

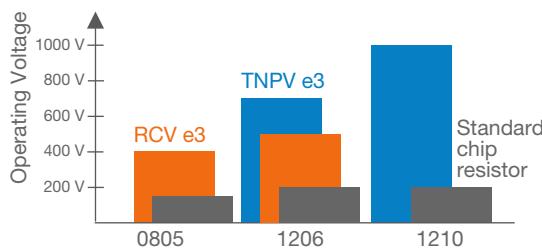
# DID YOU KNOW?

## HIGH VOLTAGE SMD RESISTORS

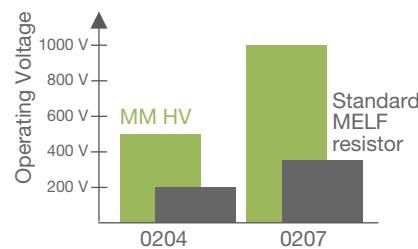
Today, various industrial and automotive applications operate at high voltages, which are significantly larger than the permissible operating voltage of a single SMD resistor. Thus, multiple resistors are typically used in series to distribute the voltage load. This workaround becomes unnecessary with the use of high voltage resistors, which combine a high operating voltage rating with a low voltage coefficient.

**Operating Voltage** — The significantly increased operating voltage allows up to five standard components to be replaced by a single high voltage resistor of the same case size. Besides component count reduction, board space will be saved and placement costs reduced. Since the voltage rating even exceeds that of standard components in the next case size, board space savings can also be achieved by 1:1 replacement with a smaller component.

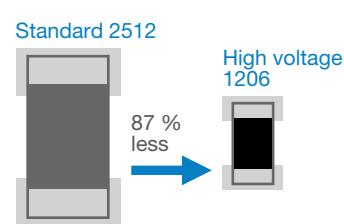
Chip Resistors



MELF Resistors

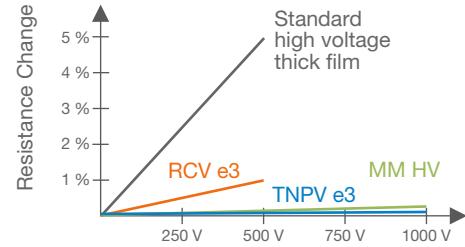


1:1 Replacement



**Voltage Coefficient** — The voltage coefficient of resistance (VCR) indicates the resistor's permissible change of resistance, depending on the operating voltage. Hence, using high voltage resistors at the allowed elevated voltage levels may cause a significant resistance change. Thus, high precision applications will benefit from thin film resistors, which feature an especially low VCR of  $\leq 2 \text{ ppm/V}$ .

Influence of Voltage Coefficient



**TNPV e3** — TNPV e3 high voltage thin film flat chip resistors combine high voltage ratings with thin film technology advantages: tight tolerance, low temperature coefficient, and excellent long term stability.

**MM HV** — MM HV thin film MELF resistors combine high voltage ratings with robust cylindrical designs, allowing for high power ratings and pulse load capability.

**RCV e3** — RCV e3 thick film chip resistors combine the properties of standard thick film resistors with high voltage ratings.

**TNPV e3, MM HV, and RCV e3** high voltage resistors are the optimum choice for applications that involve high voltages:

- Battery management
- Inverters for electric and hybrid electric vehicles
- DC/DC and AC/DC converters
- High voltage measurement
- High voltage power supplies