

Methods for Evaluating the Effectiveness of 2OE Methods to Mitigate Specific Supply Chain Risks

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The Aerospace Corporation has collaborated with and supported the AFRL-led ASSESS Working Group to evaluate the viability of second order effects (2OE) testing methods to improve the screening of microelectronic components for counterfeits and reliability escapes. 2OE are characteristics that are secondary to those for which components were designed functionally and reflect details of physical implementation (“the how it’s made”); for example, 2OE characteristics may depend on how energy is absorbed, reflected, or emitted under various test conditions. The breadth of 2OE methods spans very high dimensional feature spaces, but the detectability of specific types of “problems” may be limited to a much smaller range of measurable features, and ultimately will depend on signal to noise levels related to the scale of the “problem”, the means to data collection, and the methods of analysis. This talk will highlight findings from our research using a prototype FPGA-based 2OE test-bed, using hardware Trojans as a case problem for studying how methods optimization and detectability limits can be quantitatively assessed.