

“Power of Your Life”

Routejade 2020

Company and Product Introduction

Routejade Lithium - Ion Battery
Doughnut Model



Overview

01. Overall



- History
- Certification
- Patent

02. Technology



- Encapsulation & Stacking
- Advantages of Encapsulation

03. Products



- Cell
- Soft Pack
- Module

04. Through Lifestyle



- Wearable Fitness
- Healthcare & Medical
- Infotainment
- Military

Overall



Routejade has been growing continuously as one of special lithium-ion battery manufacturer with its own patent “Encapsulation”. Encapsulation & stack technology has been providing more flexible solution for LIB & LIPB to many customers worldwide.

- Established year : 2000.03
- Manufacturing products : LIB, LIPB, Soft-pack, Module
- Location : HQ / Factory – Nonsan (Korea)
Sales Office – Seoul (Korea)

Yesterday and Today of Routejade



“Routejade has demonstrated our leadership in the next generation of battery technology”



2000

Established and succeeded in developing 1st coin type Li-ion rechargeable battery In the world

2003

Coin type Li-ion rechargeable battery was mass-produced by totally automated assembly line

2009

Our company name was changed to "Routejade, Inc." being acquired by Mr. JJ Hong who was Kokam's chairman

2010

Provided technology cross-licensing to one of world's top chemical companies, Dow Chemical

2011

1st FLPB production line was installed for pouch cell

2015

2nd FLPB production line was installed for Asymmetric designed pouch cell

2019

For higher production capacity of pouch cell, we installed 3rd FLPB line in 2019 and 4th FLPB line In 2020

2020

“Routejade’s Certification”



RoHS



ISO 14001 – To certify the environment management system of the company

ISO 9001 – To certify the quality management system of the company

UL 1642 – Standard for Safety for Lithium Batteries

UL 2054 – UL Standard for Safety for Household and Commercial Batteries

IEC62133 – Safety requirements portable sealed secondary cells

UN38.3 – Transport of dangerous goods

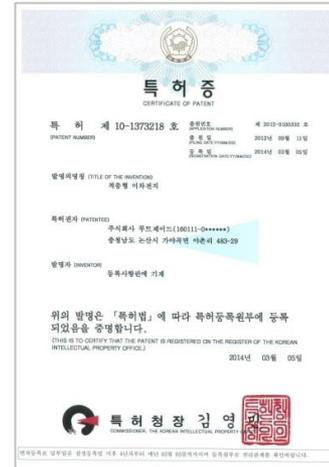
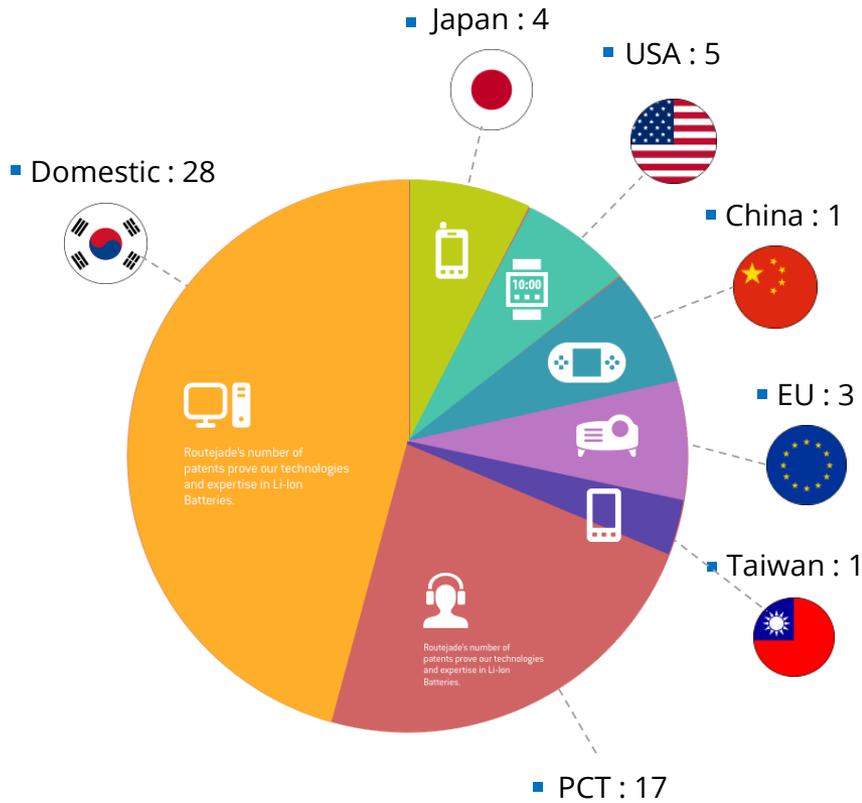
BSMI – Bureau of Standards, Metrology and Inspection

