

1.0 INTRODUCTION

1.1 Purpose of WCCA

Worst case circuit analysis (WCCA) is a method for determining circuit performance under extreme conditions by accounting for component variability. Sources of component variability include component quality level, drift due to component aging, the stress applied to each circuit component (including humidity, temperature, or radiation), and external electrical inputs.

Analyzing the circuit at its extreme limits gives an indication as to how the circuit will perform under a worst case scenario. WCCA is a valuable tool that aids in design assurance and safety. Furthermore, implementing a WCCA can help identify ways to reduce financial, legal and safety risks to the manufacturer. This technical report provides the reader with structured approaches to performing WCCA.

1.2 Value of WCCA

Performing a WCCA can provide the design team with valuable insight into sources of variability which affect circuit performance. When circuit variability is identified and quantified it can be most likely controlled. Consider the following scenario:

Company X is planning to manufacture a voltage regulator. This company has manufactured regulators for 10 years. It plans to use a previous design as the basis for the new production model. After bread-boarding the circuit, Company X decides that it will start production. After production units have been fielded, it is realized that only 80% of the regulators meet a rise time specification required for the new design. The problem in this case is a filter capacitor that has a wide tolerance range. Had a WCCA been performed, the problem would have been realized before it surfaced in production or the field. Company X repaired the units in production while field maintenance personnel spent time and money troubleshooting the host system.

Finally, the output of a WCCA allows a comparison of actual applied part stresses against part rated values which can be used to ensure ample derating has been applied to meet design requirements.