Impact and mitigation of counterfeit ICs in the aerospace and defense market

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Over the years, the relative stability of the defense and aerospace industry has served as a stable and reliable revenue pool. This market has attracted a variety of manufacturers to help offset the cyclical changes in the commercial and industrial markets. Aerospace and defense (A&D) companies continuously search for the latest and best commercial technologies to enable product innovations. However, when demand surpasses supply or end-product lifecycles outlast component level availability, buyers often are led to the open market, where they and the A&D supply chain are exposed to the hazards of counterfeit products.

The increasing threat posed by counterfeit parts has led to government and industry action.On May 21, 2012, The U.S. Senate Armed Services Committee released a report detailing the findings of their investigation into counterfeit electronic parts in U.S. defense systems. The committee reported discovering counterfeit parts in helicopters, surveillance, and cargo planes. In all, 1,800 cases involving around one million parts were discovered. Around 70 percent of these parts could be traced back to more than 650 Chinese companies. Brian Toohey, President of the Semiconductor Industry Association, testified to the Senate Armed Services Committee in November 2011 that along with the threat to national security and safety, counterfeiting costs U.S. semiconductor companies over $7.5 billion yearly, and has resulted in the loss of 11,000 jobs.

What can the government and the A&D industry as a whole do to thwart counterfeiters' efforts? The U.S. government is actively working with China in the hopes that Chinese officials will help mitigate their country's involvement in the situation. Additionally, new federal electronics anti-counterfeiting laws are being passed. In section 818 of the National Defense Authorization Act for Fiscal Year 2012, the Department of Defense (DOD) requires that their suppliers of electronic systems monitor and detect counterfeits and eliminate them from the defense supply chain. Failure to do so can result in monetary penalties such as re-work and

replacement device charges and/or debarment for repeat offenses.

Prime contractors also have implemented counterfeit control procedures in their procurement terms for subcontracts.They require their suppliers to show evidence of compliance/acceptance. There are several criteria that can lead to a part being deemed counterfeit:

1. The ordered integrated circuit (IC) does not have the original manufacturer's product construction. This can include die, symbolization, packaging piece parts, etc.
2. Refurbished or harvested products being promoted as new products
3. Parts falsely sold as upscreened products that are not adequately tested

Suppliers can implement a variety of procedures to detect these parts, the least complex being a high-magnification visual inspection of the top side symbol. The original manufacturer of an IC uses laser etching or ink stamp printing for part marking. Suspect parts may have faint scratches on the surface or irregular patterns around the edges as a result of the device being re-marked by the counterfeiter. More advanced destructive and non-destructive testing techniques include x-ray imaging to identify die size and metal lead frame patterns, device decapsulation for internal inspection, and performing scan acoustic microscopy (SAM) to detect delamination as a result of excessive heating due to device harvesting or rework. Suppliers have a large variety of methods to call upon when

the authenticity of parts comes into question.

As the industry continues to implement more and more strategies to prevent and detect the existence of counterfeit parts in the market, counterfeit suppliers also are making their own advances in the field of camouflage and distribution. Industry leaders, government officials and all those affected must remain diligent in their efforts to develop techniques and policies that allow them to stay one step ahead of the underground market of counterfeit parts.

References

• For more information please visit www.ti.com/hirel-ca,or [1] send an email to ti-counterfeit@list.ti.com [2].

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