



Plethora Power Private Ltd

LI-POWER

Lithium-ion Battery with LTO component battery pack

DATASHEET

MODEL NO. AE361012

Battery configuration	10S 12P
Cell configuration	3.6v 4200mAh (42A)
Cell chemistry used to make this battery pack	NMC with LTO as a component in cell chemistry
Pack configuration	36V 50.4Ah

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Technical Data of Cells to be used in 36V50.4Ah

■ CELL CHARACTERISTICS

Capacity	Typical	4200 mAh
	Minimum	4000 mAh
Cell Voltage	Nominal	3.6 V
	Charge	4.2 V
Charge Current	Standard	4.2 A
	Standard	1.5 hr
Discharge Current	Continuous	45 A
	Typical	AC (1 KHz) 10 mΩ
Impedance	DC (10A/1s)	16 mΩ
	Charge	0°C to 60°C
Temperature	Discharge	-40°C to 60°C
	Energy Density	Volumetric 615 Wh/l
Energy Density	Gravimetric	230 Wh/kg

■ PHYSICAL CHARACTERISTICS

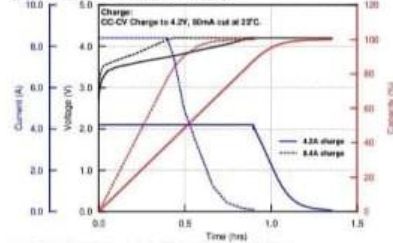


Shape	Cylindrical
Can	Steel
Diameter	21.7 mm (Max)
Height	70.2 mm (Max)
Weight	70 g (Max)

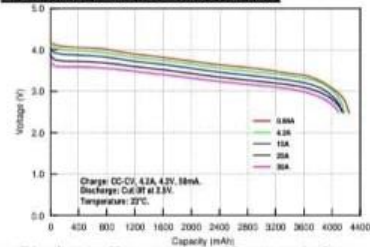
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For application specific information, please contact E-One Moli Energy Sales and Applications or the nearest MOLICEL® recognized agent.

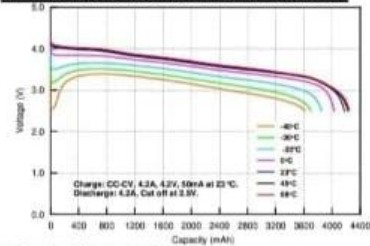
■ Charge Characteristics



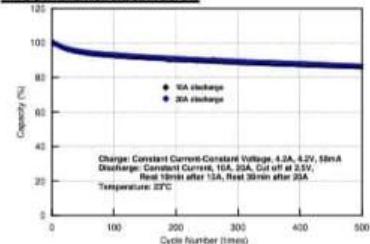
■ Discharge Rate Characteristics



■ Discharge Temperature Characteristics



■ Cycle Characteristics





1. BASIC CHARACTERISTICS:

1.1 Capacity (25±5°C)	Nominal Capacity : 50.4Ah (10A Discharge, 30V) Minimum Capacity : 48Ah (40A Discharge, 30V)
1.2 Nominal Voltage	36V
1.3 Internal Impedance (CELL)	≤ 8mΩ
1.4 Discharge Cut-off Voltage	30V
1.5 Max Charge Voltage	42±0.05V
1.6 Standard Charge Current	10A 0.2C
1.7 Max Charge Current suitability	40A
1.8 Standard Discharge Current	10A 0.2C
1.9 Max Discharge Current	40A
1.10 Max Pulse Dis Current	80A 200ms
1.11 Weight	9±0.5kg
1.12 Max. Dimension	L-280mm W-225mm H-74mm ±5mm
1.13 Operating Temperature	Charge: 0 ~ 60°C Discharge: -40 ~ 60°C
1.14 Storage Temperature	During 1 month: -5 ~ 35°C During 6 months: 0 ~ 35°C
1.15 operating voltage of battery pack	30 to 42V(±1 V)

2. Standard conditions for test:

All the tests need to be done within one month after the delivery date under the following conditions: Ambient Temperature: 25±5°C; Relative Humidity: 65±20%

Standard Charge	Constant Current and Constant Voltage (CC/CV) Current = 10A Final charge voltage = 42V Final charge Current = 0.05A
Standard Discharge	Constant Current (CC) Current = 10A End Voltage = 30V

1. Cycle Life

Item	Condition		Criterion	Test Method
1	23°C 4.2A	C500	≥ 80%	Per 5.1.4, 4.2A cycling at 23°C to 500 cycles. The % = (Ah / 3.90) x 100%
2.	23°C 10A	C500	≥ 80%	Per 5.1.5 10A cycling at 23°C to 500 cycles. The % = (Ah / 3.90) x 100%

1.1 Storage Performance (SOC: State of Charge)

Item	Condition		Capacity Retention	Test Method
1	23 °C 1 month	25% SOC	≥ 18%	After storage, rated discharge (4.2) and rated charge (4.1) for two cycles. The retention capacity (Ah) is defined at 1st discharge after storage. The % = (Ah / 4.0) x 100%
2	23 °C 3 months	25% SOC	≥ 15%	
3	23 °C 6 months	25% SOC	≥ 10%	



