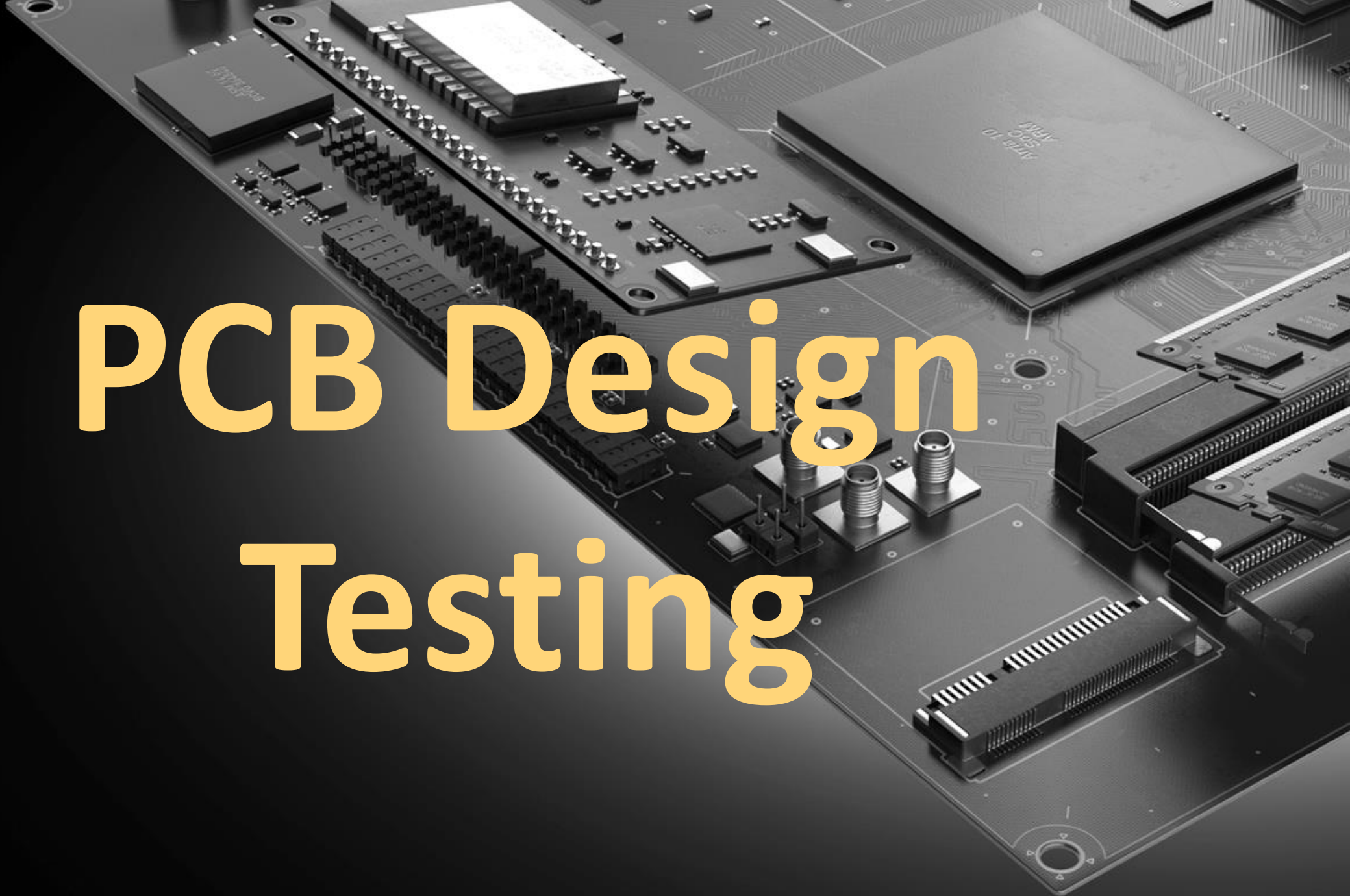


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PCB Design Testing



1. THE ADVANTAGES AND DISADVANTAGES OF DESIGNING WITH BREADBOARDS
2. THE NUANCES BETWEEN BREADBOARD PROJECTS AND PROTOTYPE LAYOUTS
3. HOW TO TEST ELECTRONIC COMPONENTS DURING PCB DESIGN

1

The Advantages and Disadvantages of Designing with Breadboards

The Advantages and Disadvantages of Designing with Breadboards

Breadboards are likely going to be in the desk drawer of every PCB designer and will likely be the first place when in need of a sandbox style domain to test the new designs on.

