



**CHAM**

**SHENZHEN CHAM BATTERY  
TECHNOLOGY CO.,LTD**

***WORLD CLASS 18650***

***17 Years Dedicated to Quality***

**PAXCELL**  
Energy Technologies

***An Authorized Representative of CHAM***

# COMPANY PROFILE

## Company Introduction



Shenzhen Cham Battery Technology Co., Ltd.

Headquartered in Dongguan **Songshan Lake** High-Tech Industrial Park.

Focus on the development of **18650** cylindrical li-ion batteries since 2003.

Recognized as **National Hi-Tech Enterprise** in 2008

Mission

**“Create a better tomorrow for our society with Cham's Green and Safe Li-ion technology”**

Aim to become first class Li-ion battery solution provider globally



# COMPANY PROFILE

## Overhead View



Dormitory



Warehouse



Office Building

**Dongguan Cham**  
**Songshan Lake Industrial Park.**  
**Existing capacity: 1.2 GWh**  
**Total expected capacity: 2.7GWh**

# COMPANY PROFILE

## Development Milestone

CHAM

2003



Est. March/18/2003  
1st 18650/2000mah  
MP in China

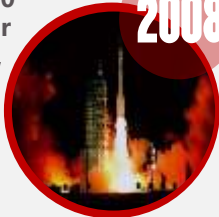
2004

ISO9001/14000 Accredited;  
18500/14500 as LG  
Electronics Vendor

2007

1st 18650/2200mah  
MP in China;  
18650/1500mah/10  
C released; Partner  
with BMZ, Hasee,  
Lenovo

2008



National Hi-Tech  
Enterprise Accredited,  
CHAM 18650 battery was  
selected as the backup  
power supply of  
"Shenzhou" VII

2009



1st  
18650/2600mah  
MP in China; SSL  
Dongguan Plant  
started,  
Initiated  
Powerocks  
brand

2013

1st  
18650/3000mah  
MP in China,  
Partner with  
Anker/OceanWing

2015

1st 18650/3350mah MP  
in China; Start Eco-  
Mobility business, As  
Top#3 EV cell supplier  
for Kandi/Geely, Zoyte,  
Kinglong Nanjing

2017

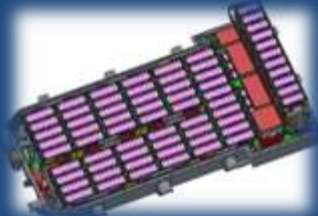
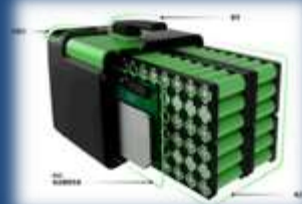


2550mAh, 2600mAh,  
2750mAh was certified  
by Automobiles  
Compulsory Test of the  
State ; Successful  
launched 56,000pcs EV  
cars in the market

2019

Introducing state of  
the art automation to  
improve our machine  
capability

## Product Application



### **Power Cell (High C-Rate):**

Eco-mobility (1/2/3 wheelers)

New Energy Vehicle

Power Tools & Gardening

Smart Home Appliance & Devices, etc

### **Energy Cell (High Capacity):**

Small-to-Large Scale Energy Storage System (ESS)

Personal Care & Medical Devices

Consumer Powerbank / FlashLight / Speaker

Commercial POS / Scanner

# COMPANY PROFILE

## High-end Consumer Electronics brand



# POWEROCKS®

Sponsor of the American National Hockey League(NHL)

Sponsor of the Canadian Hockey League(CHL)

Leading brand in Canada and North America, popular in Rogers and Telus, the largest operators in Canada, and BestBuy and FutureShop, the largest retail chains in North America

Cooperation with Tencent game League of Legends



# PROCESS CAPABILITY

**CHAM**



## KIM SONG BAE

*Cham Chief Technical Adviser*

- *Manufacturing management system expert*
- *Worked for Samsung 36 years*
- *Winner of the President's award for quality management in South Korea*
- *Rich experience in battery factory and TPM management*



# PROCESS CAPABILITY

## Manufacturing Process



**Mixing**



**Coating**



**Calendaring  
/Slitting**



**Jelly Roll  
Assembly**



**Testing**



**Electrolyte  
Injection  
/Sealing**



**Baking**

PROCESS



**Industry Advanced  
Automatic Production  
Equipment**

**Constant Temperature  
and Humidity**

# PROCESS CAPABILITY

## Unique Aging System



First-time Aging  
for 3 Days at 45°C



Second-time Aging  
for 5 Days at 45°C

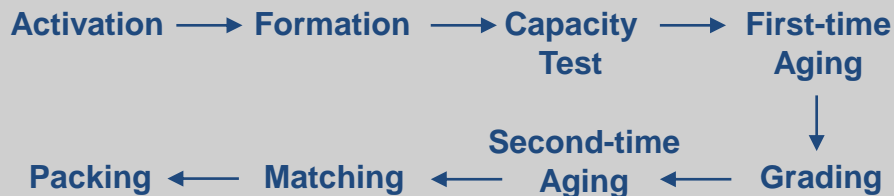


Computerized  
Management



On-time Monitoring

*100% X-Ray Inspection  
Precision in Winding Alignment  
Safe Battery Structure*



*Unique Aging System  
Ensure Customers Get the Most Reliable  
& Safe Batteries*



## PROCESS CAPABILITY PACK Solution



- As we target to provide a 1-stop solution for our valued customers, we provide the options to you to integrate our quality cells together with our robust pack design.
- Cham Pack Solution has been growing over the years and we currently have up to 30 engineers supporting our pack designs consisting of EE (Electrical) , ME (Mechanical), NPI & Program Management, Test and Programing Firmware, Packaging Design and Safety Compliance engineers in our team.
- Lead by Mr. Galen Li as head of RD with over 30 years in the battery industry, Cham is committed to giving you the most reliable and cost effective battery solution in the market.
- Our current capacity is approximately 10,000 ( $\leq 10$ Series): battery packs per day.

