

Attracting Tomorrow



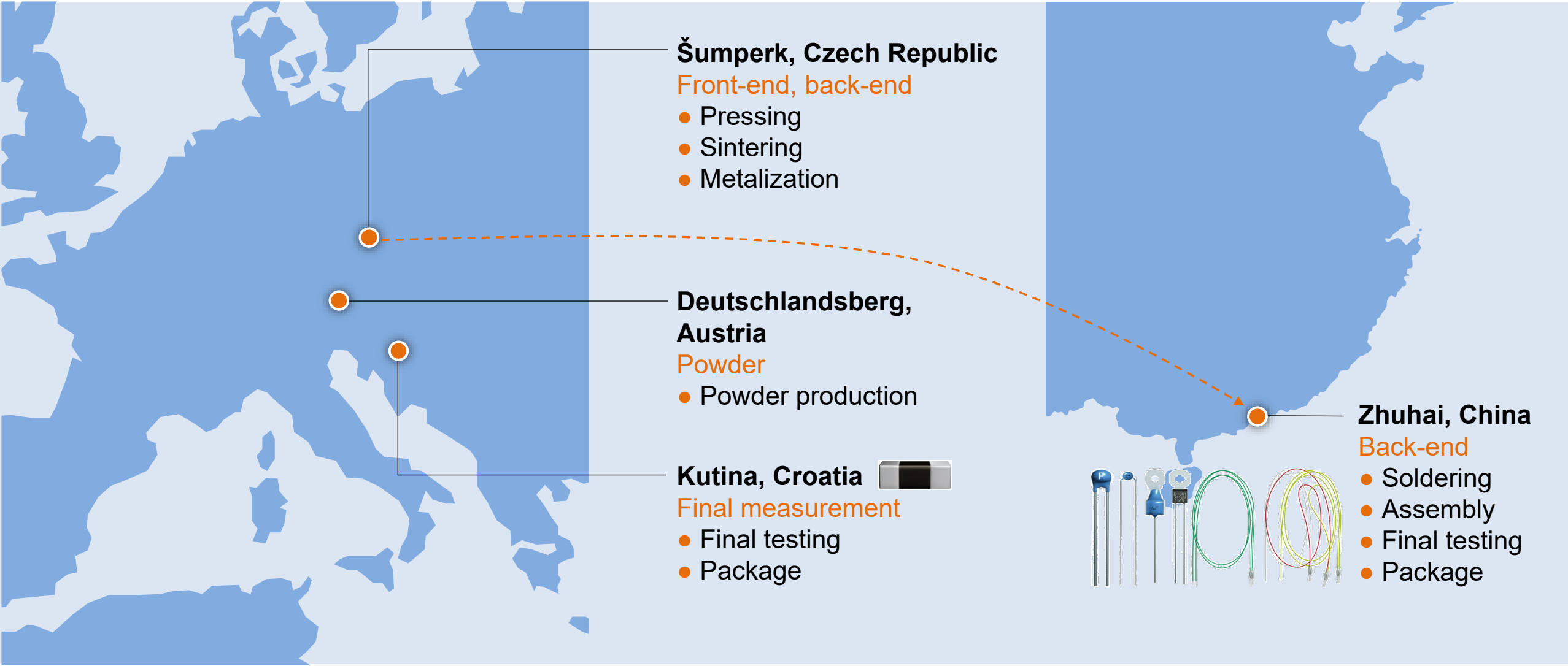
# PTC limit temperature sensors

Simple temperature monitoring

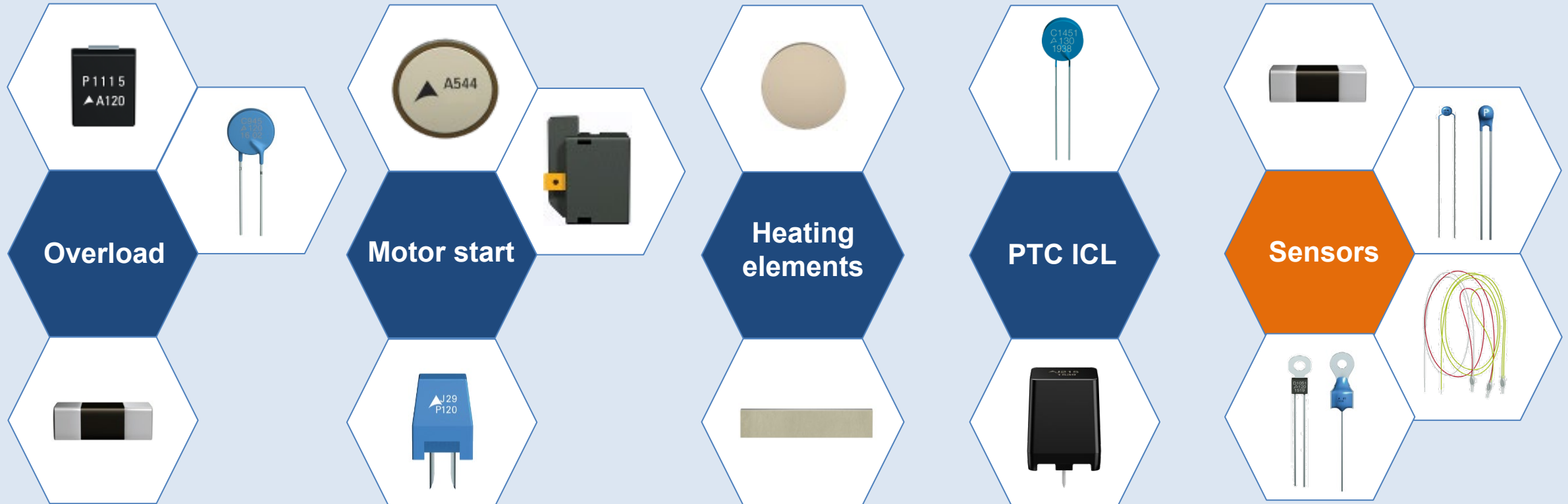
**TDK Electronics AG**  
Piezo and Protection Devices Business Group  
Product Marketing PTC thermistors  
Munich, Germany  
February 2022



