

# The Counterfeit Conundrum: 5 Best Practices for Mitigating Counterfeit Issues in the Electronics Industry



Industry white paper highlighting proven strategies to limit the impact of counterfeiting issues in the electronics manufacturing

## Abstract

Electronic component counterfeiting is on the rise. The global nature of electronic supply chains has led to more opportunities for counterfeiters to pass off fake and refurbished parts as genuine articles. There are a number of steps that the electronics manufacturing industry can take to mitigate counterfeiting issues, including:

- Developing proper procurement policies
- Improving part inspection and working with test laboratories
- Properly managing and heeding government-issued alerts
- Improving collaboration with the rest of the industry

This paper will demonstrate how adopting these practices can help combat counterfeiting issues in the electronics manufacturing industry and improve component confidence for manufacturers, resellers, and end customers alike.

## Counterfeit electronic components: What's the big deal?

The last few years have shown a steady pace in the incidence and detection of counterfeit electronic components (see Figure A).

"...perhaps 10 percent of the technology products sold worldwide are counterfeit... electronics companies miss out on about \$100 billion of global revenue every year [due to counterfeiting issues.]"<sup>1</sup>

-Michael Pecht, Sanjay Tiku

Some methods of counterfeiting include remarked parts, defective parts scrapped by the original part manufacturer, and previously used parts refurbished from scrap assemblies.

There have even been incidences where materials within the components themselves have been found to be counterfeit. In one such case, fraudulent capacitors within the components caused equipment failures after only a few months in the field.<sup>2</sup>

The use of counterfeit parts can lead to decreased performance and reliability of the end product, lost revenue, and an overall decrease in customer confidence.

Combating counterfeit issues in the electronics manufacturing industry is no easy task, and it is impossible for any one company to anticipate and eliminate the problem completely. There are a number of steps, however, that electronics manufacturing companies can undertake to marginalize the effect of counterfeit components on their business and on the industry as a whole.

The best practices listed below will help combat counterfeiting issues in the electronics manufacturing industry and improve component confidence for manufacturers, resellers, and end customers alike.

### 1. Choosing the right electronic parts distributor

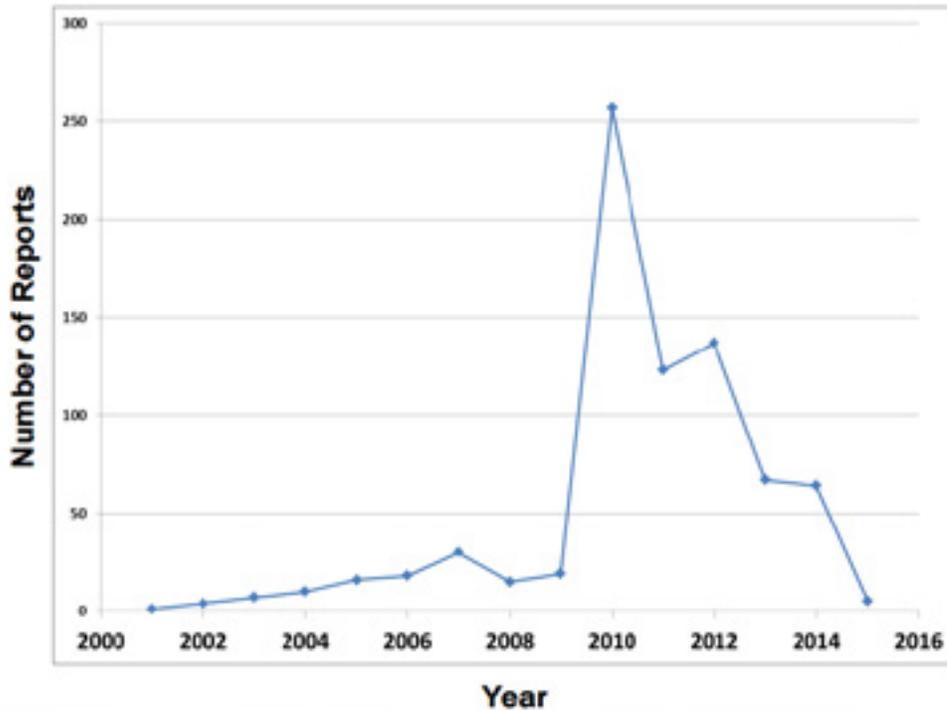
Before deciding to purchase a part, electronics manufacturers should carefully assess the quality of the distributor providing that part.

