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Effect Of Temperature On Flexible Printed Circuit Board Layout During Reflow Soldering Process

Abstract

High demands on flexibility, lighter weight, thinner size and low-cost electronic product had increased the application of Flexible Printed Circuit Board (FPCB) over Rigid Printed Circuit Board (RPCB). However, the thermal factor affects FPCB significantly during the reflow soldering process. The temperature of the reflow soldering process causes the FPCB to encounter significant deflection and thermal stress compared to the RPCB. Therefore, the present experiment investigates the effect of temperature on FPCB layout during the reflow soldering process. The deformation of RPCB and FPCB was measured using a KEYENCE LK-G152 laser sensor placed at the entrance and outlet of the reflow oven. Two temperature profiles were used as a variable for the experiment: soaking temperature profile and ramp temperature profile. The investigation shows that component placements pattern influences the deformation of FPCB. The FPCB component placements reduce the deformation due to low wetting angle and component weight. FPCB solder joint has a good wetting angle ($<90^\circ$), indicating good solder paste deposited on the FPCB. However, several solder joints on FPCB are irregular in shape due to high deformation. Therefore, it is essential to study the effect of temperature on FPCB during the reflow soldering process for industries guideline for mass production of FPCB products. © 2023 American Institute of Physics Inc.. All rights reserved.