# PROCESS CAPABILITY Management System



## ISO9001

Quality Management System



## IATF16949

Quality Management System



## ISO14001

Environmental Management System



## ISO45001

Occupational Health and Safety Management System



# R&D CAPABILITY & PRODUCT ROADMAP

**CHAM**

## *Quality Service Research*

## *Pass the Torch*

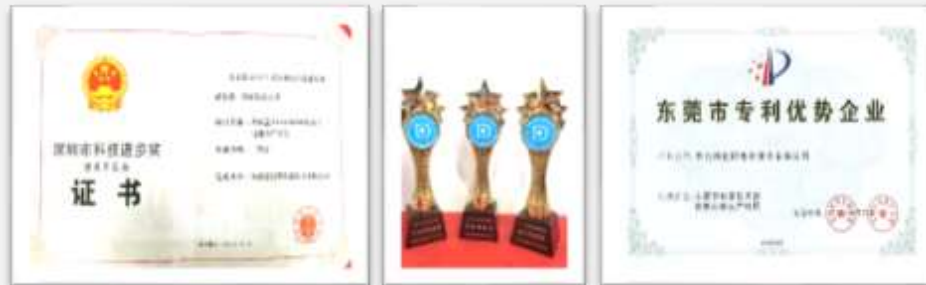


- Committed to cultivating outstanding scientific research talents in China, it has cultivated numerous talents for the lithium battery industry
- Build a world-class battery brand, break through the Japanese and Korean battery market monopoly and technical barriers
- FOCUS ON 18650 16Y, Design excellent quality safe and reliable lithium battery products

Team 1 : 40 engineers	Team 2 : 25 engineers	Team 3 : 15 engineers
<p><b>Product Development</b></p> <p>Develop for Anode and Cathode material, new formulation of electrolyte; Analyze and verify for cell test; Learn and import the latest technology from home and abroad.</p>	<p><b>Process Development</b></p> <p>Research and innovate on producing technique to improve the production lines.</p>	<p><b>Equipment Development</b></p> <p>Research, develop and improve on automatic producing equipment.</p>







**170** Patents

**27** Invention Patents

**125** Utility Patents

**18** Design Patents

Dongguan Growing SMES in 2015
Shenzhen Science & Technology Progress Award (second class) in 2013
Dongguan Patent Excellent Enterprise in 2018
Good Product of Lithium in 2016
Pilot Enterprises of The Multiplication Plan of Songshan Lake in 2017
High-tech Products of Guangdong Province in 2017
Dongguan Lithium Gold Award "Annual Technology Innovation Award" in 2018
Dongguan Lithium Gold Award "Top Ten Excellent Brands" in 2018
Dongguan Lithium Gold Award "Outstanding Contribution Award" in 2018

# R&D CAPABILITY

## Reliable Cell F8M7-2600mAh



### 2016.7

Cham Battery was included in the Enterprise Directory of Meeting the Conditions of Automobile Power Storage Battery Codes of Practice. Only 57 lithium battery companies were selected.



F8M7 2600mAh

## Cham battery is loaded with

# 56,000 units

# Zero

 safety incidents are the best interpretation of quality

KANDI K17/K17A  
27000units



ZOTYE AUTO  
3000units



KANDI K11  
12000units

R&D CAPABILITY  
Star Product F9L-3350mAh

Benchmarking  
Korea 3350mAh cell  
Superior Performance

CHAM



3350mAh

CHAM 18650F9L--3350mAh  
capacity cell is **Highest  
Runner in China for  
High Capacity Cell.**