KC – KC Mark for all electronic and electrical products

RoHS – The restriction of the use of certain hazardous substances in electrical

and electronic equipment, was adopted in February 2003 by the European Union

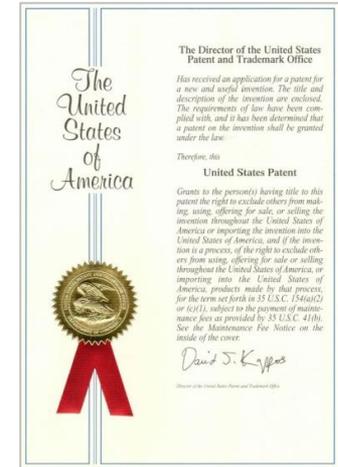
Routejade's number of patents verify our technologies and expertise in Li-Ion Batteries.



Domestic



japan



USA



EU

Routejade Total Solution

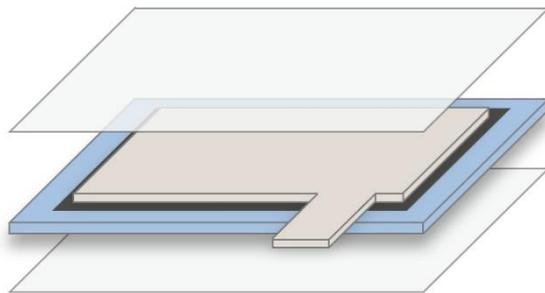


Routejade will develop and supply most shape of batteries which can be applied to customers needs

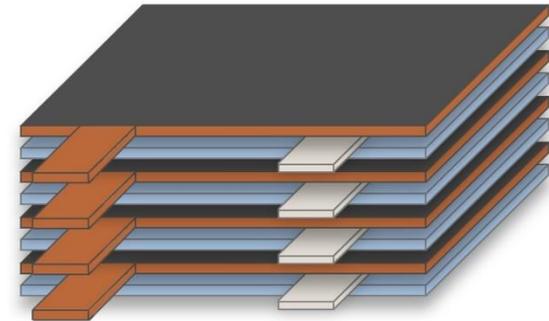
Advantage of technology for PD/FLPB/ASDB

Encapsulation

Routejade has developed a Patented Encapsulation technology to make cathode electrode plate and separator be integrated by heat-sealing.



Routejade's patented Encapsulation

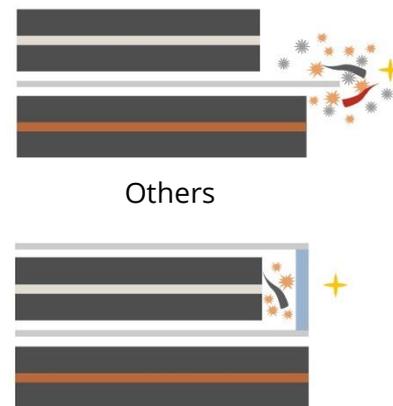


Stack

Eliminate the **"Internal Short Circuit"** possibility by burr & debris



Schematic structure of encapsulated cathode



Routejade

-  Debris from Cathode
-  Debris from anode
-  Cathode foil Burr
-  Anode foil Burr
-  Other conductive Impurities

Advantage of technology for PD/FLPB/ASDB

Routejade, your perfect supporter **with safety and high quality batteries**



Structure safety

Encapsulation technology fully prevents physical contact between cathode and anode. As a result, it can minimize the possibility of the internal short-circuit caused by the debris or burrs from the current collectors of cathode/anode.



High energy density

By minimizing the dead space caused by extra separator, we can achieve higher energy density than the competitors' technology with the same dimension and same material.



Design flexibility

Routejade's encapsulation technology enables to provide our customers with most shapes of battery. We can provide customized cells which use all possible space with asymmetric edge and/or corner so that our customers can enjoy extra capacity compared to the capacity of normal rectangular shaped battery.



