

BBG Tech Tips #6

Electrical Test

The bare board is electrical tested to ensure that it reflects the original design as intended. The test is typically a series of continuity and isolations tests. There are basically two methods for testing: *golden board* testing and *netlist* testing.

Golden Board Testing: Is primarily used when no Gerber or electronic data was available to generate the artwork used in the manufacture of the PCB. Legacy product that is usually a through-hole, simple 2, 4 and even 6 layer boards are still tested in this fashion. This is a self learn test when a (hopefully) known, good board—the golden board—is used only as a reference.

The golden board is placed on a simple test fixture and then loaded on to the test machine that when activated will “learn” everything about that board—what is and what’s not connected to what. Once the tester has been programmed by that golden board, the entire order of PCBs will be tested and compared to that board. All boards that test the same as the golden board will be *assumed* to have passed electrical test. Those that do not compare are assumed to be rejected. The golden board is then filed away with the traveler package to be used as a reference on future orders of the same part number or it may be shipped with the order for customer verification.

This type of testing is fine when there is a known, good bare board. But for a first time run it may be hard to determine which is a golden board depending on the complexity of the circuit routing and this is where all the faith you have in your engineering and QC staff come into play. Many years ago, I experienced a situation where about half the order tested good according to the “golden board” and the other half failed—you guessed it—we shipped the wrong half!

Netlist Testing: When Gerber data is available, all the nets (a string of points along a circuit) can be extracted from the information supplied. Where golden board testing was a comparison test, the netlist tests all points ensuring a high confidence of electrical integrity.

Dedicated and very complex test fixtures along with flying probe test machines are used to confirm this higher quality of assurance to gain the desired results. This true electrical test of point-to-point is just a step away from the actual schematic drawing of the PCB and takes the guess work out of assuming what is golden whether the order is for prototype or production.

Research for the above information may be from, but is not limited to, IPC reference manuals, the PCB Handbook, the Bare Board PWB Design Manual and consultation with industry professionals. Please consult a process engineer familiar with your company’s PCB assembly process before making any procedure changes.