



## EASA Safety Information Bulletin

**SIB No.:** 2011-27R1  
**Issued:** 05 December 2013

**Subject:** **Suspect (Bogus - Counterfeit) Electronic Components**

**Applicability:** Manufacturing and Maintenance Organisations using Integrated Circuits (ICs) and other electronic components

**Reason for revision:** Since the original SIB was issued, more common electronic components have also been found to be affected.

**Description:** Discontinuation of production and resulting obsolescence of original parts has it made attractive to produce falsified copies of the original ICs, including programmable devices, microprocessors and microcontrollers, especially in the high price/performance segment. Cases observed include

- Relabeling of devices to state higher performance or newer fabrication code.
- Second source production not in accordance with the original design data.
- Labelling of housings without providing the function.

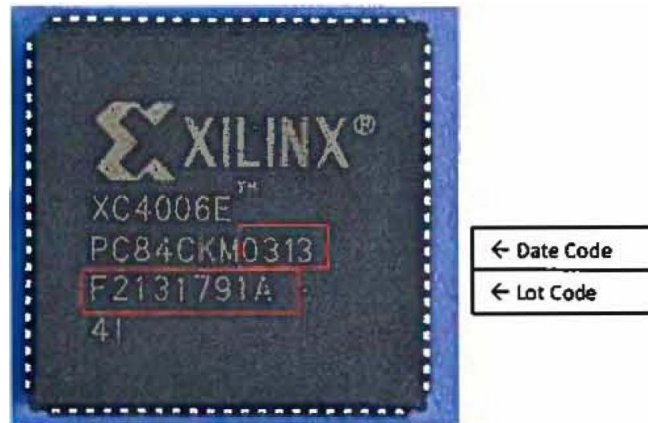
While the last case will obviously be detected during functional testing, it is much more difficult to determine, if another than the original manufacturing process has been used to produce, test, and pack the IC.

Known Events:

Xilinx Field-Programmable Gate Array (FPGA) XC4006E-4PC84I, which has been out of production since 2006, was brought (through brokers) back on the market in 2008 with date code 0313, 0046, or 0221.

Detected cases range from bogus ICs, in which a wrong die was included (with consequent erroneous behaviour), to original manufacture ICs, in which all chips contained were authentic but had been marked to show the desirable date and/or lot code to make them look newer than they really were.

This is information only. Recommendations are not mandatory.



Example

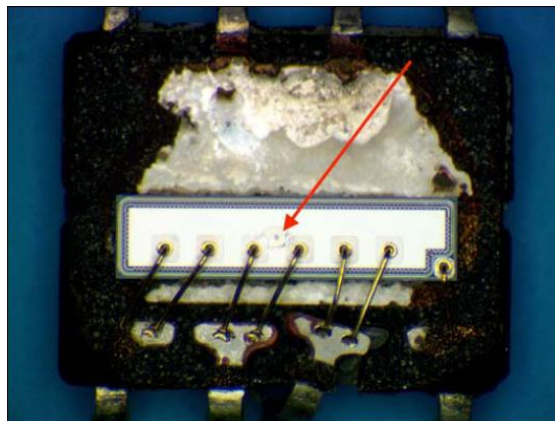
The following deficiencies have been observed during the process leading to the identification of the bogus ICs:

- Solder wetting issues – common for parts stored over long periods
- Co-planarity issues
- Pins shorted together on some of the parts
- Delamination issues leading to housing cracks
- Potential exposure to Electro Static Discharge may result in latent damage.

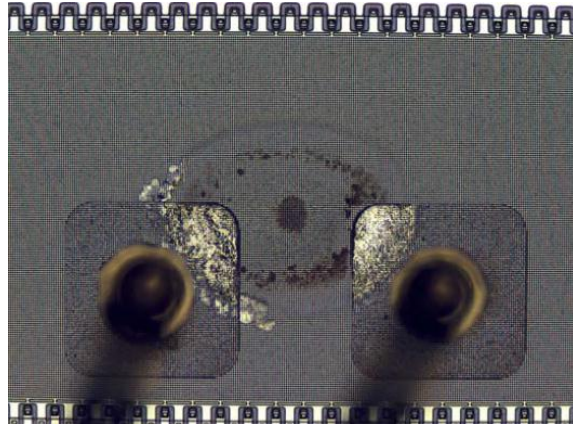
An additional event involved a counterfeit MOSFET SI4850EY-T1-E3, originally manufactured by Vishay Intertechnology, Inc., and procured from an electronic international trading company.

