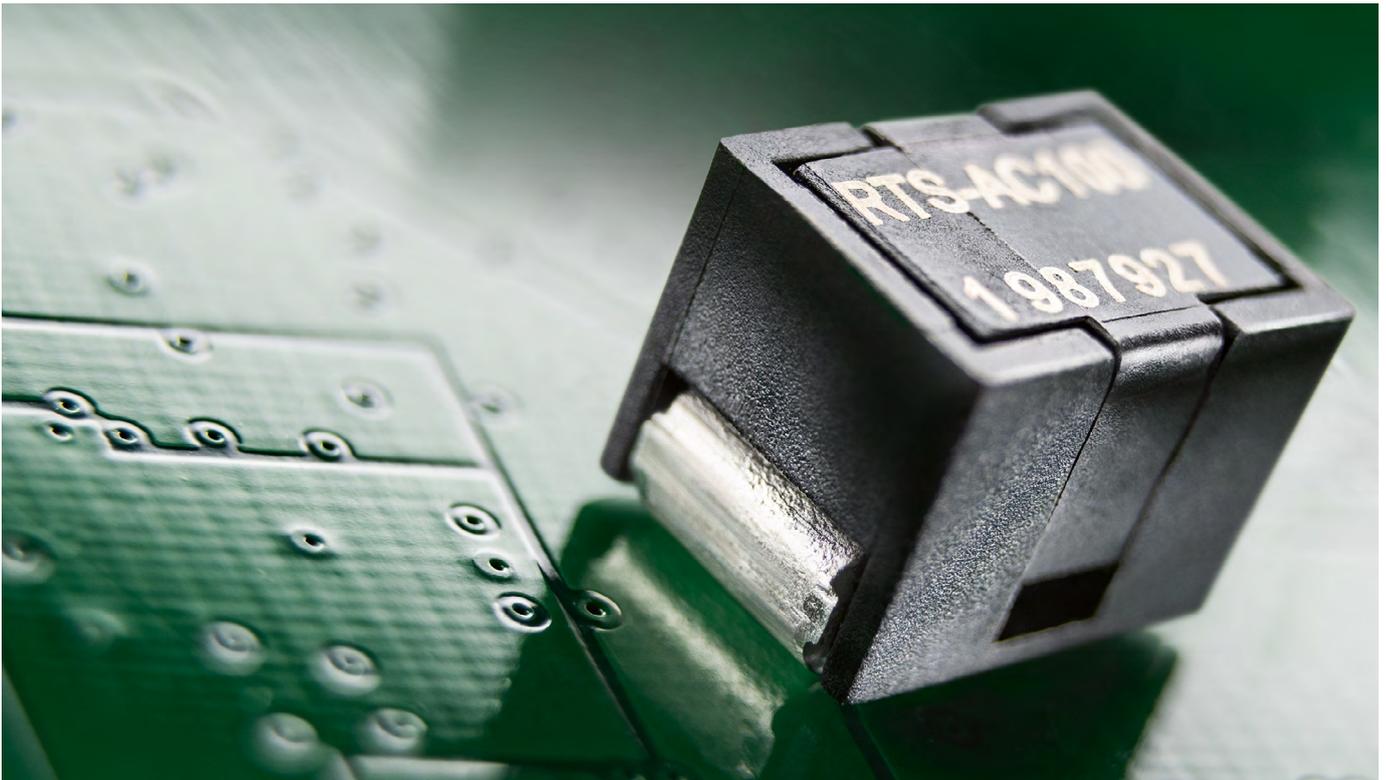


The final authority

Overcurrents aren't the only threat to modern electronics. Excessively high temperatures are increasingly becoming the number one enemy due to high power density. But how can such a danger be avoided? It makes sense to use thermal fuses. Or even better: thermal fuses with that certain extra.



The thermal protection device RTS from SCHURTER is now also available with Shunt

A characteristic of modern electronics is their enormously high power density. More and more components and functions have to fit in the smallest possible space. This leads to particularly powerful products with small dimensions, with minimal risk potential. We are talking about thermal runaway ([Application Note Protection against thermal runaway](#) ^[1]). Thermal runaway refers to the overheating of a technical apparatus due to a self-reinforcing, heat-producing process. This damage usually causes the destruction of the equipment and often leads to fire or explosion.

