



THERMAL RUNAWAY SHIELD FAQ

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What is TRS?

KULR Technology's patented Thermal Runaway Shield (TRS) is industry leading in its ability to quench and mitigate thermal runaway events in storage, transportation, and built-in operational pack designs. TRS's excellent performance is based in its ability as a phase change material to absorb large quantities of energy as a liquid and subsequently transition into a vapor.

What is a thermal runaway process?

Thermal runaway is a process that can occur in batteries when the heat generated during charging or discharging is not dissipated fast enough, causing a positive feedback loop that leads to an increase in temperature and potentially dangerous conditions such as fire or explosion. Thermal runaway can be caused by a variety of factors, such as internal short circuits, overcharging, external heat sources, mechanical damage, or manufacturing defects. Once thermal runaway is initiated, it can spread rapidly and cause catastrophic damage to the battery and its surroundings.

What is the functionality of TRS?

TRS is a safety feature that is designed to mitigate the risk of thermal runaway in batteries. Thermal runaway shielding is commonly used in high-power applications such as electric vehicles and energy storage systems, where the risk of thermal runaway is high.

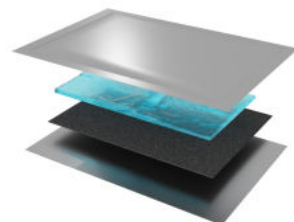
In what products can thermal runaway happen in?

Thermal runaway can potentially occur in any product that uses a rechargeable battery, such as:

- Smartphones and tablets
- Laptop and desktop computers
- Electric vehicles and hybrid vehicles
- Uninterruptible power supply (UPS) systems
- Aerospace and defense applications such as satellites and missiles
- Energy storage systems such as those used in renewable energy installations
- Power tools and other industrial equipment

What materials are TRS made of?

The materials used to make a thermal runaway shield is made of a flexible film material. This material is made into a pouch which contains a fibrous wicking material and proprietary coolant mixture.



What are the minimum/maximum dimensions for TRS?

The minimum thickness of a TRS is defined at 2mm due to the dry material stack up of the assembly, but length and width are defined based on the available volume in each application.

What is the minimum/maximum temperature that TRS can operate in?

The intended operating range of a TRS is -40°C - 115°C. When the temperatures of the system go above the range defined it is expected that the TRS ruptures and begins to interact with the system.

What is the optimal operating temperature for TRS?

Optimal temperature range where the TRS would not need to intervene is in the range of -40°C – 60°C.

What type/kind of battery chemistries are suitable for TRS?

A thermal runaway shield (TRS) can be used with a variety of battery chemistries, but it is most commonly used with lithium-ion (Li-ion) batteries, which are known to be prone to thermal runaway and have a higher risk of fire and explosion.

What battery capacity is best suited for TRS?

The capacities available are 3Ah, 5Ah, etc.

How long is a typical duty cycle of the battery pack?

The typical duty cycle is 500 to 1200.

Can we install TRS into a new system or an existing one?

TRS can be installed into new systems, but it can also be used in existing systems as long as there is some form of access to the battery assembly.