

## **Precision Timing in Battery Managment**

Safety and prevention of catastrophic failure is a primary concern in the design of a battery management system (BMS). SiTime precision timing solutions provide unique benefits for these applications.

A basic BMS architecture is shown here. Regardless of battery type or chemistry, a BMS is necessary to avoid catastrophic failure.

## **Key Considerations**

Cell over-voltage Short-circuit discharge Performance over temperature EMI





# Applications

- Electric vehicles
- E-Bikes, E-Scooters
- Industrial / military drones
- Industrial tools (mowers, blowers)
- Uninterrupted power supply (UPS)
- Energy storage system (ESS)
- Autonomous vehicles for warehouse robotics, mining, underwater, etc.

# **Si**Time

A battery management system (BMS) is an electronic system that manages a rechargeable battery cell or battery pack and monitors its health. The primary function of a BMS to:

- Authenticate
- Protect the battery from operating outside its safe operating zone
- Monitor the voltage, current, and temperature during operation
- Manage the SoC (State of Charge) and other variables during charging
- Control its environment (temperature & pressure)
- Report these parameters to the central monitoring unit

BMSs are offered in multiple topologies and sizes depending on use case.

- Centralized: Single controller for multiple batteries. This is economical but causes increased weight and cost due to wiring
- Distributed: A BMS for each cell. This is most expensive but easiest to install
- Modular: A few controllers for a finite number of cells

BMS configurations are dependent on application and are different for mobile and stand-alone applications.

- A BMS for EVs, industrial/military drones is a subsystem and tightly integrated to charging system, thermal and the communication sub-systems
- A BMS for an uninterrupted power supply (UPS) or industrial tools is standalone

In every case, a precision timing device from SiTime will be more resilient to electromagnetic interference (EMI) and provide Spread Spectrum modulation.

**Timing Solutions** 

Туре	Product	Frequency	Key Features	Key Values
Low-Power Oscillator	<u>SiT8021</u>	1 to 26 MHz	1.5 x 0.8 mm package	<ul> <li>Small device size</li> <li>High reliability</li> <li>Resilient to electromagnetic Interference, ideal for high-current environments</li> </ul>
Spread Spectrum Oscillator	<u>SiT9025</u>	1 to 110 MHz	-55°C to 125°C operating temperature	<ul> <li>System EMI reduction up to 17 dB</li> <li>-55°C to 125°C Ambient Temp</li> <li>High reliability</li> <li>Resilient to electromagnetic Interference, ideal for high-current environments</li> </ul>
For AEC-O100 requirements, contact SiTime,				

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