1.2 Safety Performance with help of BMS

1.2.1 Environmental Endurance Performance done by us.

Items		Criteria	Conditions
1	Temperature Shock	No fire or explosion	Storage: -45 °C for 1h and 85 °C for 1h, transfer time within 10 seconds. Repeat cycle 10 times.
2	Heating	No fire or explosion	At 100% SOC heat cell up in gravity convection and/or circulating air oven. Oven temperature is to be raised at a rate of 5°C (□ 2°C) per minute to a temperature of 130°C (□ 2°C). Hold oven at 130°C for 10 minutes.
3	Thermal test	Mass loss <0.1%, No leakage, venting, explosion, fire, disassembly, or rupture.	6 Hours @ 75 ± 2°C followed by 6 Hours @ - 40 ± 2°C x 10 Cycles (interval time of no more than 30 minutes between temperatures). Measurements taken after 10 cycles and 24 hours storage at 20± 5°C. (UN method)

Electrical Endurance Performance test conducted by us with the help of BMS CIRCUIT

Items		Criteria	Conditions
1	Short Circuit	No disassembly, rupture or fire within 6 hours of test. Max temp: □ 150°C.	While in preheated oven and cell temperature reaches 55 ± 2°C, short circuit cell using a total external resistance □ 0.1 ohm until cell temperature has returned to 55 ± 2°C. (UN method)
2	Overcharge	No fire or explosion	Charging at a current of 12.6A to 15V from the fully discharged state for 2.5hrs.
3	Forced Discharge	No disassembly and no fire within 7 days of test	Connect cell in series with a 12V DC power supply at a current equal to maximum discharge specified. (UN method)

1.2.2 Mechanical Endurance Performance

Items		Criteria	Conditions
1	Crush	No fire or explosion	Crush between two flat plates. Applied force is about 13KN.
2	Impact	No fire or explosion	Impact by 15.8mm□ bar with 9.1kg weight dropped from 61cm height on the flat surface.



1.3 Environmental Reliability done by us and our cell vendor

Items		Criteria	Conditions
1	Shock	No leakage, mass loss, no venting, disassembly, no Rupture and no fire. 90% voltage recovery	Subject to 6 shocks/axis, 18 total, of peak acceleration of 150g and pulse duration of 6 ms. (UN method)
2	High Temp. Storage	No leakage, no vent, no fire or explosion	0.56A discharge capacity test after leaving at 85 degree Celsius for 10h.
3	Drop	No visible electrolyte leakage, no temperature rising.	Drop from a height of 3ft onto a concrete floor 3 times each for bottom, side and header orientations (total=9 drops).
4	Vibration	No leakage, mass loss, no venting, disassembly, no Rupture and no fire. 90% voltage recovery	Subject to 7↔200Hz / 15 min vibration, 12x15 min /3 axes at amplitude of 0.8mm (1.6 mm total excursion). (UN method)
5	High Altitude Exposure	No leakage, weight loss, no vent, fire or explosion, 90% voltage recovery	Stored at a pressure of 11.6 kPa for 6 hrs at 20°C. (UN method)

5. Terminal explanations:

- 4.1 B+ : Connected to the battery's positive terminal
- 4.2 B- : Connected to the battery's negative terminal
- 4.3 B+ : Connected to the battery's output or the charger's positive terminal
- 4.4 B- : Connected to the battery's output or the charger's negative terminal

6.0 WARNINGS AND CAUTIONS IN HANDLING THE Lithium-ion BATTERY:

To prevent a possibility of the battery from leaking, heating or explosion please observe the following precautions:

WARNINGS!

- 1) Do not immerse the battery in water or seawater, and keep the battery in a cool dry surrounding if it stands by.
- 2) Do not use or leave the battery near a heat source as fire or heater
- 3) When recharging, use the battery charger specifically for that purpose
- 4) Do not reverse the position (+) and negative (-) terminals
- 5) Do not connect the battery to an electrical outlet
- 6) Do not discard the battery in fire or heat it
- 7) Do not short-circuit the battery by directly connecting the positive (+) and negative (-) terminal with metal objects such as wire.
- 8) Do not transport or store the battery together with metal objects such as necklaces, hair pins etc.
- 9) Do not strike or throw the battery
- 10) Do not directly solder the battery and pierce the battery with a nail or other sharp object.

CAUTIONS!

- 1) Do not use or leave the battery at very high temperature (for example, at strong direct sunlight or in a vehicle in extremely hot weather). Otherwise, it can overheat or fire or its performance will be degenerate and its service life will be decreased.
- 2) Do not use it in a location where static electricity is great, otherwise, the safety devices may be damaged, causing hidden trouble of safety.
- 3) If the battery leaks, and the electrolyte get into the eyes. Do not rub eyes, instead, rinse the eyes with clean running water, and immediately seek medical attention. Otherwise, it may injure eyes or cause a loss of sight.
- 4) If the battery gives off an Odor, generates heat, becomes discoloured or deformed, or in any way appear abnormal during use, recharging or storage, immediately remove it from the device or battery charger and stop using it.
- 5) In case the battery terminals are dirt, clean the terminals with a dry cloth before use. Otherwise power failure or charge failure may occur due to the poor connection with the instrument.
- 6) Be aware discarded batteries may cause fire, tape the battery terminals to insulate them.

Note: Any representations in this brochure concerning performance are for informational purposes only and are not construed as warranties either expressed or implied, of future performance