There are two types of electronic component distributors: authorized and independent. Authorized distributors tend to be more reliable, and generally have a strong reputation for delivering genuine, high-quality components. Independent distributors often provide a wider range of products at more competitive prices,

<sup>1</sup> M. Pecht and S. Tiku. "Bogus: Electronic Manufacturing and Consumers Confront a Rising Tide of Counterfeit Electronics," IEEE Spectrum, Vol. 43, No. 5, pp.37-46, May 2006.

<sup>2</sup> Sandborn, Peter. "Electronic Component Obsolescence Forecasting and Management Strategies." CALCE, pp. 18, <http://www.enme.umd.edu/ESCML/obsolescence.htm>

Figure A.<sup>3</sup> Total Counterfeit Electronic Part Reports according to GIDEP (Government Industry Data Exchange Program)



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Source: Dr. Diganta Das, University of Maryland CALCE

but reliability among them may vary.

When assessing both authorized and independent distributors, electronics manufacturers should consider the following factors:

- **Delivery service quality:** Are the distributor's orders filled accurately and within a timely fashion?
- **Quality control:** Does the distributor

employ policies and operating procedures that help ensure the quality of their products? Have they displayed a commitment to continuous improvement?

- **Handling, storage, and shipping controls:** What steps has the distributor taken to prevent part deterioration and damage during handling, storage, and shipping of the part?

<sup>3</sup> "DEFENSE INDUSTRIAL BASE ASSESSMENT: COUNTERFEIT ELECTRONICS." U.S. Department of Commerce, Office of Technology Evaluation, Counterfeit Electronics Survey, pp. 179, [http://www.bis.doc.gov/defenseindustrialbaseprograms/osies/defmarketresearchrpts/final\\_counterfeit\\_electronics\\_report.pdf](http://www.bis.doc.gov/defenseindustrialbaseprograms/osies/defmarketresearchrpts/final_counterfeit_electronics_report.pdf)

- **Corrective and preventative actions:** What actions has the distributor taken when counterfeit issues have emerged in the past? What actions is it taking to prevent counterfeit issues before they occur?
- **Part traceability:** Is the distributor capable of providing a manufacturing and supply chain history for the parts they sell?
- **Customer support and service:** Does the distributor demonstrate a commitment to customer care? Are customer questions and concerns satisfied in a sufficient and timely fashion?

While distributors who fail one or more of these tests are not necessarily propagators of counterfeit parts, the likelihood of their engagement in questionable practices is much greater than those that demonstrate high standards in the qualities listed above. It is important for manufacturers not to change or dilute their assessment criteria for any distributor, regardless of the cost or selection advantages that distributor may provide.

## 2. Visual inspection and material characterization of electronic components

Visual part inspection plays an important role in counterfeit mitigation. It is imperative that electronics manufacturers maintain and consult a working database of part information, so as to quickly and accurately ascertain the validity of a part. Part databases can be kept onsite or maintained by a third party, and should contain the following information to maximize the effectiveness of visual inspection:

- **Marking attributes:** Date code format, part number, marking technique, manufacturer logo
- **Pins:** Number and type
- **Plating:** Material type used in leads
- **Die marking:** Date code format and location, manufacturer logo appearance and location
- **Bond wire:** Configuration and type

While proper visual inspection properties and part information database management are both crucial to counterfeit mitigation, these steps alone are insufficient when confronting the counterfeit problem as a whole.

Counterfeiters have become increasingly adept at disguising fraudulent parts as genuine articles. Counterfeit parts

<sup>4</sup> "DEFENSE INDUSTRIAL BASE ASSESSMENT: COUNTERFEIT ELECTRONICS." U.S. Department of Commerce, Office of Technology Evaluation, Counterfeit Electronics Survey, pp. 186, [http://www.bis.doc.gov/defenseindustrialbaseprograms/osies/defmarketresearchrpts/final\\_counterfeit\\_electronics\\_report.pdf](http://www.bis.doc.gov/defenseindustrialbaseprograms/osies/defmarketresearchrpts/final_counterfeit_electronics_report.pdf)

are sometimes relabeled with genuine markings, causing them to appear authentic on the surface. A refurbished part may pass visual inspection, only to fail well short of its anticipated lifespan. And repackaging efforts have also been known to fool visual inspection efforts.

