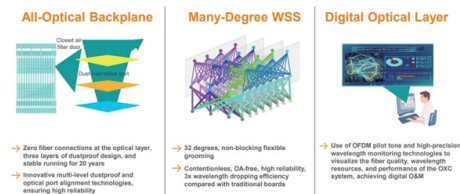


Micro-module hot channel sealing method



Article Overview

Micro-module hot channel sealing is typically achieved using solder-based or direct bonding techniques, such as Au-Sn eutectic bonding or copper-to-ceramic/copper bonding, to ensure leak-free, high-thermal-conductivity microchannels.

Overview of Sealing Methods

Micro-module hot channels in high-power electronic devices require robust sealing to prevent coolant leakage while maintaining excellent thermal performance. Common approaches include:

- **Eutectic Bonding:** Gold-tin (Au-Sn) eutectic bonding is widely used to seal microchannels in multilayer structures. This method provides strong mechanical adhesion and high thermal conductivity, making it suitable for microchannels embedded in substrates like DBC (Direct Bonded Copper) or LTCC (Low-Temperature Co-fired Ceramic) .
- **Solder-Joint Integration:** In microchannel coolers, the DBC substrate can be soldered directly to the liquid-cooled base plate. This eliminates the thermal barrier of intermediate layers and ensures a sealed interface for the hot channel .
- **Copper-to-Ceramic and Copper-to-Copper Direct Bonding:** These techniques allow stacking multiple inner layers with high surface area for heat transfer. The top and bottom sealing layers, along with inlet and outlet openings, are bonded to form a leak-proof microchannel network .

Structural Considerations...

Article Content

Microchannel heat sinks with nanofluids for cooling electronic ...

Heat sinks with micro or mini-channels have been extensively used for cooling of ECs . The decreased diameters

Comprehensive review of mini and micro channels for heating

Mini- and microchannels have emerged as key components in advanced heating and cooling systems due to their high

Self-encapsulation ultra-soft micro-channel with high thermal ...

Therefore, it is necessary to devise a micro-channel thermal dissipation structure that actively works on both sides

review on the sealing structure and materials of fuel-cell stacks ...

Among them, the sealing structure of the stack and the application of its materials are important factors that affect the

Beyond TIM: Microchannel Architectures for Advanced Thermal

This method involves etching micron-scale channels directly into the chip or packaging, allowing coolant (such as

Heat transfer and pressure drop characteristics of microchannel cold ...

They found that the optimal value of the channel layer number is 12 when the power consumption increases to 0.8 W.

Technical Brief Package Sealing Methods

Frequency Products Hermetic packaging is used in many electronic assemblies. The hermetic seal provides an “air tight”

Preparation/Sealing Polymer Microchannels for Laser Welding

The new method used electron beam lithography to apply laser absorber in precise patterns, mimicking the methods used to build

Fabrication of the nanofluidic channels type leak assembly based on

To eliminate such issue and achieve enclosed sealing of leak element and CF flange, a new nanofluidic channels

Thermal-hydrodynamic modeling and design for microchannel cold

This method adheres to the same manufacturing constraints as micro-milling of aluminum and operates under the

Fabrication of microchannel heat sinks using additive manufacturing: A ...

Conventional heat dissipation methods, such as natural convection cooling, air-cooled heat sinks, Vapor Chamber, and

Design and fabrication of conformal cooling channels in molds: Review ...

Cooling channels are mandatory in molds to force the injected materials to cool down, and usually consist of a series of

A comprehensive review on microchannel heat sinks for electronics ...

Due to its superior properties, lithography and deep silicon etching can be used to produce high aspect ratio and multi

Heat transfer enhancing mechanism and cooling performance in the

To solve the overheating issue of end faces in contact mechanical seals under high-speed conditions, a novel

Integrated Microchannel Cooling for Power Electronic Modules

Enhanced heat dissipation capability is demonstrated using this integrated microchannel cooling method. Further study will focus on

Design and fabrication of conformal cooling channels in molds: Review ...

Almost all the plastic products and some metal products are fabricated by thermoforming processes. According to the

Types of Heat Sealing: Heat Sealing Technologies

In terms of types of heat sealing, there are primarily three categories that may be customized in several ways:

Microfluidic chip sealing using femtosecond lasers

Of course, sealing the channels between each other and with the outside environment is essential in the manufacture of microfluidic

Jet-enhanced manifold microchannels for cooling electronics up to a ...

In this Article, we report an embedded microfluidic cooling strategy that is capable of dissipating heat fluxes up to

Topology Optimization of Manifold Microchannel Heat Sink for

In this study, a multi-objective topology optimization (TO) is utilized to optimize the manifold heat sink for multichip

Hermetic Seam Sealing Microelectronic Devices

Introduction - Basics: Principles of Hermetic Sealing The Objective: Protecting and controlling the internal conditions of the

Microembossed copper microchannel heat sink for high-density

A microembossed copper microchannel heat sink was designed and fabricated for high-density cooling in electronics.

Review on fabrication and experimental study of microchannel heat

Microchannels are widely used in electronic components for higher heat dissipation rate and for providing optimum

Design and Fabrication of Embedded Microchannel Cooling ...

This manuscript provides a feasible, efficient technical pathway for addressing extreme heat dissipation challenges in

Development Status of Dynamic Sealing Technology and Discussion

This paper reviews the current state of dynamic sealing technologies, examining the challenges faced by conventional

Thermal Performance Optimization of Integrated Microchannel Cooling ...

This paper presents an investigation into the heat dissipation of the integrated microchannel cooling plate in the silicon

Bioinspired thermally conducting packaging for heat management

Here we propose and fabricate a closed high-conducting heat chip package based on passive phase change, using

Reversible sealing techniques for microdevice applications

Sealing methods are also important to combine layers to make microdevices, and to interconnect or couple with

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Abstract This paper describes a process chain to form and seal thermoplastic films to obtain enclosed microfluidic cartridges with thin

A Preliminary Study of Sealing and Heat Transfer Performance of ...

Request PDF | A Preliminary Study of Sealing and Heat Transfer Performance of Conformal Channels and Cooling

High density nanofluidic channels by self-sealing for metallic ...

High density nanofluidic channels were successfully fabricated by a novel process, nicknamed as self-sealing

5 Keys to Perfecting Hermetic Seals with Laser Welding

INTRODUCTION Hermetic seals are used throughout the high-tech industry to provide maximum packaged protection from

Automated filling and sealing of embedded heat pipes

Filling and sealing of these non-tubular embedded heat pipes is a challenge, since traditional methods as evacuate, fill and pinch do

Embedded cooling method with monolithic dual-layer microchannel

This paper presents a monolithically integrated manifold microchannel cold plate that can become a general embedded cooling

Micro cooling channel heat sinks designed by topology optimization

In order to study the relationship between the flow and thermal performances and the layout of cooling channels designed by

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