

Power LED's - simplest light with constant-current circuit

by [dan](#) on January 7, 2007

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Intro: Power LED's - simplest light with constant-current circuit

Here's a really simple and inexpensive (\$1) LED driver circuit. The circuit is a "constant current source", which means that it keeps the LED brightness constant no matter what power supply you use or surrounding environmental conditions you subject the LED's to.

Or to put in another way: "this is better than using a resistor". It's more consistent, more efficient, and more flexible. It's ideal for High-power LED's especially, and can be used for any number and configuration of normal or high-power LED's with any type of power supply.

As a simple project, i've built the driver circuit and connected it to a high-power LED and a power-brick, making a plug-in light. Power LED's are now around \$3, so this is a very inexpensive project with many uses, and you can easily change it to use more LED's, batteries, etc.

i've got several other [power-LED instructables](#) too, check those out for other notes & ideas



step 1: What you need

Circuit parts (refer to the schematic diagram)

R1: approximately 100k-ohm resistor (such as: Yageo CFR-25JB series)

R3: current set resistor - see below

Q1: small NPN transistor (such as: Fairchild 2N5088BU)

Q2: large N-channel FET (such as: Fairchild FQP50N06L)

LED: power LED (such as: Luxeon 1-watt white star LXHL-MWEC)

Other parts:

power source: I used an old "wall wart" transformer, or you could use batteries. to power a single LED anything between 4 and 6 volts with enough current will be fine. that's why this circuit is convenient! you can use a wide variety of power sources and it will always light up exactly the same.

heat sinks: here i'm building a simple light with no heatsink at all. that limits us to about 200mA LED current. for more current you need to put the LED and Q2 on a heatsink (see my notes in other power-led instructables i've done).

prototyping-boards: i didn't use a proto-board initially, but i built a second one after on a proto-board, there's some photos of that at the end if you want to use a proto-board.

selecting R3:

The circuit is a constant-current source, the value of R3 sets the current.

Calculations:

- LED current is set by R3, it is approximately equal to: $0.5 / R3$

- R3 power: the power dissipated by the resistor is approximately: $0.25 / R3$

I set the LED current to 225mA by using R3 of 2.2 ohms. R3 power is 0.1 watt, so a standard 1/4 watt resistor is fine.

where to get the parts:

all the parts except the LED's are available from <http://www.digikey.com>, you can search for the part numbers given. the LED's are from Future electronics, their pricing (\$3 per LED) is far better than anyone else currently.

<http://www.instructables.com/id/Power-LED-s---simplest-light-with-constant-current/>

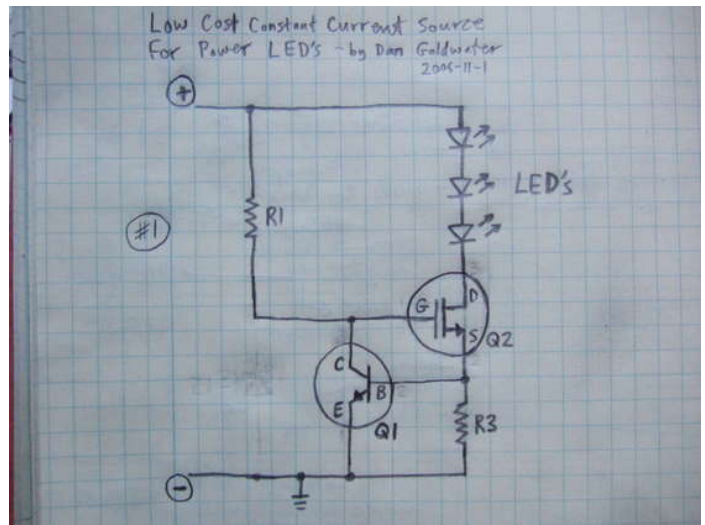
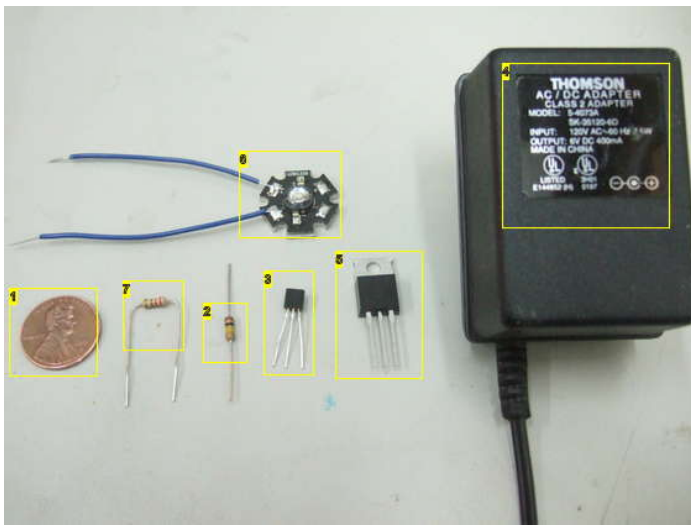


Image Notes

1. not needed
2. R1
3. Q1
4. recycled 6-volt, 400mA transformer
5. Q2
6. Luxeon Star LED
7. R3

step 2: Specs & Function

Here i'll explain how the circuit works, and what the maximum limits are, you can skip this if you want.