The best way to identify and avoid counterfeit parts is through cooperation with testing laboratories that perform material characterization, a process that uses a variety of methods to determine the composition of a given part. By utilizing sophisticated technologies such as x-ray fluorescence, scanning electron microscopes, electron dispersive spectrometers, differential scanning calorimeters, and thermo-mechanical analyzers, material characterization can authenticate parts with a great degree of certainty.

### **3. Heeding and managing GIDEP reports on counterfeit components**

Proper adherence to and management of government-issued alerts can also minimize the risks associated with counterfeit parts. The Government-Industry Data Exchange Program, or GIDEP, periodically releases reports regarding the emergence of counterfeits. By reporting known counterfeit issues, GIDEP alerts can help prevent the

recirculation of items suspected to be counterfeit within the supply chain.

“Since GIDEP’s inception, participants have reported over \$2.1 BILLION in prevention of unplanned expenditures.”<sup>5</sup>

-GIDEP

Managing GIDEP alerts can be a difficult task, however. Cross-referencing a GIDEP-suspected counterfeit part with your current inventory can be a time-consuming and error-prone affair. Manufacturers may find it helpful to employ a third party that can organize the information in the GIDEP alert at a part number level, filtering out any data which doesn’t pertain to parts currently in use or on order by the manufacturer.

### **4. Reducing the impact of electronic counterfeits through collaboration**

Industry-wide collaboration is another effective tool for mitigating counterfeit issues. Unfortunately, in the competitive business world, collaboration does not often come naturally. It’s tempting for electronics manufacturers to keep information on counterfeit components to themselves in an effort to increase their competitive edge.

But without collaboration, the reputation



of the industry as a whole may suffer. When an end customer encounters a product that fails to meet expectations, they may not recognize exactly which component is at fault. They may assign blame to an entire group of manufacturers, including those who only provided authentic, high-performance components. When counterfeit parts make it to end customers, everyone loses.

“[Through collaboration,] companies in the high-tech space are looking to get actual production visibility beyond traditional purchase-level response, to better control quality, cost, and availability to improve key customer service metrics...”<sup>6</sup>

Collaboration can take on three forms. First, manufacturers may choose to directly communicate with other manufacturers to inform them of counterfeit issues they have encountered. Second, manufacturers can send counterfeit information to GIDEP, which will then compile the data with that from other manufacturers and may choose to issue an industry-wide alert. Both are effective ways of decreasing the impact of counterfeit components and protecting the reputation of the electronics manufacturing industry.

Finally, manufacturers can utilize third party tools such as those provided by SiliconExpert, which allow users to flag counterfeits via applications built into the parts database.

## **5. Eliminating counterfeit components from the supply chain**

Tackling the counterfeit problem will require enormous effort from the world’s government regulatory agencies, combined with a strong, collaborative commitment from distributors and manufacturers alike. Even then, some counterfeits are likely to slip through the cracks. But while the counterfeit problem may seem insurmountable, mitigating its consequences is not.

By improving part procurement policies through trusted distributors and visual part inspection capabilities, employing test labs, properly heeding government alerts, and working toward an industry-wide culture of collaboration, electronics manufacturers can minimize the risks associated with counterfeit components.

<sup>5</sup> <http://www.gidep.org/>

<sup>6</sup> “Supply Chain Collaboration: The Key to Success in a Global Economy.” SAP, pp. 5, [http://www.cornerstone1.com/SAP/SAP\\_Supply\\_Chain\\_Collaboration\\_The\\_Key\\_to\\_Success\\_in\\_a\\_Global\\_Economy.pdf](http://www.cornerstone1.com/SAP/SAP_Supply_Chain_Collaboration_The_Key_to_Success_in_a_Global_Economy.pdf)



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Founded in 2000, SiliconExpert Technologies has built the world's largest electronic components database from scratch and provides this data through custom built software tools to the electronics industry. SiliconExpert's software and data are used daily by 1000s of electronic engineers, supply chain and procurement managers at leading Fortune 500 companies.

With over 400 employees worldwide, SiliconExpert maintains a global presence for its wide range of customers spanning Asia, Europe and Americas, operating in innovative industries such as consumer electronics, telecommunications, automotive, medical and aerospace.

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