

---

COMMON SOURCES OF  
**BOM REJECTION**  
AND HOW TO PREVENT THEM

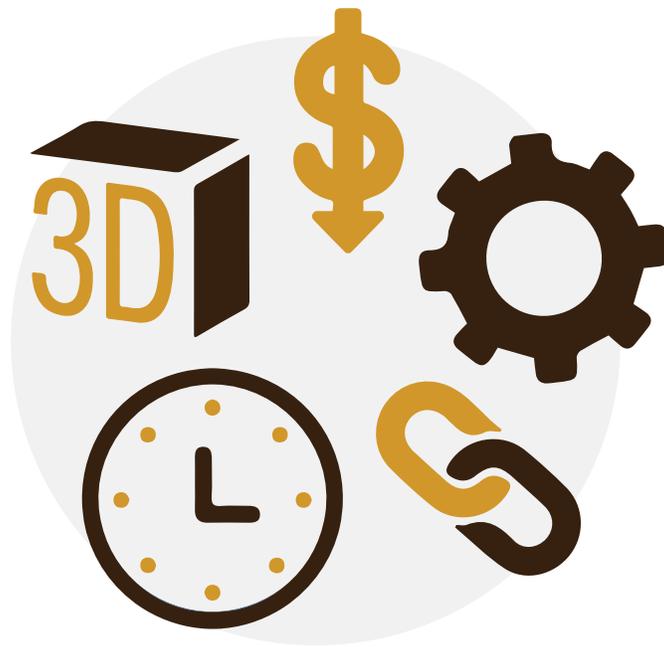


# BILL OF MATERIALS

SUBMIT, REJECT, REPEAT

**At any given time, engineers face many typical design pressures:**

**Function, performance, form factor, signal & power integrity, quality & reliability, DFM & test, and cost & time.** However, there is an often-hidden pressure that does not get discussed as much. Knowing what to look for will get your team back on the fast track to design success and end the repetitive cycle of BOM rejection.



**Every engineer at one point has seen this error message:**  
***BOM denied. Redesign required.***

These are dreaded words to an engineering team and can mean any number of problems have occurred. From obsolete parts and RoHS / REACH compliance issues to inadequate stock, almost every engineer has been bitten by one of these issues at some point. Fortunately, it doesn't have to be this way. By learning about the common causes of BOM rejection and how to prevent them, you can be well on your way to a faster and more accurate project turnaround that won't cause a headache later.

# PART SELECTION

## NOT JUST ANY PART WILL DO

### How do most engineers select their parts?

There are a few methods, including pulling from the vendor or distributor websites, data sheets, and previous designs. From there, the engineer must place the parts into the design itself. This can be in the form of schematic symbols, footprints, and/or 3D models.



### Parts from distributor websites will contain helpful part parametric attributes that can be leveraged.

The most basic parametrics are the part number, values, and manufacturer, but may also include datasheet links, associated symbols and footprints, and possibly even simulation models for signal or power integrity purposes. Once this information is imported, the engineering BOM (aka Bill of Materials) can be created.

# THE ENGINEERING BOM

## SUBMIT FOR FURTHER DISAPPROVAL

### What is a Bill of Materials?

The BOM is a list of the raw materials, assemblies, components, and parts needed to manufacture the end product. The list will specify the names and quantities, as well as other pertinent information. In essence, it is a road map of communication between an engineering team and those that will be sourcing the parts needed for your design.

	A	B	C	D	E	F	G
1			<b>Company Name</b>	Address:		Date:	Thursday, January 31, 2019
2				220 Great Town Road			
3							
4							
5							
6			Design filename:	ORCADDEMOFLOW2		Revision:	01
7			Doc #:	1-123456-7		Engineer:	Jeff Imes
8	<b>Item</b>	<b>PN</b>	<b>Qty</b>	<b>RefDes</b>	<b>Desc</b>	<b>Mfr</b>	<b>MPN</b>
9	1	EMA-00000517	2	C1-C2	CAP, Tantalum, SMD, 100 uF, 10 % %, 6.3 V, 6032-28	AVX	TPSC107K006R0150
10		EMA-00000517				AVX	TPSC107K006S0150
11	2	EMA-00000491V22	1	C3	CAP, Ceramic, SMD, 100 pF, 10 % 50 V, 0603	AVX	06035A101KAT2A
12	3	EMA-00000400V22	4	C4-C5, C12-C13	CAP, Ceramic, SMD, 0.1 uF, 10 % 50 V, 0603	AVX	06035C104KAT2A
13		EMA-00000400V22				AVX	06035C104KAT4A