More than 30Mpcs Shipped Globally

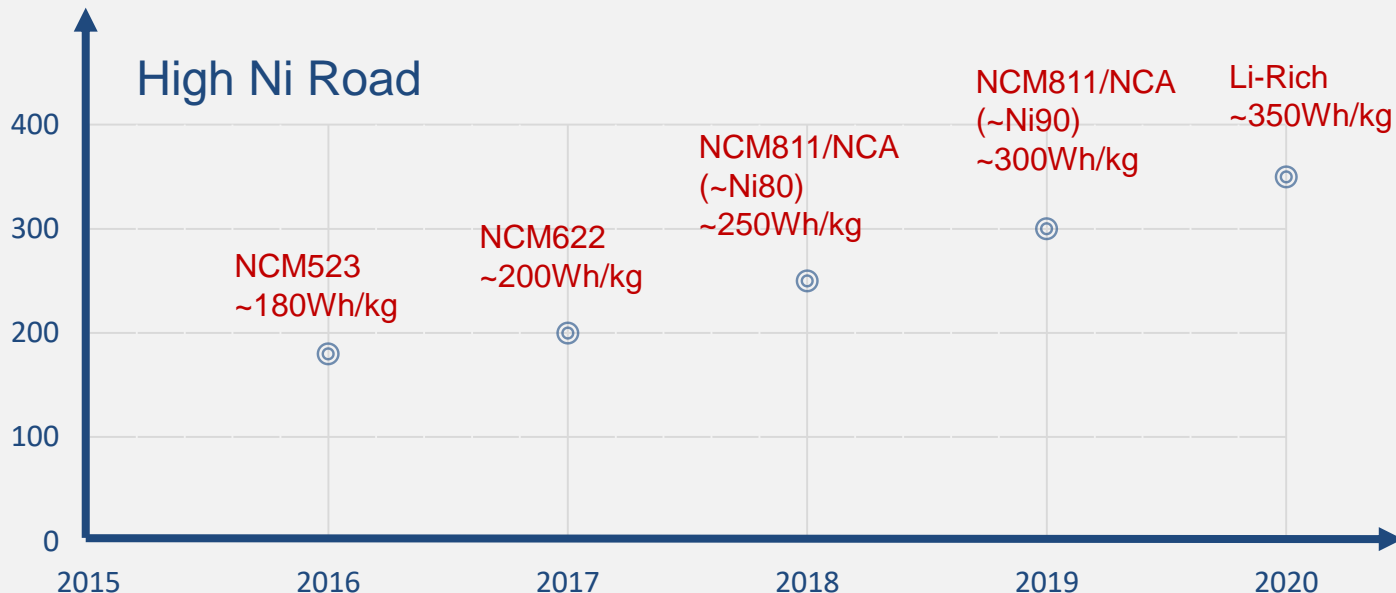


**Our World Class Battery Research Lab will complete the CNAS Qualification by the end of Y2019.**

**Capable to perform full series of battery reliability & safety test**

# R&D CAPABILITY

## CHAM Development Roadmap for NCM Cathode

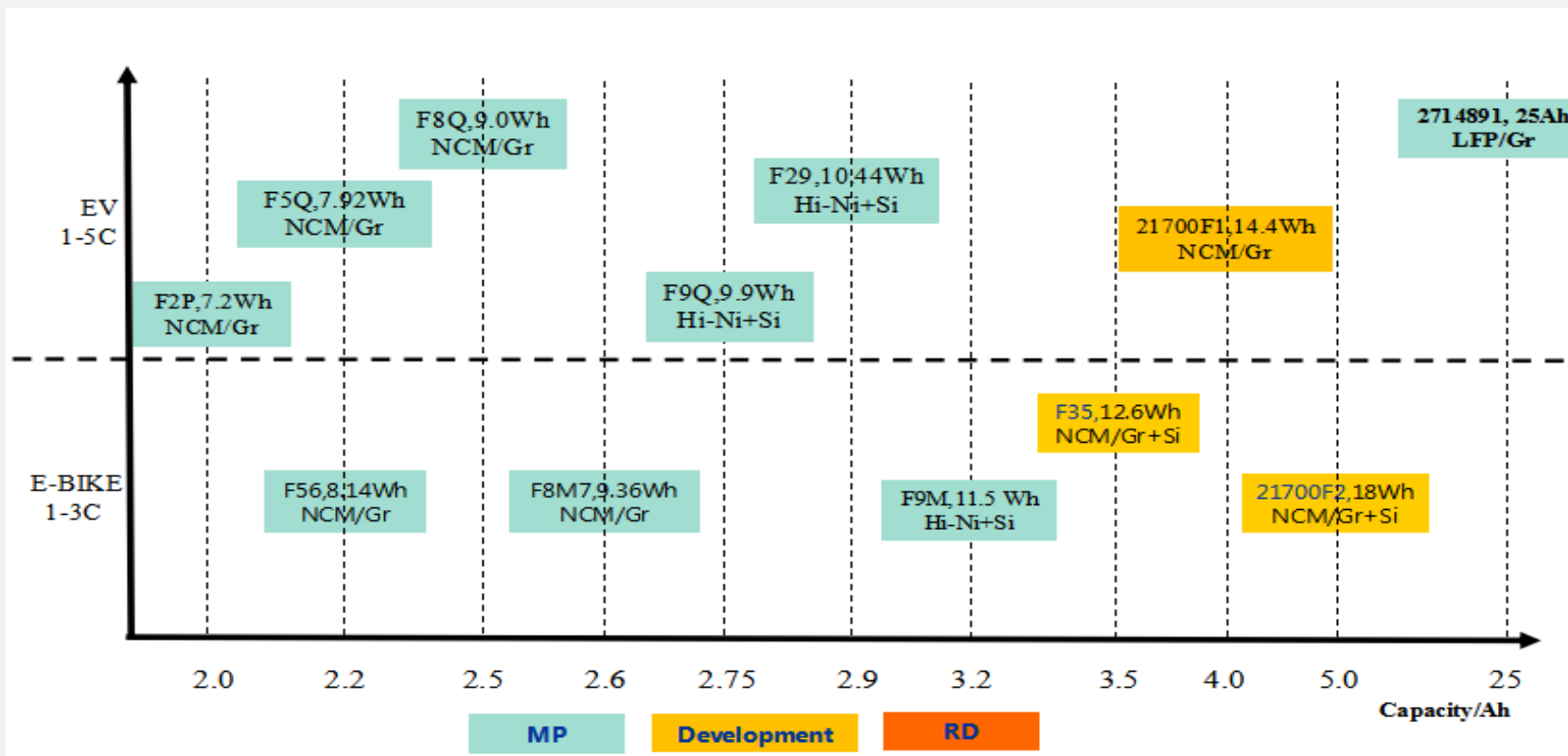


Cham is currently actively developing products with Hi-Ni.

