



PROPULSION & POWER DIVISION
 NASA-LYNDON B. JOHNSON SPACE CENTER
 HOUSTON, TEXAS

DATA PACKAGE

**T61P LAPTOP BATTERY THERMAL RUNAWAY AND
 CONTAINMENT BAG EVALUATION**

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-	8/12/19	MD	Initial Release

T61P LAPTOP BATTERY THERMAL RUNAWAY AND CONTAINMENT BAG EVALUATION

Abstract Prepared For KULR Technology Group, Inc.

Acceptable For Public Disclosure

Report Summary

- KULR Technology's Hydra Thermal Runaway Shield (TRS) was shown in testing to eliminate or at the very minimum mitigate the risks of dangerous fires and explosions that can occur when lithium ion battery packs fail.
- Between January and June 2019 experts with NASA's Propulsion & Power Division tested storage and use of rechargeable lithium ion laptop batteries. The tests intentionally triggered the batteries into dangerous failures in order to study what storage methods may stop battery fires from spreading battery to battery in the chain reaction known as thermal runaway propagation.
- NASA initiated the tests in part because thermal runaway, "is a serious concern for aerospace and defense customers and electric vehicle manufacturers."
- Testing involved dozens of configurations for storing fully-charged batteries in aluminized bags, eight batteries in total, up to two per bag. In one configuration with two batteries in one bag "with a single KULR Hydra Thermal Runaway Shield," when both batteries were triggered into thermal runaway, NASA found that "batteries in adjoining three (3) ... bags were actually protected, and did not rise above 61°C."
- In other storage and failure configurations NASA also found that:
 - Multiple NASA tests have demonstrated KULR's Hydra Thermal Runaway Shield stopped propagation within a single bag.
 - In all NASA test scenarios, the results have demonstrated KULR's Hydra Thermal Runaway Shield successfully prevented bag to bag propagation.