

# **RF reliability characterization in CMOS bulk and SOI technologies for 5G applications**

**Purushothaman Srinivasan and Fernando Guarin**  
**GlobalFoundries Reliability, NY, USA**

The reliability infrastructure developed for Silicon based logic applications was not sufficient to address the requirements for RF-5G circuits, a new RF reliability characterization has been developed and presented here. This webinar will provide a practical overview of the key reliability mechanisms along with a viable methodology that addresses the challenges faced by reliability engineers studying the reliability of 5G/mmWave/RF applications implemented in Silicon based technologies. The methodology presented here can be extended to other material systems.

We will review RF reliability within the context of scaling, power and integration showing how these have positioned the Silicon and Silicon Germanium technologies as viable contenders for very high speed, high integration and high reliability applications. We will show a practical approach to the reliability evaluation of Power Amplifiers operating in the 28 to 39 GHz range along with a discussion of the qualification methodologies required for the release of these technologies to the market. We will cover aspects of the development of reliability models that work under industry standard circuit simulators providing circuit designers with the necessary tools to extract the maximum performance while achieving optimum reliability. Stress data on a commercial beamformer solution will be used to show the excellent agreement of the experimental data to the physics-based reliability model projections. A brief overview of Self heating and its characterization in Silicon based systems will also be presented. Throughout this tutorial we will show several examples of reliability stress data along with the models to support our methodology and conclusions.