

Optimization on laser soldering parameters onto lead-free solder joint

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Abstract. This paper presents the results of optimization on laser soldering parameters onto lead free solder joint. The objective of this study is to determine the laser power needed and scanning time required to produce a high quality of solder joint. Laser soldering was selected due to its rapid and controllable selective process as well as suitable for temperature sensitive assemblies, which is very desirable nowadays as compared to time consuming process such as casting. A fibre laser with 200W was used in this study to form a joining between lead free solder wire and copper board. However, a continuous laser power was ranged between 48 to 60W to create joining. Before that, flux was also applied prior to laser soldering for uniform heat distribution throughout the solder volume. Lead free solder wire with the size of 1.0mm diameter was formed into several shapes including straight line-shape with 20mm in length, and spiral-shape with 6mm diameter, in order to capture and disperse the heat evenly. Results showed that laser power ranged from 48W to 60W with 3.5 to 4.5s duration was found to be suitable for lead free solder wire with spiral-shape condition. Besides, the wetting angle was also in optimal when the laser power was increased. The optimized fibre laser parameters obtained in this study will be used for future reference in performing a laser soldering between solder alloy copper board.