Although the component was visually identical to the original component, the internal design of the component was different. In addition, manufacturing was poor as several damages had been detected when analysing further different counterfeit samples.

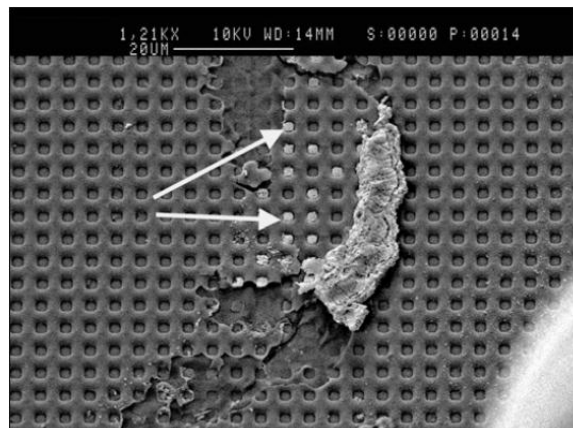
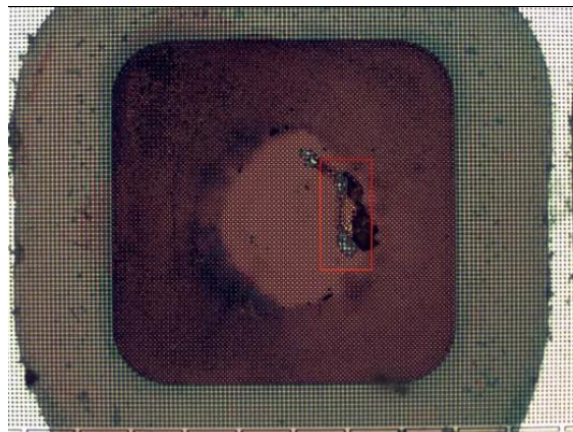
As shown below, a large alloy site was discovered at the centre of die of a sample showing short circuited gate-drain-source.



This is information only. Recommendations are not mandatory.



On a second sample, cratering was found beneath the gate bond. Optical and SEM inspection after delayering of both samples revealed cracks in the oxide and cratered silicon beneath the source bonds in each sample. There was also evidence of gold alloying into the source contacts in the damaged areas (see picture below).



These components induced equipment failures during qualification testing in extreme conditions.

However, given the type of defects, the counterfeit component could result in failures in normal operating conditions.

This is information only. Recommendations are not mandatory.

It is acknowledged that some of the deficiencies affecting these counterfeit components may sometimes occur with original parts as well. Nevertheless, bogus electronic components (including ICs) will present a higher probability of occurrence for such effects, implying the need of taking additional cautions as the history and the handling of the unit is unknown.

All these effects may lead to a significant reduction of the Mean Time Between Failures (MTBF) of the bogus electronic components (including ICs) compared to the original one, with potential impact on the system safety assessment performed at aircraft level.

At this time, the safety concern described in this SIB is not considered to be an unsafe condition that would warrant Airworthiness Directive (AD) action under EU [748/2012](#), Part 21.A.3B.

**Recommendation:** Manufacturers buying parts through brokers or international dealers are strongly recommended to perform a more extensive incoming components inspection and consider implementing advanced parts tracking, based on lot and date code.

In case of detecting an unusually high number of non-functioning or fake electronic components, please provide such information to EASA.

Additionally, when observing an increase in the failure rate of a board or unexpected equipment failure during qualification or screening tests traced to a component, consider counterfeit components as one potential reason. Implement continuous monitoring of the failure rate to determine if the failure rate is increasing above a level which would invalidate MTBF or safety calculations. In such case, the following actions are recommended:

- Equipment manufacturer to inform the Agency and the aircraft manufacturer(s) and/or design organisation(s) that have installed this equipment about this MTBF or safety reduction.
- Aircraft manufacturers and design organisations to inform the Agency about the impact on the system safety assessment at aircraft level coming from this MTBF or safety reduction.

**Contact:** For further information contact the Safety Information Section, Executive Directorate, EASA. E-mail: [ADs@easa.europa.eu](mailto:ADs@easa.europa.eu).

This is information only. Recommendations are not mandatory.