that I read the debate and a lot of this information has to be inferred because it is sort of stated implicitly; maybe I can draw out a simple rule-out once and for all.

many thanks,
-h

Re: Will these LEDs work?

posted by [tehn \(tehn\)](#) on 11.07.2007 14:10

3.4V should work. i can't say for certain because i've never tried them, but they *should* work according to the datasheet of the max7221.

again, test them in the grid pcb without soldering them before committing.

Re: Will these LEDs work?

posted by [mesmer \(guest\)](#) on 11.07.2007 14:58

too late, for about 12 of them.

I did try to test them with the above described batteries, but they wouldn't light up; I guess I better finish that ATX-PC-PS unit to electronix PS conversion project.

I am operating on the premise that they will light up when they have more current through them (perhaps the batteries are too low) I registered 220 mA yesternight....

When my logic kit arrives, I'll power these babies up from the headers, getting power from USB ... I'll let everyone know.

att.
-h

(thanks, btw)

Re: Will these LEDs work?

posted by [tonedeft \(tonedeft\)](#) on 11.07.2007 15:08

on your voltmeter, set it to the setting with the picture of the diode on it (the one where it beeps when you touch the probes together.) put the LED across the leads, it should light, if not, reverse it. when the LED lights the Vd for the diode shows on the voltmeter.

220mA would fry most LEDs, it's about 10 times the current they expect.

I'm not sure about the LED driver on the monome kit, but this is how you work with LEDs.

- Find the Vd (turn on voltage, usually 0.7 - 4V)
- Find the recommended current, usually at the top of the charts in the spec sheet they'll say "tested at 20mA or whatever", that's a good sign they expect 20mA across them, call that Id.
- Figure out your supply voltage, I'll refer to that as Vs.

$(Vs - Vd) / R = Id$

R = a resistor you put in series with the diode

BUT in all reality, just try some out with the monome kit, there's no need whatsoever to go through this, tehn has already done all the work. that's great that you're learning and asking all the right questions but a lot of this doesn't apply to the monome kit but rather a hobbyist electronics web site. I fear people are going to read about your trials and tribulations and think they'll have to go through the same obstacle course. you'll be fine, wait for the kit, you'll be rocking your own flavor in no time.

Re: Will these LEDs work?