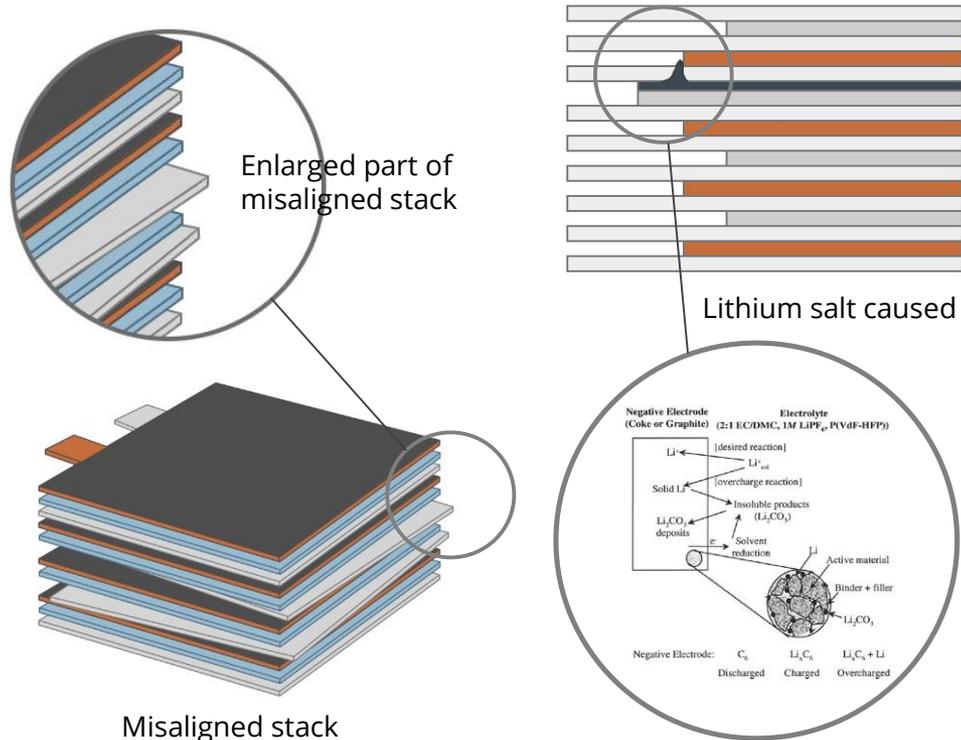
Full Automation

Fully automated production line including encapsulation and stacking process facilitates high productivity and high quality consistency in our products.

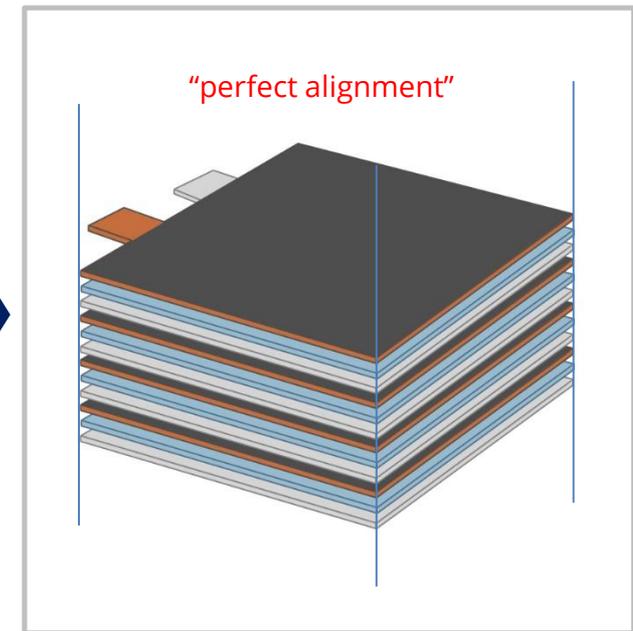
Advantage of technology for PD/FLPB/ASDB

1. Structure safety – Perfect alignment

Internal short mechanism of stacking



Routejade's Encapsulation



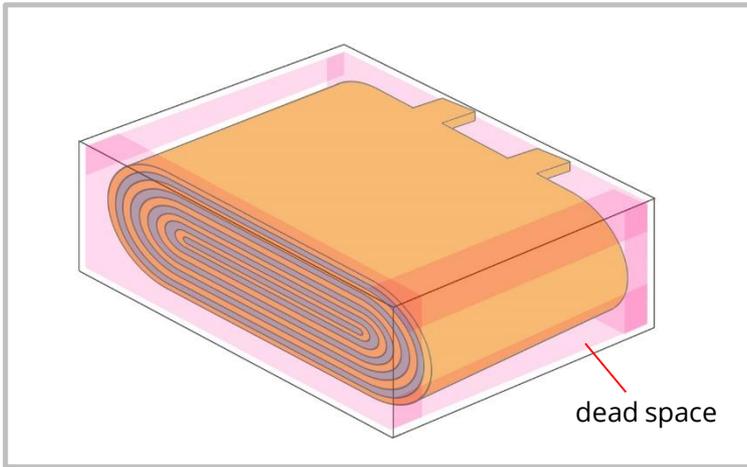
No possibility of lithium salt because of perfect alignment

1. Electrode misalignment in jelly roll makes lithium deposition.
2. This lithium growth can cause capacity loss and even trigger short circuit.