	MP	Development
Ni80	F9Q/F30/F29	F8P / F8S / F8T
Ni90	F9L	F9M / F9P / F35 / F2

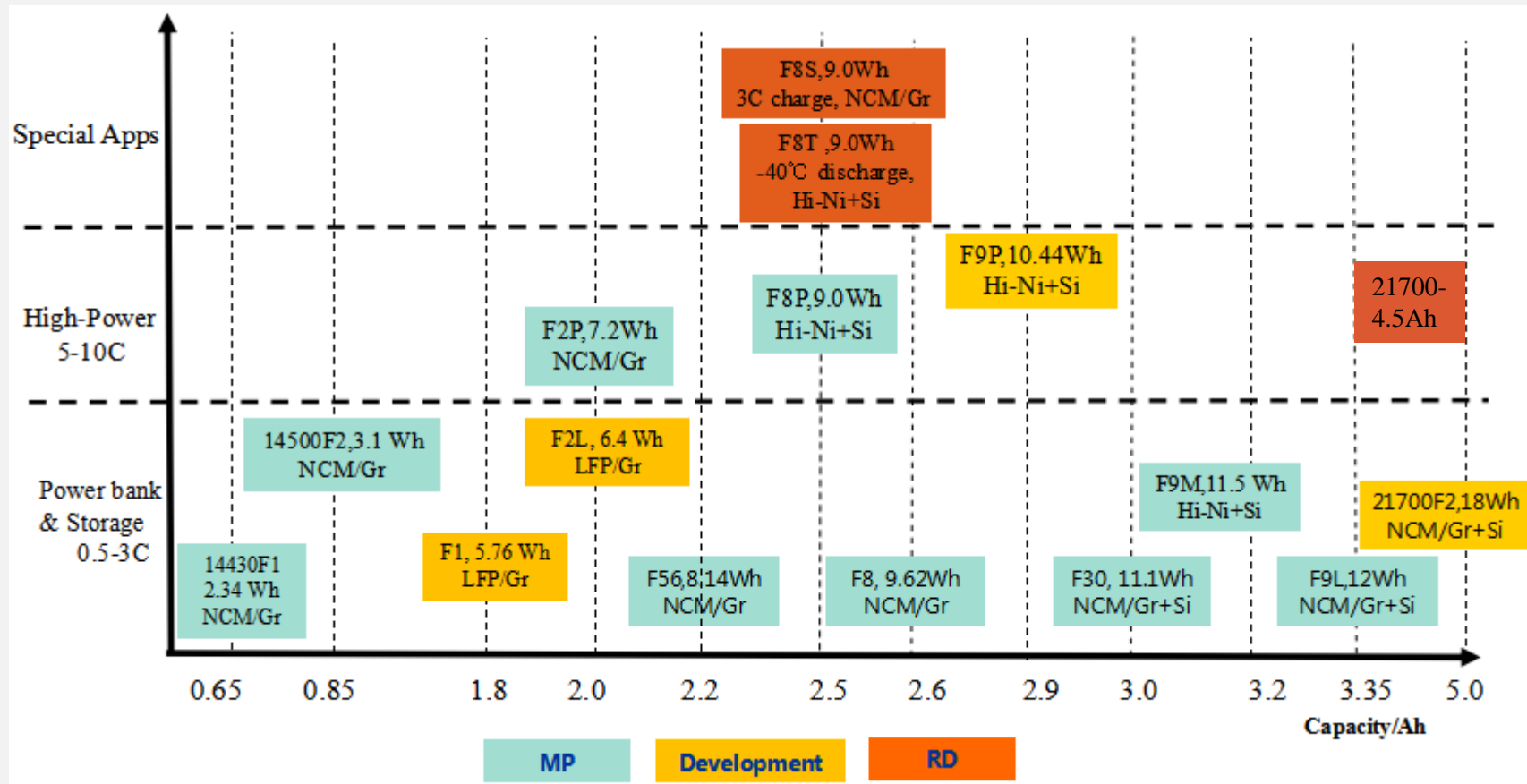
# R&D CAPABILITY

## CHAM Cells Development Roadmap - Mobility



# R&D CAPABILITY

## CHAM Cells Development Roadmap - Others



# PRODUCT ROADMAP

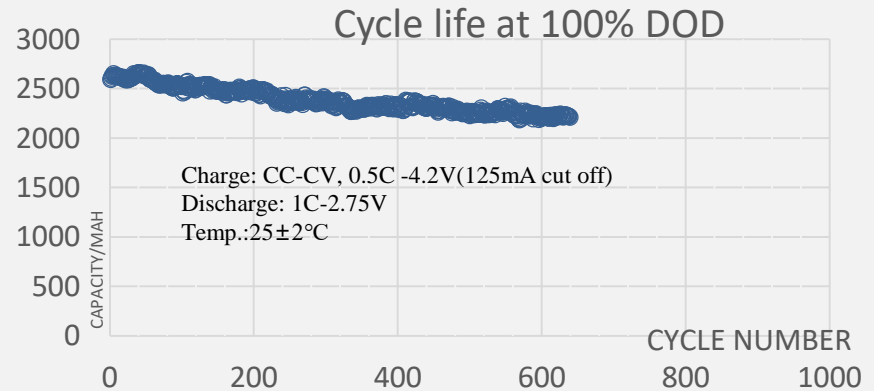
## 18650F8M7 2600mAh



### Certifications

UL1642/UN38.3/CB/REACH/  
BSMI/CQC/BIS

Model		18650F8M7
Nominal Capacity		2600 mAh
Normal Voltage		3.6 V
Impedance		≤40 mΩ
Standard Charge Current		0.5 C
Max. Continuous Discharge Current		3 C
RT Cycle Life		600 Cycle ≥70% (0.5C/1C)
Energy Density	Mass Energy Density	211 Wh/kg
	Volume Energy Density	548 Wh/L
Application		2 wheelers, Sweeping Robot, Smart Home Appliance & Devices





# PRODUCT ROADMAP

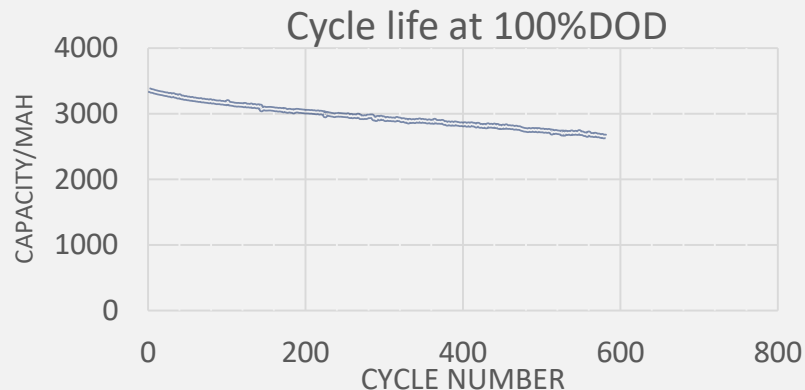
## 18650F9L 3350mAh



### Certifications

UL1642/UN38.3/CB/RoHs  
/GB31241/REACH/BIS/BSMI

