

# Fighting The Counterfeit Semiconductor Epidemic

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As the semiconductor industry has grown dramatically over the last 30 years, so to has the counterfeiting of semiconductors. The fraudulent manufacturing, distributing and selling of fake semiconductors has a negative effect on reputable component manufacturers and distributors, causes purchasing dilemmas for component buyers, problems for equipment manufacturers, and trouble for equipment operators. In worst-case scenarios, it may cause manufacturers to be driven out of business or result in catastrophic field disasters through equipment failure.

The Semiconductor Industries Association Anti Counterfeiting Task Force (SIA ACTF) has established the following 3-point definition of counterfeiting:

1. Substitution or unauthorized copies of a product
2. A product in which the materials used or the performance of the product has been changed without notice by other than the original manufacturer of the product.
3. A substandard component misrepresented by the supplier

Assessing the real value of counterfeit semiconductors entering the global market is extremely difficult. The original semiconductor manufacturers have been reluctant to disclose counterfeit instances, in case this should affect their customer confidence or stock price. Equipment manufacturers are also reluctant to admit they have purchased counterfeit devices, as such a disclosure could impact confidence in their ability to manufacture and deliver equipment with the right quality and reliability. Since both sellers and buyers have a reluctance to disclose counterfeiting instances, the authorities that could act to shut down the counterfeiting operations have rarely been asked to do so.

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All sectors of the semiconductor market are affected by counterfeit devices to a degree. Counterfeiters identify certain factors in the market, which allow them to capitalize on selling their substandard devices wherever they can identify a demand. There are three major situations where counterfeiting occurs:

**A. Manufacturing shortfall/product shortages** — Counterfeiting operations identify where they can sell their fake parts when there are device shortages caused by insufficient manufacturing output of certain semiconductor types

**B. High value products** — Counterfeiting operations identify where they can sell devices that cost them little to source, but can be sold at the high market price of the genuine devices

**C. Obsolete and discontinued devices** — Counterfeiting operations find ways of delivering parts that have been discontinued by the original semiconductor manufacturer.

In each of these cases, the devices delivered are unlikely to operate as genuine parts and very often, by the time the user has identified there is a problem, the source of the device has vanished or is untraceable.

Counterfeit products enter the market supply chain through the sales brokering networks that exist to source and supply obsolete and difficult-to-find products. OEMs that purchase semiconductors through brokers or independent distributors on the gray market take a great risk, as there is no guarantee of authenticity, quality, traceability, reliability, or the continuous availability of the devices. There is no easy way to ensure that the devices purchased are genuine or if they have been properly stored and handled to ensure quality and reliability. As counterfeiters become more sophisticated, the probability increases of receiving re-marked devices with falsified part numbers or company logos, empty devices with no die, falsified paperwork/RoHS compliance, and counterfeit chips from gray market purchases.

## Types of counterfeiting

The semiconductor industry is a global industry with worldwide manufacturers, distributors and customers. It is also an industry that makes extensive use of subcontract facilities. There are but a few of the major manufacturers who have all their own production facilities. Many companies, especially the newer ones, are fabless and rely totally on subcontractors for their device fabrication and assembly. Unless the subcontract operations are managed and controlled effectively by the original semiconductor company, it is possible for the less scrupulous subcontractors to allow rejected product or material to be sold to counterfeit operations. There are many ways counterfeit devices are produced:

**A. Total counterfeiting** — This is the complete manufacture of a device by a counterfeit operation to look like and to function the same way as a genuine item. The counterfeit operation is trading on the good name of the original manufacturer

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to secure business, usually at a higher price than they would otherwise be able to receive for the devices if sold as their own brand.

**B. Manufacture at subcontractors, or product “skimming”** — When an original semiconductor manufacturer uses a subcontractor for fabrication and/or assembly and testing of devices, they must be extremely careful to monitor and fully control the subcontracted operations. If they don't, it is possible for less scrupulous subcontractors to over-produce or to claim they achieve a lower production yield than their actual output. All the extra devices produced can then enter the market through the broker chains.

**C. Inadequate control during disposal of scrap and rejects** — Reject devices are produced at various stages throughout the manufacturing operation. These devices are worthless as far as operating in equipment, but it is possible to salvage some of the precious materials used in their manufacture. For this reason most of the manufacturing rejected devices are sent to companies for crushing and precious metal salvage. These salvaging operations provide a “certificate of scrapping” to the original manufacturer to certify that the parts have been destroyed. However, there have been instances where salvager has provided the certificate without scrapping devices, which were then sold surreptitiously into the counterfeiting chain.

**D. Reclamation of used components** — There are vast quantities of electronic equipment that are scrapped but contain still-working semiconductors. These products are usually dumped in landfill sites or crushed at refuse locations. However, it is possible to reclaim some valuable components from this equipment where suitable recycling operations exist. With the introduction in Europe of the WEEE legislation, this recycling will increase. In general, semiconductors should not be removed from soldered boards and re-used, since the assembly and removal operations can seriously damage their electrical performance, reliability and operational life. There are, however, less-reputable operations that remove semiconductors from scrap equipment with the intention of reselling them.

**E. Re-branding to sell at higher cost** — Certain counterfeiters target markets where the price of devices is high due to high performance requirements and the need for stringent testing operations in the manufacturing flow. Examples are devices required to operate at extended temperature ranges, such as industrial or military applications, or the higher speed versions of memories and processors. Counterfeiters obtain the lower cost, lower specification versions, re-mark them and resell at the higher price.

**F. Falsely claiming conformance to industry certifications (e.g. RoHS)** — Legislation, such as RoHS in Europe and China to ban the use of certain hazardous materials, is presenting a new opportunity for counterfeiters. Here they provide paperwork stating that devices are compliant with the European legislation, when in fact they are selling old and otherwise unusable products that are non-compliant.

Buyers can limit their risk of obtaining a substandard part by following some simple

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practices. First and foremost, **ONLY** buy parts from component manufacturers and their authorized distributors, and consider cost instead of pricing (even if you are getting a bargain on a component purchase, the cost of manufacturing downtime or failure of the end-product if the device is faulty or counterfeit far outweighs front-end savings). Check with suppliers about hard-to-find parts, as authorized distributors buy up EOL lots, and companies such as Rochester Electronics are authorized by suppliers to build legacy devices using the manufacturer's original die to provide continuing customer support for the discontinued products

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