Kerabsorb – EMI absorber and gap filler pad in one

Today, electrical and electronic systems are more closely interconnected than ever before. That is why materials and components that absorb or dissipate electromagnetic radiation are playing an increasingly important role in minimizing interference that can impair performance. Whether in consumer electronics housings or in complex systems in vehicles, aircraft, and industrial plants, EMI absorbers help to improve signal quality, reliability, and safety.

Depending on their design, EMI absorbers work according to different principles. On the one hand, attenuation can be achieved by absorbing electromagnetic radiation and converting it into heat. On the other hand, the impedance at the contact point can be influenced by adjusting the impedance of the material, thereby minimizing reflection. Furthermore, reflection or shielding can be achieved through multi-layer structures or metal layers. In addition, so-called metamaterials and nanostructures enable attenuation across a broad spectrum or in specific narrow bands.

Typically, porous metals and foams as well as ferrites and ceramic absorbers are used in EMI absorber materials, which are available on the market in a wide variety of forms such as films, adhesive tapes, or coatings.

are available. In addition to their damping properties, most materials also exhibit thermal conductivity, which contributes to the longevity of the assemblies. However, due to the ever-decreasing component geometries, new challenges are also arising for such absorber materials.

Due to limited space availability, multi-layer structures for securing the electrical breakdown voltage are difficult to implement or cause problems due to the increased thermal transition resistance in the thermal challenges of the assemblies. With Kerabsorb materials, we have succeeded in developing a material that, in addition to its damping and heat-conducting properties, also has a defined insulation strength. Kerabsorb material thus combines the properties of a classic gap filler pad with those of an EMI absorber.

Depending on their design, EMI absorbers work according to different principles. On the one hand, attenuation can be achieved by absorbing electromagnetic radiation and converting it into heat. On the other hand, the impedance at the contact point can be influenced by adjusting the impedance of the material, thereby minimizing reflection. Furthermore, reflection or shielding can be achieved through multi-layer structures or metal layers. In addition, so-called metamaterials and nanostructures enable attenuation across a broad spectrum or in specific narrow bands.

Material	Attenuation (dB)	Thermal conductivity (W/mK)	Breakdown voltage (kV/mm)
Frequency range (GHz)	2,4 | 5,0 | 42 – 48 | 73 – 81		
Kerabsorb 1500	-23 | -25 | -40 | -40	1,5	5
Kerabsorb 2500	-23 | -25 | -40 | -40	2,5	5

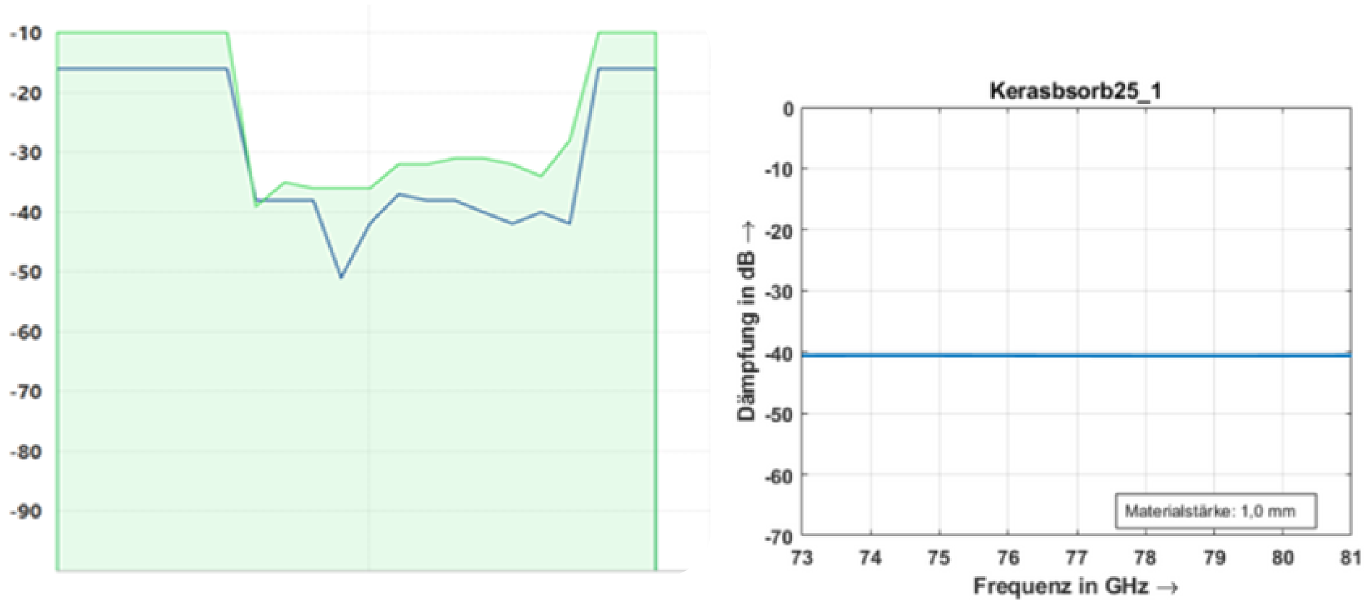

Figure 1: Measurement of the shielding properties of Kerabsorb 2500 at 2.4 GHz (blue) and 5 GHz (green) using a self-built measuring stand (left). High-frequency measurement in the range from 73 GHz to 81 GHz at FAU at the Chair of High-Frequency Technology.

In collaboration with the Chair of High Frequency Technology at Friedrich Alexander University, the attenuation properties in various high frequency ranges were determined. The Kerabsorb 1500 and 2500 films showed an attenuating effect in the range of 42–48 GHz of

at least -40 dB. Attenuation of -40 dB was also measured in the frequency range from 73 to 81 GHz (Figure 1, right, Kerabsorb 2500). Studies have shown that this shielding effect is independent of thickness.

For measurements in the low GHz range, a measurement setup was designed in collaboration with Elotec Fischer Electronic, in which a standard router (MI Router 4 A) served as the transmitter and a WLAN stick (USB 3.0 dual band WLAN stick model no.: 50678/20170209SZ001 con CSL) served as the receiver. During the measurement, the Kerabsorb material is placed between the transmitter and receiver and the attenuation is determined. Before the actual measurement, a blind measurement is performed for the test setup to determine the attenuation of the test setup.

Figure 1 (left) shows the measurement of the Kerabsorb 2500 foil. Initially, the measurement system runs without foil between the transmitter and receiver, whereby an attenuation of -10 dB is already measured. After inserting the Kerabsorb 2500, the attenuation increases to -33 dB at 2.4 GHz and -35 dB at 5 GHz. This results in an effective attenuation of -23 dB at 2.4 GHz and -25 dB at 5 GHz.

In summary, it can be said that Kerabsorb materials have succeeded in developing an EMI absorber material that combines the classic properties of a gap filler pad and an EMI absorber. In addition to their damping properties in the high-frequency range, these materials also exhibit a damping effect in the low GHz range.

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