Model		18650F9L
Nominal Capacity		3350 mAh
Normal Voltage		3.6 V
Impedance		≤60 mΩ
Max. Continuous Charge Current		0.5 C (1625mAh)
Max. Continuous Discharge Current		1.5C
RT Cycle Life		300 Cycle ≥80%, 2.75V-4.2V ( 0.3C/0.5C)
Energy Density	Mass energy density	255 Wh/kg
	Volume energy density	689 Wh/L
Application		Powerbank, Portable Speaker, Small Scale Energy Storage System



# PRODUCT ROADMAP

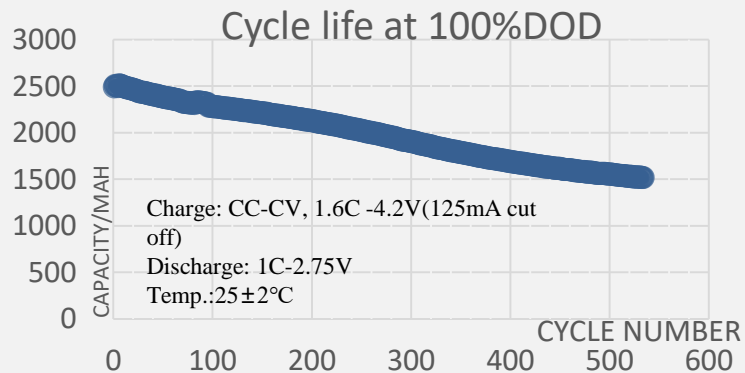
## 18650F8P 2580mAh



### Certifications

UL1642/UN38.3/CB/RoHs  
/GB31241/REACH/KC

Model		18650F8P
Nominal Capacity		2580 mAh
Rated Discharge Capacity (4A/10A)		≥2450 mAh
Normal Voltage		3.6 V
Impedance		≤18 mΩ
Max. Continuous Charge Current		1.6C
Max. Continuous Discharge Current		① 8C, ② 12C (with 80°C cut)
RT Cycle Life		250 Cycle ≥1500mAh (4A/20A)
Energy Density	Mass energy density	207.3 Wh/kg
	Volume energy density	537.2 Wh/L
Application		Power Tools