Specifications:

input voltage: 2V to 18V

output voltage: up to 0.5V less than the input voltage (0.5V dropout)

current: 20 amps + with a large heatsink

Maximum limits:

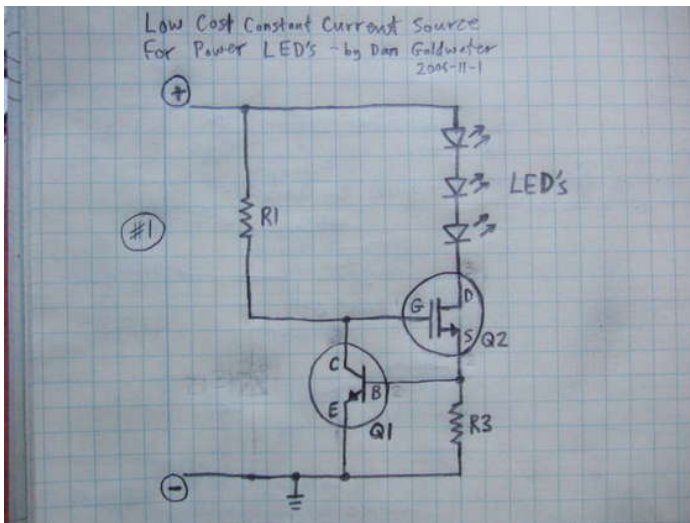
the only real limit to the current source is Q2, and the power source used. Q2 acts as a variable resistor, stepping down the voltage from the power supply to match the need of the LED's. so Q2 will need a heatsink if there is a high LED current or if the power source voltage is a lot higher than the LED string voltage. with a large heatsink, this circuit can handle a LOT of power.

The Q2 transistor specified will work up to about 18V power supply. If you want more, look at my Instructable on LED circuits to see how the circuit needs to change.

With no heat sinks at all, Q2 can only dissipate about 1/2 watt before getting really hot - that's enough for a 200mA current with up to 3-volt difference between power supply and LED.

Circuit function:

- Q2 is used as a variable resistor. Q2 starts out turned on by R1.
- Q1 is used as an over-current sensing switch, and R3 is the "sense resistor" or "set resistor" that triggers Q1 when too much current is flowing.
- The main current flow is through the LED's, through Q2, and through R3. When too much current flows through R3, Q1 will start to turn on, which starts turning off Q2. Turning off Q2 reduces the current through the LED's and R3. So we've created a "feedback loop", which continuously tracks the current and keeps it exactly at the set point at all times.



step 3: wire the LED

connect leads to the LED



step 4: Start building the circuit!

this circuit is so simple, i'm going to build it without a circuit board. i'll just connect the leads of the parts in mid-air! but you can use a small proto-board if you want (see photos at the end for an example).

first, identify the pins on Q1 and Q2. laying the parts in front of you with the labels up and the pins down, pin 1 is on the left and pin 3 is on the right.

comparing to the schematic:

Q2:

G = pin 1

D = pin 2

S = pin 3

Q1:

E = pin 1

B = pin 2

C = pin 3

so: start by connecting the wire from the LED-negative to pin 2 of Q2

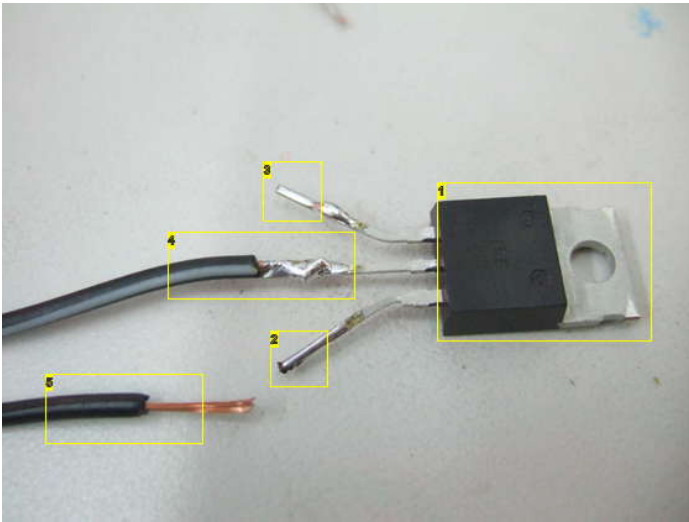


Image Notes

1. Q2: power NFET.
2. pin 3
3. pin 1
4. pin 2 of Q2, connected to LED-minus wire
5. the LED-plus wire

step 5: keep building

now we'll start connecting Q1.

first, glue Q1 upside-down to the front of Q2 so that it is easier to work with. this has the added benefit that if Q2 gets very hot, it will cause Q1 to reduce the current limit - a safety feature!

- connect pin 3 of Q1 to pin 1 of Q2.
- connect pin 2 of Q1 to pin 3 of Q2.

