Substandard Electronic Parts

Electronic News has recently published a series of articles reporting that PC motherboards and power management systems are suffering premature deaths from faulty parts, such as aluminum electrolytic capacitors and other commodity components, manufactured in East Asia (B. Levine and E. Sperling, “Penny Wise, Tons Foolish”, Electronic News, October 23, 2002). According to Shawn Wood, a senior analyst at iSuppli Corp, a number of top-tier computer makers are so worried about failure that they have begun testing their motherboards. IBM has said that reports of faulty capacitors have been surfacing for several months but so far IBM has not been directly affected, although it is working with its customers to ensure that its products are not at risk.

According to the article there are two driving forces for this unacceptably high level of failure. Equipment manufacturers in East Asia have been using parts often cost less and are below that of the top global suppliers. Further passives producers in that region are not capable of mass-producing base metal or polymer products, which are the leading edge for quality and technology for passive components.” In addition, there is a significant population of bogus or counterfeit electronic parts circulating East Asia.

While many leading OEMs and contractors are doing extensive testing to determine the overall quality of locally purchased parts, the results have remained inconclusive. These results are not surprising. Part testing is expensive, time-consuming, intermittent by its very nature, and is a reactive action that does not address the true root-causes of faulty electronic parts.

Over the past several years, CALCE has worked with its consortium members to develop a methodology for selecting quality part suppliers (C98-26, C00-29, C00-44, and C01-15). CALCE’s efforts have been driven by the knowledge that the part manufacturer’s organizational quality system practices and policies are the primary factor in the quality and integrity of commodity electronic parts, which in turn affect the level of risk inherent in the use of these parts.

In addition to our past work on assessing the quality of part manufacturers, CALCE has been looking into the problem of counterfeit parts in the electronics supply chain to understand its extent, scope and modus operandi, and to come up with potential mitigation solutions. We have found in our research that all types of parts and parts of any manufacturer are susceptible to counterfeiting.

For any equipment manufacturer, the supply chain is very complex due to the nature of the final product and the huge number of part manufacturers, authorized distributors (franchisees), independent distributors and part brokers supplying to them. It is difficult for them to identify counterfeit parts among thousands of parts used by it daily unless there is a sustained and deliberate attempt to do so, which is not a cost-effective process. The detection of counterfeit parts usually occurs when field failures in products are traced to a part and the subsequent investigation reveals that the defective part is counterfeit. Yet, failures caused by counterfeit parts may not be detected at all or may be attributed to other causes. For equipment manufacturers, the economic repercussions of such parts reach far beyond the cost of merely replacing the devices and include costs of safety, loss of performance, repair or replacement and reputation.

CALCE recommends the use of a systematized part selection and management process during the product development stage as a primary counterfeit detection and isolation measure. Following a structured risk-informed part selection and management methodology, which incorporates an “eyes-on, hands-off” approach, is the first tool to be used against counterfeit parts. This methodology, developed at CALCE, evaluates the risks inherent in the use of an electronic part and then facilitates informed decisions regarding its selection and future management activities based on availability and cost constraints such that discrepancies with respect to unusual part availability and cost can be detected. The ultimate solution, that can be, for OEMs faulty part fears is reducing the length of the supply chain and to have manufacturing of parts and their assembly into equipments taking place at the same location.