# PRODUCT ROADMAP

18650F9P 2950mAh    18650F9M 3200mAh

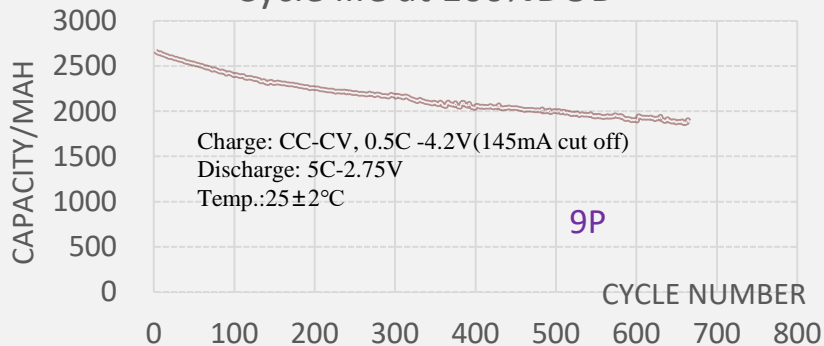


## Certifications

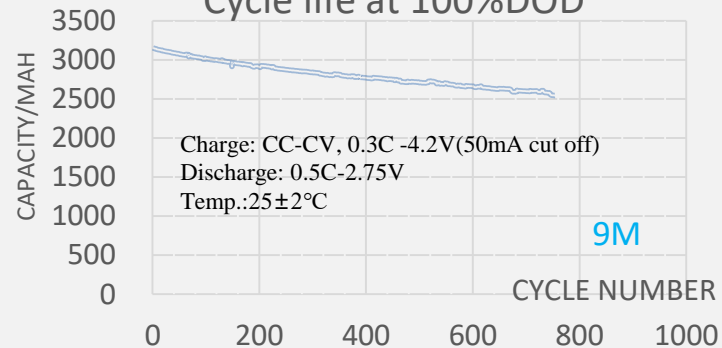
UN38.3/UL1642/CB/GB31241/BIS

Model		18650F9P	18650F9M
Nominal Capacity		2950 mAh	3200 mAh
Normal Voltage		3.6 V	3.6 V
Impedance		≤25 mΩ	≤40 mΩ
Standard Charge Current		0.5 C	0.5 C
Max. Continuous Discharge Current		5C	2C
RT Cycle Life		600 Cycle ≥80% (0.5C/1C) 400 Cycle ≥60% (0.5C/5C)	500 Cycle ≥80% (0.5C/0.5C) 300 Cycle ≥80% (0.5C/2C)
Energy Density	Mass Energy Density	230 Wh/kg	250 Wh/kg
	Volume Energy Density	620 Wh/L	658 Wh/L
Application		Vacuum, Electric Boat, Smart Home Appliance & Devices	Sweeping Robot, Energy Storage System (ESS), Smart Home Appliance & Devices

Cycle life at 100%DOD



Cycle life at 100%DOD



# PRODUCT ROADMAP

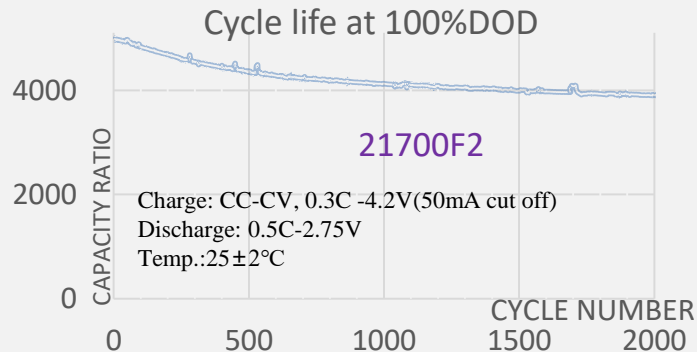
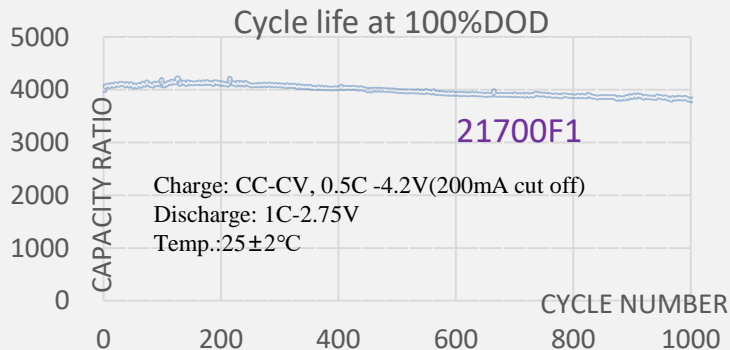
21700F1 4000mAh 21700F2 5000mAh



## Certifications

GB31484/485/486/BIS/UN38.3/BIS

Model		21700F1	21700F2
Nominal Capacity		4000mAh	5000mAh
Nominal voltage		3.65V	3.62V
Impedance		≤25 mΩ	≤40 mΩ
Standard Charge Current		0.5C	0.3C
Max. Continuous Discharge Current (0-100%SOC)		3C	1.5C
RT Cycle life		1000 cycle >80% (0.5C/1C)	300 cycle >80% (0.3C/0.5C)
Energy density	Mass Energy Density	209 Wh/kg	255 Wh/kg
	Volume Energy Density	552 Wh/L	679 Wh/L
Application		4-wheelers, Electric car	Energy Storage System (ESS), Powerbank, Smart Home Appliance & Devices