# Production plants



# PTC product range



**Parameters**  
 U: 12 to 500 V  
 R: 0.3 to 1800 Ω  
 Ø: 4 to 22 mm  
 SMD: 0603 to 4032

**Parameters**  
 U: 180 to 265 V  
 R: 4.7 to 5000 Ω  
 Ø: 16 to 20 mm

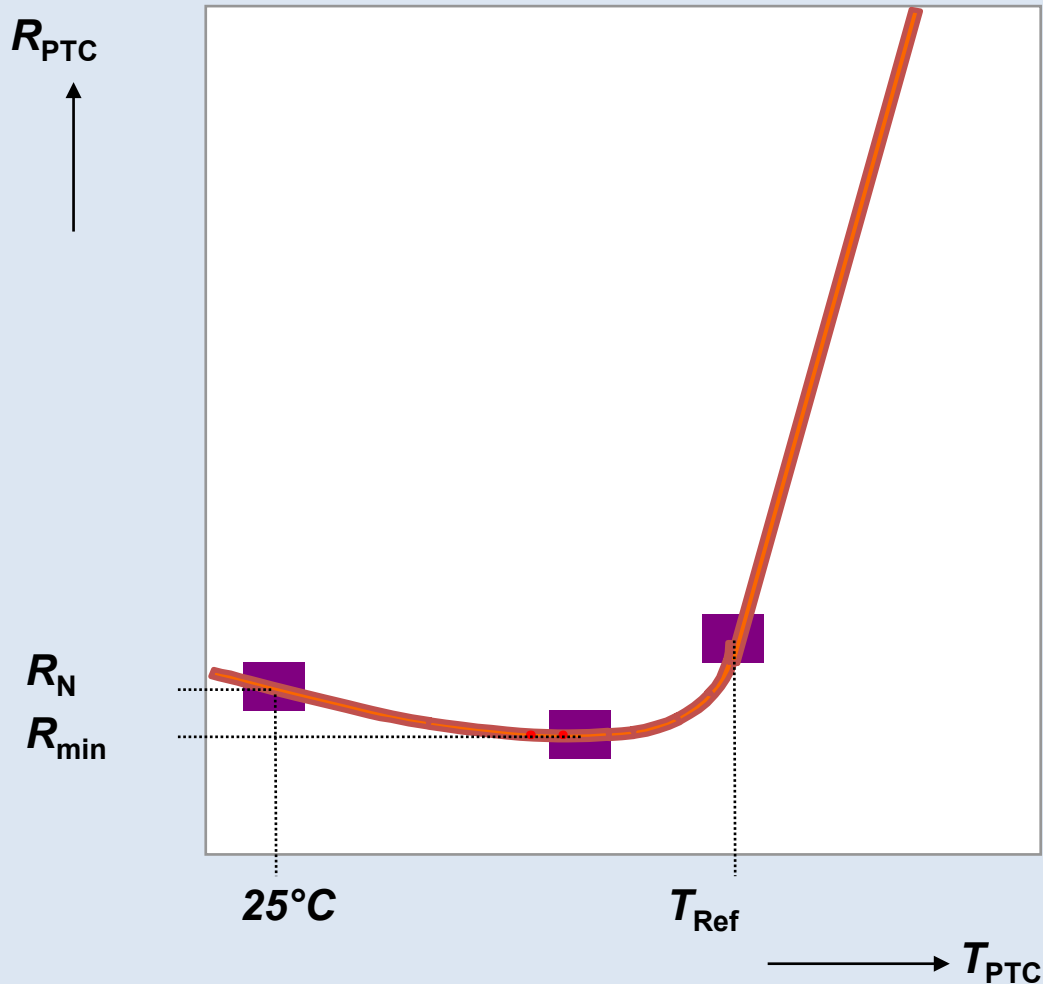
**Parameters**  
 U: 12 to 800 V  
 R: 0.75 to 960 Ω  
 th: 1 to 3 mm  
 Ts: +40 to +280 °C