Advantage of technology for PD/FLPB/ASDB

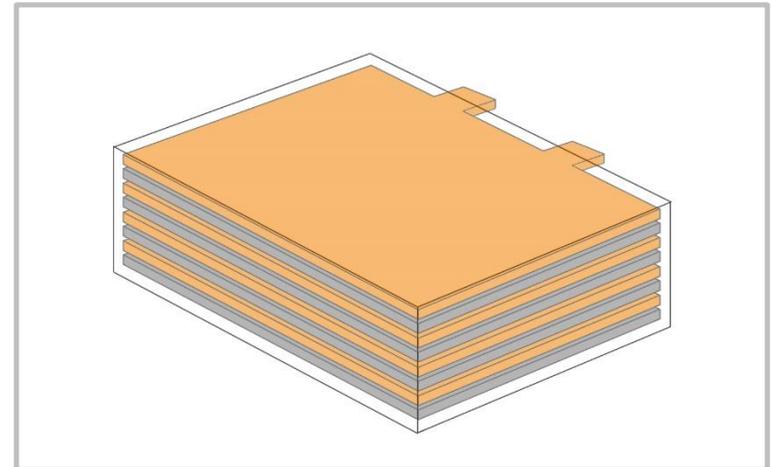
2. High energy density – Minimize the dead space

Winding technology

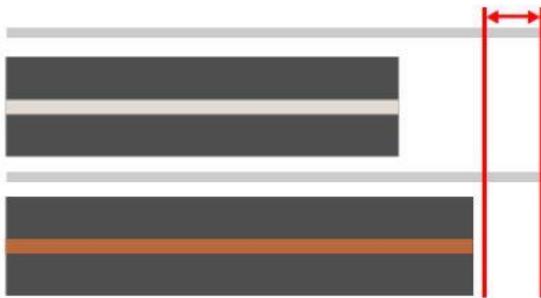


Exceeded size of separator makes dead space

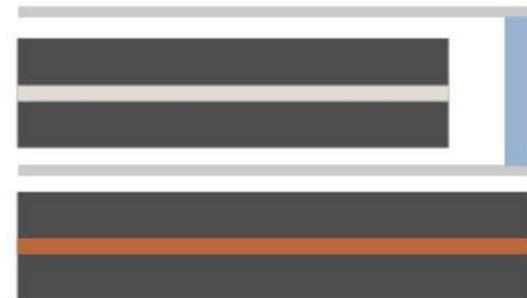
Routejade's encapsulation



Totally same size of stack structure



8~15%
less dead space



By minimizing the dead space by extra separator, we can achieve higher energy density than the competitors' technology with the same dimension and same material.

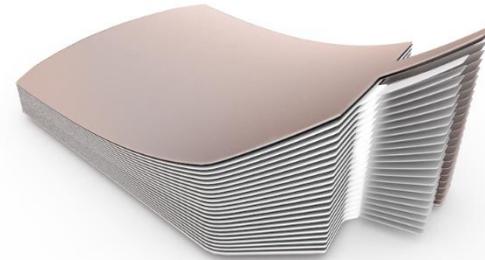
Advantage of technology for PD/FLPB/ASDB

3. Design flexibility

Routejade's encapsulation technology enables to provide almost all shape of battery in same process. Customized cells also have using maximized internal space by fulfill asymmetric edge and/or corner.