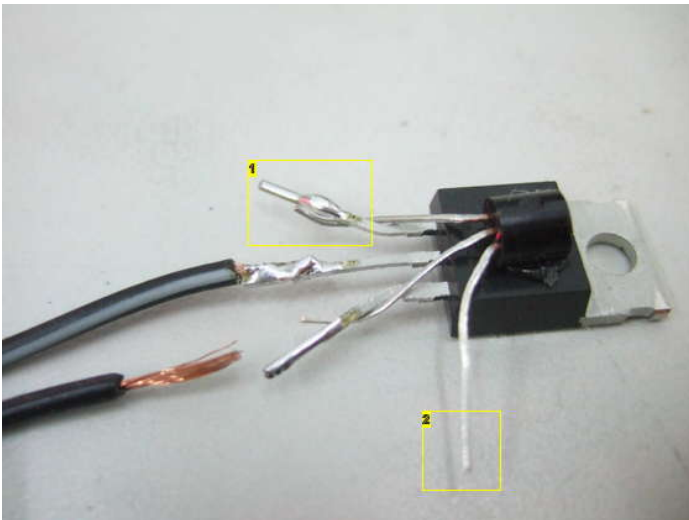


Image Notes

1. pin 3 of Q1 to pin 1 of Q2
2. pin 1 of Q1

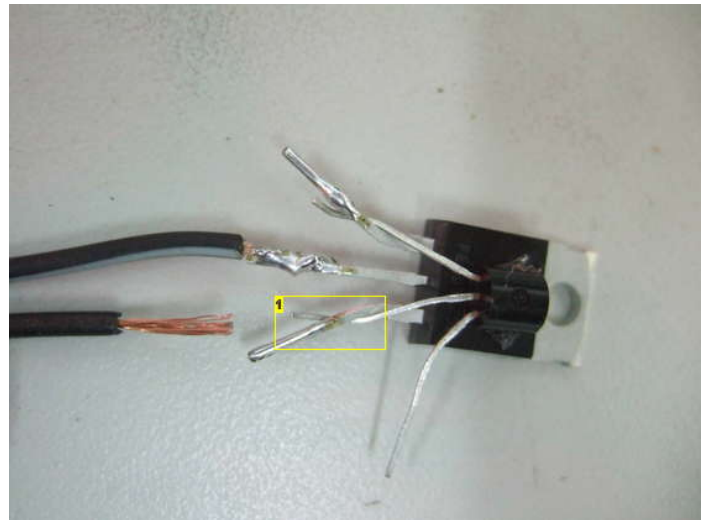


Image Notes

1. connect pin 2 of Q1 to pin 3 of Q2

step 6: add a resistor

- solder resistor one leg of resistor R1 to that dangling LED-plus wire
- solder the other leg of R1 to pin 1 of Q2.
- attach the positive wire from the battery or power source to the LED-plus wire. it probably would have been easier to do that first actually.

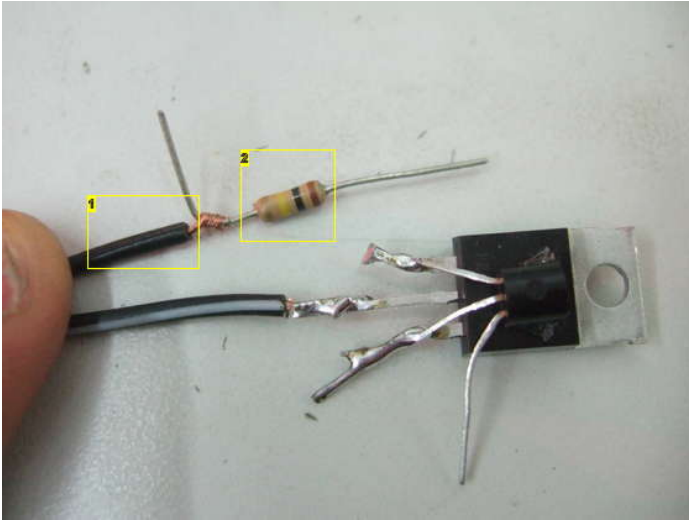


Image Notes

1. LED-plus wire
2. R1: 100k-ohm



Image Notes

1. connect the positive wire from power source

step 7: add the other resistor

- glue R3 to the side of Q2 so it stays in place.
- connect one lead of R3 to pin 3 of Q2
- connect the other lead of R3 to pin 1 of Q1

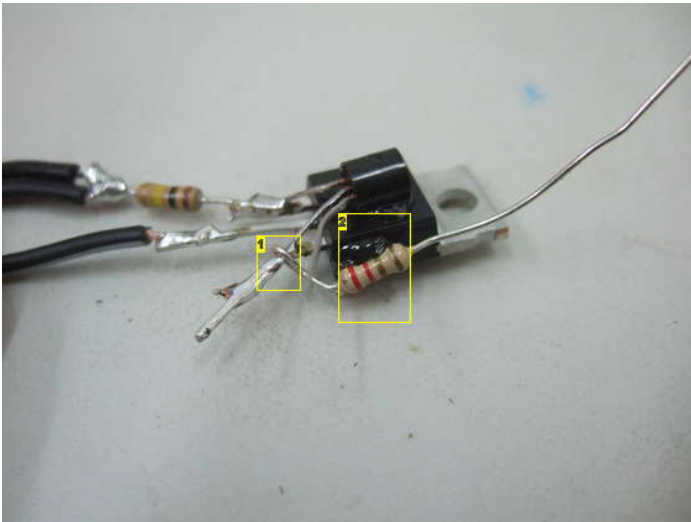


Image Notes

1. connect R3 lead to pin 3 of Q2. wrap lead around for easy soldering
2. R3, 2.2-ohm glued to side of Q2