**Parameters**  
 U: 400 to 1000 V  
 R: 22 to 7500 Ω  
 C<sub>th</sub>: 0.5 to 2.3 J/K

**Parameters**  
 T<sub>sens</sub>: +60 to +180 °C  
 Size: Leaded, SMD,  
 single, tripple sensor  
 SMD: 0402, 0603, 0805

# Description of a PTC and key parameters

## Typical R/T curve



### What is a PTC?

A PTC (**P**ositive **T**emperature **C**oefficient) is a resistor whose resistance varies with temperature.

With increasing temperature, the resistance of the PTC will increase.

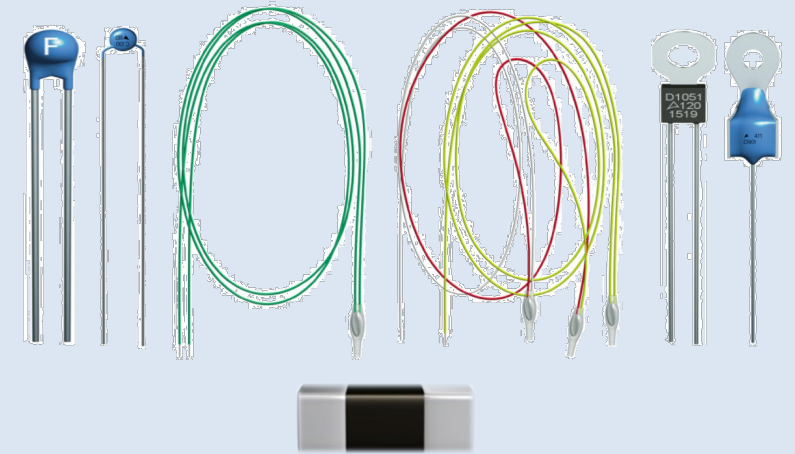
$R_N$  Resistance value at  $+25^\circ\text{C}$

$R_{min}$  Minimum resistance of the PTC

$T_{ref}$  Reference temperature or Curie temperature; at this temperature the resistance value is  $2 \times R_{min}$ .

# Function and technology advantages

- Senses over-temperature in the circuit
- Simple system integration
- Self regulating behavior
- No replacement needed after failure case
- SMD types available for usage on small PCBs

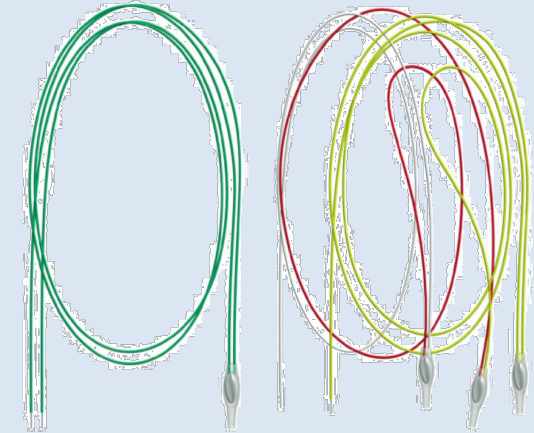


# Company advantages

- Market leader for PTC thermistor products
- More than 50 years experience in PTC technology
- Wide limit temperature range available (+55 to +180 °C)
- Products based on AEC-Q200 qualification available
- Customer-specific products possible

