Kokam’s SLPB cell has proven its outstanding power, high energy density, longer cycle life and safety. Kokam is a pioneer in supplying small to large format SLPB cells ranging from 11.6 Ah to 240 Ah.

- Exceptionally High Power Performance
- High Energy
- High Gravimetric and Volumetric Power Density.
- Excellent Power-to-Energy Balance (up to 20C)
- Longer Cycle and Calendar Life
- Low Impedance and Heat Generation
- Light Weight
- No Memory Effect
- High Charge / Discharge Energy Efficiency
- Low Self-Discharge Rates

“Superior Performance, Proven Quality, Greater Reliability, Increased Safety”

Kokam sets about to solve the limitations associated with conventional lithium-ion technologies, including cycle and calender life, safety, recharge time, power delivery and ability to operate in extreme temperatures. The technology’s performance features surpass other existing battery capabilities in the market place today.

Pouch type has more surface area compared to Prismatic type (High Capacity Cell), therefore more effective in letting out heat.
**Advantages**

- **Wide Range of Operation:** -30 ~ 60°C.
- **High specific power:** 5C-rate continuous and 8 C-rate peak charge & discharge operation.
- **High round trip efficiency (RTE):** >95%.
- **Long cycle life:** 8,000 cycles @ 80% DoD, 4C charge & discharge operating conditions.
- **Extremely Safe:** A thermal runaway event is significantly less likely to occur in LTO cells.
  - LTO cells can also be re-operated after an event of an over-discharge, unlike conventional graphite based Li-Ion cells. This feature enables the user to operate the battery cells under extreme environmental and operational conditions.

---

**High Energy NMC (Nickel Manganese Cobalt)**

- **Advantages**
  - High energy density (ESS: ~203Wh/kg, UHIE NMC: ~248Wh/kg):
    - Up to 5MWh of batteries can be stored in a 40ft container
  - More than 96% of high efficiency at 0.5C
  - Competitive Price: The NMC cells have a comparative advantage in terms of price, considering it’s superior performance, reliability and safety features.

---

**High Power NMC**

- **Advantages**
  - Improved performance with 8C discharge
  - Improved performance with 3C charge
  - Improved high power cycle life
  - Up to 3MWh of batteries can be stored in a 40ft container
  - Special coating applied to cathode to improve high power performance

---

**Ultra High Power NMC**

- **Advantages**
  - High C-rate up to 20C-rate level
  - High C-rate discharge performance for uses in frequency regulation, UPS, etc.
  - Improved performance without safety or cycle life trade off

---

**Lithium Titanate (LTO)**

- **Advantages**
  - Wide Range of Operation: -30 ~ 60degC.
  - High specific power: 5C-rate continuous and 8 C-rate peak charge & discharge operation
  - High round trip efficiency (RTE): >95%.
  - Long cycle life: 8,000 cycles @ 80% DoD, 4C charge & discharge operating conditions.
  - Extremely Safe: A thermal runaway event is significantly less likely to occur in LTO cells. LTO cells can also be re-operated after an event of an over-discharge, unlike conventional graphite based Li-Ion cells. This feature enables the user to operate the battery cells under extreme environmental and operational conditions.

---

**NMC + LFP + LTO (NANO)**

- **Advantages**
  - Specially designed for defense & aerospace application
  - This hybrid type cell has incorporated the advantages of NMC, LFP and LTO cells in one cell. It is suitable for extremely volatile and dynamic operational conditions. The high power, energy and safety features allow the NANO cells to be flexibly applied in various applications.
Ultra High Power NMC Characteristic

[High Energy]

- Lead acid Battery
- Traditional Li-ion Battery
- UHP Cell

20ft Container: 1.3 MWh
40ft Container: 3.2 MWh

[Z-Folding Technology]

Low Internal Resistance, High Efficiency

- Internal Resistance
  Kokam UHP: 0.3~0.35mΩ
  (Competitor NMC: 0.5~0.7mΩ)
- 50% lower Internal Resistance compared to other battery manufacturers
- Z-fold stacking and special coating method significantly reduces internal resistance and increases efficiency, power, and cycle life.

[Increased cycle life]

- 90% DOD, 1C/1C over 4,500 cycle
- 90% DOD, 4C/4C over 3,000 cycle

[Tab fuse]

- In order to prevent the cell from being shorted, the cathode tab is fused

[Heat Dissipation]

- Pouch type has more surface area compared to Prismatic type (High Capacity Cell), therefore more effective in letting out heat.
  - 1.6x of heat dissipation → 19.1cm²/Ah:11.6 cm²/Ah
  - 3.5x of dissipation surface → 650mm²/6.5t:216 mm²/22.5t
- UHP Cell creates less heat than standard NMC cells, allowing for more vigorous operations

[High Power]

- 4C-rate Continuous Charge
- 8C-rate Continuous Discharge
- 15C-rate Instant discharge possible

For Information Only
### Chemistry Category Summary

#### Ultra High Energy NMC Cell

<table>
<thead>
<tr>
<th>Model</th>
<th>Capacity (Ah)</th>
<th>Dimension (mm)</th>
<th>AC-IR (mΩ)</th>
<th>Weight (kg)</th>
<th>Discharge Rate C-rate (C)</th>
<th>Energy Density (Wh/kg)</th>
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<tbody>
<tr>
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#### High Energy NMC Cell

<table>
<thead>
<tr>
<th>Model</th>
<th>Capacity (Ah)</th>
<th>Dimension (mm)</th>
<th>AC-IR (mΩ)</th>
<th>Weight (kg)</th>
<th>Discharge Rate C-rate (C)</th>
<th>Energy Density (Wh/kg)</th>
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<tr>
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</table>

#### Ultra High Power NMC Cell (UHP)

For laser weapon, torpedo, etc. with high power and improved cycle life

<table>
<thead>
<tr>
<th>Model</th>
<th>Capacity (Ah)</th>
<th>Dimension (mm)</th>
<th>AC-IR (mΩ)</th>
<th>Weight (kg)</th>
<th>Discharge Rate C-rate (C)</th>
<th>Energy Density (Wh/kg)</th>
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#### High Power NMC Cell

<table>
<thead>
<tr>
<th>Model</th>
<th>Capacity (Ah)</th>
<th>Dimension (mm)</th>
<th>AC-IR (mΩ)</th>
<th>Weight (kg)</th>
<th>Discharge Rate C-rate (C)</th>
<th>Energy Density (Wh/kg)</th>
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#### NANO Cell (NMC+LFP+LTO)

For aerospace and special applications with improved safety, and low temperature performance

<table>
<thead>
<tr>
<th>Model</th>
<th>Capacity (Ah)</th>
<th>Dimension (mm)</th>
<th>AC-IR (mΩ)</th>
<th>Weight (kg)</th>
<th>Discharge Rate C-rate (C)</th>
<th>Energy Density (Wh/kg)</th>
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