

Discrete Components with Pre-Applied Lead Corner Solder

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I. BACKGROUND

- Automotive industry dictates the standard for quality excellence for most (if not all) semiconductor packaging and test manufacturing companies
- To achieve such state, semiconductor and electronic devices for automotive applications follow stringent requirements
- One requirement is for the device to have wettable or solderable sidewall

II. PROBLEM IDENTIFICATION

- Automotive devices need to have solderable/wettable sidewall to enable automated visual and mechanical inspection (VMI) after mounting to the printed circuit board (PCB)
- Aside from the usual semiconductor packages, discrete components like the passive surface-mount devices

(SMD) should also satisfy the requirements for automotive applications

- Passive SMDs in Fig. 1 include resistors, capacitors, inductors, transformers, and diodes (*i.e.* ESD diodes)

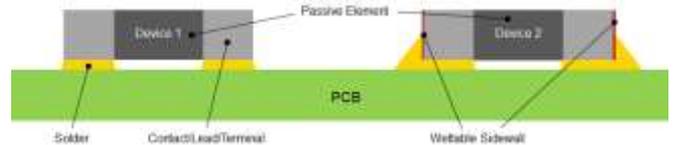


Fig. 1. Discrete component connection with PCB.

- A device without sidewall solder would have lower board level reliability (BLR) or PCB solder joint life as compared to the same device with sidewall solder
- Plating of the sidewall to make it solder wettable needs expensive additional equipment (*i.e.* Sn (tin) immersion)
- Device with wettable sidewall (but without sidewall solder) would still have lower BLR compared to the same device with sidewall solder

III. PACKAGE DESIGN SOLUTION

- Discrete components like SMDs are augmented and improved with pre-applied lead corner solder material in Fig. 2
- With pre-applied solder on the leads' sidewalls, enhanced and more robust solder joint to the PCB is created (better BLR)

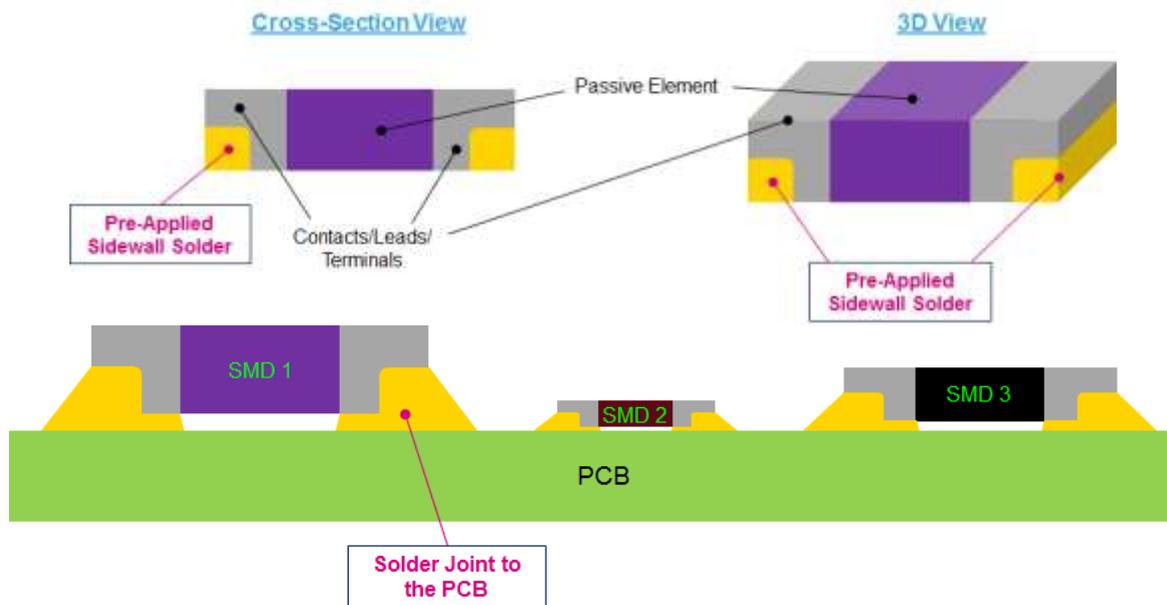


Fig. 2. SMDs augmented with pre-applied solder material on the leads' sidewalls.

- The improved design could also enable automated solder joint VMI after mounting the SMDs to the PCB