CADY

Case Study

CADY's AI-powered technology detected a potential capacitor breach in WINT's schematic design, leading to an ECO.

Introduction

This case study delves into the analysis of WINT's main board conducted by CADY. In this case, the designer identified a specific finding in the report that required immediate attention, categorized it as "Need to fix." and issued an ECO [Engineering Change Order] as the design was already in production and there was a need to replace the capacitor before the product left the assembly line.

Inspection Report Overview

CADY's report includes a variety of findings, ranging from wrong input voltages to connection instruction violations. The system's comprehension of datasheet information leads to an average accuracy rate of 80% in its findings. Each finding is presented in a new line containing a drop-down selection where the user can mark the finding as "Need to Fix" or "Skip". "Need to Fix" is quite straight forward, whereas in the "Skip" option the user has a choice to ignore the alert due to intentional design or due to insignificance. The rest (20%) are false positive alarms (not design errors) that can easily be classified by the user, as the system provides information in the report regarding the information's origin in the datasheet, that led the system to issue that specific alert.

In over 65% of the inspected projects, at least one of the findings is marked as "Need to fix", meaning that the finding is accurate and significant.

Let's dive deeper into the critical detected error:

Potential Capacitor Breach

In this case, the system detected a capacitor, cl31a107mqhnnne, in both the Netlist and BOM, and successfully matched it to the corresponding entry in CADY's database. Through the system's NLP algorithm, which analyzed the component's datasheet, **it was inferred that this capacitor's rated voltage is 6.3V**.

Consequently, the system scanned through the netlist and discovered that this particular capacitor was connected to a power supply net named "P4V". The system inferred the supply voltage from the net's name as 4V, and calculated the difference between the supply voltage and the capacitor's rated voltage. **The system concluded that the voltage difference (4V) is too close to the rated voltage (6.3V)**, since, when taking a 50% derating factor into consideration, it can lead to overvoltage.

Overvoltage is a situation where the voltage applied to a capacitor exceeds its maximum rated voltage. This can lead to a breach in the capacitor due to the breakdown of the dielectric material or an increase in the equivalent series resistance (ESR), which can cause a reduction in the capacitor's reliability or even lead to a complete failure.

Thus, derating capacitors is essential to ensure their reliable operation and prevent premature failure. Derating involves selecting a capacitor with a voltage rating that exceeds the actual operating voltage by a certain margin, typically around 20-50% over the actual operating voltage. This helps to protect capacitors from various environmental factors such as temperature, humidity, and voltage stress, which can cause a decrease in capacitance or an increase in ESR. By derating capacitors, they can withstand the anticipated operating conditions and provide reliable performance over their intended lifespan.

In this case, the user chose a 50% derating factor, so the system alerted on a potential capacitor breach. Following this finding, the user issued an Engineering Change Order (ECO) on this capacitor, and chose a different capacitor with higher rated voltage as a replacement.

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About CADY

CADY uses AI technology to perform automatic inspection and verification of electrical schematics - enabling clients to improve and expedite the design process, save money & resources, reduce time to market and contribute to the quality, reliability, and safety of the final product. CADY's system realizes requirements and properties of the components in the schematic from their corresponding datasheets and checks them against the schematic wiring connections to detect errors.

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