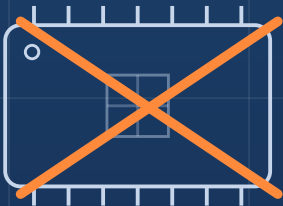


PRODUCTION - GRADE

ALIEXPRESS SWAP LIST

Nine components that fail in your customer's hands, not on your bench. And the trusted source or better swap for every one, plus red flags and five minute tests.



COUNTERFEIT PART
FAILS IN PRODUCTION



AUTHORIZED PART
USE THIS INSTEAD

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DOC NO.
ALX-09

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The AliExpress Component Swap List

Nine parts to keep out of your product, and exactly what to use instead

AliExpress is a great resource for a wide variety of components, but a product headed for production gets held to a different standard than a bench project. A counterfeit part almost never fails on the day you solder it down. It fails once your product is in a customer's hands, and at that point you are paying for a whole production run over a two dollar part.

The nine components below are the worst offenders. Each entry in this guide gives you the reason the part fails and the trusted source or better replacement to use in a real product. The last two pages add the ten second red flags for spotting a fake listing, and the five minute tests to run on parts before you trust them.

THE NINE SWAPS AT A GLANCE

#	NEVER USE THIS	USE THIS INSTEAD
9	Cheap FTDI FT232 chips and cables	A genuine FT232, CH340, or CP2102 from an authorized distributor
8	Mislabeled sensor modules	A genuine BME280 through an authorized channel, or the sensor on your own PCB
7	Cloned STM32 microcontrollers	Genuine ST parts from Digi-Key, Mouser, or Arrow
6	Fake name brand electrolytics	Authorized distributor stock, or a quality budget brand
5	Counterfeit power MOSFETs	Power parts from authorized distributors, load tested when inherited
4	TP4056 charging modules	An MCP73831 or TI BQ series charger on your own board
3	9,900 mAh 18650 cells	Traceable cells from vetted distributors, capacity tested
2	Fake fuses and X and Y capacitors	Authorized safety parts with verified marks and paperwork
1	Two dollar mains USB adapters	A certified supply with a test report you can look up

WHY PRODUCTION IS DIFFERENT

For a hobby project or a one off for your bench, buy whatever you want, because a bad part just means ordering another one. A product is different, since every part gets multiplied by every unit you build, and it has to be the same part when you reorder next year.

#9

FTDI USB to Serial Chips and Cables

USB TO SERIAL

WHY IT FAILS IN A PRODUCT

- The FT232 from FTDI is probably the most counterfeited chip in hobby electronics, and the cheap boards and cables are where the clones live.
- Back in 2014, FTDI pushed out a Windows driver update that detected the clones and reprogrammed their ID number to zero, which left them permanently dead.
- A later driver version stopped killing clones and instead made them send the text "non genuine device found" out the serial port, which corrupted the data going to whatever was listening.
- Your product can stop talking to a customer's computer after a routine Windows update they never chose to install. You changed nothing, but you take the support call and pay the return shipping.

SWAP IT FOR

REPLACEMENT PART	WHY THIS PART
Genuine FTDI FT232	Buy it from an authorized distributor like Digi-Key or Mouser, so you know you are getting an authorized FTDI part.
WCH CH340	A perfectly good part when cost is what matters, as long as you buy it through legitimate channels.
Silicon Labs CP2102	The other solid low cost bridge chip, again purchased through legitimate channels only.

#8

Sensor Modules

SENSORS

WHY IT FAILS IN A PRODUCT

- The BME280 from Bosch measures temperature, pressure, and humidity, while the cheaper BMP280 measures temperature and pressure with no humidity sensor at all.
- Plenty of listings sell BMP280 modules with BME280 printed in the title, and the two boards look identical.
- You wire it up, run a standard BME280 library, and it refuses to start, because that library checks the chip's ID and gets the wrong number back.
- Then you go hunting through your wiring, your pull-up resistors, and your I2C address, when the real problem is that the chip is not the one you ordered.

SWAP IT FOR

REPLACEMENT PART	WHY THIS PART
Genuine Bosch BME280	Buy the module through an authorized channel, so the chip on the board matches the chip in the title.
The sensor on your own PCB	Better yet, put the sensor directly on your own board, where you control the sourcing for every unit you build.

THE TEN SECOND ID CHECK

The ID register tells you exactly what you are holding. A real BME280 comes back as hex 60, while the humidity free BMP280 reads hex 58. Run that check before you touch a single wire.

#7

STM32 Microcontrollers

MICROCONTROLLERS

WHY IT FAILS IN A PRODUCT

- The STM32F103 is one of the most cloned microcontrollers on the planet, and what shows up on a lot of cheap boards did not come from ST at all.
- Sometimes it is a pin compatible part from another manufacturer with ST's markings reprinted on top, and sometimes it is a lower grade part remarked as a higher grade one.
- Those chips almost always boot and run your blinking LED demo just fine, then drift from the datasheet in small ways. Timer behavior is a little off, a peripheral ignores the reference manual, or the flash size does not match the part number.
- You end up tearing apart your firmware for weeks when your firmware was never the problem.

