



# DID YOU KNOW?

## PULSE LOAD CAPABILITY OF SMD FILM RESISTORS

Many electronic circuits are exposed to high pulse loads and thus require pulse-proof resistors. A resistor's pulse load capability is determined by its ability to dissipate the pulse power, which is converted into heat in the resistive layer, thereby limiting the temperature rise in the layer.

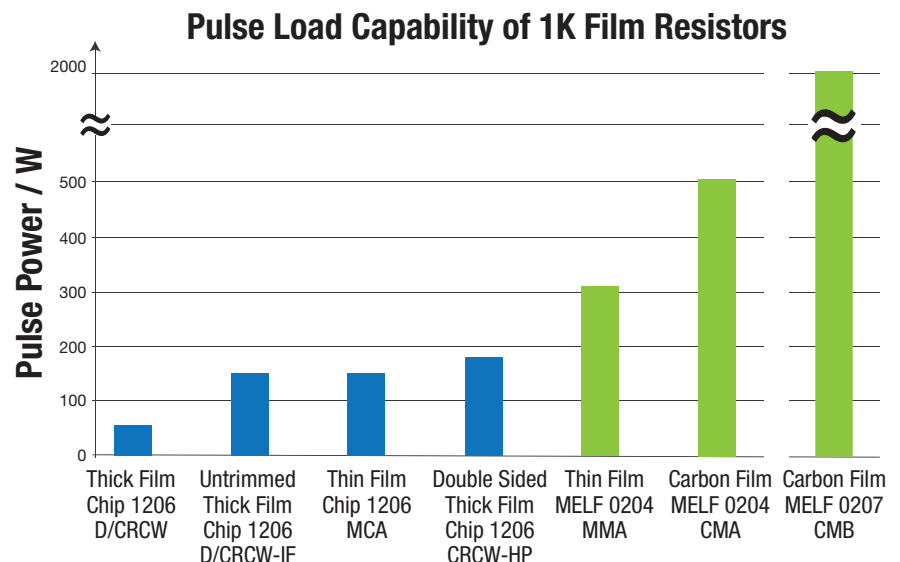
The most important resistor properties enabling a high pulse load capability are:

1. A resistor geometry that allows for a large resistive area. The larger the resistive area, the easier it is for the heat created by the pulse load to be efficiently distributed over the whole available area, and for the temperature rise to be kept at a minimum.
2. A trimming pattern that facilitates homogeneous current distribution. Heat is only created where current actually flows, so the elaborate trimming patterns used in thin film technology allow for a homogeneous current distribution and avoid local overheating (so called hotspots) of the resistive film.
3. A resistive film material with high thermal stability to withstand the temperature rise induced by the pulse load.

The MELF design offers the highest pulse load capability of any SMD resistors. Thanks to their cylindrical shape, their resistive area per footprint is the largest. This design also allows a helical trimming pattern to be used, enabling a uniform current distribution. Carbon film MELF resistors deliver an even better pulse load capability due to the unrivalled thermal stability of carbon.

On the right, typical destructive limits for Vishay SMD film resistors of different technologies are shown for a pulse length corresponding to a 3 ms rectangular pulse.

More details on the properties that define a resistor's pulse load capability are given in the Application Note "[Carbon Film MELF – Pulse Load Champion](#)".



Thin Film MELF resistors are frequently used in applications that experience high-pulse loads:

- DC/DC converters
- Industrial motor drivers
- IGBT drivers
- Surge pulse / ESD protection
- Industrial I/O protection