

# Fire Detection System Design For Reliability

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Reliability is the ability of a system or a component to perform its functions under its intended operating conditions for a specified period of time. As trends of device and system miniaturization continue and customer performance requirements become more stringent, product reliability specifications are increasingly challenging to meet and validate. The integration of multiple functions in electronic products is becoming a key enabler for a broad range of industrial, medical, military, fire safety, security and other applications. These integration efforts inevitably increase the complexity of products and the intricacy of the reliability engineer mission. Moreover, the ubiquity of electronics in our lives and their portability is such that these devices are exposed to extreme operating conditions with the expectation that they survive and continue operating at their best rated performance. Designing reliability into products is no longer a simple task left to the last minute but a multidisciplinary effort that starts in earnest after the first design concepts are generated. Product reliability is very often one of the most important customer requirements in any industry, yet it is rarely given justice in academic curricula. This case study will emphasize the importance of design for reliability, present an overview of steps that engineers must follow to deliver reliable fire detection products, as an example, introduce the principles of physics of failure and apply some statistical models to describe the reliability of fire detection devices and systems.

Anis Zribi is the Global Detection Technology Manager at Kidde Safety, UTC Climate Control and Security Systems. Dr. Zribi has over 10 years experience in various sensing applications at the device and system levels with major corporations such as General Electric and United Technologies. Dr. Zribi holds 22 patents and over 40 pending patent applications in MEMS, photonics, sensors and sensor systems. He authored or co-authored more than 33 articles in peer-reviewed journals and conference proceedings and two book chapters.