Advantages of Breadboards

- Breadboard can change with ease.
- If the design failed in a catastrophic way , entire circuit may be in jeopardy . With the breadboard acting as a sort of shield, portions of the design remain intact.

Limitations of Breadboards

- Breadboards will not be a good tool when designing circuits with high voltage.
- The boards will have difficulty in keeping up with high current applications .
- When dealing with frequencies in the higher, more precise reaches of the spectrum, signal integrity will be in jeopardy and will not easily travel through the board.



The Advantages and Disadvantages of Designing with Breadboards

Alternatives to Breadboards

- Some simulated programs mimic what breadboards aim to accomplish but will not run the labor of setting up the circuit design.
- As long as the ability is written into each simulator, it can be tested and simulated. There is learning curve associated with each program and has its own degree of difficulty.
- A program that encompasses features such as Design Verification allows to simulate design under a vast array of variables to test for flaws and inconsistencies without ever setting foot in a lab setting.



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2

Understanding the Nuances Between Breadboard Projects and Prototype Layouts

The Nuances Between Breadboard Projects and Prototype Layouts

Breadboards are very different than the circuit boards that PCB designers are used to

What are Breadboard Projects

- A breadboard is a platform to build the prototype or temporary circuits on.
- Breadboards come in two different versions - solderless and solderable.
- The solderless versions are more common as they are the easiest to work with. Each row of connected holes has a metal clip in the hole to capture the leads or wires that will be put into it.
- A soldered breadboard requires that each lead or wire be soldered into the hole. This makes the soldered versions of breadboards more robust but they are not as reusable as the solderless versions.

Advantages of Using a Breadboard

- Breadboard is a great way to build a prototype or temporary circuit.
- They can be done quickly compared to designing a printed circuit board.
- It does not require a CAD system or other similar tools.



Nuances Between Breadboard Projects and Prototype Layouts

Advantages of Using a Prototype Layout

- You can create the size of a circuit board needed instead of being restricted by the size of the breadboard.
- Components can be used instead of being restricted to thru-hole parts.
- It is easier to see and understand the circuits without looping wires going everywhere.
- A PCB is more robust which will bend under the weight of many large parts.
- The copper of a PCB is more durable than the metal connections and jumper wires of a breadboard.



Nuances Between Breadboard Projects and Prototype Layouts

Advantages of Using a Prototype Layout

- The components on a PCB are soldered in for a strong connection.
- A PCB will have a better current carrying capacity than a breadboard . A PCB can handle higher voltages than a breadboard as well.
- Signals will perform better on a PCB without the higher parasitic inductance and capacitance that is typical in a breadboard.
- Replicating a PCB is a much easier than creating multiple hand-assembled breadboards.
- A completed breadboard just isn't attractive to buyers like a completed PCB layout is.



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3

How to Test Electronic Components during PCB Design

How to Test Electronic Components during PCB Design

By testing the electronic components of the board before manufacturing can ensure that it will perform as intended with the design.

Is Testing PCB Components During Design or Not

This is a very important design step, schematic simulation does not guarantee the functionality, reliability or even manufacturability of the design.

The reasons for performing a schematic simulation of circuit are –

- Determine Component Parameters**- Primarily voltages, currents, and impedances.
- Verify Circuit/System Operation**- Check inputs/outputs, and signal levels.
- Make Changes and Correct Errors**- Replace parts, or make design changes.
- Save Costs**- By not having to buy components or materials for testing.



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How to Test Electronic Components during PCB Design

How to Test PCB Components During Design

- The use of a PDNA provides a united design and analysis environment for PCB design.
- Power distribution analysis can be performed over the entire board or only specify predefined areas.
- The ability to look at a component's incoming and outgoing traces can be used to determine the component's specific parameters.
- The ability to gather thermal, signal, and power integrity, current density, and trace impedances during design is a significant benefit to the PCB design process.



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