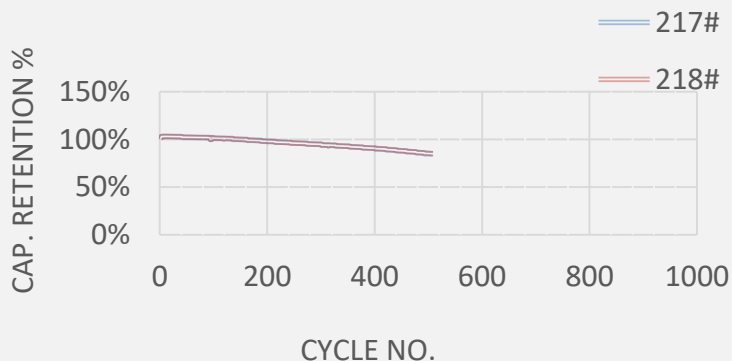
# PRODUCT ROADMAP

## 14500F2-850mAh

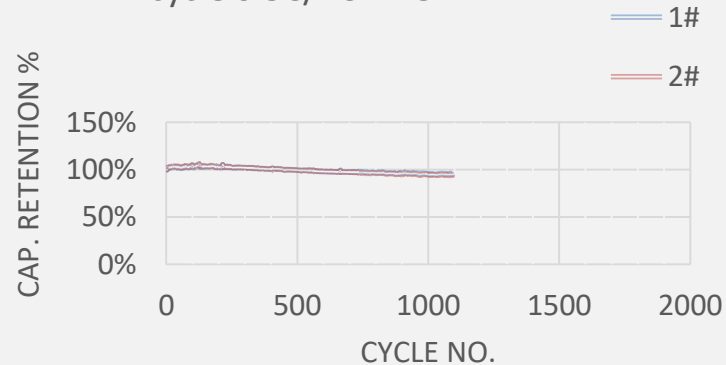


Model		14500F2
Nominal Capacity		850 mAh
Minimal capacity		850 mAh, 0.5C / 0.2C (C=850mAh)
Nominal voltage		3.6 V
Impedance		≤70 mΩ
Max. Continuous Charge Current		0.85 A (1 C)
Max. Continuous Discharge Current		1.7 A (2 C)
RT Cycle life		300 Cycle ≥80%, 2.75V-4.2V (with 1C/1C)
Energy density	Mass Energy Density	146 Wh/kg
	Volume Energy Density	412 Wh/L

Cycle at 55°C 0.5C/1C 2.75-4.2V



RT cycle 0.5C/1C 2.75-4.2V



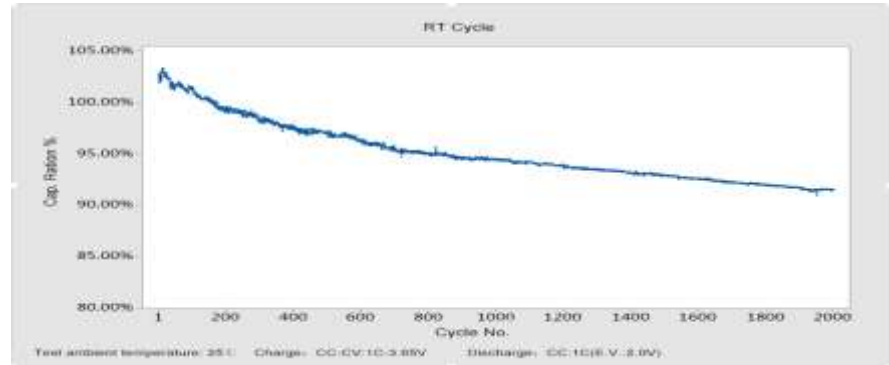
# PRODUCT ROADMAP

## LFP Prismatic Battery-25Ah






ITEM	SPECIFICATION
Nominal capacity	25Ah
Nominal voltage	3.2V
Charging voltage	3.65V
Discharge ending voltage	2.0V
Standard charging current	0.5C
Standard discharge current	1.0C
Max charge current	2.0C
Max pulse discharge current	5.0C/30s
Max discharge current	2.0C
Max recommended charge and discharge cell body temperature	Charge: 0~45°C Discharge: -20~60°C
Internal resistance	≤1.5mΩ(AC Impedance, 1000 Hz)
Cell dimensions	Thickness : 28.0 mm Max
	Width : 148.2 mm Max
	Height: 94.7mm Max
Weight	705±15g

Widely applied in energy storage, medical equipment, EVS, electric power tools and other areas which require super safety and long cycle life.



