

# Microwave Hybrid Heating As An Alternative Method For Soldering– A Brief Review

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**Abstract.** The paper reviews the Microwave Hybrid Heating (MHH) method as well as the effect of MHH towards the interfacial reaction and the shear strength at the solder/Cu joint. Previously, reflow soldering process was performed to solder electronic component. Due to its high defect rate, processing time and energy consumption, MHH method are getting more attention among electronics manufacturers to perform industrial process as it is beneficial in modern microtechnology. MHH method has faster heating rate, improve heating uniformity, reduces the chance of thermal runaway, reduce processing temperature, and reduce hazards to human and environment. This approach has proven to yield scallop-like and angular trapezoid structure of Cu<sub>6</sub>Sn<sub>5</sub> and Cu<sub>3</sub>Sn in the intermetallic compound (IMC). The IMC thickness shows a competitive result (5.337μm and 5.717μm) compared to reflow soldering. However, not many studies were done on the shear strength of the solder joint.

**Keywords:** Microwave Hybrid Heating; Sn-Ag-Cu; susceptor.

## 1 Introduction

Microelectronics assembly especially in a surface mount technology uses reflow soldering as the joining method. Reflow soldering can be defined as ‘the joining of mating surfaces that have been tinned and/or have solder between them, placing them together, heating them until the solder fuses, and allowing them to cool in the joined position’ [1]. It is used as a technique to provide electrical, thermal, and mechanical connectivity between two metallic surfaces. However, it is known that reflow soldering requires more processing time, consumes higher energy and produced higher solder joint defect rate [2] compared to other conservative methods.

Nowadays, microwave energy has been applied as an alternative to the process that consumed high energy that is being used in the industries [3]. Formerly, microwaves were used for communications [4]. However, an experiment by Percy Spencer in 1950 about the heating of materials by microwave energy got recognized [5]. Since then, new processes for industrial manufacturing were recognized such as tempering,

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