

[www.kokam.com](http://www.kokam.com)

**Kokam**<sup>TM</sup>

The Application of Innovation



## Kokam Co., Ltd.

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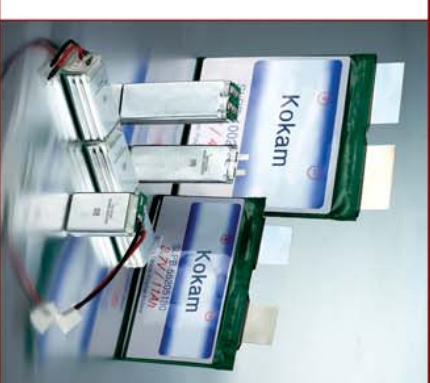
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## Superior Lithium Polymer Battery

Lithium Polymer Rechargeable Batteries



Kokam Co., Ltd.  
[www.kokam.com](http://www.kokam.com)

# Company profile

## A global leader in power solutions!

Kokam Co., Ltd. was established in 1989, processing machines such as the polyester film manufacturing system, polarized film production system and breathable (porous) film casting system. Kokam Co., Ltd. boasts of the best production line for polarized film with perfect quality and yield. Backed by its experience and know-how, Kokam Co., Ltd. has developed new technologies and manufactured processing equipment for the special film industry. LCD-polarized film industry and Li-polymer battery industry. Kokam Co., Ltd. makes high-quality and reliable rechargeable lithium battery and processing equipment and develops new advanced technologies. Kokam Co., Ltd. is a rapidly growing, high-technology firm that designs, manufactures and distributes rechargeable batteries incorporating next-generation technology (lithium-ion/polymer), targeting industrial total power solutions. Kokam Co., Ltd. possesses its own unique, proprietary technology with proven marketability over objective and perceived competition. Substantial opportunities to tap the market of wireless device manufacturers and distributors who seek better lithium-ion batteries than those readily available on the market abound.

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## Battery division

Lithium polymer battery "SLPB": Superior lithium polymer battery

- Small and medium-sized capacity battery (20mAh~480mAh)
  - ▶ RC (radio control) airplane, RC car, RC boat
  - ▶ DMB, telematics, PMP, GPS, cellular phone, digital camera, digital camcorder, etc.
- ▶ Military, industrial application and all kinds of wireless solutions
- ▶ Power tools, motorized devices, etc.
- Large-capacity battery (5Ah~240Ah)
  - ▶ Electric vehicle: Pure EV, hybrid EV, neighborhood EV, solar car, etc.
  - ▶ Utility : UPS, electric bicycle, electric wheel chair, electric boat
  - ▶ Others : Submarine, unmanned air vehicle, medical and military use, robotics, wireless facilities

## Engineering division

- ▶ Technical license and machinery building as turnkey base
  - Lithium polymer battery
- ▶ Engineering license and machinery building as turnkey base
  - TFT LCD Polarized film (TN/STN/FTT)
  - Polyester (PET) film
  - Breathable film
  - Plastic recycling program
- ▶ Import and export: machinery and materials
- ▶ Battery pack production and technical support





# Radio control innovation

## The revolution of rechargeable batteries for radio control

### The amazing world of radio control batteries

#### The pioneer of the radio control market

There are many people who enjoy radio control as their hobby. For the past several years now, Kokam has gained extensive experience and developed a solid reputation in the radio control market. We have invested considerable time developing our technology and researching on our customers' needs. Thanks to such efforts, Kokam has developed several amazing batteries for the radio control market, thus giving rise to a new radio control mania. We are set to develop a new-concept radio control. As we have invested in improving the quality and technology for the battery, so are we doing our utmost to develop next-generation radio control batteries. We promise to come up with products and advanced technology that guarantee total customer satisfaction. Kokam is your best partner, a pioneer in the radio control market.

## Features of the superior lithium polymer battery

### 1) High technology and outstanding performance

- ▶ High energy density - Max. of 200 wh/kg
- ▶ High C rate capability - Cont. 20C / Peak 40C
- ▶ Wide operating temperature - -20°C ~ 60°C
- ▶ Low internal impedance - Excellent power, lower heat emission
- ▶ Environment-friendly - No heavy metal used
- ▶ Zero memory effect - Longer life cycle, easy operation
- ▶ Minimal self-discharge

### 2) Ultra high safety

- ▶ Most models certified by UL
- ▶ Unique structure of cell that facilitates heat emission inside
- ▶ Accumulated formulation technology

### 3) Low cost

- ▶ Original patent
- ▶ Low material cost
- ▶ Simple process
- ▶ High yield rate
- ▶ Home-made machines

## Application

Radio control, electric toy, etc.



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## Superior lithium polymer large cell

**Offers total power solution for large-capacity application, with its unique combination of lightness, high energy, and temperature endurance**

Finally, here is a reliable battery solution that can respond to the rapidly growing demand for environment-friendly, high-energy and lightweight battery that can be utilized in a wide variety of applications such as electric vehicles (NEV, PEV, HEV), uninterruptible power system (UPS), unmanned air vehicle (UAV), underwater autonomous vehicles, etc.