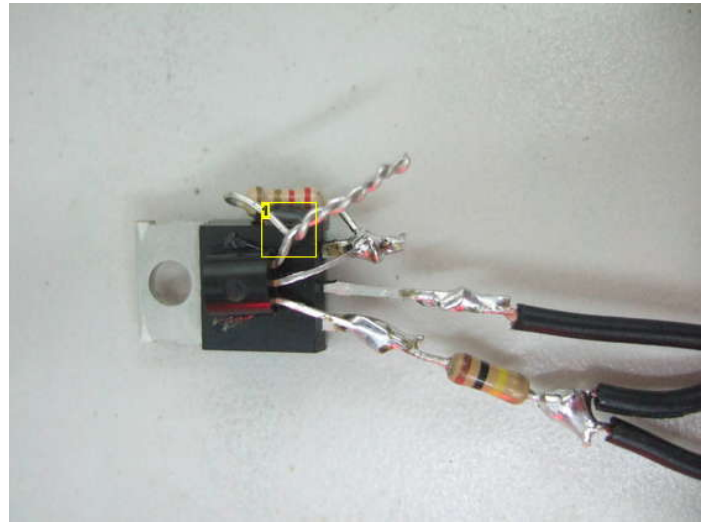


Image Notes

1. other lead of R3 to pin 1 of Q1

step 8: finish the circuit!

now connect the negative wire from the power source to pin 1 of Q1.

you're done! we'll make it less flimsy in the next step.

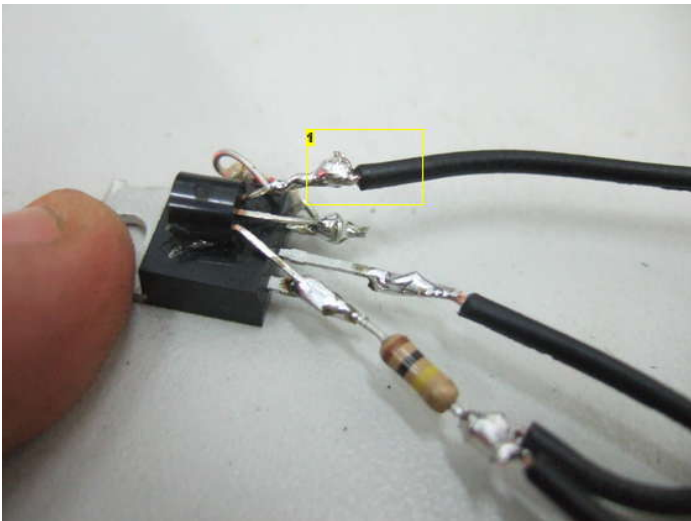


Image Notes

1. negative from power source to pin 1 of Q1





step 9: permanant-ize it

now test the circuit by applying power. assuming it works, we just need to make it durable. an easy way is to put a large blob of silicone glue all over the circuit. this will make it mechanically strong and waterproof. just glob on the silicone, and make an effort to get rid of any air bubbles. i call this method: "BLOB-TRONICS". it doesn't look like much, but it works really well and is cheap and easy.

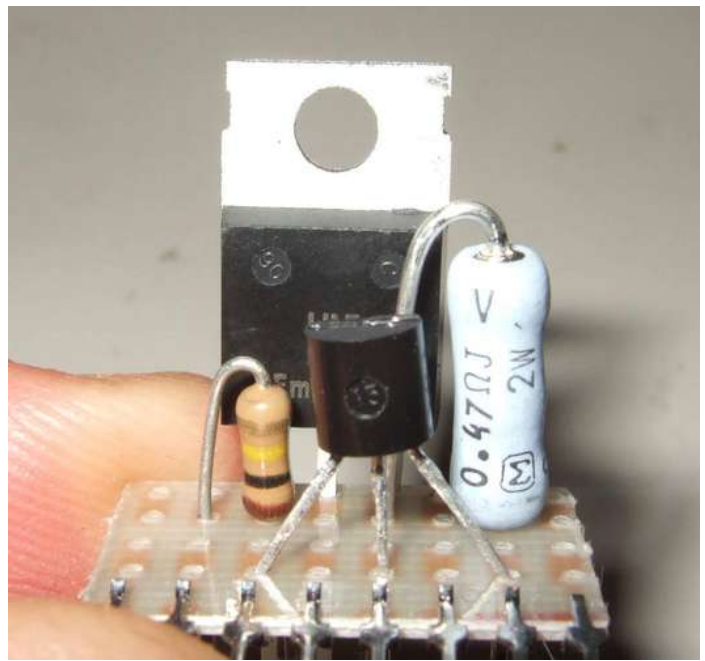
also, tying the two wires together helps reduce strain on the wires also.

i've also added a photo of the same circuit, but on a proto-board (this one is "Capital US-1008", available at digikey), and with a 0.47-ohm R3.



