SIA Presentation

Mike Kultgen, ADI Fellow and General Manager
Battery Management Systems Group
Analog Devices: Quick Overview
Over 4,700 patents and $4 billion R&D investment in the past 10 years

<table>
<thead>
<tr>
<th>Founded</th>
<th>1965</th>
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<tbody>
<tr>
<td>Headquarters</td>
<td>Wilmington, MA</td>
</tr>
<tr>
<td>Employees</td>
<td>~16,400</td>
</tr>
<tr>
<td>Countries</td>
<td>30+</td>
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<tr>
<td>Global Manufacturing</td>
<td>U.S. (Massachusetts, California, Washington), Ireland, Philippines, Malaysia</td>
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<tr>
<td>Revenue</td>
<td>$5.6Bn in FY2020</td>
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<tr>
<td>Markets</td>
<td>Industrial Communications, Automotive, Aero/Defense, Consumer, Health Care</td>
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<td>Automotive Focus</td>
<td>Electrification, Digital Experience, Autonomous Mobility</td>
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<tr>
<td>Publicly Listed</td>
<td>NASDAQ:ADI Part of S&amp;P 500 and NASDAQ 100</td>
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Typical EV Pack and Battery Management System

BMS Functions

1. MEASUREMENT
   - Every cell in a high voltage Li-ion pack must be measured, voltage, current, and temperature
   - Accurate measurements extend range, reduce cost, through better SOC estimation
   - Accurate measurements reduce charging time

2. BALANCE
   - Cell imbalance limits the pack’s capacity
   - Every cell must be balanced with minimum impact to cost and measurement accuracy.

3. DATA COMM.
   - Data integrity is critical, the EMI is horrible, high voltage isolation is required
   - “The vendor who solves the data communications problem will win the market” from a major USA OEM

4. SAFETY
   It must be safe or nothing else matters. ISO26262 ASIL-D.
BMS Consumer and Ecosystem Impact
Accelerating the Adoption of Sustainable Electric Vehicles

GRID
Distributed battery storage reduces peak demand on the grid, enabling more charging

CELL & PACK MANUFACTURING
The speed and quality of cell manufacturing is improved with BMS.

GENERATION
Battery storage makes renewable energy more effective

VEHICLE ASSEMBLY
Wireless BMS reduces manufacturing complexity, enables design flexibility

RE-USE & RECYCLE
Wireless BMS enables 2nd life of EV batteries, saving cost and lowering the carbon footprint

VEHICLE OPERATION
Accurate BMS increases range, reduces charging time, and improves safety. Zero cobalt LFP requires an accurate BMS