SWAP IT FOR

REPLACEMENT PART	WHY THIS PART
Genuine ST STM32 parts	Buy your microcontrollers from an authorized distributor like Digi-Key, Mouser, or Arrow, which covers you from prototypes through your early production runs.
A volume quote at scale	Once your volumes climb into the tens of thousands, ask your distributor for a volume quote or talk to ST directly, because nobody in production keeps paying catalog price.

THE REORDER PROBLEM

A clone that happens to work today tells you nothing about next year's batch, because the next order could easily be a different die. A product needs the same part every time you reorder, and only an authorized channel can promise that.

#6

Name Brand Electrolytic Capacitors

CAPACITORS

WHY IT FAILS IN A PRODUCT

- When you see Panasonic, Vishay, or other premium brand capacitors selling for a fraction of the distributor price, what you are actually buying is a plastic shell with a respected brand name printed on it.
- That shell is the easiest thing in the world to fake, and what is underneath it is usually a low grade cap with the wrong ESR and a much shorter life.
- ESR is the internal resistance of the capacitor, and it controls how much ripple current the cap can handle before it heats up and dries out.
- Get that wrong in a switching power supply and your product does not fail on your bench. It fails eight months later, across your entire production run.
- The capacitor plague of the early 2000s already showed how bad this gets, when bad electrolyte took out motherboards by the millions.

SWAP IT FOR

REPLACEMENT PART	WHY THIS PART
Authorized distributor stock	Buy your electrolytics from authorized distributors, so the brand on the sleeve matches what is inside the can.
A quality budget brand	If your budget is tight, remember that a quality cap from a budget brand will always beat a fake version of a premium brand.

#5

Power MOSFETs

POWER SWITCHING

WHY IT FAILS IN A PRODUCT

- A MOSFET is just an electronic switch, and how much current it can safely carry is one of its most important specs.
- Counterfeit power MOSFETs are typically a smaller, cheaper die inside the right looking package with the right part number etched on top.
- One will pass a bench test at low current every time, and it may even handle your full rated current at room temperature. Then you run it inside a sealed enclosure on a hot day, the undersized die cannot shed the heat, and it fails.
- Even when it survives, running a small die past what it was built for damages it a little at a time, so the part dies months later in the field instead of on your bench.
- This one bites hardest in motor drivers, battery chargers, and anything else switching real power.

SWAP IT FOR

REPLACEMENT PART	WHY THIS PART
MOSFETs from authorized distributors	Power parts are the last place to save fifty cents, so buy them from authorized distributors, full stop.
A load tested inherited part	If you inherit a design with mystery FETs already in it, load test one at its rated current under worst-case conditions before you trust it across a production run.

#4

Lithium Charging and Protection Boards

BATTERY CHARGING

WHY IT FAILS IN A PRODUCT

- The fifty cent charging modules built around the TP4056 are handy to have on a bench, but the trouble is what is actually on them.
- The charger chip is often a clone, and the charge current gets set by a single resistor the seller picked with no idea what battery you are using.
- The protection circuit is sometimes missing entirely, with bare pads where the protection chip and the two switches that cut off the battery belong.
- That means you can end up pushing 1A into a 400 mAh cell, with nothing watching for an over discharge or a short. That is a lithium cell running with no safety net inside a product you are shipping to your customers.

SWAP IT FOR

REPLACEMENT PART	WHY THIS PART
Microchip MCP73831	A cheap, well documented charger chip you place on your own board, with the charge current set for your specific cell.
The BQ series from TI	My favorite charger family. Well documented parts that let you verify exactly what you have on every board you build.

SET THE CHARGE CURRENT YOURSELF

For a real product, the charger belongs on your own board, where you choose the charge current for your specific cell. It does not belong on a fifty cent module configured for a battery the seller never saw.

#3

High Capacity 18650 Cells

BATTERIES

WHY IT FAILS IN A PRODUCT

- You will see listings for 9,900 mAh 18650 cells, sometimes even 12,000 mAh, for a couple of bucks each. Physics does not allow that, since the best cells Samsung, LG, and Panasonic can build in that can size top out around 3,500 mAh.
- Anything claiming way more than that is a rewrapped cell, often a used pull from a scrapped laptop pack, and the measured capacity is frequently under 1,000 mAh.
- The fake capacity is the smaller problem, because you also have no idea what that cell has been through, what its internal resistance looks like now, or whether it has any protection circuitry at all.
- Putting a cell like that inside a product you are selling means you are knowingly carrying a fire risk, and the recall and liability that follow are yours alone.

SWAP IT FOR

REPLACEMENT PART	WHY THIS PART
Traceable cells from vetted distributors	Buy your cells from vetted distributors who can trace them back to the actual manufacturer, like Samsung, LG, or Panasonic.
A capacity tested cell	Capacity test every cell before it goes into a build, so a tired rewrap never makes it into a customer's hands.