# Li-ion Lead Acid Replacement Battery Options



PACK型号	10.8V 18.2Ah	14.4V 13Ah	24V 10.4Ah	48V 13Ah	48V 15.6Ah	48V 20.8Ah	60V 36.4Ah
Model							
Chemistry	NCM	NCM	NCM	NCM	NCM	NCM	NCM
Cell Model	F8R 3.6V/2600mAh	F8R 3.6V/2600mAh	F8R 3.6V/2600mAh	F8R 3.6V/2600mAh	F8M7 3.6V/2600mAh	F8M7 3.6V/2600mAh	F8M7 3.6V/2600mAh
Configuration	3S7P	4S5P	7S4P	13S5P	13S6P	13S8P	17S14P
Nominal Voltage	10.8V	14.4V	24V	48V	48V	48V	60V
Nominal Capacity	18.2Ah	13Ah	10.4Ah	13Ah	15.6Ah	20.8Ah	36.4Ah
Standard Charge Voltage	12.6V	16.8V	29.4V	54.6V	54.6V	54.6V	71.4V
Max. Charge Voltage	12.75V	17V	29.75V	55.25V	55.25V	55.25V	72.25V
Standard Charge Current	4A	3A	2A	3A	3A	4A	7A
Max. Continuous Discharge Current	18A	13A	10A	13A	15A	20A	36A
Max. Pulse Discharge Current	63A<1S 126A<100mS (@25°C)	55A<1S 110A<100mS (@25°C)	60A<1S 120A<100mS (@25°C)	56A<1S 112A<100mS (@25°C)	60A<1S 120A<100mS (@25°C)	55A<1S 110A<100mS (@25°C)	100A<1S 200A<100mS (@25°C)
Weight	1.4KG	1.3KG	1.8KG	3.5KG	4.5KG	6KG	13KG
Size	150*96*69mm	150*95*65mm	150*100*98mm	180*169*77mm	240*140*70mm	290*190*80mm	312*185*160mm
ACR	≤100mΩ	≤120mΩ	≤160mΩ	≤200mΩ	≤200mΩ	≤150mΩ	≤150mΩ
Protect Function	Over Charge Protection、Over Discharge Protection、Over Current Protection、Short Circuit Protection、Over Temperature Protection						

# Product Catalogue



Item	Model	Capacity (mAh)	Voltage (V)	Impedance (mΩ)	Max. Continuous Dis. Current	Cut Off Voltage (V)	Mass Energy Density (wh/kg)	Volume Energy Density (wh/L)	Cycle Life (Charge/Discharge Current)
14500	14500F2	850	3.6	≤70	1.7 A (2 C)	2.75	146	412	≥300 (1 C / 1 C)
18650	18650F2P	2000	3.6	≤20	20.0 A (10 C)	2.75	199	427	≥300 (0.5 C / 20 A)
2.0Ah -2.2Ah	18650F5Q	2200	3.6	≤22	10.0 A (4.54 C)	2.75	178	452	≥1000 (0.5 C / 1C)
	18650F56	2200	3.7	≤60	2.2 A (1 C)	3	185	470	≥300 (0.5 C / 0.5 C)
18650  2.5Ah -2.6Ah	18650F8P	2500	3.6	≤18	30.0 A (12 C)	2.5	207	537	≥250 (4 A / 20 A)
	18650F8M6	2600	3.6	≤50	7.5 A (3 C)	2.75	211	548	≥500 (0.5 C / 1 C @2.75-4.2V)
	18650F8M7	2600	3.6	≤40	7.5 A (3 C)	2.75	211	548	≥600 (0.5 C / 1 C @3.0-4.2V)
	18650F8M7I	2600	3.6	≤25	7.5 A (3 C)	2.75	211	548	≥1200 (0.5 C / 1 C @3.0-4.1V)
18650  2.9Ah -3.5Ah	18650F8R	2600	3.7	≤60	2.6 A (1 C)	3	211	543	≥300 (0.5 C / 0.5 C)
	18650F9P	2900	3.6	≤25	15.0 A (5 C)	2.5	221	610	≥400 (0.5 C / 15 A)
	18650F30	3000	3.7	≤60	4.5 A (1.5 C)	3	231	627	≥300 (0.3 C / 0.5 C)
	18650F9M	3200	3.6	≤40	9.3 A (3 C)	2.5	250	658	≥500 (0.5 C / 0.5 C)
21700	18650F9L	3350	3.6	≤60	4.8 A (1.5 C)	2.5	251	681	≥300 (0.3 C / 0.5 C)
	21700F1	4000	3.65	≤20	8.0 A (2 C)	2.75	211.6	549	≥1200 (0.5 C / 1 C)
	21700F2	5000	3.62	≤40	7.5 A (1.5 C)	2.5	255	694	≥300 (0.3 C / 0.5 C)
Item	Model	Capacity (Ah)	Voltage (V)	Impedance (mΩ)	Charging Voltage (V)	Discharge ending voltage (V)	Standard Charging Current	Standard Discharge Current	Max Recommended Charge and Discharge Cell Body Temperature
LFP PRISMATIC BATTERY	25Ah	25	3.2	≤1.5mΩ (AC Impedance, 1000 Hz)	3.65	2	12.5A (0.5C)	25A (1C)	Charge: 0~45°C Discharge: -20~60°C



Outdoor emergency repair  
emergency power supply

Solar monitoring system



Outdoor  
Emergency lights



GPS



Railway solar  
warning light



Wireless  
walkie-talkie



Solar automatic alarm  
at railway crossing



Emergency lights



Flashlight



Baton



UAV system



Monitoring system  
backup power UPS



## RAILWAY BATTERY APPLICATIONS

# Application Fields



Outdoor emergency repair  
emergency power supply



Solar Street Light



Emergency mobile  
charging vehicle

Solar monitoring system



Outdoor  
Emergency lights



GPS



Wireless  
walkie-talkie



Flashlight



Monitoring system backup power UPS



ETC



Emergency lights



UAV system

# HIGHWAY BUREAU BATTERY APPLICATIONS



Charging cash counter



Power bank



UPS



Emergency lights for banking facilities



POS



ETC

## FINANCIAL APPLICATIONS



# Paxcell Group

**Authorized Representative for Cham Battery**

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**[www.paxcell.com](http://www.paxcell.com)**