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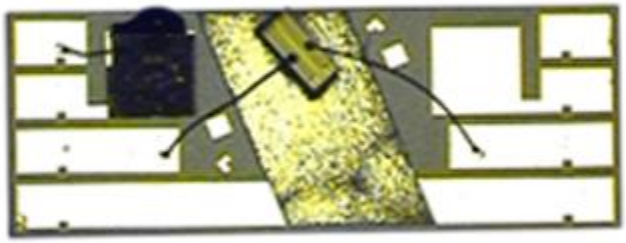
APPLICATION NOTES

Handling and Mounting Chip on Submount



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Introduction

The objective of this application note is to provide users with a guideline for AuSn eutectic die bonding and wire bonding of Denselight SOA, SLED, GC die. It provides recommendations based on Denselight AuSn die attach processes. This application note should be used as a reference for setting up a die attach process. As packaging equipment, materials and assembly processes will exist, it is recommended that users fully characterize their process to define optimal die attach conditions. ESD should be followed to prevent unexpected laser diode failure:

- The user must be connected to the ground and use anti-static gloves.
- Use ESD wrist straps when in direct contact.
- Work surfaces should be grounded

Material & Design Consideration

- A eutectic gold tin solder, Au80Sn20, with a melting point of 280°C in a preform or pretinned format should be used for performing die attach.
- A general rule of preform size is 90% of the die metallization.
- When using large preform to die ratios the thickness of the preform can be kept relatively thin and Denselight has found 6-10um thickness to be adequate. In cases where control of solder flow beyond the periphery of the die is an issue, smaller preform to die ratios can be used, but thickness may need to be increased to compensate and keep overall volume consistent.
- It is recommended that a thermistor be assembled on the same submount to monitor temperature and provide accurate feedback for temperature control.

Die attach process considerations

Below are some considerations in the Die Attach processes:

- The die attach process should be performed using automated equipment to attain repeatability.
- Solder reflow is achieved using conductive steady state heat or pulsed heat.
- Steady state heat uses a heating element that is set to a constant temperature throughout the entire process.
- Pulse heating uses a temperature profile much like a mass reflow process but with shorter rise, dwell and cool times. For either case, a peak temperature of 340°C shall not be exceeded.
- In the case of steady state heat, the die should be held no longer than 30 seconds at peak temperature.
- Also, the time at which the preform is held in a reflowed state prior to the die being placed should be as short as possible in order to keep Sn oxide formation at a minimum.
- For pulse heating, a background temperature of 200°C is a good starting point with ramp up of temperature occurring as fast as possible.
- The peak temperature time of a pulse heat system should be long enough to ensure the preform completely reflows and wets to the mating surfaces.
- This time may vary based upon the thermal mass of the package/carrier and the heating capability of the pulse heating system. Denselight has found that a 5-10 second time at peak temperature of 340°C is sufficient for most internal applications.
- Below is an example of a typical pulse heat profile.

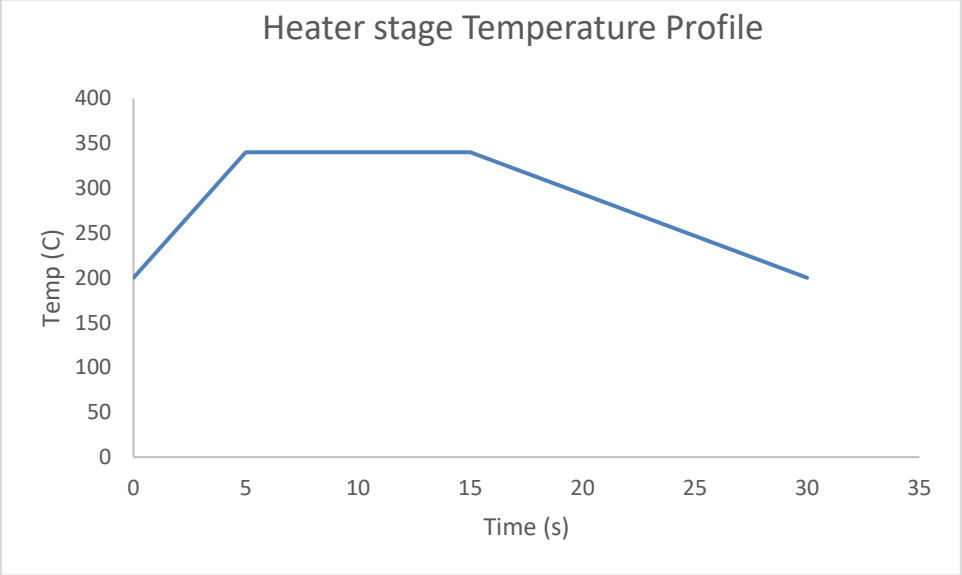

Figure 1

- Preheating of die, through conductive heating, via a heated stage or collect may be employed.
- A pre-heat time of 5-10 seconds is adequate for most applications, but should not exceed 30 seconds.
- In the event if preform thickness or solder composition is not optimum, we can use scrubbing to improve bonding. User will need to optimize the optimum conditions for bonding based on equipment used

Wire Bonding considerations

All bond pads should have an Au layer to facilitate both ball and wedge wire bonding. Al wire should not be used as this can create intermetallic growth with the Au bond pads.

Ball Bonding Process

1. Place the ball on the die and the wedge on the pad to minimize the force applied to the die.
2. Heat substrate with die to 130 - 150°C during wire bonding.
3. Select appropriate size wire to allow for ball size and wire bond placement accuracy on bond pads. Bonds should not overhang the outside of bond pads to avoid contact with exposed metallization from other areas of the die.

Wedge Bonding Process

1. Bonding may be done in any order with first bond, stitch bond, or last bond placed on die.
2. Heat substrate with die to 130 – 150°C during wire bonding.
3. Select appropriate size wire to allow for bond, tail, and wire bond placement accuracy on bond pads. Bonds should not overhang the outside of bond pads to avoid contact with exposed metallization from other areas of the die.