

## content\_mgmt - Feature #1203

### Taking proper photographs of electronic hardware and PCBAs

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#### Description

Engineers by nature, are often willing to share their experience and designs, looking for criticism or for recognition. Design something and build designed device is not even half of job overall, unlike many beginners think. Proper documentation and ability to explain what that blinky thing actually does is a key for success of many projects, from many different application areas.

Writing good quality documentation and manuals is whole another level of difficulties and experiences, compared to making schematics, making board layout and soldering everything together.

Any successful market players know this and spend tremendous man-hours on projects documentation, either its internal eyes only service information, or public datasheets and manuals.

And today, in 21st century one may think, what would be easier job to do, given wide availability of great instruments and tools to make a document? Well, drawback is usually not absence of tool, but rather lack of experience or knowledge about what is available to use. On this article only one aspect of documentation/support area would be covered - photography. Like a well-known common phrase - one picture can say more than thousand words.

All examples and photos below are courtesy of xDevs.com, and available to download in original size by click. All metadata information, such as EXIF settings with exposure, focal settings and camera presets are kept.

### Art of electronics gear photography, common mistakes and solutions for them.

First, let's get understanding of common mistakes hardware guru's do trying to take a photo of their project.

- On-camera flash

This is literally a photography killer, right there. No matter what camera is that, compact or high-end DSLR, on-camera flash will always produce bad result due to straight angle with flat and usually shiny boards and surfaces in front of camera. Also flash kills LEDs, display or controls indicators on working equipment as well.

Example bad photo1 example bad photo 2

Remember, photography is process of capturing direct and reflected light from different objects in a view. Does not matter what camera you use, either 50\$ USD point-and-shoot or highly expensive professional gear, correct light is a must. While it sounds complicated, making a good setup is really easy and possible with just stuff laying on everybody's desk.

Example good1 Example good 2

These two photos were taken with just ambient light during a day, with indirect sun illumination thru living room window.

But flash is not always evil. There is a handy tip to get decent shots, for example if you visiting client site or in remote location. If you have white roof, you can use reflected light from camera flash to lit up object. You can use any suitable reflector, just hold it by hand in front of camera pop-up flash, at -45° to ceiling, so all light from flash will go up. To get enough light it's often required to force maximum flash power in camera settings. For such photos I usually have 1/100 - 1/200 second exposures and f/5.6 to f/8 focal settings, with ISO 400-800. Shiny foil from chocolate bar or glossy credit card can work really well as reflectors ;)

Example good1 Example good2

Photos taken with plastic card reflector with ~45° C angle to ceiling, held in front of pop-up flash on Nikon DSLR camera.

- A4 or A3 blank white paper or plastic sheet - can work as a reflector or diffuser. Place sheet near your object, and direct white light source to it, so object will get only soft diffused light. This will keep sharp black shadows away, and improve overall contrast.
- Dark environment, not enough light
- If you don't have space or capacity to have good lightning, get a regular tripod and use long exposures. It will work out well for most of cases.
- Bold reflections on shiny surfaces
- Low resolution camera

Avoid using smartphones and web cameras to take hardware photos, unless you absolutely have to. Even then, try to get even cheap compact camera to get better quality shots.

- Incorrect focus or out of focus

Common mistake taking photos of static objects, like PCB laying on the table is to use camera's autofocus. While it could work fine most of time, it can also result focusing on wrong part or even get completely out of focus at moment of shutter release. For most of mid-range cameras it's easy and convenient to use manual focusing, to point exactly object and view you want. For example when taking close-ups on small TSSOP IC marking it would be no help if camera focus on nearest 7805 TO-220 case with heatsink. You will get super sharp image of regulator, but unlikely to read anything on TSSOP package which just 10 mm away. More expensive DSLR cameras have this problem even wider, due their narrow sharp focus area and sensor size.

- Excessive coverage, area of interest is too small

Again it's not because all these people cannot take photos, or don't know what they are doing, it's due to lack of experience in new area, such as photography, for most of them.

- Surface alignment for straight PCBA shots

It's not rare to see top photo of circuit board, on which everything in center is sharp and nice, but features on left/right side are all blurred out. It's usually happening when focal plane of camera's image sensor is not perpendicular to de

### Tips for beginner hardware photographers

Now, knowing all discussed in previous chapter, we can make a list of handy first-aid tools to save your photos. It is kept inexpensive, but yet providing maximum outcome for best result.

- Tripod, any generic cheap model would do fine, can be bought for ~25-50\$. Better to have one which can extend tall enough to take overview shots.
- Simple LED flashlight for long-exposure lightning/difficult areas. Almost any engineer have bunch of white LEDs laying in jellybean box, so it can be even DIY, just 10-20 white LEDs and battery will do the job. 5-15\$
- Few clean A2/A3/A4 sheets to use as diffusers and reflectors for lightning. 1-10\$

Use 5-10seconds timer when using camera on tripod. This will save photo from shaking blur, and will allow to get most of camera resolution and sharpness.

Worth to set highest resolution and quality for JPEGs in your camera, to have non-resized images. Much better to have high-resolution source file to work with cropping/resizing on your big computer big screen, than thinking what to do with 500x600 pixel photo after resize and crop already done before on camera, and there is no possibility to retake photo.

Don't forget to clean your board/hardware prior to taking photos, it's not very visually appealing to look at dirty boards with dust specks and hair stuck between pins and components:)

### Examples and setups used to make them

#### Keithley 2002 A/D board

Used gear:

- Nikon DSLR camera
- Nikkor 50mm f/1.4D AF lens
- Tripod
- LED flashlight

#### Close-up photo of ALTERA NIOS II Board Stratix II edition board

Used gear:

- Nikon DSLR camera
- Sigma APO DG Macro 150mm f/2.8 lens
- Tripod
- LED flashlight

If you are serious and taking photos of hardware on regular basis, consider investing into good one of 90..150mm range specialized Macro prime lens with repro ratio 1:1, which will allow to bring sharpness, quality and resolution of your photos to whole new level. These lenses specially designed to provide maximum sharpness and no distortion to image geometry. Also they can give really good close-up, since ability of focusing from near distance.

### Test equipment photo during calibration phase

Used gear:

- Nikon DSLR camera
- Nikkor 35mm f/1.8 AF-S lens

h4.

Used gear:

- Nikon DSLR camera
- Nikkor 28-70mm f/2.8D AF-S lens
- Tripod
- LED flashlight

### Conclusion

Hope this short article will help you to make good illustrations and photographs for articles, forum posts and documentation. Making readers enjoy reading your publication may make them want to have your product and convert them into customers. Keep producing quality content, and quantity will come eventually.