POSiFA
Microsystems, Inc.

PTFD10 AN-01

Working with Thermal Flow Die

The purpose of this application note is to provide design engineers with detailed information regarding the PTFD10 to conduct a thorough analysis for performance evaluation.

Figure 1 Flush mounted die on a ceramic substrate with glob top encapsulant covering the bonding wires

Attachment and Bonding

The PTFD10 die should be flush mounted in a substrate so that the die surface is leveled against the surface of the substrate (Figure 1). Commonly used substrate materials are ceramic and FR4 (PCB).

Figure 2 describes the dimensions of the cavity in which the die is set, and the relative position and dimensions of the bonding pads. The bonding pads should be gold-plated for optimal bonding yield.

We recommend using aluminum wire for bonding. The bonding wires should be protected with glob top encapsulant (Figure 1).

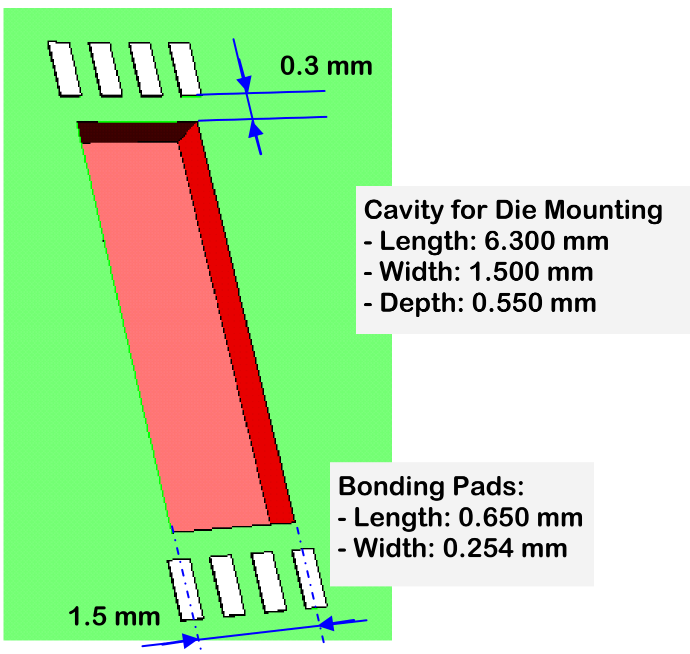

Figure 2 Die Cavity Dimensions and Bonding Pad Dimensions and Position

Interconnections

Using the inscription on the die as the marker, interconnections are described in Figure 3.

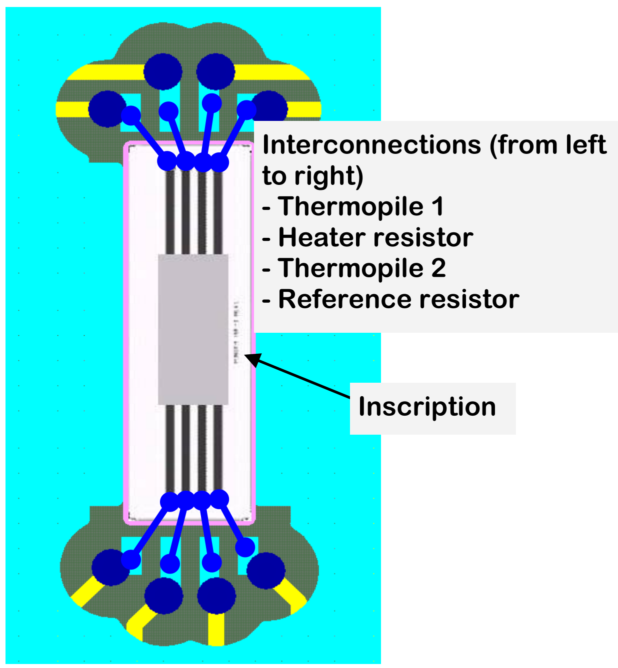

Figure 3 PTFD10 Interconnections

Flow Path Design

The flow path should channel the flow medium across the surface of the die. The flow direction should be perpendicular to the long side of the die. The flow path should align with the center of the die and should be at least 1.2 mm in width. This is to ensure that the sensitive area of the die is fully exposed to the flow medium.

Figure 4 illustrates on design option.

Burn-in

Before the die is put into operation we recommend 200 hours of burn-in time to achieve optimal stability. The burn-in current should be at least the operational current (e.g. 7 mA for gas applications). Elevated burn-in current can achieve the same level of stability faster (e.g. 12 mA for gas applications should reduce the burn-in time by at least 50%).

