



70W Dimmable LED Worklight v1.4



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[VIEW IN BROWSER](#)

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Summary

This is a 70 watt "7000" lumen dimmable LED floodlight that mounts on anything that has a 1/4" or 3/8" thread.

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Tags: [light](#) [led](#) [tripod](#) [worklight](#) [floodlight](#) [cobled](#)



This is a 70 watt "7000" lumen dimmable LED floodlight that mounts on anything that has a 1/4" or 3/8" thread. It's a standard thread used on all kinds of camera gear, like tripods, microphone stands, articulating arms, etc. Also has a new quick release stand now.

I first saw this LED panel on YouTube channel [bigclivedotcom](#) last year. I wanted to make some kind of enclosure for it, and this is what I ended up with. [See Clives video here.](#)

The light has a buck\boost converter, which is set to work between 15-32 volts. It has a dimmer with on\off switch and 1 USB port to power other things. It has optional magnetic mounts, so it can be mounted on steel surfaces (should hold it well in any direction).

- If you want to make custom mounts instead of the magnets, the holes are 3.5mm, spaced 30mm apart, center-to-center.

The light has to be actively cooled by a fan (which is barely audible at full speed). The fan is controlled by a temperature reading fan controller. It reads the temperature on the light with a probe.

I'm not going to go into on how to solder or crimp wires. That can be learned on YouTube. You will also need to know how to use a multi-meter.

The light is around 230x127x30mm.

Changelog:

v1.1

- Added some walls around the fan, making the back stiffer. Has holes for putting wires in.
- Added holes in the frame between the magnets, for possibly mounting things in the center.
- I found an adapter cable which allows the light to be run on USB-C PD power supplies. Added some info in power supply section.
- I've made an adapter for 18v Makita tool batteries so you can run the light on them. [Here](#). Runtime depends on the size of the battery and the settings you have on the light.

v1.2

- Added a couple new bezels. They are supposed to be used with 1mm thick plastic glass. The glass will protect the fragile silicone on the LED panel from damage. One of the bezels have a grid pattern that will protect it even more, but it does give some shadow effects on the edges of the light beam. Heat will increase a small amount with the glass in the way.
- Power distribution board is no longer used.
- Added some v1.2 photos.
- Made a magnetic base that can be used to hold the light [Here](#)

v1.3

- No change to the light itself, but I made a quick release stand for it. It uses the Makita adapter I made earlier. I put it on it's own page as this one is getting quite picture and word heavy. ****You can find the stand here.****
- Also grouped a bunch of images together, as the amount was getting rather large.
- Added new 360.
- I did some battery run-time tests using the stand. At full power (70W) with a 5Ah battery, the light lasted a little over one hour. Under-voltage protection was set to 15v. At low power it would last a very long time. Calculators say it could be over 45 hours..
- If you build the stand with intent to use batteries you should know what you are doing. Messing with them can be disastrous.

- Max temperature using the bezel with acrylic glass was 70°C on the glass (thermal cam). PETG seems to be fine. This was with 30°C Ambient.

v.1.3000001

- Micro update: Seems I forgot to upload the dimmer knob all this time.. fixed.
- I have three of these now, all currently used in the photo booth where the pictures are taken. The PWM frequency on the dimmer seems to be very high. I can't see any flicker on my cameras.

v1.4

Big change to the frame: The area around the power connector are now changeable plates. This means that you can change to a different connector, should you want to.

There is more space on this plate, so I added a switch and a voltmeter. The voltmeter can be useful if you are using a battery to power the light, and the switch will cut all power so the battery is not slowly drained.

The plates slide into tracks from the top, and is held on all 4 sides.

Added a plate for just the barrel jack and switch (no voltmeter).

- The small switch is a very common rocker type.
- Added plate for a C8 mains connector with switch. This is for people who are qualified to work on mains power. I'm not, so I can't say anything about what gear you would need to run it on mains. The plate is mostly an example, but it fits that model well.
- Added a .step file for a power plate blank, which will make it easy to modify to a different connector.
- These plates are printed with the front facing plane down. I have not printed a full frame yet, but I have tested all current plates in a test section of the frame, so I know they work.

v1.400001

Added a .step file for the bezels so adjustments can be made if the COB has a slightly different layout.