Image Notes

1. BLOB-TRONICS!
2. strain-reduction on the wires



Related Instructables



Super simple high power LED driver by Artificial Intelligence



Mood vase by meseta



DIY CMOS RAM Memory by gigavolt



Power LED underwater lights by Waterfox51



Pulse Width Modulated LED Torch by mathews



RGB Color Controllable High Power LED Room + Spot Lighting by dan

Comments

50 comments [Add Comment](#)

[view all 218 comments](#)



MexicoDoug says:

Jan 3, 2011. 6:58 AM [REPLY](#)

Can R3 be replaced with a 2.2K ohm resistor for a very, very low current application to give 0.227 mA constant current or is that not within the operating parameters of the transistors? If it is ok, except for the power dissipated in the LED and resistor, will the rest of the circuit contribute to significant inefficiency (Is there a way to estimate the mA drain of the circuit at this low current not including the LED and R3)

I want to use it to make a constant current 3V battery tester and count the hours it takes to discharge the batteries.

Thanks!



dan says:

Jan 9, 2011. 4:21 PM [REPLY](#)

i think that will work. just check it with a multimeter because the accuracy might be +/- 10%.



ovven says:

Jan 7, 2011. 10:06 AM [REPLY](#)

what value transistors did you use as i am building a very similar set up but cant find a decent place to get the same model transistor.

Cheers



unaffiliatedperson says:

Dec 7, 2010. 7:36 PM [REPLY](#)

im tryin to run two leds in series they work at 3.7 V and i need 1A current. could this circuit work? i was using two 18650 batteries in series but they exploded on me over the weekend.



ihwild says:

Future Electronics changed their web address. It's now <http://www.futureelectronics.com/>

Nov 28, 2010. 6:36 AM [REPLY](#)



jufreese says:

I have done the BLOB method on a circuit before....turned out the regulator got a little too hot and melted all the hot glue off of it. Keep that in mind.

Oct 25, 2010. 12:52 PM [REPLY](#)



frollard says:

hence the use of silicone glue, not 'hot' glue :D That could go poorly - as it did when I "repaired" my landlord's laptop power supply. It remelted and stuck to the floor. Doesn't normally get hot, but if you leave it on carpet with a blanket over it, it does get hot :S

Nov 22, 2010. 1:47 PM [REPLY](#)



seadweller43 says:

I was hoping to get a little help learning how to utilize this instructable to connect two separate series of LED's to an Arduino. The first set of 1w LED's will be 8 white and the second set will be 4 blue. I'd like them to be connected to the Arduino for a automated dimming feature. I want to create a sunrise/ sunset effect for an aquarium.

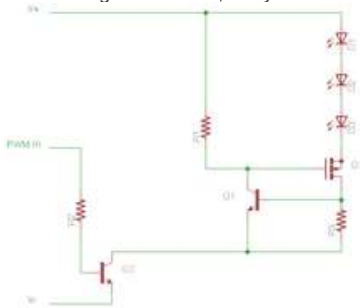
Oct 28, 2010. 7:00 PM [REPLY](#)

Thanks in advance.



technodude92 says:

almost forgot the circuit, sorry for the double post



Nov 15, 2010. 3:11 AM [REPLY](#)



technodude92 says:

I'm assuming you will be using PWM to dim the LED's here but this circuit while pertinent to your project is not exactly what you need for dimming. For that you will need to switch power to this circuit on and off quickly. The arduino cannot source the ammount of current necessary to run these high power LED's and so an extra transistor is required. This transistor should be chosen so that it can handle switching the current of whatever power LED's you are using. R2, is a current limiting resistor, chose it's value so as to keep the current draw from the arduino pin within reasonable limits. using Ohms law if your arduino can source 50ma per pin, then at 5 volts you would need a 100ohm resistor ($5V/0.05A=100\text{Ohms}$). Hope this helped

Nov 15, 2010. 3:09 AM [REPLY](#)



frollard says:

I've been searching for this solution for a long time! Kudos!

Is there any way to introduce q3 before q2 in the circuit to make q2 act as both current limit AND pwm digital switch?

Nov 22, 2010. 1:45 PM [REPLY](#)



seadweller43 says:

thanks for the reply. I wish I had just half of your knowledge of electronics. My damn bachelor's degree in business management won't help me with for stuff like this. Do you have any good book suggestions or website that will help me learn this stuff easier?

Nov 15, 2010. 11:10 AM [REPLY](#)



EmmettO says:

Can this circuit be used to drive multiple LEDs? If so, would they be wired in parallel or series?

May 12, 2010. 4:29 PM [REPLY](#)



vanmankline says:

I'm not an expert on this topic, but I'm learning.... From what I know:

You would need to switch out the resistors and ensure the other components can handle the current you require. The way these work you will get better results if you wire the LEDs in series.

Oct 28, 2010. 9:05 AM [REPLY](#)



EmmettO says:

Thanks, I eventually figured it out. <http://www.instructables.com/id/USB-Mega-Flashlight/>

Oct 28, 2010. 11:02 AM [REPLY](#)



richie1479 says:
Is a good design

Oct 12, 2010. 3:40 PM [REPLY](#)



LEDismylife says:
Is it possible to make a series Of 5x 3 watt LED with just one LED driver? If it is, may i know what type of resistors and regulators i should need...
Thanks.

