

Contactless PCB Thickness Measurement

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Abstract: Consistent Printed Circuit Board (PCB) thicknesses are requirements intended to ensure a good quality Printed Circuit Board Assemblies (PCBAs). PCBs come in a range of form factors and geometries, depending on their function and application. These form factors affect the design of the PCB thickness.

Many systems used for PCB dimensional thickness measurements rely on contact based measuring instruments. Contacts and pads have an effect on the measured thickness, while instrument position and probe resolution are crucial for measurement accuracy. The means of contact between the specimen and the measuring instrument is usually a probe such as the ends of a micrometer. This contact causes probe degradation due to friction, periodic equipment calibration, loss of accuracy, and potential damage to the specimen.

Lasers provide a better measurement resolution when applied to surfaces with varied topography, especially when inspecting or testing highly dense PCBs, without contacting the PCB. Many companies have used equipment that deploy lasers, in conjunction with other technologies, to perform contactless measurements. The limitations of a laser system are a continuous measurement output and laser alignment. These limitations inhibit quick set up changes, data logging and general shop floor usage. To overcome these challenges, an economical and commercially available contactless system, modified to fit company needs, is developed.

We implemented this solution in two phases. This study focused on the first phase. The first phase concentrated on the immediate need for use. A single purposefully designed frame housed the laser sensors. Two gage blocks with graduations accommodated PCB thicknesses. The second phase involved a semi-automated solution with a modified frame to include a centering mechanism to hold the PCBs, perform measurements and display a single measurement value on command while eliminating the need for gage blocks. Phase One of the solution has been shown to be successful and Phase Two will soon be commenced.