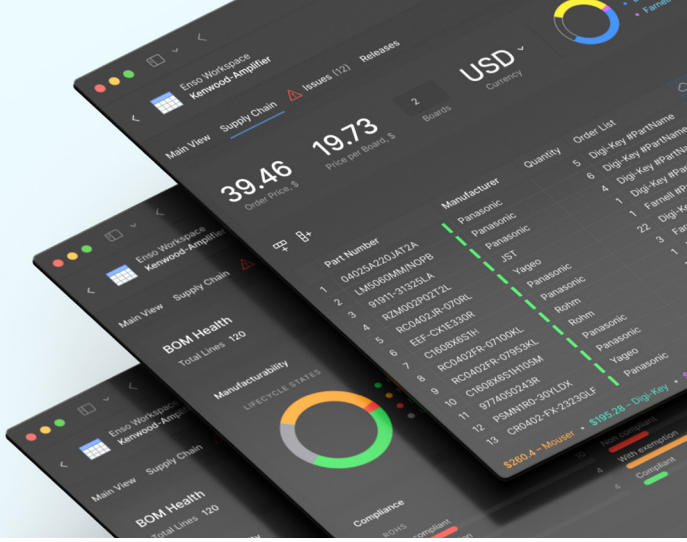
Altium

PCB Procurement Checklist for Assembly Success

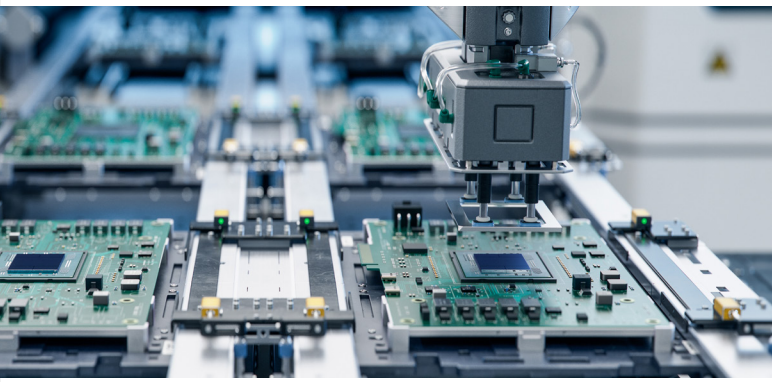


PCBA buyers often face challenges executing parts purchases for their prototype or production runs. Problems originating in the PCB library, incomplete supply chain information, and lack of transparency from distributors can lead to purchase and production delays. To help designers and buyers execute production orders quickly, we created this PCB procurement checklist. Designers and buyers can take a collaborative approach to develop a process that addresses these items and helps maintain cost competitiveness without compromising on engineering requirements.

1. Is the BOM Complete?

This item might appear obvious, but it is the most important; completing the remaining items in this checklist requires a BOM with accurate information for each line item.

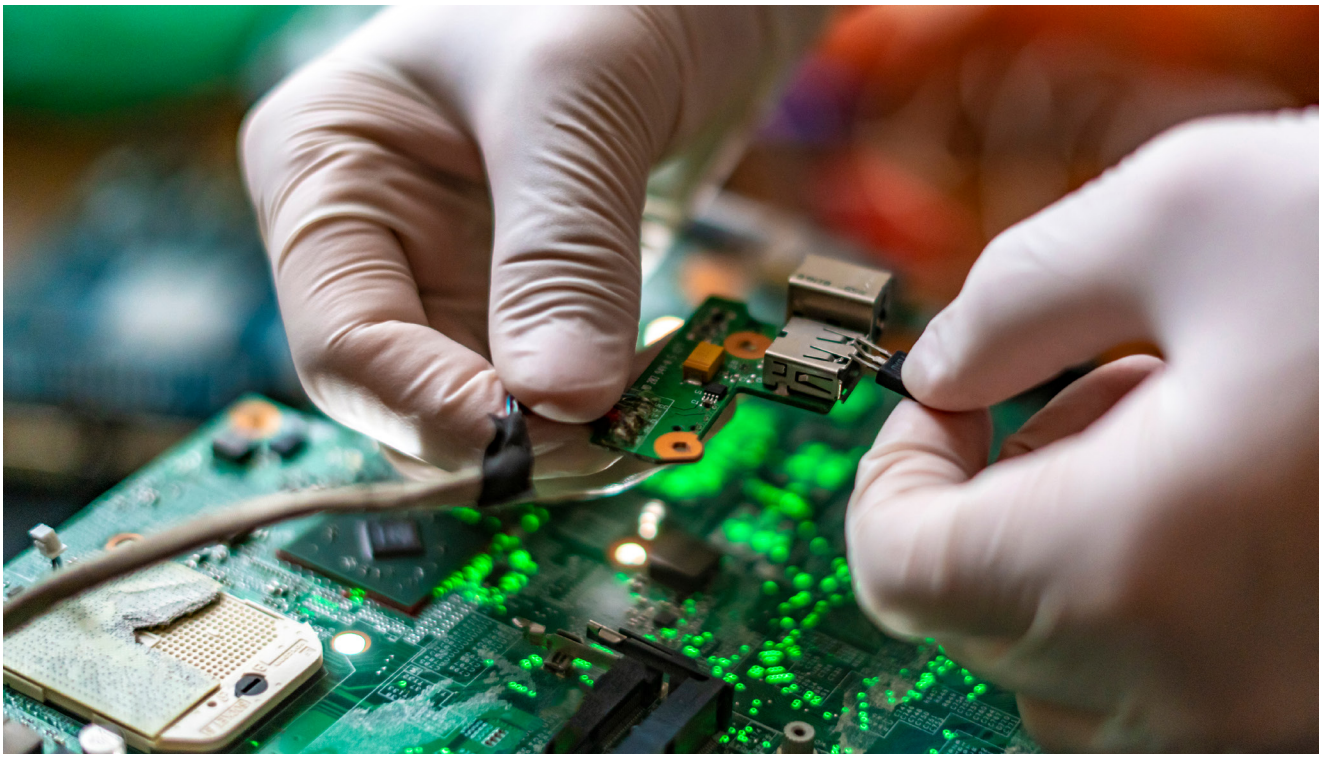
The master document that lists required parts in a PCBA is the BOM, which is created by product designers. For an electronic product, the BOM lists all the parts in a PCB as well as additional electrical and mechanical parts like cable assemblies, wiring, screws, enclosure parts, and specialty materials. It is sometimes taken as gospel that a BOM as generated by engineers is complete and accurate.



