

Application Note AN-1219

SMD0.2 Detail

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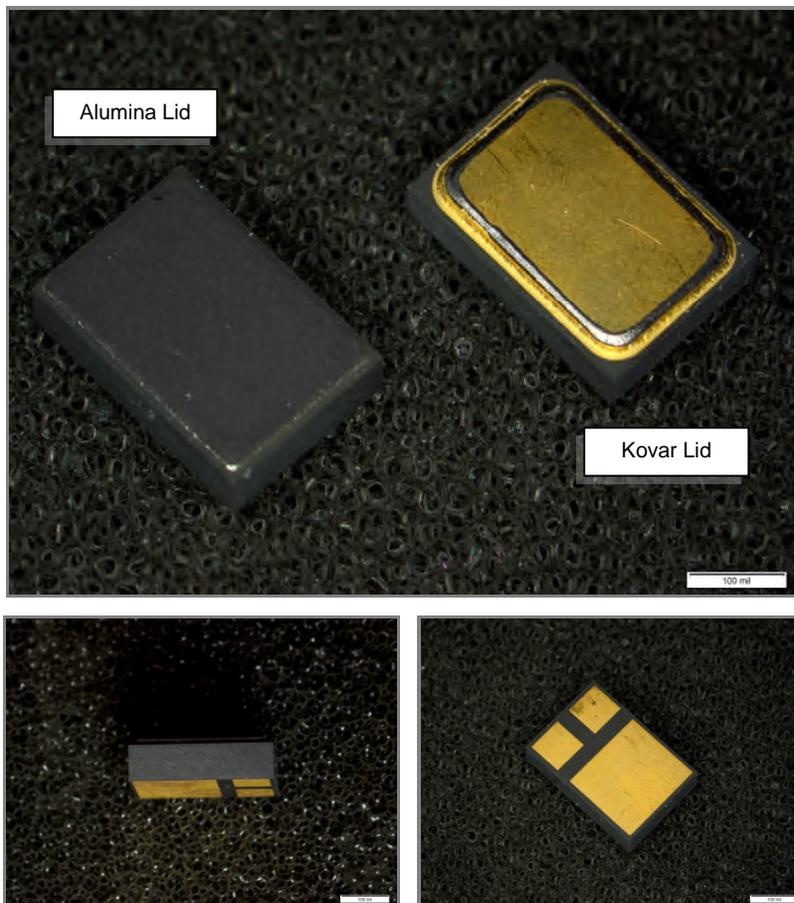
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Introduction

The SMD0.2 product family utilizes a hermetic package platform that is designed for applications where high reliability, compact size, light weight, and low thermal resistance must be satisfied at the same time. One of these applications is Space. The platform has a length of 0.305 inch (7.75 mm) and width of 0.210 inch (5.33 mm). Its typical weight is 0.2 grams. The junction to case thermal resistance is minimized by using material of high thermal conductivity.

In order to fully realize the benefits of the SMD0.2 platform (shown below), users need to understand its design, performance characteristics, and construction. This application note is intended to aid in this purpose.

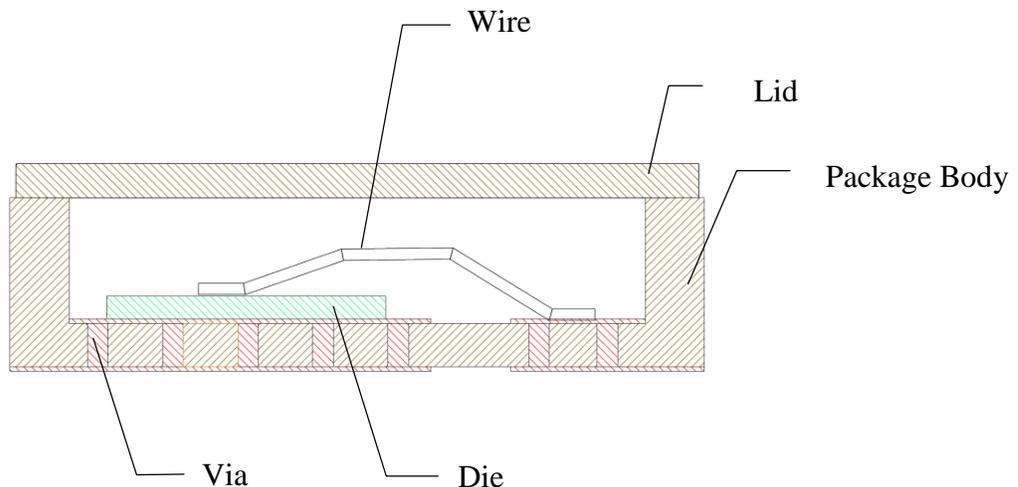


Package Construction

The SMD0.2 package consists of two parts, the package body and lid. The package body is made of aluminum nitride (AlN) ceramic; there are three terminal pads on the outside bottom surface of the package body and three terminal pads inside the package body. Each external pad is connected to its corresponding internal pad using high temperature metal vias, which provide electrical connection. There are two lid types available; Kovar and alumina, these are provided to customers as options.

As shown in the figure below, the die is soldered to the drain pad inside the package; bond wires are used to connect the die source and gate to the corresponding pads inside the package. The package is then hermetically sealed. The drain, source, and gate pads on the outside of the package are intended to be surface mounted to a printed circuit board (PCB).

The AlN ceramic of the package body has high thermal conductivity, which helps to reduce the thermal resistance of the package. The one piece package body design makes the package footprint small while providing enough space for die. The multiple vias under the drain and source pads reduce electrical resistance.



Package Materials and Finish

The materials used in the package and their finish are listed in the table below.

Package	Leads/Pads		Lid		Seal Ring		Frame/Sidewall		Base	
	Material	Finish	Material	Finish	Material	Finish	Material	Finish	Material	Finish
SMD 0.2 w/ Kovar Lid	Tungsten vias	Nickel and gold*	Kovar	Nickel and gold*	Kovar	Nickel and gold*	AlN ceramic	N/A	AlN ceramic	N/A
SMD 0.2 w/ Alumina Lid	Tungsten vias	Nickel and gold*	Alumina	N/A	None	N/A	AlN ceramic	N/A	AlN ceramic	N/A

*100 μ " electroless nickel plating, 40-120 μ " electroless gold plating

Performance Characteristics

Weight, Footprint, and Thermal Resistance

Weight, typical: 0.2 grams, finished product

Footprint, typical: 0.064 in² (0.305" x 0.210") or 41.3 mm² (7.75 mm x 5.33 mm)

Thermal resistance, maximum: 5.4 °C/W

Package Resistance and Inductance

Package resistance, typical: 8 mOhms including bond wires

Inductance, package total: 6.8 nH, (drain lead and source lead inductance are not applicable due to package structure)

Assembly Integration

Lid Isolation

For the SMD0.2, both of the lid types are isolated.

Mounting on PCB

The material of the SMD0.2 package body is aluminum nitride ceramic, which has a CTE (coefficient of thermal expansion) of 4.5 ppm/°C. When the package is mounted on the user's PCB, the CTE difference between the package and the PCB will create a certain amount of stress in the package. In many applications, this stress is well below the material strength of the ceramic and should not cause any problems. There are cases in which the stress could be higher than the ceramic's strength, depending on the CTE and structure of the PCB as well as the application temperature range. If this occurs, the SMD0.2 package cannot be surface mounted directly on customers' PCB, and has to be mounted with leads or a carrier. It is advised that the customer tests the assembly design and process and consult with International Rectifier as needed.