Indigo2 Application Note 0801

Thermal Characterization of Indigo2™

Indigo2 is a second-level Thermal Interface Material (TIM2) system for use between an electronic component (lid, heat spreader, package case, etc.) and heat sink/heat exchanger. Indigo2 is an engineered composite structure that contains areas of differing thermal impedance.

Enerdyne recommends testing Indigo2 "In-situ", utilizing thermal test vehicles (TTVs). Unlike ASTM D5470 which applies a uniform heat flux across the interface with laboratory planar surfaces, In-situ testing represents actual application heat flux distributions and surface conditions. This results in a more accurate representation of product performance.

As the Indigo2 structure requires a frame of pressure sensitive adhesive around the perimeter of the application (to contain the Phase Change Metal Alloy (PCMA) and for interfacial strength), overall thermal impedance across the structure varies with form-factor. Figure 1 illustrates the seal area with a higher thermal resistance than the area of the interface filled with PCMA.

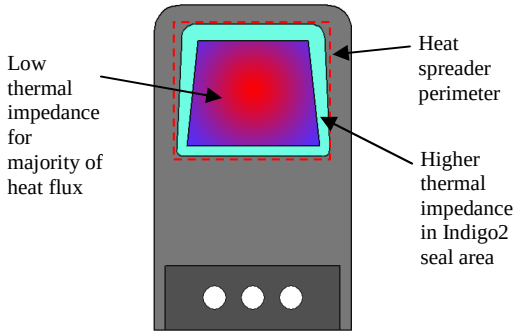

Figure 1: Higher thermal impedance of adhesive frame area

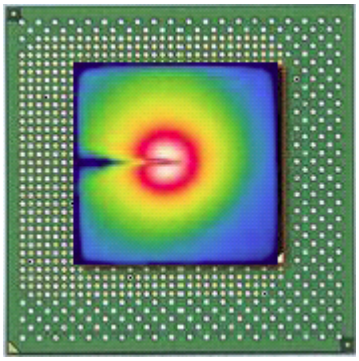

Figure 2: Typical thermal map of a processor and heat spreader

In most TIM2 applications, an uneven heat distribution exists with the majority of the total heat load located near the center of the heat spreader. In a typical microprocessor application, 85% of the heat may be dissipated within the centermost 15% of the heat spreader surface area (see Figure 2). As a result, the higher thermal impedance near the component perimeter does not materially contribute to reduced thermal performance of the overall interface.

Therefore, to properly evaluate the performance of Indigo2, testing should be performed within a test vehicle (In-situ) that represents the target application dimensions, surfaces and heat flux distribution.

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