### Sounds good. So....what's the issue?

All of this is pretty standard and should be familiar with anyone who has gone through a successful PCB design project. So where do things start to break down? In short, problems start to show themselves once this BOM has been sent to be purchased and sourced.

From here, we can play out a theoretical exchange not very far off from many engineers' experiences: the supply chain/ procurement personnel review the BOM, ultimately reject it, and provide feedback on required changes (often due to part obsolescence). The design team must then scramble to rework the design before resubmittal and the BOM is again rejected—this time due to a component shortage or long lead times on stock. Again, the designers must redesign and resubmit and finally, the BOM is approved and production can begin.

This circular process loses not only valuable production time, but costly hours of man-power in redesign work and re-submittal. So why does this issue happen so much, and perhaps more importantly, how can we prevent it?

# MARKET CONDITIONS

## IMPACT PART SELECTION

---

**In recent years, the industry has shifted to adapt to changing technology.**

As a result, certain industries -such as automotive and medical- now have a high demand on specific parts, while others are becoming obsolete. Systems that were once optional are now standard, which is depleting the market at a faster rate. This demand can make it near impossible for smaller businesses to obtain the parts they need.



**Another factor in the changing marketplace is mergers and acquisitions, often followed by increased regulations.**

Once a company completes their merger, they re-assess their product lines and discontinue certain items, then create new ones. New and improved regulations are instated as the market moves toward a more sustainable, lead-free environment. This results in an ever-changing marketplace with unpredictable conditions, so being aware of the general goings-on is necessary for an engineering team to make the best possible choices in part acquisition.

---

# DATA ANALYSIS

## FILLING IN THE BLANKS

**Between an unpredictable market and ever-changing regulations, it can be easy to get discouraged by an endless cycle of BOM rejection.**

To properly understand what's going wrong, it helps to look at the issue from a different perspective. Many times, what is contributing to component sourcing problems and delays is not what's *in* the BOM, so much as what is *missing* from it.

According to Vern Densler, a supply chain expert from SiliconExpert, there are some vital pieces of data you will need to fully understand your options:

<b>Part Status</b>	<b>Is it active? Last-time buy? Discontinued? Not recommended for new designs?</b>
<b>Lifecycle Risk</b>	<b>The probability of obsolescence of similar parts in the market.</b>
<b>Counterfeit Risk</b>	<b>The risk your part may have a counterfeit in the open market. Is your manufacturer a target?</b>
<b>Lead Time</b>	<b>How long will it take to acquire parts &amp; manufacture after BOM approval?</b>
<b>Compliance Data</b>	<b>Are you compliant with REACH/RoHS regulations and lead/contaminant levels in your parts?</b>

Having this data can ensure that your parts are the best possible solution for your product. If possible, part information and status should be checked during the initial design process, and lead time should be inquired upon prior to releasing the BOM for approval.

Taking the initiative to cover your bases pertaining to the above information can mitigate the number of errors found and vastly improve your time-to-market schedule. As we've seen in our theoretical situation, failure to ask the prudent questions will inevitably cause critical hang-ups in your project life-cycle.

# AN EXERCISE...

## WHICH WOULD YOU CHOOSE?

In a survey, we polled engineers to choose between four SMD part options based on the following information.

The results were typical, with 41% of answers choosing the Murata Manufacturing supplier with the cheapest price and therefore an increased chance of higher revenue.

