Combating counterfeit semiconductors

In times of supply shortage, or where component obsolescence limits availability, the prevalence of counterfeit devices often multiplies. Ken Greenwood discusses common myths around counterfeiting and how companies can protect themselves from counterfeit products

We have moved far beyond incorrect manufacturers logos and IC packages with no die inside caught by the simplistic visual inspection testing used by those following AS6081. The Counterfeiters now have very sophisticated operations as the potential gains can be enormous.

Customers whose normal supply routes prove insufficient may assume unauthorised or grey market sources are the only solution; and that "testing" can eliminate quality risks. Nothing could be further from the truth; but there are zero-risk sourcing options available.

What is a counterfeit semiconductor?

In the Semiconductor world Counterfeits include:

- Non-Functional or scrap product which is re-marked as good and re-sold.
- Functional yet sub-standard product purchased by the counterfeiter remarked and re-sold as full grade product at an increased price.
- Re-cycled and recovered components re-sold as new.

The consequences of allowing sub-standard product to enter the supply chain may include:

- Reduced production yields and increased rework.

- Increased in-service failures and reduced reliability.
- Heightened risks and financial liability associated with catastrophic system failure.
- Cost of reputational damage.

What does "100 per cent tested" really mean?

Customers may incorrectly assume "testing" provides a 100 per cent genuine guarantee. At its most basic, 3rd party testing comprises one or some of the following:

- **Paperwork and Visual Inspection:** Unlikely to identify the professional counterfeit devices. Traceability documents & certificates are also regularly forged to support the overall deception.
- **X-Ray Inspection:** Unlikely to identify fraudulently up-screened, well-marked recovered & re-used, or recovered failed-test devices.
- **Basic Continuity or Functional Testing:** Will not identify the fraudulently unscreened or well-marked recovered & re-used devices
- **Full Functional Testing:** The datasheet only provides a subset of the characteristics tested by the Original-Chip-Manufacturer (OCM).

Is functional testing carried out over the full temperature range?

When functionally testing a device, FAULT COVERAGE is critical. Without 100 per cent test fault coverage, the device WILL have residual failures. Residual failures are devices that contain faults, but which PASS the testing used.

Semiconductor test is an intangible process – easy to conceptually understand – difficult to technically implement.

Effective test requires high fault coverage and accurate fault modelling. AS6171 calls out far greater testing for parts bought through Independent Distribution and yet is rarely followed.

The only way to offer a 100 per cent guarantee that a device operates to its specification, is to test it using the original component manufacturer's (OCM) test processes. However, even the most basic MCU test, as carried out by the OCM, comprises many 100,000's of man-hours in development.

Third-Party test houses cannot hope to replicate these complex test processes, often only partial electrical and/or functional testing is carried out.

The ultimate tool in the fight against Counterfeit is AUTHORISATION.

AUTHORISED After-Market Suppliers and Manufacturers (as called out in the US-DoD DFARS), such as Rochester Electronics, provide the only 100 per cent guaranteed and counterfeit-free source for active-shortage and obsolete semiconductors.

Finished devices stored and supplied by authorised sources are guaranteed to come only from the OCM and to have been stored in-line with the OCM's recommendations. These products offer a 100 per cent conformance guarantee.

As a licensed manufacturer, Rochester Electronics are also able to offer ongoing production of obsolete devices. Built from known-good-die, these products are tested using the OCM test procedures and, in many cases, the original test equipment – Guaranteed 100 per cent compliant to the original specification.

Rochester Electronics is authorised by the OCM to mark their products with the original part number and the current date-code. Many of these devices are still in production 20 years after the original discontinuation.

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