

Lithium Cobalt Oxide(LiCoO₂) — LCO

Voltages	3.60V nominal; typical operating range 3.0–4.2V/cell
Specific energy (capacity)	150–200Wh/kg. Specialty cells provide up to 240Wh/kg.
Charge (C-rate)	0.7–1C, charges to 4.20V (most cells); 3h charge typical. Charge current above 1C shortens battery life.
Discharge (C-rate)	1C; 2.50V cut off. Discharge current above 1C shortens battery life
Cycle life	500–1000, related to depth of discharge, load, temperature
Thermal runaway	150°C (302°F). Full charge promotes thermal runaway
Applications	Mobile phones, tablets, laptops, cameras
Comments	Very high specific energy, limited specific power. Cobalt is expensive. Serves as Energy Cell. Market share has stabilized.

Lithium Manganese Oxide (LiMn₂O₄) — LMO

Voltages	3.70V (3.80V) nominal; typical operating range 3.0–4.2V/cell
Specific energy (capacity)	100–150Wh/kg
Charge (C-rate)	0.7–1C typical, 3C maximum, charges to 4.20V (most cells)
Discharge (C-rate)	1C; 10C possible with some cells, 30C pulse (5s), 2.50V cut-off
Cycle life	300–700 (related to depth of discharge, temperature)
Thermal runaway	250°C (482°F) typical. High charge promotes thermal runaway
Applications	Power tools, medical devices, electric powertrains
Comments	High power but less capacity; safer than Li-cobalt; commonly mixed with NMC to improve performance.

Lithium Nickel Manganese Cobalt Oxide (LiNiMnCoO₂) — NMC

Voltages	3.60V, 3.70V nominal; typical operating range 3.0–4.2V/cell, or higher
Specific energy (capacity)	150–220Wh/kg
Charge (C-rate)	0.7–1C, charges to 4.20V, some go to 4.30V; 3h charge typical. Charge current above 1C shortens battery life.
Discharge (C-rate)	1C; 2C possible on some cells; 2.50V cut-off
Cycle life	1000–2000 (related to depth of discharge, temperature)
Thermal runaway	210°C (410°F) typical. High charge promotes thermal runaway
Applications	E-bikes, medical devices, EVs, industrial
Comments	Provides high capacity and high power. Serves as Hybrid Cell. Favorite chemistry for many uses; market share is increasing

Lithium Iron Phosphate(LiFePO₄) — LFP

Voltages	3.20, 3.30V nominal; typical operating range 2.5–3.65V/cell
Specific energy (capacity)	90–120Wh/kg
Charge (C-rate)	1C typical, charges to 3.65V; 3h charge time typical
Discharge (C-rate)	1C, 25C on some cells; 40A pulse (2s); 2.50V cut-off (lower than 2V causes damage)
Cycle life	2000 and higher (related to depth of discharge, temperature)
Thermal runaway	270°C (518°F) Very safe battery even if fully charged
Applications	Portable and stationary needing high load currents and endurance
Comments	Very flat voltage discharge curve but low capacity. One of safest Li-ions. Used for special markets. Elevated self-discharge.

Lithium Nickel Cobalt Aluminum Oxide (LiNiCoAlO₂) — NCA

Voltages	3.60V nominal; typical operating range 3.0–4.2V/cell
Specific energy (capacity)	200-260Wh/kg; 300Wh/kg predictable
Charge (C-rate)	0.7C, charges to 4.20V (most cells), 3h charge typical, fast charge possible with some cells
Discharge (C-rate)	1C typical; 3.00V cut-off; high discharge rate shortens battery life
Cycle life	500 (related to depth of discharge, temperature)
Thermal runaway	150°C (302°F) typical, High charge promotes thermal runaway
Applications	Medical devices, industrial, electric powertrain (Tesla)
Comments	Medical devices, industrial, electric powertrain (Tesla)

Lithium Titanate (Li₂TiO₃) — LTO

Voltages	2.40V nominal; typical operating range 1.8–2.85V/cell
Specific energy (capacity)	50–80Wh/kg
Charge (C-rate)	1C typical; 5C maximum, charges to 2.85V
Discharge (C-rate)	10C possible, 30C 5s pulse; 1.80V cut-off on LCO/LTO
Cycle life	3,000–7,000
Thermal runaway	One of safest Li-ion batteries
Applications	UPS, electric powertrain (Mitsubishi i-MiEV, Honda Fit EV), solar-powered street lighting
Comments	Long life, fast charge, wide temperature range but low specific energy and expensive. Among safest Li-ion batteries.

