

Topside re-melt or re-reflow

Introduction

If a PCB has a combination of leaded-components and SMD-components, The SMDs can be mounted on the topside and or the bottom-side of the PCB. If the SMDs are mounted on the topside of the PCB, the assembly process starts after mounting the components in the solderpaste with reflow soldering of the SMDs. Next the leaded-components are mounted and these components are often soldered in a wave soldering process.

During wave soldering the whole PCB is exposed to the thermal demands needed for soldering the leaded components. One has however to keep in mind that there are extra thermal restrictions in this case, due to the already soldered SMDs on the topside of the PCB.

If these restrictions hamper the soldering of the leaded-components, one should use another soldering technique for the leaded-components, such as selective soldering.

Process settings

In case a combination of reflow and wave soldering is necessary for a PCB-assembly, it is important that design and solderability requirements are fully met. This is necessary, so that the wave soldering process can be set to the minimal thermal demands for soldering the leaded-components, so that the process will not affect the reflow soldered joints.

In theory the topside temperature of the PCB must during wave soldering at all times be below the melting temperature of the solderpaste that is used in the reflow process.

The practical situation however often demands not only the prevention of a re-melt of the already soldered joints, but also demands a certain remaining strength of these joints. This is necessary, so that these joints will not crack during the wave soldering process as result of a tension that is generated due to the differences in thermal expansion between the PCB and the reflow soldered component.

In the practical situation it is almost impossible to predict if there is a risk of topside re-melt or cracking joint. Measuring on critical spots with small thermocouples during the wave soldering process might give the necessary information.

Component displacement

If the temperature on the topside of an already reflow soldered PCB is getting too high, joints may crack, re-melt and or components may move or even be displaced.

A reason for component displacement can be a sudden mechanical force at the moment all joints are still in a molten state or not completely solidified. Such a force or hit can take place when the PCB comes out of the machine conveyor and is taken over to an outfeed conveyor which is not placed well in-line. As a result the PCB jumps, falls, or bounces during this transport stage, resulting in the displacement of components from joints that are not already completely solidified. This has been found in a real case.

The displacement of components can also be caused as a result of poor wettability of the parts to be soldered. In that case however the displacement can already be seen directly after the reflow process.

So if the displacement of reflowed components on the top-side of the PCB is only found after wave soldering, then the most probable cause is a mechanical force acting upon the PCB in the stage that the solder at the joints is not completely solidified.

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