posted by [mesmer \(guest\)](#) on 11.07.2007 15:27

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*****
* DISCLAIMER: *
* * *
* MOST OF MY POSTS, QUESTIONS and GENERAL ANXIETY *
* REGARDING PUTTING TOGETHER THE KITS DO NOT *
* REFLECT THE GENERAL EXPECTED EXPERIENCE. *
*****
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* THOSE PAINS ARE DUE TO THE FACT THAT I CHOSE A *
* DIFFERENT KIT, THAN THE ONE SOLD HERE. *
* REGARDING DIY KITS, I CAN BE MASOCHISTIC *
* LIKE THAT, IT'S TRUE. BEST REGARDS. H. *
*****
```

There :D

Thanks, other than that, you are so correct in so many places. AND, I think a post like that was needed. I understand this is the power of the WIKI concept. See, your post should really be a DIY reference article. Perhaps only a Pathfinder, with links everywhere that's needed. It's basically a glorified FAQ edited within a WIKI, in wiki-fashion by all.

Perhaps I read the units wrong, but then 220uA is too small ... Need to investigate. Having (anxious) fun. Many thanks.
-h

Re: Will these LEDs work?

posted by [tonedef](#) ([tonedef](#)) on 11.07.2007 15:42

lmfao!!! godspeed with your kit and journey. you'll be just fine.

good luck, have fun!!

Re: Will these LEDs work?

posted by dylan (guest) on 13.07.2007 21:37

Jameco part number: 334749

These are some blue LEDs that should work just fine. They are cheaper than the ones that then suggested (although still pricey), they have a wider viewing angle and lower voltage. tehn, maybe you could shed some light on why you chose the blue one that you did? If it was just out of looking through the catalog real quick, I would say that you should suggest these instead since they are much cheaper.

Re: Will these LEDs work?

posted by [tehn](#) ([tehn](#)) on 13.07.2007 23:26

my suggestions were arbitrarily based on whatever jameco catalog i had lying around.

what's the mcd difference between these two blue leds?

Re: Will these LEDs work?

posted by dylan (guest) on 14.07.2007 21:01

They're actually the same MCD at 900.. Pretty bright. I tested one the other day and they look damn good.

Actually, I can't tell the difference between the two, why the one you picked is so much pricier. The only differences I can see from the catalog is that the one I suggested is 470nm wavelength with a 45 degree viewing angle and the one you have selected is 470 with a 30 degree viewing angle. And the one I have is 3.2v as opposed to the 3.7v one you suggested. Also, the dimensions appear to be slightly bigger on the one you mentioned. Not significantly though. Like I said, they're both 900mcd though.

Like I said I tested one and it looks fantastic. I put in an order, I will let you know how it works out but I don't anticipate any problems.

Re: Will these LEDs work?

posted by dylan (guest) on 14.07.2007 21:05

Here's the link for all you blue LED fans:

<https://www.jameco.com/webapp/wcs/stores/servlet/ProductDisplay?langId=-1&storeId=10001&catalogId=10001&pa=334749&pro>

Part No: 334749

Re: Will these LEDs work?

posted by [surreal](#) ([surreal](#)) on 15.07.2007 12:57

2 questions

will these LEDs work?

http://cgi.ebay.com/50-WHITE-LEDs-6000mcd-3mm-led-leds-FREE-RESISTORS_W0QQitemZ270099240580QQihZ017QQcategoryZ294QQtc

do i need to ask for resistors?

Re: Will these LEDs work?

posted by [tehn](#) ([tehn](#)) on 15.07.2007 14:49

you don't need any resistors whatsoever.

it's within the voltage spec, so they should work, i think?

also weird auction, in that it says they're in palmdale, ca, but ship from the uk? hmm.

i'd suggest getting the manufacturer part number, and finding the real datasheet on your own. the possibility for misinformation on ebay is huge.

Re: Will these LEDs work?

posted by [sean](#) ([sean](#)) on 15.07.2007 15:11

Is the T1 (3mm) restriction due to physical layout of the keypad kit or the circuit?

If I'm using my own display, could I use T1 3/4 (5mm)?

Re: Will these LEDs work?

posted by [surreal](#) ([surreal](#)) on 15.07.2007 15:45

keypad kit restriction

Re: Will these LEDs work?

posted by [tonedefit](#) ([tonedefit](#)) on 15.07.2007 16:05

yeah, clearance under the buttons. the best bet is to get a couple types, try them then buy 70 of what you liked the most. in hindsight it seems that just about any LED works and looks good as long as it's under the voltage limit (3.4V? don't recall right now, too lazy to go find it) tehn specs out and is 3mm through hole. surface mount LEDs will also work, they're just not as easy to solder onto the board.

Re: Will these LEDs work?

posted by [selalou10](#) ([selalou10](#)) on 16.07.2007 13:26

ok. so i've read all the above posts, and have a pretty decent understanding of what i need for the LEDs. I want blue leds, and found some with the following specs:

Reverse Voltage:5.0 V
DC Forward Voltage: Typical: 3.4 V Max: 3.8V
DC Forward Current:20mA
Viewing Angle:20±10 degree

I havn't read anything about REVERSE VOLTAGE specs, and quite honestly don't know enough about electronics yet to make the call myself.

Any help?

Also, these LEDs i found seem super bright (Luminous Intensity-MCD: Min: 8000mcd Max: 13000 mcd) but their viewing angle is rather narrow. Is that really going to matter much if they are indeed super bright? Will it more or less 'glow-up' the entire button?

Thanks guys!!

Re: Will these LEDs work?

posted by [tonedefit](#) ([tonedefit](#)) on 16.07.2007 18:48

I'm sure they'll be fine. Best to get a few and try them or make sure you can return the bunch.

I pretty much over analysed the LEDs in the above posts, maybe I should delete some of them??

Here's a nice page on LED basics

<http://www.kpsec.freeuk.com/components/led.htm>

Diode voltage - A diode or LED (aka Light Emitting Diode) are voltage controlled current switches. They will not let current pass through them until the voltage across them hits a certain value called V_f (forward) or V_r (reverse) (not all diodes conduct in the reverse direction.) Hooked up in the forward direction (cathode <negative> at a lower voltage than the anode <positive end>) the voltage across the diode rises until it hits the forward voltage (V_f), then current flows (LED lights up) and then the diode maintains V_f across it. Diodes aren't ideal devices, they're non-linear so V_f will be a short range of values, like 3.4 - 3.8V. Reverse voltage, V_r is the voltage the diode holds when connected in reverse, you can ignore that value because yours will never be hooked up in reverse.

Anyway, the LED driver on the 40h kits is great, very forgiving.

As for viewing angle, IMO it doesn't really matter, there's enough silicon in the button that light disperses throughout.

monome, 2007. we are friends, hello.

notice!

go to the [new forum](#) to post new discussions. you'll need to re-register.