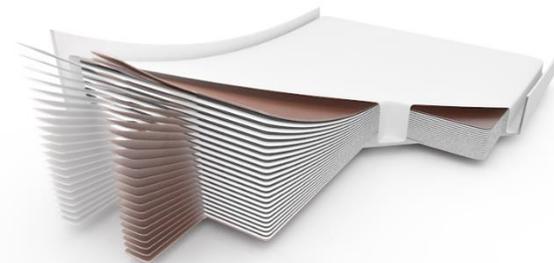
Odd shape 1



Odd shape 2



Doughnut

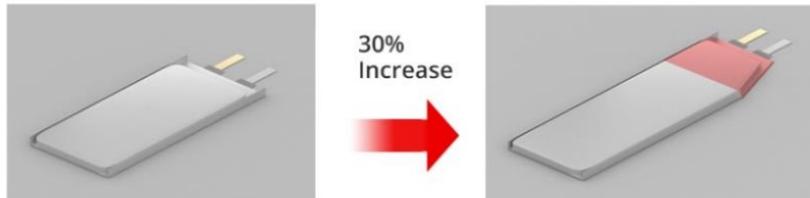
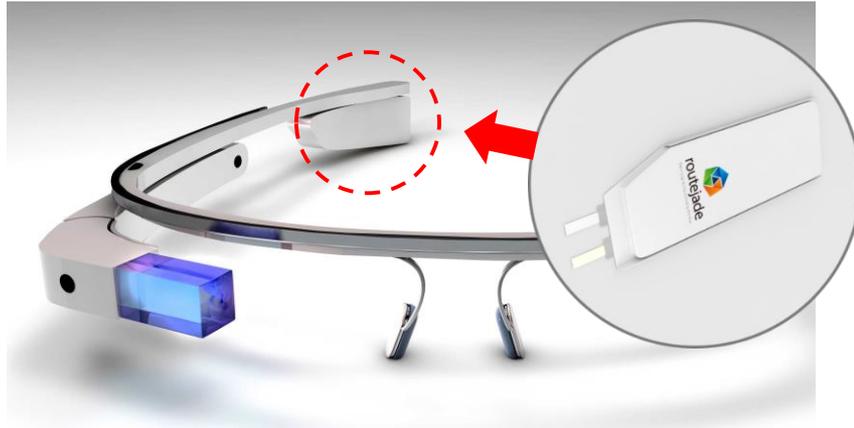


L-Shape

Advantage of technology for PD/FLPB/ASDB

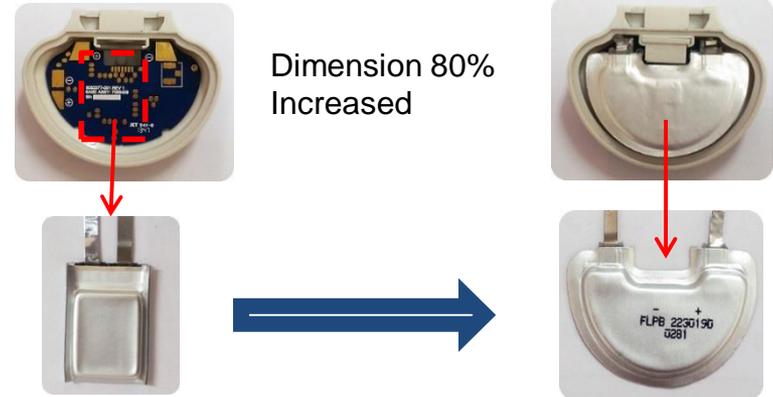
3. Higher capacity and performance with design Flexibility – Examples

Application example of **smart glasses**



Comparing with normal prismatic cell, 30% higher capacity benefit can be achieved because the cell perfectly fits in the device.

Application example of **medical device**



Comparing with normal prismatic cell, maximum 80% of capacity benefit can be achieved because the cell perfectly fits in the device.

Advantage of technology for PD/FLPB/ASDB

4. Full automation – Progress of technology

By applying our technology, we innovated the new production line and progress the productivity.



