

Quality Management

Design Rules Check

We incorporate a Design Rules Check (DRC) in our manufacturing and fabrication processes as a quality control test. For new orders, we initially address layout problems by using an automated testing machine to verify that the layout does not have routing, placement, or any other layout problems. Using the DRC, we compare the layout and the net list to PCB design limitations and the rules. It will verify part placement and trace routing to make sure there is no overlapping, untraced connecting pins, incorrect layer placements or other limitations that have been determined for routing widths and clearances. In addition, we use the DRC to ensure the PCB is capable of being manufactured. Any errors we find, we immediately contact the customer prior to commencing the production process.

Electrical Tests for Prototype PCBs

On small run and prototype PCBs, the factory always provides the Flying Probe Electrical Test. Using the Flying Probe tester, we test the PCB to ensure it has no short or open circuits, as well as testing to verify that the PCB nets we manufacture correspond to your design. The Flying Probe tester possesses few limitations on access. It does not need test fixtures. It can test PCBs with almost an unlimited amount of nets. In general, the Flying Probe test will catch errors such that the failure rate of the PCBs is generally less than one percent.

Production Testing

On production orders, we use a "bed of nails" tester, which have long been used as a test fixture. It has many small and spring loaded pogo pins that are inserted into holes on an epoxy phenolic glass cloth laminated sheet. These are lined up with tooling pins, which connect with the PCB test points. Every one of the pogo pins will connect to the device of the PCB that is going to be tested. Upon initiating the device-under-test via the bed of nails tester, many separate test points will be connected for testing. This test ensures there are no shorted or opened circuits, and will also ensure the PCB nets correspond with the design nets. This test generally maintains the PCB failure rate to less than one-tenth of one percent.

Automated Optical Inspections

Automated optical inspections (AOI) provide an internal quality check of the inside layers of PCBs with multiple layers. This type of inspection performs a vision scan of the PCB surface using scanners and/or hi def. cameras so the entire area of the PCB can be checked. The primary advantage of AOI is that it is highly reliable and accurate and a

more sophisticated type of testing than visual inspection testing. For a basic board inspection (one without components placed), AOI can test for the following failures:

- • **Line width out of rules specifications**
 - • **Spacing errors outside of rules specifications.**
 - • **Excessive amount of Cu.**
 - • **Missing pads when they are required**
 - • **Shorted circuit paths**
 - • **Traces or pads that were partially or fully severed.**
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- • **Holes that are broken out, which is usually caused by a hole that has been drilled beyond its target pad.**