	LiCoO2	LiMn2O4	LiNiMnCoO2 (LG CHEM 18650)	LiFePO4	LiNiCoAlO2	Li2TiO3	LiPO	Li4Ti5O12
Voltages	3.60V nominal; typical operating range 3.0–4.2V/cell	3.70V (3.80V) nominal; typical operating range 3.0–4.2V/cell	3.60V, 3.70V nominal; typical operating range 3.0–4.2V/cell, or higher	3.20, 3.30V nominal; typical operating range 2.5–3.65V/cell	3.60V nominal; typical operating range 3.0–4.2V/cell	2.40V nominal; typical operating range 1.8–2.85V/cell	3.7V(1cell)	2.4V nominal, 1.8 to 2.85V per cell
Energy	150–200Wh/kg. Specialty cells provide up to 240Wh/kg.	100–150Wh/kg	150–220Wh/kg	90–120Wh/kg	200-260Wh/kg; 300Wh/kg predictable	50–80Wh/kg	2800mAh	50-80Wh per kg
Charge	0.7–1C, charges to 4.20V (most cells); 3h charge typical. Charge current above 1C shortens battery life.	0.7–1C typical, 3C maximum, charges to 4.20V (most cells)	0.7–1C, charges to 4.20V, some go to 4.30V; 3h charge typical. Charge current above 1C shortens battery life.	1C typical, charges to 3.65V; 3h charge time typical	0.7C, charges to 4.20V (most cells), 3h charge typical, fast charge possible with some cells	1C typical; 5C maximum, charges to 2.85V	35C continuous	1C typical, 5C max
Discharge	1C; 2.50V cut off. Discharge current above 1C shortens battery life	1C; 10C possible with some cells, 30C pulse (5s), 2.50V cut-off	1C; 2C possible on some cells; 2.50V cut-off	1C, 25C on some cells; 40A pulse (2s); 2.50V cut-off (lower than 2V causes damage)	1C typical; 3.00V cut-off; high discharge rate shortens battery life	10C possible, 30C 5s pulse; 1.80V cut-off on LCO/LTO		10C, 30C pulse, 1.8V cutoff
Cycle life	500–1000, related to depth of discharge, load, temperature	300–700 (related to depth of discharge, temperature)	1000–2000 (related to depth of discharge, temperature)	2000 and higher (related to depth of discharge, temperature)	500 (related to depth of discharge, temperature)	3,000–7,000		3000-7000
Thermal runaway	150°C (302°F). Full charge promotes thermal runaway	250°C (482°F) typical. High charge promotes thermal runaway	210°C (410°F) typical. High charge promotes thermal runaway	270°C (518°F) Very safe battery even if fully charged	150°C (302°F) typical, High charge promotes thermal runaway	One of safest Li-ion batteries		N/A
Application	Mobile phones, tablets, laptops, cameras	Power tools, medical devices, electric powertrains	E-bikes, medical devices, EVs, industrial	Portable and stationary needing high load currents and endurance	150°C (302°F) typical, High charge promotes thermal runaway	UPS, electric powertrain (Mitsubishi i-MiEV, Honda Fit EV), solar-powered street lighting		UPS, electric powertrain solar-powered Street lighting

18650	LG MJ1	Samsung 25R5	LG HG2
Energy	12.78 Wh	9.00 Wh	10.80 Wh
Voltage	Charge max-4.20V Nominal-3.65V Discharge end-2.50V	Charge max-4.20V Nominal-3.60V Discharge end-2.50V	Charge max-4.20V Nominal-3.60V Discharge end-2.50V
Capacity	3500.00 mAh	2500.00 mAh	3000.00 mAh
Charge(C-rate)	0.97 C	1.6 C	1.33 C
Discharge(C-rate)	2.86 C	8 C	6.67 C
Power(Watts)	Charge max-12.41W Discharge max-36.5W	Charge max-14.4W Discharge max-72W	Charge max-14.4W Discharge max-72W
Time	Standart charge-4 hours Rapid charge-3 hours	Standart charge- 3hours Rapid charge-1 hours	Standart charge- 4 hours
Anode	Carbon	Carbon	Carbon