1st pouch cell line

2011

13PPM



2nd pouch cell line
for Asymmetric design

2014

20PPM



3rd pouch cell line

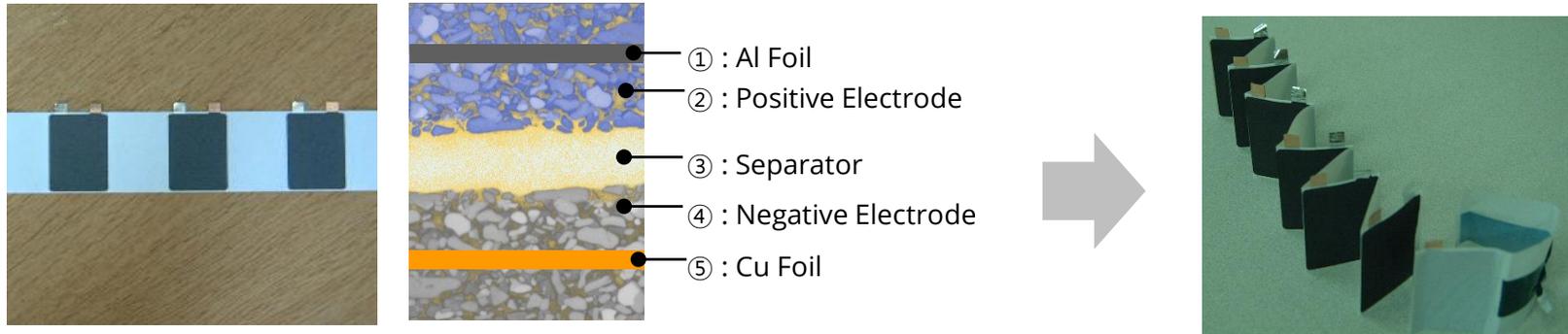
2019

Upgrading PPM

Advantage of technology for SLPB_L

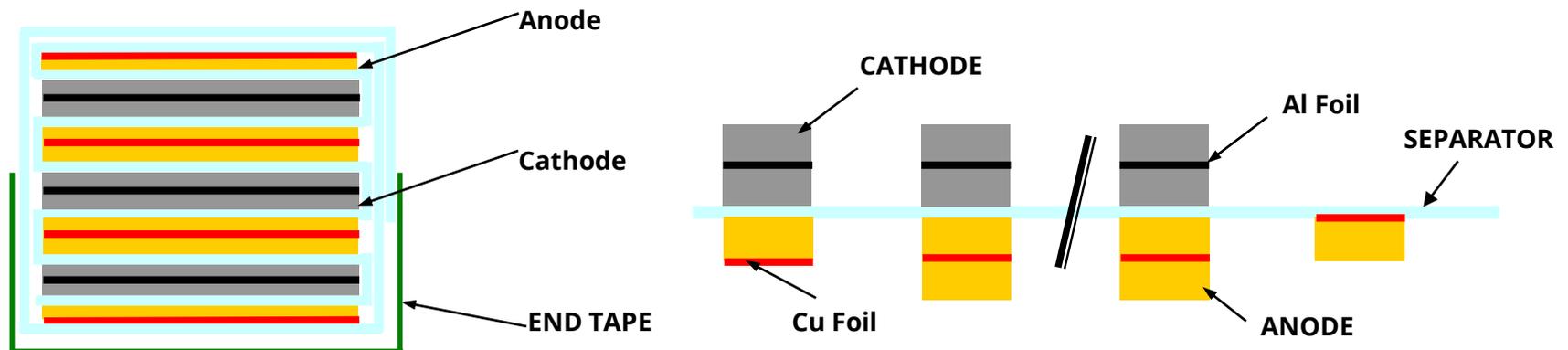
1. Z-Folding Technology

Routejade has been using Z-folding technology for SLPB_L series (Superior Lithium Polymer Battery) to make battery with **low internal resistance** and **high charge / discharge energy efficiency**.



<Cross-section profile of the bi-cell>

Reduce the **“Internal resistance”** and Increase **“Efficiency”** **“power”** and **“Cycle life”**



Schematic structure of Z-Folding

Production capacity

Li-ion Battery	Soft (Pouch)	FLPB 1 st	T : < 5.0 (mm) W : < 27 (mm) L : < 40 (mm) (< 200mAh)	200K/M (Full Auto)	Smart Watch Activity Tracker Medical Device Wearable Device Payment device IOT Device
		FLPB 2 nd	T : < 10.0 (mm) W : < 40 (mm) L : < 60 (mm) (< 1,300mAh))	250K/M (Full Auto)	
		FLPB 3 rd	2.5 < T < 4.0 (mm) W : < 20 (mm) L : < 30 (mm) (< 400mAh))	200K/M (Full Auto)	
	Hard (SUS)	PD (Power Disc)	∅ : 20~35 (mm) T : 3.0~5.5 (mm) (~ 600mAh)	300K/M (Full Auto)	
Li-Polymer Battery	Soft (Pouch)	SLPB (Total 5 lines) High C-rate	T: 2.4~11.5 (mm) W: 29~106 (mm) L: 10~140 (mm) (~ 10Ah)	50K/M (Semi Auto)	RC product Power tool Medical device

Production capacity

PowerDisk™ (Coin type)

Model	Typ. Capacity (mAh)	Charging Voltage(V)	Dimensions (mm)	
			Diameter	Thickness
PD2032C1	85	4.2	20.1	3.50
PD2048	120	4.2	20.1	5.00
PD2430C1	110	4.2	24.5	3.15
PD2440	150	4.2	24.5	4.30
PD2450	200	4.2	24.5	5.40
PD3032	200	4.2	30.0	3.40
PD3048	300	4.2	30.0	4.90
PD3555	500	4.2	35.0	5.70

Production capacity

FLPB™ (Pouch type)

Model	Typ. Capacity (mAh)	Charging Voltage(V)	Dimensions (mm)		
			Thickness	Width	Length
FLPB301220	48	4.2	3.0	12	20
FLPB381220	68	4.2	3.8	12	20
FLPB501220	85	4.2	5.0	12	20
FLPB221723	70	4.35	2.2	17.5	23
FLPB301031	76	4.35	3.0	10.5	31
FLPB251630	100	4.35	2.5	16	30.5
FLPB352030	200	4.35	3.5	20	29.4
FLPB342735	325	4.2	3.4	27	35
FLPB551831	300	4.2	5.5	18.6	31
FLPB573452	1,230	4.2	5.5	34	50.4
FLPB463535R (Round pouch)	460	4.2	4.6	35	35
FLPB493535R (Round pouch)	500	4.35	4.9	35	35

Production capacity

ASDB™ (Asymmetric Design Battery)