Print instructions Various Notes:

- The parts can be printed with 0.3mm layer height.
- I use at least 3 perimeters, with a .4 nozzle.

Top and bottom layers should be high enough to make the back plate solid.

PLA is out of the question for this project. The light gets way too hot (at full power). You will need to use PETG, CPE or ABS for this. I'm using PETG. There might be some specialty PLA available though.

The temperature of the light will depend on how you set the limits. On my settings (which is 12.5V 5.5Amps 68W), it stays around 60C/140F, with the fan on.

The frame has capped ceilings above the holes where the nuts for the bezel screws goes. This is to ensure the holes for the nuts gets bridged correctly. You will need to drill these holes out with a 3mm drill bit.

Supports should be used in the holes for the tripod adapter, power connector and USB Port. They need to be accurate.

Bezel is printed upside down.

Tripod adapter clamp is printed solid and on it's side.

Dimmer knob can be printed either way.

The part named HoleMount is just an alternative to the magnetic mounts. It has a hole for string, hooks, rings or whatever. It's printed on the side.

You can use other electronics then what I use as long as it fits and doesn't mess with the airflow too much.

There is 20mm of space between the inside back and LED panel. Taller components will block more airflow.

The electronics are taped or glued in place (except the fan). This is so you can move them wherever you want.

Don't use hot glue, it can melt.

Don't use silicone that smells like vinegar. It releases acids during curing that corrodes electronics.

Neutral cure silicone could be an option.

I don't recommend using normal superglue (especially on the magnets).

It's very hard so the repeated impacts can shatter the joints (and the magnets). I'm using reinforced superglue gel (it's black). It has rubber in it so it's a little flexible. It has better shearing and impact strength.

If gluing to PETG you may need to use a primer for low surface energy materials (especially on magnet mounts). It improves the glue's bond strength

Not sure if printed PETG is considered a LSE material though.

There is a mirrored version of the frame included. It swaps the dimmer and USB with the power connector.

Useful if you have two lights on a stand next to each other. The lights will be symmetric.

Don't mirror the frame in the slicer. It will flip the fan grill, which turns it into a whistle..

I tested around 20 fan grill types before I settled on this one. It's chosen for minimal fan noise and airflow obstruction.

The fan sucks air in from the back and blows it out the sides. Don't flip it.

I not sure what the Color Rendering Index is, so I don't know how useful it would be for pro photography/video.

- The PWM frequency on the dimmer does not seem to interfere with cameras (causing flicker), so it must be very high.

If used for photography I would buy all the panels from the same place at once. If you buy them over time you can end up with lights with a slightly different color temperature (like 5k and 6k kelvin). This can be confusing to a camera's white balance.

Making it passively cooled is probably a no-go. Heatsinks that large are expensive, and the cheap fan works well.

What you need:

70W COB LED panel

eBay search:
70W Cob Panel

It's a very bright 12-14V 70W panel. This type of COB light (Chip on board) has no way to limit the current itself, so it needs a driver\converter that has current limit ability, otherwise it will overheat and self-destruct. It will go over 100C without cooling.

Soldering wires to this can be difficult because the panel will pull all the heat away from your soldering iron. I put the panel on the printer heatbed and set it to 100C. Then it's a lot easier to solder. Just don't let it sit for too long.

LTC3780 Buck\Boost (aka Step Up\Step Down) Converter

eBay search:
LTC3780

Note: I've seen at least 4 different boards of this type that are very similar to each other. They have a slightly different component layout. I don't know if there are performance differences between these.

What this board does, is take a range of voltages on the input and converts it to a higher, or lower voltage on the output (that you set) It's advertised as a "10 Amp" 5-32V (input) to 1-30V (output) converter.

In our case it will only be used in buck\step down mode (output voltage will be lower then the input). This means the input current will always be lower then the output, which means less heat.

This is one of the lowest profile converters I've found with current limitation that's capable of running this LED panel with no issues (if set right, I killed 3 of them). If I remember right, the mosfets are only rated 8A continuous.

