Sumitomo Bakelite Co., Ltd.
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Adoption of Heat-Dissipating Insulating Sheet in Resin-Insulated Substrate Integrated Power Module

Sumitomo Bakelite Co., Ltd. (Headquarters: Shinagawa-ku, Tokyo; President and Representative Director: Shinichi Kajiya) has developed a heat-dissipating insulating sheet that combines industry-leading thermal conductivity with electrical insulation properties. We are pleased to announce that this product enables the replacement of conventional ceramic substrates used in power modules and has been adopted as the insulating layer of resin-insulated substrates manufactured by NHK Spring Co., Ltd., which are used in power modules within automotive inverters produced by DENSO Corporation.

Background of Development

Power modules are critical devices that play a central role in power conversion and control systems, and they are widely utilized across various fields, including industrial equipment, the automotive sector, renewable energy, and consumer applications. In recent years, the adoption of SiC power semiconductors has driven further advancements in performance. In particular, in the automotive industry, power modules are extensively used in EV and PHEV inverters, DC-DC converters, and other applications, contributing to extended vehicle range, improved energy efficiency, and reductions in CO_2 emissions.

As the evolution of electric vehicles (EVs) progresses, there is an increasing demand for power modules capable of handling higher currents and voltages, along with the need to address the heat generated. Since 2018, we have been fully engaged in the development of heat-dissipating insulating sheets designed to meet the stringent requirements for high thermal conductivity and electrical insulation in power module components, and we have been advancing mass production.

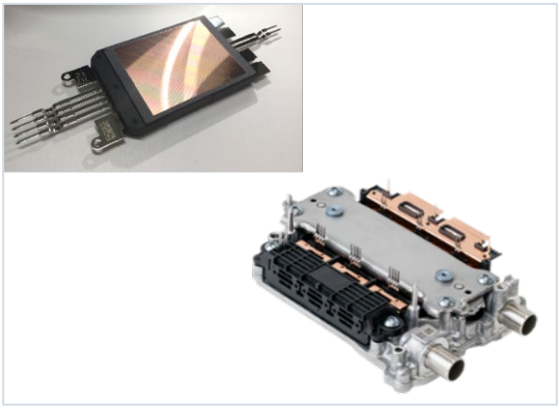

Image provided by: DENSO Corporation

Power Module with a Metal Substrate (Left) and Inverter (Right)

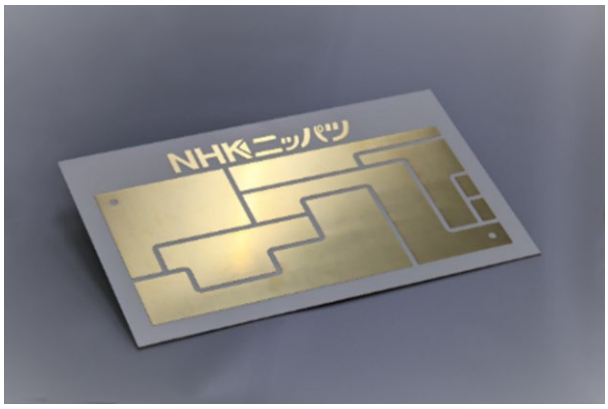

Image provided by: NHK Spring Co., Ltd.

Metal Substrate with Resin Insulation Material (Image)

* The image shown is for illustrative purposes only and differs from the actual mass-produced product.

About the Heat-Dissipating Insulating Sheet BLA-6051

This product is a thermosetting resin adhesive sheet with high thermal conductivity and high electrical insulation. It enables the replacement of ceramic substrates when used as the insulating layer of resin-insulated substrates. By developing a proprietary high-thermal-conductivity resin and incorporating it into the heat-dissipating insulating sheet, we have achieved the following five key features:

Heat-Dissipating Insulating Sheet BLA-6051

1. **Industry-Leading Thermal Conductivity**
   By utilizing advanced heat-dissipating resin and BN filler orientation control technology, we have achieved thermal resistance comparable to silicon nitride (AMB substrates) in resin-insulated substrates. This exceptional heat dissipation capability enhances thermal management performance in electronic and industrial equipment, suppressing temperature increases and significantly improving product reliability.

2. **High Voltage Resistance**
   The sheet offers excellent electrical insulation, essential for electronic equipment, ensuring safety and reliability even in high-voltage environments.

3. **Thin Film Capability**
   By leveraging the characteristics of resin materials, this product enables thin-film applications. It contributes to weight reduction and enhances design flexibility, thereby expanding its applicability to a wide range of next-generation products.

4. **Dimensional Stability with Minimal Warpage**
   The sheet provides excellent heat resistance, capable of withstanding continuous operation at temperatures above 150°C. Compared to ceramic substrates, it exhibits superior performance in reducing warpage during semiconductor chip mounting and in power module products. This enhances design flexibility, simplifies the assembly process, and improves yield by minimizing warpage-related issues.

5. **Replacement of Ceramic Substrates**
   Replacing ceramic substrates with resin-insulated substrates is expected to reduce costs. Additionally, leveraging the unique strengths of resin materials allows for the addition of enhanced properties, achieving both cost reduction and high performance. This approach effectively resolves the challenges previously associated with ceramic substrates.

Future Plans

Currently, we are expanding sales primarily in the automotive sector, while also broadening applications to industrial inverters, renewable energy systems, and factory automation (FA). We aim to achieve business growth, targeting annual sales of 10 billion yen by 2035.

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