Of all these items in a BOM, the portion that creates the most challenges for buyers is the PCB components portion of the BOM, precisely because it originates from CAD libraries and is created during the engineering phase of product development. Unfortunately, for a variety of reasons, a BOM may contain incomplete information or errors, which always leads to a delay in executing parts orders. Each line item in the BOM should have, at minimum, the following accurate information:

- Shorthand part description
- Manufacturer part number that matches packaging (tape-and-reel, cut tape, tray, etc.)
- Manufacturer name
- Component footprint or package name
- Reference designators and quantity
- Supplier name and part number matching the approved vendor list (AVL)

BOMs may often contain additional pieces of information, such as a fitted/non-fitted note or alternate part numbers (see below). Before authorizing a PCBA production run, designers and procurement can work together to fully review the BOM to ensure there are no sourcing or procurement surprises that lead to delays and cost overruns.



2. Are Attrition Requirements Known and Accounted For?

All PCB assembly orders will carry attrition requirements, and these component quantities must be provided as overage to the PCB assembler. For short prototype runs or small batch production runs, the PCB assembler will not begin an order until after all parts are received with the required attrition amounts in the parts kit. For larger production orders, production might be allowed to begin, but an entire order could be broken into smaller batches until enough overage is available to account for the full attrition requirement.

There is no fixed or de facto minimum attrition quantity required in PCB assembly. Amounts can range from 10% to 50% and can depend on multiple factors, including:

- Package size (for SMD passives)
- Mounting type (BGA, SMD, or through-hole)
- Component type (mechanical vs. electrical)
- Package type (leaded vs. leadless)
- Component cost (cheaper = higher attrition rate)

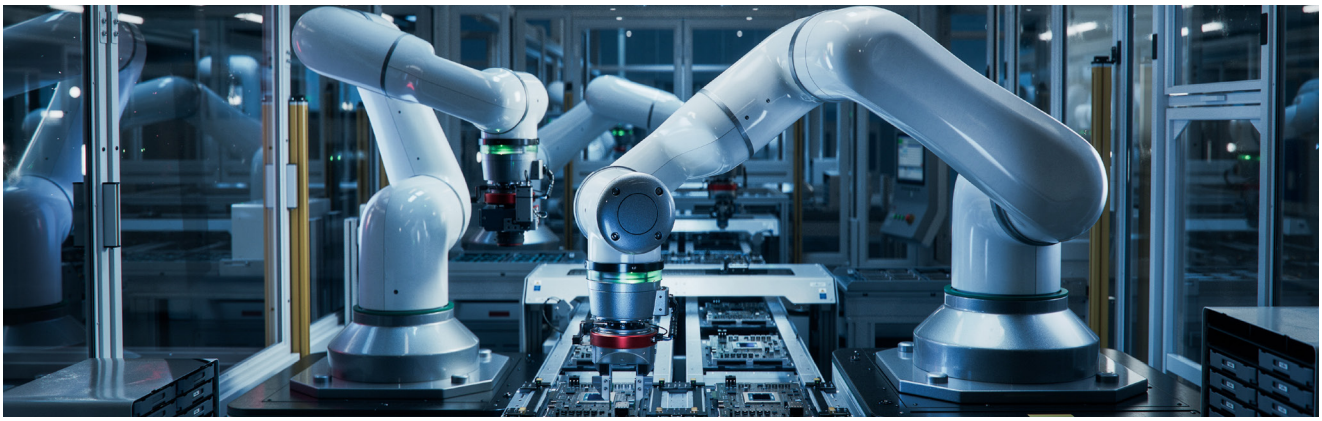
Failure to fully account for attrition is one of the major reasons for PCB assembly delays and cost overruns in small to medium-sized PCBA production runs. Fortunately, PCBA manufacturers have done an excellent job providing attrition requirements on their websites and in capability statements. Make sure the overage requirements are known and included in parts orders before executing a purchase.

