



Stay cool under pressure with KERAMOLD® – Thermally conductive TPEs for integrated thermal management

In electronics manufacturing, there is a growing demand for materials that not only provide reliable insulation but also dissipate heat efficiently. With **KERAMOLD®**, **KERAFOl** presents an innovative thermoplastic material system that combines thermal conductivity, electrical insulation, and high process flexibility. The material can be used in classic injection molding as well as in 2K processes and opens up new possibilities for functional integration in housings, modules, and overmolding applications.

Material concept: Elastomer meets thermal conductivity

KERAMOLD® is based on thermoplastic elastomer (TPE) matrix systems combined with selected ceramic fillers. This creates a material that efficiently dissipates heat while remaining flexible, soft, and electrically insulating. Unlike traditional thermal interface materials or potting compounds, KERAMOLD® is available as a processable granulate – ideal for use in standard injection molding machines.

This allows three-dimensional heat conduction paths to be created: heat can be dissipated vertically to the heat sink in a targeted manner, while at the same time heat is spread in the X/Y direction within the component plane. In combination with top-side cooling concepts—i.e., heat dissipation via the top side of semiconductors or power modules—KERAMOLD® enables a holistic thermal architecture in which both the bottom and top sides are actively involved in cooling. The result: more homogeneous temperature distribution, fewer hot spots, and longer component life.

Technical characteristics and variants

The KERAMOLD® product line includes materials with thermal conductivities ranging from 1.5 to 2.5 W/m·K and electrical breakdown strengths of up to 16 kV/mm. This makes KERAMOLD® both highly thermally conductive and electrically insulating—ideal for power electronics, sensor technology, and high-voltage applications.

The Shore A hardness range can be set between 15 and 80 depending on customer requirements—from very soft and adaptable to structurally rigid, depending on the component and application.

Other key characteristics: good chemical resistance, operating temperature range from –40 °C to +125 °C, and flow properties that also allow for delicate lamella or rib structures.

Adhesion properties are a key development feature: KERAMOLD® exhibits very good adhesion to PBT, PP, and PA, enabling 2K injection molding solutions to be implemented without any problems. Excellent adhesion has also been demonstrated on FR4 substrates—ideal for direct overmolding of electronic assemblies.

Application: Protection, heat dissipation, and 3D gap pads

KERAMOLD® often replaces several process steps: Instead of casting modules or equipping them with thermal pads, they can be directly overmolded—this saves assembly time, reduces material transitions, and improves heat dissipation.

One example is the overmolding of a battery management system (BMS): A board overmolded with KERAMOLD® 20 reached a temperature of around 45 °C in tests, while an unprotected comparison board heated up to over 90 °C (see Figure 1). The structure also provides additional protection against moisture, dust, and mechanical stress.

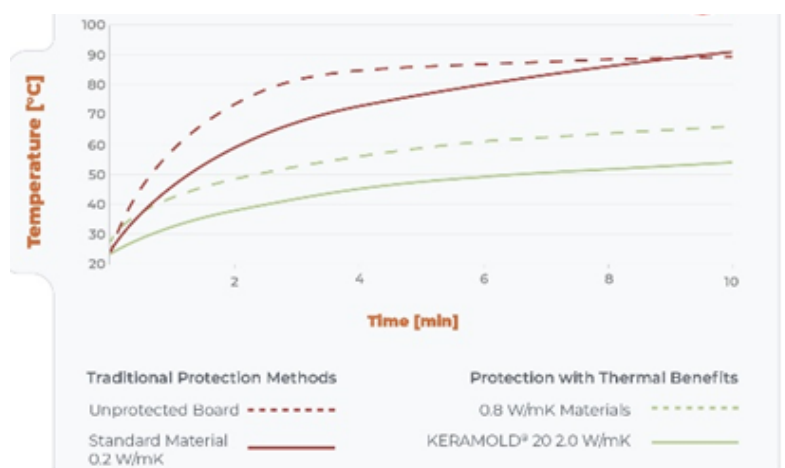
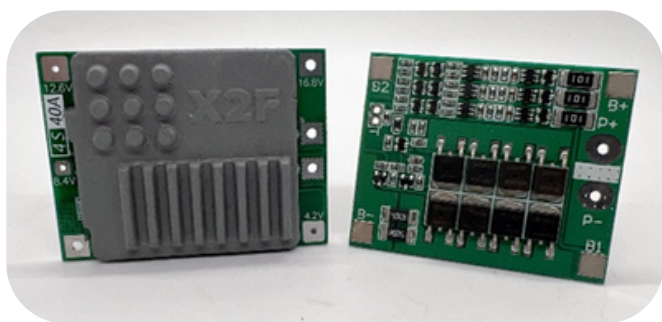


Figure 1. Battery management system overmolded with Kerafold 20 (left). Heat generation of the overmolded BMS compared to an unprotected BMS and a BMS protected with other materials (right).

KERAMOLD® can also be used to manufacture three-dimensional gap pads that compensate for height differences between components and create a defined heat conduction path to the heat sink. The three-dimensional design options not only improve vertical heat conduction, but also support lateral heat spreading within the component – crucial for top-side cooling concepts, where heat is dissipated both downwards and over the top. Typical applications range from power electronics, LED systems, DC/DC converters, inverter and actuator assemblies to battery modules, sensor technology, and communication components.

Processing, rapid tooling, and sustainability

KERAMOLD® is fully injection moldable and can be processed on standard machines. For functional samples or pre-series production, KERAfol offers rapid tooling projects with additively manufactured mold inserts or prototypes from a 3D printer, allowing realistic sample parts to be tested within a few days.

A key advantage over traditional casting compounds is its recyclability: KERAMOLD® is thermoplastic and can therefore be melted down and reused multiple times. Sprue and scrap material can be recycled—an important contribution to sustainable production.

Outlook: Low-pressure molding and system integration

KERAfol is currently developing an optimized KERAMOLD® variant for low-pressure molding (LPM), which can overmold sensitive electronic components at low pressure and temperatures. This makes KERAMOLD® interesting for casting replacement applications where conventional hot melts reach their limits.

With the planned copper adhesive variant, the EMI shielding version, and the LPM development, KERAMOLD® is establishing itself as a material platform for functionally integrated injection molding systems that combine protection, cooling, electrical insulation, and structure in a single material—paving the way for more efficient, compact, and durable electronic solutions.

**Have we sparked your interest?**

Visit our website and discover our wide range of high-quality film types for a variety of performance requirements. We would also be happy to advise you personally and help you select the right film.

Small series production and prototype manufacturing are also carried out without tooling costs.