

Failure modes in LED-based systems

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Reliability is an essential scientific and technological domain intrinsically linked with system integration. Nowadays, semiconductor industries are confronted with ever-increasing design complexity, dramatically decreasing design margins, increasing chances for and consequences of failures, shortening of product development and qualification time, and increasing difficulties to meet quality, robustness and reliability requirements. The scientific successes of many micro/nano-related technology developments cannot lead to business success without innovation and breakthroughs in the way that we address reliability through the whole value chain.

In this talk to be presented at the Reliability for Electronics and Photonics Packaging symposium ([link](#)), I will present the reliability approach at Signify. It includes the use of an in-house developed toolset, widely deployed failure mode descriptions and the extensive use of acceleration tests using knowledge based qualification methods. Following IEC62168 (Guide to principal component reliability testing for LED light sources and LED luminaires) we detected over 90 failure modes in our products, ranging from Browning of LED silicone, Chip moisture corrosion, Filament bulb failures, Silver mirror corrosion and Luminaire glass broken. Each failure mode has its own characteristics, be it catastrophic in nature or having a more degradation nature of appearance to the product. Approximately 80-90% were solved in design prior to market introduction but the remainder part, unfortunately, was detected after installation. The learnings from the latter ones is widely spread within the company as Lessons Learned in order to learn fast and prevent re-occurrence.