Oct 2, 2010. 5:38 PM [REPLY](#)



conntaxman says:
I know that i made one using three 3 watt leds in series, and used the cir from the instructables.I think I changed the chip whith a higher amp, rate,But same styl chip ,and they worked fine. Im now buying some 20 watt leds, have one and it sure is bright.looks like an 85 watt inc.bulb
John

Oct 5, 2010. 12:52 PM [REPLY](#)



conntaxman says:
For making a power supply is their any way besides using a stepdown transformer will say using a 120vac down to 18vac? Is it possible to use like 3 MC7815CTG [output 15vdc at 2.2Amp] or something different like a LM338K transistor. Im trying to make a power supply for a new 20 watt led with 1000LM at 13-15 vdc with 1400 to 1800 ma.
I ran it so far with a 12 dc wall wart at 1000ma. and it was very bright. And that was down 3 volts. I want to try to make a power supply that will fit in a recessed light housing.
tks
John.

Sep 27, 2010. 7:37 PM [REPLY](#)



kingofrandom92 says:
i am so happy there are people like you on instructables that use the normal symbols for building a circuit draw up like this.

May 31, 2009. 1:11 AM [REPLY](#)



.Unknown. says:
Normal?

Jul 12, 2010. 4:26 AM [REPLY](#)



rogueleadr says:
agreed

Oct 14, 2009. 8:16 PM [REPLY](#)



MinerJay says:
Hi all, I am wanting to power a waterproof LED rope for illuminating a sign. The rope is 6 meters long and has a current draw of 1800mA. The supply will be a 12 V rechargeable battery so assuming that the input voltage is 12 V and the current needed by the load is 1800mA then if I read correctly your selection for R3 would be $V \text{ divided by } I = R$ therefore $12V/1.8A=6.66 \text{ ohms}$ assuming the resistance needs to be 6.6 Ohms and the current rating of the resistor would be 2 amps (24W) this sounds like a very expensive and costly resistor, surely I am wrong please someone help me I am at a loss.

Jun 18, 2010. 6:33 PM [REPLY](#)



cdousley says:
if im right you just need the right wattage resistor but im not sure.

Jun 25, 2010. 11:24 PM [REPLY](#)



cdousley says:
cool

Jun 25, 2010. 11:16 PM [REPLY](#)



indralho says:
Can anybody teach me ? I just made this circuit with 7.2 volt input voltage but it was so dim. I am using the same component.

Jun 16, 2010. 5:44 PM [REPLY](#)



Subterranean says:
If I was wanting to just draw a constant current from the power supply (batteries in this case) could I replace the LEDs with a dummy load, say a power resistor, and have it still work fine?

Is there a better, but still simple circuit for doing this?

Thanks for any help.

May 19, 2010. 7:38 AM [REPLY](#)



TS84 says:
Can any one tell me to replace , Q1: small NPN transistor (such as: Fairchild 2N5088BU) and Q2: large N-channel FET (such as: Fairchild FQP50N06L) its really hard to find both of them in my country.and i want to drive luxeon 3W white LED.please help me.....

Aug 3, 2009. 12:52 PM [REPLY](#)



EmmettO says:

May 13, 2010. 4:03 AM [REPLY](#)

This is a very late reply but I've just been working on this circuit. I don't think it matters the exact parts. All you need is a NPN transistor for Q1 and a FET for Q2. I pulled mine out of an old TV circuit board and everything appears to work correctly. I'm not even using a 100 K ohm resistor, I could only find a 56 K ohm in my stash.

Now I'm just trying to figure out how to modify the circuit. If the voltage is constant at 6v then you multiply by .5 of R3 for your current but I don't know what to do if using a different voltage.



crazyromanian says:

Aug 4, 2009. 10:36 PM [REPLY](#)

have u tried mouser.com, they're based in the US, I think they ship to most any country and they usually have better prices than say Digikey for the same product (the only down side is mouser does not have as many "obsolete" items).



doctaq says:

Apr 23, 2010. 11:31 PM [REPLY](#)

hey there

so instead of the transistor you recommended I used

http://www.mouser.com/Search/ProductDetail.aspx?R=BC184L_D27Zvirtualkey51210000virtualkey512-BC184L_D27Z

I put it together like in your instructions but nothing happens when I hook it up, does the collector current matter? I'm thinking that maybe somehow I might need a different R1? I used the same fet and used a .75 ohm current set and 100k ohm R1, 12v power supply and 1 Cree XR-E, I also tried it with 3 batteries for 4.5ish volts, neither did anything.

thanks



loloo says:

Mar 30, 2010. 2:52 PM [REPLY](#)

I have eight 10W, 7-8V LEDs. What power supply I need and what change in this circuit I have to make in order to LEDs give light safely?