It has 3 adjustment pots on the board. One is output voltage, one is current limiter, and one is under voltage protection (means it will shut off if the voltage is to low on the input) I set my protection to 17 volts, to prevent the use of low-voltage high-current power supplies (like a 5V 20A). This is because the input current would get very high in boost mode, so it will overheat and blow the mosfets and a bunch of other stuff. It has a 15amp fuse on board, which seems pretty ridiculous to me. It did not save any of the 3 boards I killed. You can buy smaller fuses for it though (search "littlefuse nano" if you need that).

In my case, I set the output voltage to 12.5V and the current limit to 5.5 Amps (68.75 watts).

You may end up with different settings on your light.

The output current (and voltage) will be shared between the panel, dimmer, fan and fan controller, and possibly the USB board (Depends what USB board you get, and where you connect it. See USB section).

I have no issues running it this way.

1 Port USB Step down converter

eBay search:

Depends on which one you want. It will fit many types that has flat edges on the front of the connector (no weird flanges).

Search "USB (Step Down,buck)" to see all of them. There is a picture of the ones I've tried.

Search "USB (Step Down,Buck) QC 32V" to find the one that can connect directly to the input. It has Quick Charge (Second smallest in picture, nr3).

Doesn't really matter which one you choose, except that one of them has the same max voltage that the LTC3780 has. That means you could connect it directly to the input power (power supply) without thinking about voltage being too high for the USB board. Seeing as the max power on this USB board is 24W with Quick-Charge, it might be best to draw the power directly from the input so the current to the LED panel is not shared with the USB. You might need a bigger power supply to run the panel and USB QC at full power at the same time though. Around a 100W supply, like 19V 5A(95W), 20V 5A(100W), 32V 3A(96W) etc, might be needed.

Less powerful USB boards can be connected to the 12.5V output shared with the LED Panel. The light intensity will drop a little when USB power is used at the same time (or at least it should if the current limit is set correctly).

Some USB connectors have small plastic tabs on the side. If they get in the way, just snap them off.

The USB board is glued in place.

Power Supply

eBay search:

(19v,20v) laptop power supply (4.5A,4.6A,4.7A,4.8A,4.9A,5A,5.1A,5.2A, 5.3A,5.4A,5.5A,5.6A,5.7A,5.8A,5.9A,6A)

This is an advanced search. Paste the whole thing in.

Recommend a laptop power supply here, as they are very common and cheap. They are usually 19V. You will need around 4.5 Amps or higher to run the light at full power. 19V and 4.5A is 85.5 Watts

You should buy this from a reliable source, so you dont get killed or have your house burn down because of a cheap dodgy power supply directly from China. The level of safety in them is often very bad.

(see Youtube channel DiodeGoneWild to see how bad they can get).

The power supply needs to have a 5.5x2.1mm or 5.5x2.5mm connector (see connector section).

- **Alternative power supply**

You can use a USB Power Delivery "Charger" if you want.

These USB-C PD power supplies are more expensive as it's not a standard that's very common yet. The power supply and cables needs to be rated to the maximum specs of this standard (which is 20V 5A) to run the light. You will also need an adapter cable which contains a trigger board. This cable will request 20V from the supply.

The eBay search for that adapter cable is:

5.5 usb c pd cable

I uploaded a picture of one that works. It's rated 90W
This will convert the 5.5x2.5\2.1mm cable to USB-C.

80x80x10 12V 3-Wire Fan

eBay search:
80x80x10 fan
or GDT8010S12B

This a low profile 80mm fan with 3 wires (third wire is the speed reading). Pretty silent at full speed. The one I recommend is called GDT8010S12B. Searching for GDT8010S12B gives very few results. You can just search 80x80x10 fan and it will be everywhere, just read the back label to find it instead.

The fan grill is designed to be used with this exact fan.
Using other fans can cause more noise.

Fan controller has a max current of 800ma, so the fan should be lower than this. The GDT8010S12B is around 130ma.

3Pin Temperature Sensing Fan Controller

eBay search:
3pin pwm temperature fan controller
or: pwm temperature fan controller 9mm - with the description included. It can be a little tricky to find sometimes.

This is a fan controller that reads the temperature on the LED panel with a probe, and adjust the fan speed as the temperature goes up. I've written a manual on how to set these, as the instructions on the eBay listings are total garbage. Hopefully it makes sense. It's a bit convoluted to set the first time.