Poll Results (single answer required):

MPN: C0402C102J5GACTU	Supplier: KEMET Corporation	29%
MPN: CL05C102JB5NNND	Supplier: Samsung Electro-Mechanics	17%
MPN: GRM1555C1H102JA01B	Supplier: Murata Manufacturing	41%
MPN: C0402C102J5GACAUTO	Supplier: KEMET Corporation	14%

Given the same information, which would YOU have chosen?

	MPN	Supplier	Description	Average Price
1	C0402C102J5GACTU	KEMET Corporation	Cap Ceramic 0.001uF 50V COG 5% Pad SMD 0402 125°C T/R	\$0.02
2	CL05C102JB5NNND	Samsung Electro-Mechanics	Cap Ceramic 0.001uF 50V COG 5% Pad SMD 0402 125°C T/R	\$0.02
3	GRM1555C1H102JA01B	Murata Manufacturing	Cap Ceramic 0.001uF 50V COG 5% Pad SMD 0402 125°C Bulk	\$0.01
4	C0402C102J5GACAUTO	KEMET Corporation	Cap Ceramic 0.001uF 50V COG 5% Pad SMD 0402 125°C Automotive T/R	\$0.05

# AN EXERCISE...

## HOW ABOUT NOW?

However, when polled a second time with a table full of different, more extensive information, our audience seemed to make a different choice.

The Samsung Electro-Mechanics manufacturer won by far, with 84% of votes. Why is this?



With more information given, you can see the Murata part was obsolete and two of the other manufacturer's had lengthy lead times. Given new data, Samsung was the clear winner.

	MPN	Supplier	Description	Average Price	Minimum Lead Time (Week(s))	Maximum Lead Time (Week(s))
1	C0402C102J5GACTU	KEMET Corporation	Cap Ceramic 0.001uF 50V COG 5% Pad SMD 0402 125°C T/R	\$0.02	54	54
2	CL05C102JB5NNND	Samsung Electro-Mechanics	Cap Ceramic 0.001uF 50V COG 5% Pad SMD 0402 125°C T/R	\$0.02	24	24
3	GRM1555C1H102JA01B	Murata Manufacturing	Cap Ceramic 0.001uF 50V COG 5% Pad SMD 0402 125°C Bulk	\$0.01	Obsolete	Obsolete
4	C0402C102J5GACAUTO	KEMET Corporation	Cap Ceramic 0.001uF 50V COG 5% Pad SMD 0402 125°C Automotive T/R	\$0.05	33	33

This exercise provided a clear illustration as to why it is critical to obtain the most information up-front to reduce a myriad of issues later. When engineers are armed with the information they need, they can quickly make the best component decision for their organization.

# RECIPE FOR DESIGN SUCCESS

## DO YOUR RESEARCH

There are several key factors to ensuring the best possible outcome for your project and its scheduled time-to-market.

First, the designer must have access to the component data when they are designing, preferably within their design tool. With the knowledge readily available, they can make the correct decisions the first time. Additionally, BOMs must be thoroughly scrubbed prior to releasing the drawings, with several pairs of eyes to catch mistakes.

Often, choices are made to save money now, rather than later. However, this decision may cost you when things start to go wrong. It is best practice to ensure the components used are chosen for low-risk rather than price. Having an Approved Parts List (APL) can aid in choosing the correct parts, but it must also be regularly maintained with up-to-date information.



**Reduce  
Costly Respins**



**Improve  
Productivity**



**Manage TTM  
& Schedules**

Take the time to look at critical data for each part in your BOM, and make sure you have access to updated data within your component selection tools. Implementing these steps at the beginning of your design cycle will ensure a lower risk of incurring unexpected costs and can result in a smoother product release schedule.

With OrCAD, you can leverage data from our partners at SiliconExpert right from your ECAD dashboard. Our database integrates seamlessly with the cloud to provide you with updated part and BOM data for your designs. Reduce the resources spent on respins and get it right the first time with OrCAD today.

Want more information? Visit [www.SiliconExpert.com](http://www.SiliconExpert.com) or contact us at [info@ema-eda.com](mailto:info@ema-eda.com) for inquiries.