KDS4444 says:

Sep 6, 2009. 2:38 AM [REPLY](#)

Okay, I am sorta new to electronics and schematic terminology, but I got me a couple of Luxeon LEDs and I want to build a driver. I understand the function of a resistor, transistor, etc., and I understand concepts like Ohms, Amps, Watts, etc. at a layman's level, BUT I have been reading and re-reading (and RE-reading) over this list of components and I get stumped at your description of "Selecting R3". Though I claim some rudimentary electronics understanding, the sentence, "R3 power is 0.1 watt, so a standard 1/4 watt resistor is fine", as simple and clear as it must seem to most, just ends up becoming jello in my head! Aren't resistors rated in Ohms, not watts? When you say "R3 power" what do you "mean"? (Volts? amps???) And what is a "standard" 1/4 watt resistor?? Can you imagine I am a 5th grader and walk me through not just the numbers (0.1 watts, etc.) but through the range of "acceptable" numbers/ratings (i.e., can you gimme the "too much", "too little", "what happens if you don't do it this way" stuff!)? I suspect that terms are being used somewhat casually in this step and as a novice the VERY SPECIFIC meanings of terms to me are VERY important until I can begin to ignore them! THANK YOU!!!



Sharanga says:

Mar 27, 2010. 2:21 AM [REPLY](#)

Dan, thanks for the circuit idea. I needed something like this.

KDS4444: regarding your question on rating resistors in ohms and watts, though this is a bit late, I thought I'd still respond, since the question is still relevant and worth knowing the answer to. Will try to keep it simple (which naturally will make it a bit longer :-)

Resistors are indeed measured in ohms, as you have noted. But the "Watts" (the wattage) of the resistor is also important, because this tells you how much power (heating) the resistor can handle without getting destroyed. Ideally you should know both these things when selecting components for your circuit.

When you apply a voltage to the resistor, a current passes through it, and it gets heated up to some extent. This heating is just wasted power, which we measure in Watts by multiplying the voltage and the current.

The same resistor can be available in the market with different "wattages"; for example, your R3 = 2.2 ohms could be available as 0.25 Watts, 0.5 Watts, 1 Watt, and so on. Resistors are manufactured in these **standard** wattages; you cannot find some odd figure like 0.1 Watt, 0.4 Watt, 0.85 Watt, and so on in the market.

The higher the Watts (wattage), the bigger the physical size of the resistor (it also gets more expensive). It therefore makes sense to select the resistor with the lowest wattage that can do the job safely, based on your calculations of currents and voltages. (I wanted to upload an image, but unfortunately the page does not seem to display uploaded images though it offers the option.) Your circuit will also be compact in size without getting unnecessarily bulky. For example, you wouldn't need a 1 Watt resistor for a penlight LED circuit, though you could certainly use it.

So, Dan worked out that R3 can be 2.2 ohms. Then, he figured out that it does not need to handle more than 0.1 Watt of heating. That is what he calls **R3 power**. Now, you are not going to get a resistor in the market with 0.1 Watt capacity. The closest is 0.25 Watts. So, this is what you select. In any case, it is usually better to select a resistor with wattage on the higher side, just to keep things cool and safe.

This is what "Selecting R3" means. We have selected a resistor of 2.2 ohms, 0.25 Watts

To understand things like whether R3 = 2.2 ohms is too much, too little, and so on, you will really need to know a little more about how components like transistors work. Hope this is helpful.

(By the way, Dan, is that R3 = 2.2 ohms correct? The picture is a little unclear, but I get the feeling that I can see 3 red bands on R3 there.)



andrewortman says:

Sep 13, 2009. 9:39 PM [REPLY](#)

Hi there, maybe I can help a bit.

If you apply a voltage across the resistor, there will be current flowing through that resistor. That current can be modeled by $i = v/r$ (from ohm's law)

The power rating on resistors is the maximum allowed power that can go through that resistor. Power is the product of voltage AND current ($p = v \cdot i$)

A standard "1/4" watt resistor can take up to 0.25 watts, which is really the most common type of resistor you can buy at hobby shops like radioshack. You can calculate power through a resistor using a handful of equations, all going back to $p=vi$ and $i=v/r$ if you replace i in $p=vi$, you get $p=v^2/r = (v^2)/r$ - where v = voltage ACROSS the resistor and R is the resistance in ohms.

Hope this helps!



andrewortman says:

eh, the formatting genies got me there at the end.

it should say power = voltage square divided by resistance

Sep 13, 2009. 9:40 PM [REPLY](#)



KDS4444 says:

Now THAT is helpful! Thank you!

Sep 15, 2009. 12:52 PM [REPLY](#)



conntaxman says:

Dose anyone have a cir. that would run 7 3watt leds together? Forward voltage of each is 3.5 to 4vdc and the current is 700ma each. There are many cir to run 1 3watt led at a time using LM317T.

tk's to all

Johnny

Jan 31, 2010. 10:45 AM [REPLY](#)



KT Gadget says:

Depending what power supply you are going to use, your best bet would be to give each LED its own driver, or if saying the power supply is 12V, make 2 and put a high watt resistor on the second because it will only have 3 LEDs in your case on that line and 4 LEDs on the other without a resistor.

Mar 20, 2010. 11:23 PM [REPLY](#)



cryptopsii says:

Won't work because a darlington is a sort of dual bipolar transistor and you need a FET (Field effect transistor) A bipolar transistor drive current if current flow through it's base. A FET drive current if Voltage is applied to it's gate (it replace base). And a Mosfet is different that a fet and won't work either.