Had to upload the manual as a picture, no support for text files.

I think I set my settings to mode 2, start fan at 40C and increase speed up to 60C, where the fan is at max.

There is a 4 wire version of this controller, but this is not capable of turning off the fan, so it will always run.

15x28mm 1/4-3/8" Tripod Adapter

This is a common adapter people use on tripods and other camera\lighting gear. It's made from aluminium so the threads wont wear out. I use this because it's large, so it has good support in the frame, and you can mount it either way so you can choose 1/4" or 3/8" threads. Mounts from the inside. Impossible to pull out of the frame.

10A 12-30V PWM Dimmer

eBay search:

10A 12 30 PWM controller

Not much to say here. It's a dimmer. Has no problems taking the current going to the light. Has a built-in on/off switch in the knob.

5.5x2.5mm Metal Power Jack Connector

eBay search:

Connector metal female 5.5 2.5

This is a good quality metal connector. Has a 2.5mm center pin, and a 5.5mm outer diameter plug. Also available in 5.5x2.1mm, if you need that. Depends on the power supply you get. Wires are soldered on to it.

Thermal glue and Kapton tape

eBay search: What it says.

Thermal glue (not paste) is used to attach the temperature probe to the back of the LED panel.

Kapton tape is a tape used for high temperatures. It's used over the glue to keep the probe in place while it sets.

Power Distribution Board (PDB)

eBay search:

Power Distribution Board 35

- I don't use this anymore, as I now use the 32v USB board directly on the input.

This is optional. It's a 35x35mm PCB with no components. Often used in drones. It just gives you multiple points where wires can be connected. Makes it look nicer. I split the tracs on my board in the middle with a knife (the white line in photo), so one side has input voltage, and the other has 12.5V.

You can just ram all the wires in the same screw terminals instead, but that looks pretty janky (might get heat issues too). Or just remove the terminals and solder everything. That's the most secure. I will most likely do that on the next one.

- Apparently if you screw terminals too hard, the solder joint can shear and cause a bad connection. Happened to me. The light started to change intensity when I knocked on the board, and the current limit always moved. Had to redo the joints.

Wire

eBay search:

20AWG silicone wire

I'm using at 20AWG (or larger) silicone wire on everything. It's more flexible and nicer to work with than PVC. Has no problems dealing with the current, or heat.

Various Screws

I'm using black, pan head, hex screws.

8x 15-35mm M3 screws and square nuts for the front bezel that's holding the LED panel in place.

2x 18-20mm M3 screws and square nuts for the tripod adapter clamp.

4x 12-15mm M3 screws and whatever nuts for the fan. Depends if you want the nuts in the recessed hole on the fan, or on the top. The nuts will spin in the hole a little bit, so you will need to wedge them to tighten it, or glue them.

4x 10-12mm M3 screws and square nuts for the magnet holders (optional).

The dimmer and LTC3780 boards are now attached with printed plates that are glued or heat-staked in place (heat the top of the pins and press it down, so they mushroom over the board). This is so you can mount them wherever you want. The LTC3780 can also be mounted with double sided tape.

The fan controller is taped as well.

The fan should not be taped, as it's a critical part for keeping the light from overheating.

Washers are optional. I only use 2 on the tripod adapter clamp, as it needs to be tight, and 4 on the magnet holders.

4x 20x10x5mm Magnets

eBay search:

20 10 5 N52 neodymium

or 20x20 5 neodymium (this type is more rare, and expensive)

They are glued into the mounts. I'm using reinforced superglue, and used a primer for LSE materials.

No guarantee you will actually get N52 grade though.

Model files



frame_v1-4.stl



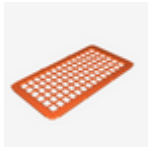
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bezel.stl



bezel_for_glass.stl



bezel_with_grid.stl



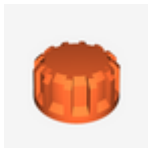
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dimmer-knob.stl



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adapter-clamp.stl



converter-mount.stl



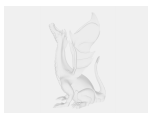
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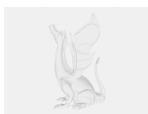
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p-panel_barrel_jack_switch.stl



power-panel_blank.step



bezels.step

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