Operation

We recommend operating the die in a constant current mode. For gas flow application we recommend a constant current of 7 mA to be applied to the heater resistor. Due to the Seebeck effect, this will generate voltage on the thermopiles. The differential voltage of the thermopiles is proportional to the mass flow (Figure 5).

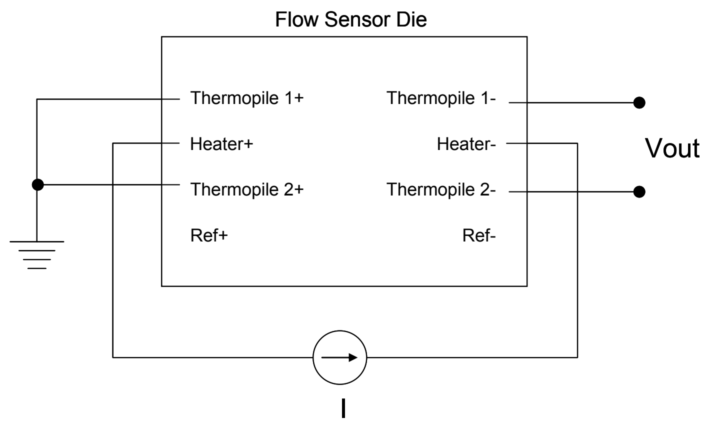

Figure 5 Thermal Flow Die Operation

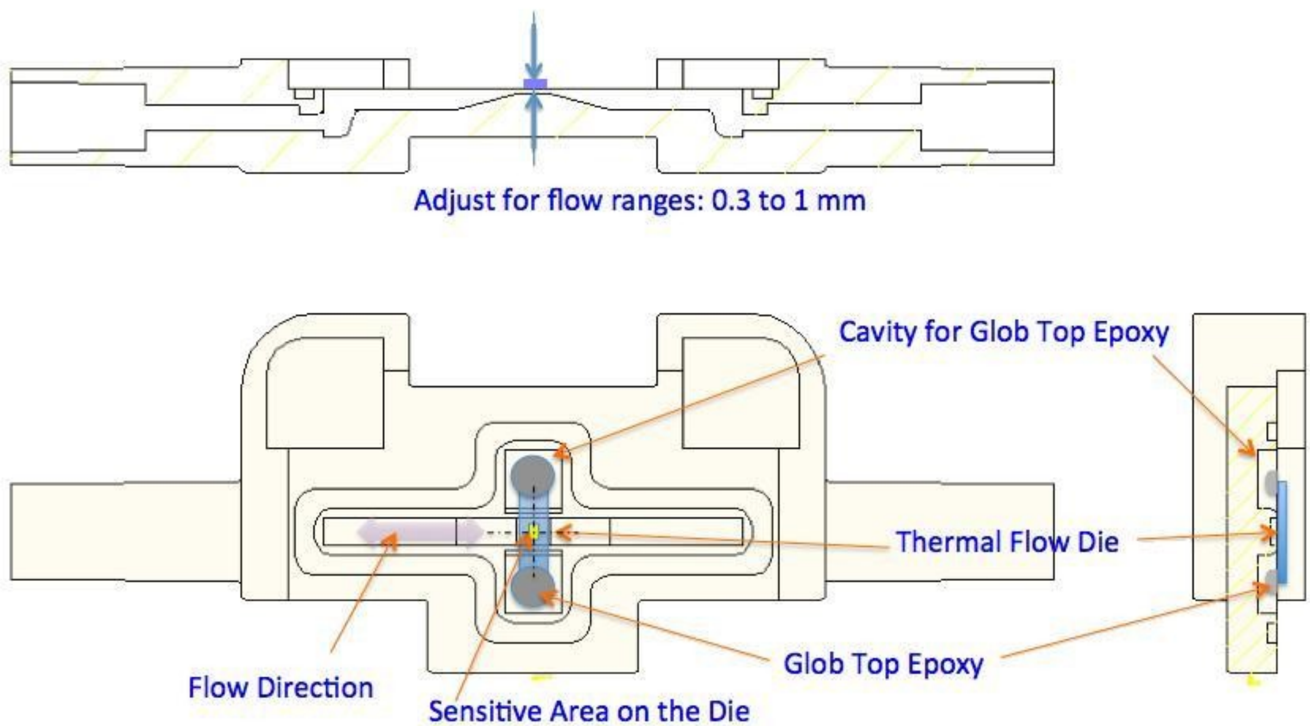

Figure 4 Flow Path Design Illustration