1. Under mass production

Model	Capacity (mAh)	Charging Voltage(V)	Dimensions (mm)			Remark
			Thickness	Width	Length	
ASDB331426	76	4.35	3.25	14.2	25	
ASDB371828	160	4.35	3.70	18	28	
ASDB402334	270	4.35	4.00	23	34	
ASDB542437	450	4.35	5.40	24	37	
ASDB343415	94	4.35	3.40	35	15	

2. Up to customers request

Model	Capacity (mAh)	Charging Voltage(V)	Dimensions (mm)		
			Thickness	Width	Length
D-shape					
Trapezium					
L-shape					
Mulstage Shape					
T-shape					
Doughnut shape					

Up to customers request

Production capacity

SLPB™ (Pouch type)

* All SLPB models have charging voltage 4.2

Type	Model	Capacity (Ah)	Dimensions (mm)			Max Discharge Rate (C)	
			Thickness	Width	Length	Continuous	Pulse
34 Series	SLPB483459H3	0.74	4.8	34	59	15	30
	SLPB593459H3	0.91	6.0	34	59	15	30
38 Series	SLPB723870H4	1.5	7.6	38.5	70.5	20	40
43 Series	SLPB834374H	2	8.5	43	74	15	30
	SLPB8043128H	3.2	7.8	43	128	20	40
	SLPB11543140H5	5	11.6	43.5	142.5	30	50
64 Series	SLPB356495	2.1	3.7	64.5	95.5	2	3
	SLPB526495	3.3	5.4	64.5	95.5	2	3
	SLPB776495	5.3	7.8	64.5	95.5	2	3
106 Series	SLPB68106100	8	7.2	106	102	2	3
	SLPB75106100	7.5	7.9	106	102	5	8
	SLPB98106100	10	10	106	102	2	3

Production capacity

Cell line up



Power Disc

Coin Type
Lithium ion Battery



FLPB

Flexible
Lithium Polymer Battery



ASDB

Asymmetric design
Lithium polymer Battery



SLPB

Superior
Lithium Polymer Battery

Our Technology Trend

*. Round pouch cell

Currently, smart watch trend is round shape like the design of normal watch. But, most of smart watch manufacturers have applied the square pouch cell because there is no supply of round pouch cell, so far.

To lead the trend of round smart watch, Routejade has launched the round pouch cell which is perfectly circle shape including PCM. We can support customers to utilize the maximum space of the device.

Round Shape Products
for Smart Watch
Head Phone.. Etc.



Round battery optimized for round shape smart devices



Routejade for your life

1. Fitness - We motivate you to keep in shape



FLPB381659B



Specification

- 360mAh / 4.2V
- Dimension(mm)
3.8(T) x 16.0(W) x 59.0(L)

FLPB251630



Specification

- 100mAh / 4.35V
- Dimension(mm)
2.5(T) x 16.0(W) x 30.0(L)

Round pouch(FLPB493535R)

