

Physics of Failure of an Electronics Product Must be Quantified to Assure its Reliability

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There is an obvious incentive to determine what could possibly be done to advance the existing practices in handling microelectronics and photonics reliability.

Despite all the existing and costly effort, electronic and photonics products that underwent the highly-accelerated-life-testing (HALT), passed the existing qualification testing (QT) and survived burn-in testing (BIT), often fail prematurely in the field. Are the today's practices and, particularly, their HALT and QT adequate, and if not, what could be done differently, so that the failure free performance of an electronic or a photonic product that passed the QT is assured, and could such an assurance be achieved without quantifying reliability? HALT, if successful, is expected, as is believed, to create significant, although unknown, safety margins. If this is indeed the case, could the today's HALT result in an over-engineered and, hence, in an unnecessarily expensive product? The ability to answer these questions is of obvious practical importance, especially for industries and applications, when high reliability is imperative, such as, e.g., aerospace, long-haul communications, military or medical fields. In addition, the performance of many non-electronic systems depends on the reliability of electronic, photonic and micro-electronic mechanical systems (MEMS) and devices, equipments and instrumentations. Thus, there is an obvious incentive to determine what could possibly be done to advance the existing practices by answering these questions.

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