3. Are Distributor Parts on Backorder?

Another common source of delay that occurs when ordering from franchise distributors is parts going on backorder. Parts may go on backorder due to high demand, shipping delays, or production delays at the parts manufacturer. The parts have been promised to the vendor, and the vendor reports them in their inventory but has not yet received the parts.

While distributors do their best to report accurate inventories on their website and through their API, sometimes the reported inventory includes parts which are on backorder. If a parts order includes backordered parts, the distributor will break the order up into multiple shipments, and only a portion of the requested parts will arrive in the main parts kit for PCB assembly. Sometimes, backorder dates can reach up to 1 year.

When creating an order on a distributor website, a quick review of the parts list in the order will show whether any of the line items are on backorder. When time is a major factor, it's best to procure these parts from another vendor on your AVL if they are available. If another approved vendor cannot supply the parts, consider an alternative or a reputable broker.



4. Are Substitute Parts Known and Qualified?

Some industries, such as consumer electronics, allow just about any suitable part number to be used as a substitute. A prime example is SMD passives in standard case sizes because, at the package level, these parts are infinitely interchangeable.

The same is not true in Industries such as automotive, aerospace, industrial systems, marine electronics, and medical devices. The range of suitable substitutes for a given part number is quite limited, and suggested alternates on distributor websites do not always align with industry reliability standards. Many companies will put parts through rigorous qualification and testing in order to verify that reliability standards can be met in the product's intended use conditions.

Because not all parts are created equal, substitutes for parts in the BOM should be known and documented. Ideally, this information is included directly in the BOM, but this is not required, and there are other ways of documenting standards-driven alternates. At minimum, a company should have some system for documenting the reliability limitations, ideally in the PCB libraries, so that alternate parts can be searched and identified quickly. These can then be included in a BOM so that procurement can include these parts in a purchase order when necessary.

5. Are Parts Quantities Near Price Breaks?

Who doesn't love saving a bit of money? Sometimes, parts quantities are close to the level that triggers a price break, and ordering a higher quantity of parts will create a net savings on the total component costs for a PCB assembly run. Sometimes, the price break translates only to a small savings per PCBA, but these savings add up when aggregated across hundreds or thousands of units.

Distributor support for quickly identifying price breaks is spotty; some distributors make this easy by flagging the price break in your parts order, while others force you to use trial and error to identify savings. However, a good supply chain platform, like Octopart, can help buyers spot all price break levels for each line item in a BOM. Support for identifying price breaks is another criterion that can be used to select vendors for a company's AVL.

6. Have Any Parts Gone Obsolete or EOL?

Designers generally try to choose parts for a design that are in-production with no EOL/LTTB notices being issued by the component manufacturer. Of course, sometimes an obsolete/EOL part makes its way into a BOM without being noticed by the designer. It is also the case that a part which was current at the beginning of a project suddenly goes obsolete or EOL when it's time to build PCBAs. When this occurs, designers need to update the BOM and PCB data, and procurement needs to budget for an alternative part.

This is another checklist item that designers and procurement can review together, sometimes at multiple stages in the design process. An early review of the BOM to identify these parts and select alternates saves time when the design is released for production. An excellent time to perform this review is at the completion of schematic capture, when the BOM is being locked in preparation of starting the PCB layout.

7. Is Country of Origin or Tariff Cost Known?

Procurement has changed drastically over the past several years due to the collapse of just-in-time supply chains, and subsequently due to the imposition of protectionist industrial policies, including tariffs. This means buyers now need to know something about the country of origin for the components they are buying, as well as the import tariff cost.

Tariffs are not a new cost driver, but due to today's higher tariff rates, tariffs and other import levies now need to be more carefully scrutinized as part of the per-assembly cost; this applies to the components and the PCBAs. Component distributors can provide this information when a formal quote is requested by a customer.



Success Starts in Two Places

Getting through the process of design, quoting, and executing purchases hinges on accurate electronic components data from two sources:

- **In the PCB libraries** - This information becomes the source of truth for the information in the PCB and, ultimately, in the BOM.
- **In your supply chain platform** - These systems can narrow down to the information you need from AVLs and component manufacturers.

Everything a designer does in the PCB layout relies on having complete and accurate component data in their PCB libraries. The libraries can also contain supply chain information directly from a data aggregator, which then exports into the BOM for an assembly order. When supply chain data is available directly in PCB libraries at the outset of a design project, buyers can have confidence in the final production data and BOM, ultimately speeding up order processing and purchasing.

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