ABSTRACT

Use of Burn-In for Enhancing Reliability of Highly Reliable Electronic Systems.

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High reliability is the key to success in this modern market. Important issues in reliability are reviewed in the first chapter and we focus our study on burn-in, a pre-conditioning of assemblies and the accelerated power-on tests performed on equipment subjected to temperature, vibration, voltage, and humidity cycling. Burn-in techniques are widely applied to integrated circuits (IC) to enhance the reliability observed by the users. After considering the impact of incompatibility, all level burn-ins and redundancy allocation are performed in Ref. [11] and Chapter II, from which, the system burn-in is preferred because it can remove many of the residual defects left from component and subsystem burn-in.

The complex configuration of a system makes it hard to formulate the time for system failure by a probability distribution. A simple nonparametric approach is introduced to handle this difficulty. Furthermore, the cost of testing a system is high, which results in only limited samples available for new ICs. To overcome these problems, a nonparametric Bayesian approach is applied to determine the system burn-in time by using the Dirichlet distribution and the Dirichlet process. Systems used in random environments are also considered.