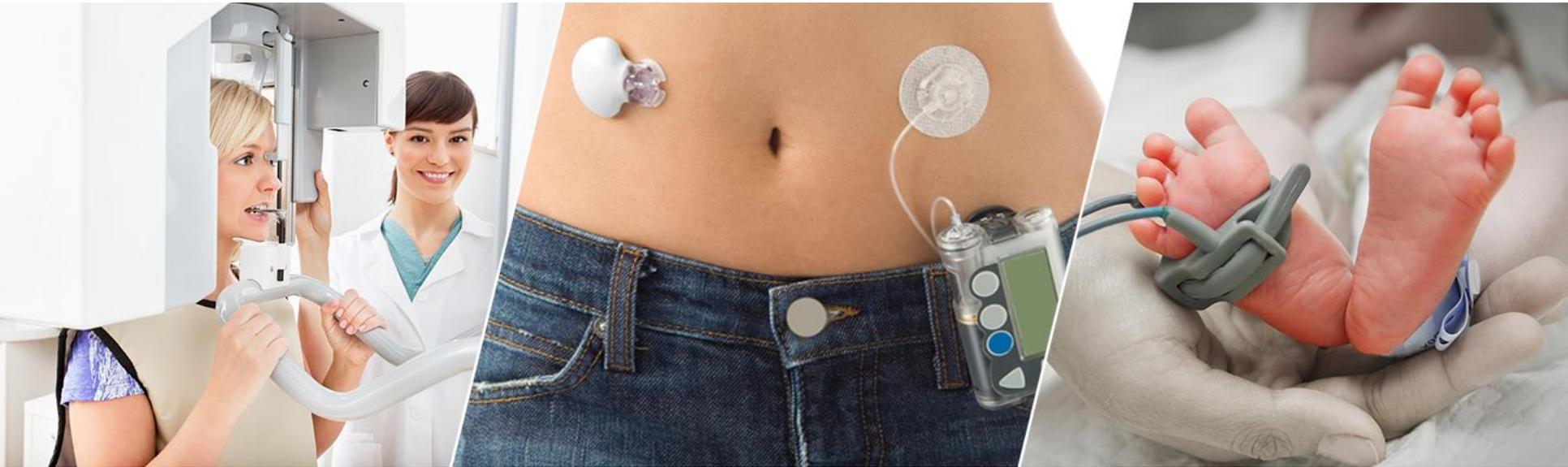


Specification

- 500mAh / 4.35V
- Dimension(mm)
4.9(T) x 35 (Diameter)

Routejade for your life

2. Health Care - We care about your health even you don't



SLPB593459H3



Specification

- 910mAh / 4.2V
- Dimension(mm)
6.0(T) x 34.0(W) x 59.0(L)

D-Shape(ASDB343415)



Specification

- 94mAh / 4.35V
- Dimension(mm)
3.4(T) x 35(W) x 15(L)

PD2032C1



Specification

- 85mAh / 4.2V
- Dimension(mm)
3.7(T) x 20(Diameter)

Routejade for your life

3. Infotainment - We enrich your life



FLPB104045



Specification

- 140mAh / 4.35V
- Dimension(mm)
1.0(T) x 40.0(W) x 45.0(L)

Doughnut(ASDB753843)



Specification

- 850mAh / 4.35V
- Dimension(mm)
7.5(T) x 38.6(W) x 43.2(L)

PD3048



Specification

- 300mAh / 4.2V
- Dimension(mm)
30(Diameter) x 4.9(T)

Routejade for your life

4. Military - We support strategic operation We're in ahead to protect you



FLPB301220



Specification

- 48mAh / 4.2V
- Dimension(mm)
3.0(T) x 12.0(W) x 20.0(L)

FLPB342735



Specification

- 325mAh / 4.2V
- Dimension(mm)
3.4(T) x 27.1(W) x 35.0(L)

FLPB352030



Specification

- 200mAh / 4.35V
- Dimension(mm)
3.4(T) x 20.2(W) x 30.6(L)

Routejade for your life

5. Security - We're keep awaken for your security



Trapezoid(ASDB452727)



Specification

- 280mAh / 4.2V
- Dimension(mm)
4.5(T) x 27.0(W) x 27.0(L)

FLPB104045



Specification

- 140mAh / 4.35V
- Dimension(mm)
1.0(T) x 40.0(W) x 45.0(L)

PD2430C1

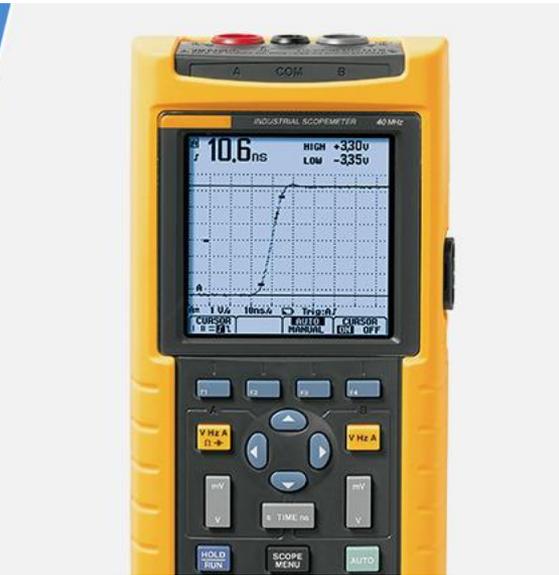


Specification

- 110mAh / 4.2V
- Dimension(mm)
3.3(T) x 24.5(Diameter)

Routejade for your life

6. Industrial - We promote your cordless work space



SLPB11543140H5



Specification

- 5,000mAh / 4.2V
- Dimension(mm)
11.7(T) x 43.5 W) x 142.5(L)

Round-Pouch(FLPB493535R)



Specification

- 500mAh / 4.35V
- Dimension(mm)
4.9(T) x 35(Diameter)

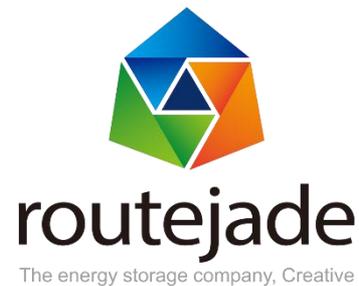
PD3555



Specification

- 500mAh / 4.2V
- Dimension(mm)
5.70(T) x 35(Diameter)

“Power of your life – Routejade”



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