Application Note Summary: Solid State Batteries for Automotive

Introduction

Autonomous or smart transportation has gone from concept to fast-evolving reality in just a few years. All aspects of transportation systems will be touched by dramatic. technological developments, not just cars, but also buses, parking systems, planes, trains, traffic management, trucks and, of course, all important safety systems. New devices are therefore seen as key to enabling Smart Transportation.

Cars have up to 100 sensors and with increased use of systems such as Bluetooth LE, Wi-Fi & Cellular, more devices with added functionality are being developed. But such devices will often need new power sources to operate autonomously for a long time (circa 10 years). This is all the more important as cabling is the third heaviest component (behind chassis and engine), averaging 100 kg (Automotive Sensors, 2017).

The enabling technology for deploying increased sensor numbers is distributed energy storage using Solid State Batteries (SSB) such as Ilika's Stereax™.

Stereax® advantages for automotive devices

- Ultra-thin profile.
- Various footprint shapes, including custom sizes.
- High energy density.
- Low self-discharge.
- Stereax patent pending SSB stacking adds capacity.
- No battery transportation issues.
- No product end-of-life disposal issues.
- Ability to withstand high temperatures.
- May be combined with supercapacitors for very low temperatures.

Automotive devices enhanced by solid state batteries

- *Tyre pressure monitoring system:*
  New generation powered by Stereax placed inside tyre for greater accuracy, with added functions,, e.g. temperature, radial acceleration, tangential acceleration, tread wear.

- *Rain sensor:*
  Stereax® SSB are moisture resistant and their small size enables ultra-thin sensors with solar energy harvesting, without cabling or bulky coin cells.

- *Key fobs:*
  Ultra-thin fobs may not allow space for coin cells. Can use mechanical impulse from pressing button to charge solid state battery.

- *Battery pack temperature control:*
  Stereax® SSB can be used at temperatures up to 100°C.

- *Exhaust sensors:*
  Stereax® SSB resistant to high temperatures; no cabling.

- *Pre-collision:*
  Ultra-thin sensors outside cars would not need cabling.

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