# Product range overview (1)

- Max. operating voltage 30 V
- Measuring voltage  $\leq 2.5$  V
- Rated resistance  $\leq 100$   $\Omega$
- Limit temperature range +60 to +180 °C
- Operating temp. range at  $V_{\max}$  0 to +40 °C
- Approvals RoHS, UL 1434



- EIA case size 0402, 0603, 0805
- Max. operating voltage 32 V
- Rated resistance 470 to 680  $\Omega$
- Limit temperature range +70 to +145 °C
- Operating temp. range at  $V_{\max}$  -40 to +125 °C
- Approvals RoHS, UL 1434, AEC-Q200



## Product range overview (2)

- Max. operating voltage 30 V
- Measuring voltage  $\leq 2.5$  V
- Rated resistance  $\leq 100$   $\Omega$
- Limit temperature range +60 to +120 °C
- Operating temp. range at  $V_{\max}$  0 to +40 °C
- Approvals RoHS, UL 1434



- Max. operating voltage 16 V
- Measuring voltage 2.5 V
- Rated resistance  $\leq 330$   $\Omega$
- Limit temperature range +100 to +120 °C
- Operating temp. range at  $V_{\max}$  0 to +40 °C
- Approvals RoHS, UL 1434





## Product range overview (3)

- Max. operating voltage 30 V
- Measuring voltage  $\leq 2.5$  V
- Rated resistance  $\leq 250$   $\Omega$
- Limit temperature range +70 to +160 °C
- Operating temp. range at  $V_{\max}$  0 to +40 °C
- Approvals RoHS, UL 1434



- Max. operating voltage 30 V
- Measuring voltage  $\leq 2.5$  V
- Rated resistance  $\leq 100$   $\Omega$
- Limit temperature range +80 to +140 °C
- Operating temp. range at  $V_{\max}$  0 to +40 °C
- Approvals RoHS

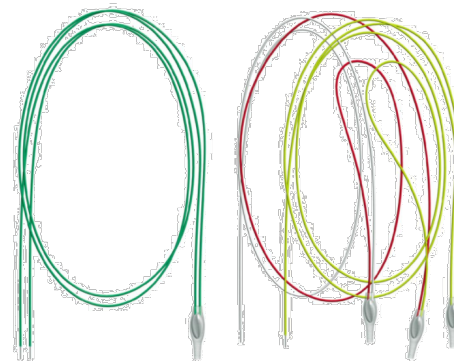
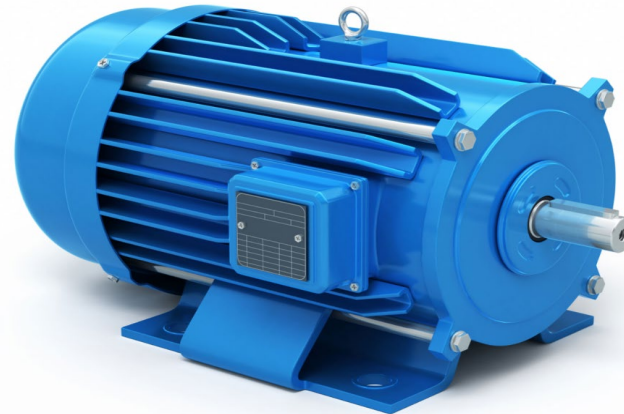


# Applications (1)

## Automotive headlights



## Electric motors

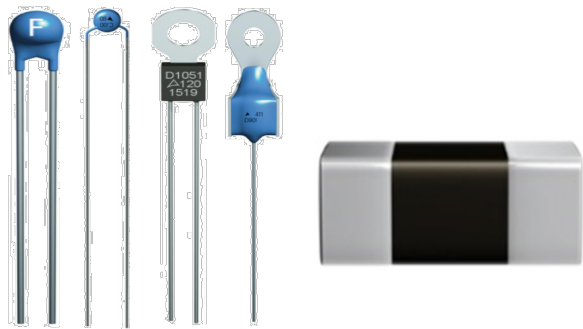


## Laptops



# Applications (2)

## Switch-mode power supplies



## Automotive electronics



# Checklist of design inputs

| Mechanical parameters  | Electrical parameters | Others                                |
|------------------------|-----------------------|---------------------------------------|
| Dimensions / case size | Limit temperature     | Packaging                             |
|                        |                       | Automotive or industrial applications |
|                        |                       | Operating temperature                 |
|                        |                       |                                       |
|                        |                       |                                       |



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