Power Device Construction FAQ

Power Marketing
May 2016
OVERVIEW

- This document addresses many of the frequently asked questions posed by Wolfspeed bare die customers on the proper handling and processing of bare die
- Good Rule-of-Thumb: if it works well for silicon, it will work well for Wolfspeed silicon carbide
DIE ATTACH RECOMMENDATIONS FOR SiC DEVICES

- Wolfspeed silicon carbide devices are completely compatible with existing silicon processing parameters for high-power devices.
- Special considerations do not need to be made with regard to using silicon carbide devices in place of silicon devices.
- Customers can use materials and parameters that they have previously developed for mounting high-power silicon devices:
  - Options include SAC solder, SnAgSb J-alloy, and AuSn alloys.
  - While any Pb-based solder is also an option, the use of these materials is in violation of several environmental compliance regulations.
  - Standard industry profiles for these materials can also be used.
- As with any new manufacturing change, Wolfspeed strongly recommends that the customer properly qualify the final product to ensure the robustness and stability of their new product.
- Important: Optimal thermal conductivity is critical to long-term performance of the device. Take care to keep die-attach voiding as low as possible to maintain good thermal conductivity.
  - Voiding greater than 2% is not recommended.
WIREBONDING RECOMMENDATIONS FOR SiC SCHOTTKY DIODES

- Wolfspeed silicon carbide Schottky diodes are completely compatible with existing silicon processing parameters
- Special considerations do not need to be made with regards to using silicon carbide diodes in place of silicon diodes
- Material selection:
  - Wolfspeed’s Schottky diodes utilize 4 microns of aluminum for the pad metallization. Therefore, Wolfspeed recommends aluminum wires for ease of wirebonding, although any wire types used with success on silicon die in identical applications can also be used
- Wire diameter:
  - Wire selection can be based upon standard industry current-rating calculations for silicon
- Wire-bonding parameters:
  - Wire-bonding parameters selection can be based upon pre-existing parameters used for silicon
- Summary:
  - Wolfspeed Schottky diodes are designed to be drop-in replacements for existing silicon diodes. If the customer already has a pre-existing wire-bonding procedure for silicon diodes, they can use this procedure as a starting point for Wolfspeed SiC Schottky diodes
  - However, as with any new manufacturing change, Wolfspeed strongly recommends that the customer properly explore the process space via standard DOE techniques ensure the robustness and stability of their new process
POTTING MATERIALS FOR SIC DEVICES

• Wolfspeed silicon carbide devices are completely compatible with existing silicon processing parameters

• Special considerations do not need to be made with regards to using silicon carbide devices in place of silicon devices

• Customers can use materials and parameters that they have previously developed for silicon module coatings and potting materials

• However, as with any new manufacturing change, Wolfspeed strongly recommends that the customer properly qualify the final product to ensure the robustness and stability of their new product
DEVICE TESTING FOR SiC SCHOTTKY DIODES

• Wolfspeed silicon carbide Schottky diodes are completely compatible with existing silicon processing parameters

• Special considerations do not need to be made with regards to using silicon carbide diodes in place of silicon diodes

• Customers can apply existing silicon test techniques to SiC Schottky diodes, with adjustments made to specs to account for the enhanced performance of the SiC diode (as per datasheet) or the requirements of the customer’s final device
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