RDRAM* Thermal Interface Material Specification

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Document Objective

- Specify the thermal interface material properties for robust thermal / mechanical performance of the RIMM assembly.

Scope

This document is applicable to RIMMs with cover assemblies over the RDRAM* components

Introduction

Due to increased memory device power dissipation with increasing performance, the RDRAM module requires a heat spreader to ensure the device junction temperatures are maintained within their operating limits. In order to ensure good thermal contact between the device and the heat spreader an interface material is required. Thermal design considerations dictate certain interface material reliability requirements and structural/mechanical design considerations dictate certain other reliability and assembly requirements for both the interface material and device packages.

Interface Material Requirements

This section identifies the material properties and geometries of the thermal interface materials that have been shown to meet the RDRAM reference designed module requirements for robust thermal, mechanical, and reliability performance.

Material Stiffness:

The interface material shall not exhibit an Engineering Stress-Strain Curve (Engineering Stress is defined as the actual load, divided by the initial sample area over which that load occurs) that exceeds that shown in Figure 1, at any time prior to or during heat spreader plate assembly. Strain rate for determination of material stiffness should be 1mm/min. This curve represents a material that meets the maximum expected variation in the gap between the top surface of the packages and the spreader plate, and the maximum allowable loading on the package that enables long term reliability of the microBGA package.

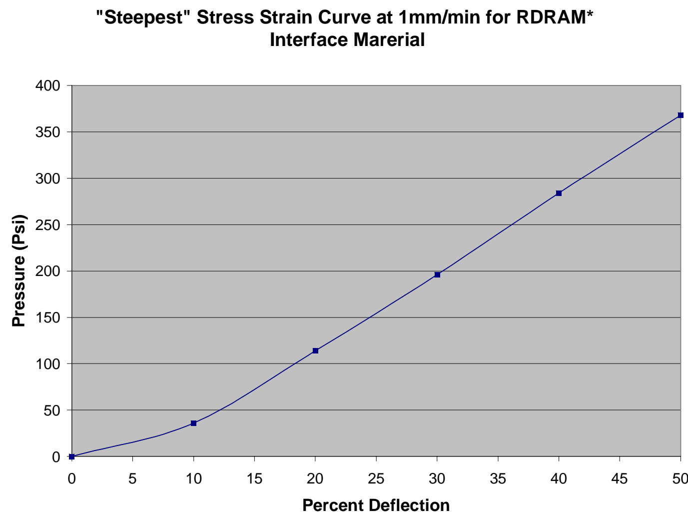

Figure 1 – “Stiffest” interface material stress-strain curve

Material Geometry:

Pads and Gels
Interface materials that can be pre-applied to the heat spreader plates and modules (i.e., pads and gels) shall cover the packages with at least 80% die area coverage (~0.5in x 4.0in). The thickness of the material is dependent upon the spreader plate design chosen. http://developer.intel.com/design/chipsets/memory/rdram.htm

Dispensable Materials
Interface materials that are dispensable shall cover the packages, and the corresponding area opposite of the packages on the spreader plates with at least 80% die area coverage.

NOTE: Regardless of material chosen, specific module layout, or heat spreader design chosen, the interface material geometry shall be such that a direct thermal path between the SPD and heat spreader **DOES NOT OCCUR** during module assembly and use. Operation outside of the SPD specified envelope will occur.

Thermal Performance

The thermal resistance of the material on the module shall be less than 4C/W, based on the contact area of the package, material thickness, and the active device maximum specified power dissipation (from the DRAM vendor's data sheet). This thermal resistance shall be determined with all other devices on the module operating as they would in a real system.

Dielectric Withstand

The chosen interface material shall have a dielectric constant consistent with an insulator.

Volatile Content

The interface material shall have less than 0.5% mass loss over the life of the module.

Reliability Requirements

See the RDRAM Module Mechanical Assembly Reliability Specification.