Current measuring sensor

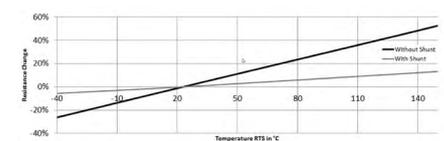
The temperature dependence of the electrical resistance of components must always be taken into account when designing assemblies and circuits. This property for measuring the current can also be used specifically.

Since overtemperature protection is usually triggered solely by thermal conditions and largely ignores the current flow, it often makes sense to combine such overtemperature protection with a current measuring sensor in the form of a shunt.

This means that a rapidly occurring fault (overcurrent) can be detected and interrupted by means of a shunt. A creeping temperature increase can be detected and interrupted by the thermal protection device.

The shunt, (a low-impedance resistor with the lowest possible temperature dependence), allows precise measurements of the current flowing through the component, regardless of the ambient temperature. In the standard version of the RTS with shunt, the resistance of the measuring sensor is 500 $\mu\Omega$. The small voltage dropping at this resistance is measured. Electronic circuits

can also process lower voltages at the shunt. The lower the voltage, the less the measuring device influences the circuit. A controller processes the measured values received and can react with a separation of the circuit if the current is too high.



With shunt, the impedance of the RTS shows a significantly lower temperature dependence

Fail-Safe Device

The new SCHURTER RTS thermal protection was developed as the final authority in a safety chain. It does not replace the classic overcurrent protection. It complements it with a functionality that was previously not provided by fuses.

The thermal protection in the form of the RTS is placed as close as possible to the component to be protected. If the ambient temperature of the power semiconductor exceeds a specified threshold value, the thermal protection separates the component from the circuit.

This provides galvanic separation in the event of thermal runaway. In addition, the amount of current flowing through can be precisely measured and, if necessary, corrected by means of an electronic control system.

Customer-specific variants

Standard products have the advantage that they have been tried and tested in practice and are quickly available in large quantities. However, the technical characteristics do not always fit perfectly as a solution to a given problem. Instead of a shunt with 500 $\mu\Omega$, another value might be more appropriate due to the measurement sensitivity.

The triggering temperature of the RTS of 210 °C could also be set lower or perhaps higher for a current problem or a wide variety of applications.

All this is feasible and is also implemented by SCHURTER in customer-specific projects.

Fully Integrated Fail-Safe Device

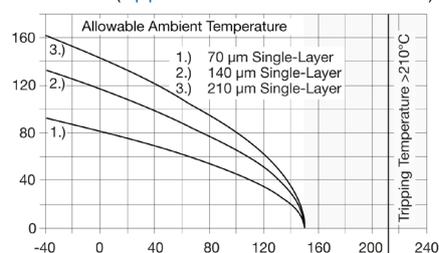
Even the additional installation of an overcurrent fuse in the housing of the RTS is possible. This would mean three products in a single, reflow-solderable SMD component with a very low footprint: overtemperature protection, overcurrent protection and a sensor for measuring the

current intensity in the form of a shunt. This not only saves costs, but also increases operational safety.

Customer-specific design

SCHURTER offers a wide range of standard products. During the development of the RTS thermal protection device, the environmental conditions played an important role in the design of the component parameters. For this very reason, close cooperation and coordination is recommended with regard to circuit design for particularly effective protection ([White Paper48 VDC](#) [2]).

The current design of the standard version of the RTS thermal protection was specially selected for the protection of power electronics in the automotive sector at 12 VDC ([Application Note Thermofuse](#) [3]).



RTS derating table as a function of ambient temperature and PCB layer thickness

IATF 16949: experienced partner

SCHURTER is certified according to IATF16949 and serves a multitude of customers with device protection elements which have been tested according to AEC-Q200 ([White paper AEC-Q200](#) [4]) for various applications (battery management,

climate control, control electronics, cable protection etc.). Millions and millions of fuses to protect against overcurrent and overtemperature are in use worldwide. The close networking with international automotive organizations and the industry itself makes SCHURTER a competent partner for all questions concerning the protection of electronics in automotive engineering and related, particularly demanding industries.

About SCHURTER

SCHURTER continues to be a progressive innovator and manufacturer of electronic and electrical components worldwide. Our products ensure safe and clean supply of power, while making equipment easy to use.

SCHURTER AG
 Werkhofstrasse 8-12
 6002 Lucerne
 CH-Switzerland
 +41 41 369 31 11
 contact@schurter.ch
 schurter.com

References / Document Downloads

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- [2]: <https://www.schurter.com/data/download/3159499>
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