#2

Fuses and Safety Rated Capacitors

SAFETY PARTS

WHY IT FAILS IN A PRODUCT

- Fuses and safety capacitors have one job, which is to fail correctly when something else goes wrong, and a counterfeit cannot be trusted to do it.
- A fuse is supposed to open at a specific current within a specific amount of time, so it cuts power before anything else overheats. A fake fuse that holds at three times its rating is a disaster waiting to happen.
- X capacitors go across the two mains lines, and Y capacitors connect a mains line to ground or to something your customer can touch. Both are built to fail open rather than short out, and a fake Y capacitor that shorts puts mains voltage somewhere a person can touch.
- Counterfeit versions of both are everywhere, and the safety agency marks printed on them are just ink.
- There is no bench test that rescues you either, since a safety part only proves itself during the one event you hope never happens.

SWAP IT FOR

REPLACEMENT PART	WHY THIS PART
Fuses from authorized distributors	Buy every fuse through an authorized channel, verify the agency marks are real, and keep the paperwork.
Genuine X and Y safety capacitors	This is the one category where I would not even weigh the tradeoff. Authorized distributors only, with real certifications behind the marks.

#1

Mains Powered USB Chargers and Power Supplies

POWER SUPPLIES

WHY IT FAILS IN A PRODUCT

- These are the two dollar wall adapters that plug straight into an outlet, and teardowns of the cheap ones turn up the same problems over and over.
- The isolation barrier between the mains side and the low voltage side measures under 1 mm in some of them, when safety standards call for several mm of clearance.
- The certification marks molded into the case were never earned by anybody, and basic input protection like a fuse or a surge suppressor gets left off to save a few cents.
- If that supply fails, dangerous AC voltage may make it to the low voltage side, and that puts your customer at real risk.

SWAP IT FOR

REPLACEMENT PART	WHY THIS PART
A certified supply from a real brand	Use a supply that comes with an actual test report and a certificate number you can look up yourself.
Verified certification marks	A real mark traces back to real paperwork. If the seller cannot produce the report, treat the mark as decoration.

WHERE I DRAW A HARD LINE

Buying one of these for your own bench is your call. Designing your product around one is where I draw a hard line, because the person taking the risk is your customer.

Spot a Fake Listing in Ten Seconds

Six red flags that give away a counterfeit before you ever click buy

You do not need a lab to filter out most bad listings. Every flag below shows up right on the listing page, and any one of them is reason enough to walk away.

THE RED FLAG	WHAT IT TELLS YOU
A premium brand at a fraction of the distributor price	Nobody sells genuine Panasonic or Vishay parts for a fraction of authorized pricing. You are buying the label, not the part.
A spec that physics does not allow	A 9,900 mAh claim on an 18650 cell is impossible, since the best cells in that size top out around 3,500 mAh. The number on the wrapper is the confession.
A title that names one part while the board carries another	BME280 in the listing title on a BMP280 module is the classic version. If the title and the actual chip disagree, the title loses.
Bare pads where protection parts belong	Empty footprints where the protection chip and cutoff switches should sit mean the safety net was left off to save a few cents.
Safety marks with no paperwork behind them	Certification logos are just ink unless the seller can produce a test report with a certificate number you can look up yourself.
No traceability back to the manufacturer	A legitimate source can tell you exactly where a part came from. If the seller cannot, you also cannot count on getting the same part when you reorder next year.

THE CHEAPEST DEBUGGING YOU WILL EVER DO

A fake does not announce itself, and you are already debugging your own design, so the last thing you need is to be debugging your parts at the same time. Ten seconds on the listing is the cheapest debugging you will ever do.

Five Minute Tests Before You Trust a Part

Quick incoming inspection checks that catch a fake before it reaches a build

When a part does make it to your bench, these checks catch most fakes in about five minutes, long before one gets multiplied across a production run.

THE TEST	HOW TO RUN IT
Read the ID register	Digital sensors report who they are. A real BME280 comes back as hex 60, while a BMP280 reads hex 58. Check the ID against the datasheet before you debug anything else.
Verify the microcontroller against its part number	Read the device ID and the flash size and compare them to what the part number claims. Clones drift from the datasheet in exactly these small ways.
Load test power parts under worst-case conditions	Run a MOSFET at its full rated current at worst-case temperature, not just a quick check at room temperature. An undersized die shows itself under heat.
Capacity test every cell	Discharge the cell at a known current and measure what you actually get. A genuine cell lands near its label, while a rewrap frequently measures under 1,000 mAh.
Measure what a charging board really does	Check the actual charge current going into your specific cell, and confirm the protection circuit is populated and actually cuts off. Never trust the resistor a seller picked for a battery they never saw.
Look up the certificate number yourself	Ask for the test report behind any safety mark, then look up the certificate number. If there is no report and no number, treat the mark as decoration.

GET A SECOND SET OF EYES BEFORE YOU SPEND REAL MONEY

Sourcing calls like these come up constantly on the way to production, and they are a lot easier when you are not making them alone. Inside the Hardware Academy you get help from me and a team of experienced engineers, including a review of your actual design before you spend real money building it.

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