Jan 18, 2010. 5:19 PM [REPLY](#)



Zando says:

Umm, a MOSFET is a FET, FET stands for Field-effect transistor, MOSFET stands for metal-oxide-semiconductor field-effect transistor, its formed with a thin layer of a glass-like substance between the gate and the drain/source, as apposed to a JFET, which stands for Junction field-effect transistor, which is formed with a reversed biased p-n junction between the gate and drain/source. JFETs tend to have higher leakage currents, around 10^{-9} amps, while MOSFETs leak only at around 10^{-14} amps, MOSFETs tend to stand much higher currents and be cheaper and smaller to make, while JFETs can work at much higher voltages and switch a bit faster. Your processor is made out of millions of MOSFETs. Both can work the same if there specks cover it, but JFETs can rarely handle much current

Mar 20, 2010. 9:57 AM [REPLY](#)



om-3alawi says:

Hello there,

I'm new here and don't know much but project is a line of site of optical link in a short range, and I'm using white Lxeon 3 star. For the 1st part, is the curcuit parts going to change if i used LHL-LW3C instead of Luxeon 1-watt white star LXHL-MWEC??????

i hope someone can help
thanks

Jan 27, 2010. 9:34 AM [REPLY](#)



conntaxman says:

Could I use this cir. to run three 3watt leds ,forward voltage 3.5 to 4vdc and 700ma draw.And what would be the best battary voltage to use.6 or 12 vdc.the link is above.

http://www.instructables.com/id/Power-LED_s---simplest-light-with-constant-current/?&sort=NEWEST&limit=50&offset=100

Also what is the most of these leds that I could run in seires?

tk's

John

Jan 25, 2010. 9:08 AM [REPLY](#)



Highjump44 says:

my friend had conductive silicone and did that pretty funny

Jan 17, 2010. 8:11 PM [REPLY](#)



skantu says:

Hi dude,

im using a dynamo 6v 3w for just 1 high power led 1W, what resistenvce do you recomend? im reall stupid in numbers.

thanks.

Jan 17, 2010. 6:42 PM [REPLY](#)



jason 77 says:

Jan 14, 2010. 12:50 PM [REPLY](#)

Hey Dan.... First I want to say thanks for all the great stuff you have on here!

I have used this circuit 2 times already for relatively low power leds "under 400mA" I now built this circuit to out 1A, and then decided to use a PWM to control the brightness of the led. I built the constant current circuit on a proto board and it seemed to work fine with the led... however when I take out the 100k ohm resistor "R1" the led dims but does not go out? Do you have any Idea what is wrong with my circuit? I am using 2 1 ohm resistors in parallel to get .5 ohms which according to my calculations should give me about 1A of power.



JohnPS says:

Dec 29, 2009. 9:45 AM [REPLY](#)

Hello,

I need the Low Cost Constant Current Source for Power LED's to supply 3.4 to 3.8 v to a LED circuit. As shown in the pencil drawing on this site, this is a series circuit which concerns me because I plan on running about 20 .5w led's which will be a light source for a small painting booth. What will need to be modified for 20 led's?

Thank you,
John



Meigus says:

Nov 30, 2009. 10:13 PM [REPLY](#)

Thank you so much for the circuit!

I made the circuit using a potentiometer (variable resistor)+constant resistor for R3, and using 8.5V (crappy 9volt battery). I tested the circuit with LEDs, but I plan to use it for other stuff.

You should make a note that if you change the voltage or components, you have to change your equation. You put in step one that the equation is $.5 / R3 = \text{amperage}$. I had to change the equation to $6/R3 = A$. I had different components besides the battery. (tip29A NPN transistor and BTS117 N-mode/channel MOSFET. I got both from ebay cheap for 5 packs!)

I got really confused at first, cause my 843 ohm pot. was putting through about 7 mA. Just doing backtracking i realized the equation was different for me.

Hope this helps anyone who tries to make this awesome, cheap, effective circuit.

P.S. Because my values were different, I had to add the normal resistor. With the 2200 ohm resistor and the 843 pot, I get a sweet spot of 1.99 mA averaging measurements from 4 different LEDs tested individually.

I also suggest anyone who makes this circuit to make an average amperage if you use it for unknown LEDs. The variability for my four LEDs was 1.94mA to 2.06, so I guess a nice +/- 3% change. I used GOLD stripe resistors, but the potentiometer was 1 kilohm but actually topped out at something like 843 ohms, so that probably would be the least accurate component in my circuit.



luvotter says:

Sep 20, 2009. 10:43 AM [REPLY](#)

I recommend you do this before BLOB-IT in step 8. Thanks for this cool compact circuit.



killjade says:

Jul 23, 2009. 4:36 PM [REPLY](#)

Hey I need some help understanding how this works. Being an Auto Tech apprentice, I have a very good grasp on how electricity works. All the laws etc... In fact I get most of the electrical car problems that come into the shop. But I can't figure out how this circuit works because it's conflicting with my knowledge. I just got into electronics hobbying because I want to build some cool things for my car. Here are my issues. Lets say the the supply voltage is 12v. We will be using a LED that runs in 250amps and has a forward voltage of 3.5 for example. That means, using this circuit, we'd have to drop 8.5v before the led. So why is R3 ahead of it? Shouldn't it be before the led? I'm still trying to understand the operation of Q2 and Q1 so maybe that's my issue. This setup makes it seem like 12v will go through the led first when it should only be 3.5. Help :(

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