Kokam has developed SLPB (superior lithium polymer battery), which has ultra-high capacity of up to 200 Ah using the state-of-the-art technology of our own patented assembly system and in-house production facilities.



## SLPB features

- ▶ Low energy consumption - Lightweight
- ▶ High power density - 1300W/kg
- ▶ Fast charge capability - Max. of 3C
- ▶ High discharge rate - Max. of 10C
- ▶ Longer life cycle - 1200 cycles at DOD 80%
- ▶ Wider operating temperature - -30°C ~ 60°C
- ▶ Environment-friendly - Zero emission
- ▶ Maintenance-free operation
- ▶ Higher safety - Low heat in discharging

## Applications

### ELECTRIC VEHICLE

- ▶ Pure EV
- ▶ Hybrid EV
- ▶ Neighborhood EV
- ▶ Solar car

### UTILITY

- ▶ UPS
- ▶ Electric bicycle
- ▶ Electric wheel chair
- ▶ Electric boat

### OTHERS

- ▶ Submarine
- ▶ Unmanned air vehicle
- ▶ Medical and military use
- ▶ Robotics
- ▶ Wireless facilities



# Product Ordering Information

<b>0350</b>	<b>20</b>	-	<b>0101</b>	<b>A</b>	<b>BB</b>
CAPACITY	C RATE		CONFIGURATION	ASSEMBLY	CONNECTOR
Category A			Category B		

## Remark

1. To place an order, refer to the digits above.
2. For details, check the table below.
3. For the assembly method, refer to the "Cell/Pack assembly code"
4. For the connector, check the "Connector Code"

CATEGORY A		CATEGORY B		
Capacity	C-Rate(cont.)	Configuration	Assembly Code	Connector Code
0048 → 48mA	02 → 2C	0303 → 3S3P	C	DD
0350 → 350mA	20 → 20C	1003 → 10S3P	G	AD
100K → 100,000mA	5 → 5C	0101 → 1S1P	*	*
:	:	:	:	:
:	:	:	:	:

\* Contact to customer service team for assembly & connector of large cell.

## Battery and battery packs

The part numbers of each bare cell are shown in the product lists.

Other technical specification can be defined based on the pack configuration, assembly codes and connector codes as full part numbers.

1. Select the preferred battery models in the product lists for each category of batteries(pages 9, 10).
2. Indicate the information on battery capacity(mAh or Ah), max. continuous discharge rate (8C, 15C, 20C, etc.) based on the list on the front part of full part numbers.
3. Indicate the configuration of the battery pack, series and parallel with two digits as shown above.
4. Indicate the assembly specification of the required product with one letter among the assembly codes.
5. Two different connectors can be marked with two letters for charging and discharging among the connector codes.

When using one connector for charging and discharging, mark the same letter twice.

## Charger

1. Select the appropriate charger models for the battery pack in the charger collection (page 19).

## PCM(Protection Circuit Module)

1. Check the battery pack configuration required for PCM.
2. Check the standard and max. current drain of the device to be installed together with the battery pack.
3. Check the max. allowable dimension for mounting PCM on the device or preferred cell.
4. Select the appropriate part number of PCM in the PCM table(page 20) based on the information above.

In case the appropriate PCM cannot be found in the list contact Kokam.

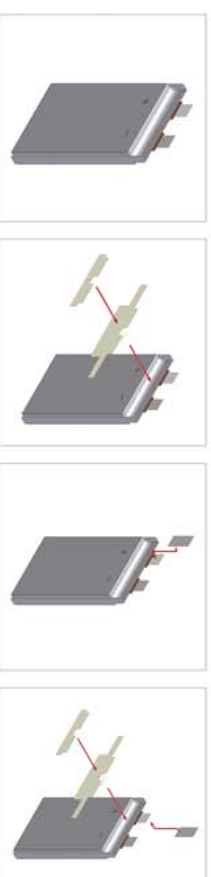
## BMS

1. See the BMS function and applicable range at page 20. The specification shall be decided through technical discussions with Kokam.

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## Cell / Pack Assembly Code

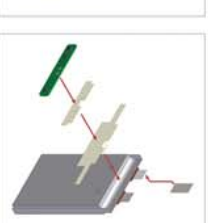
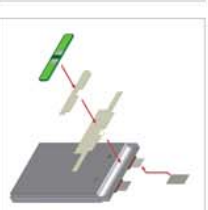


Bare Cell (A)

Cell + IN (B)

Cell+TW (Front) (C)

Cell+IN + TW (D)

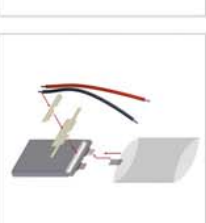
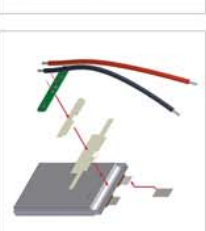
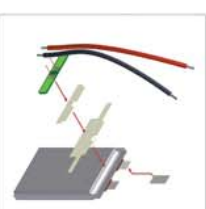


Cell+TW (Rear) (E)

Cell + Tab - Cut (F)

Cell + IN + TW + PCB (G)

Cell + IN + TW + PCM (H)

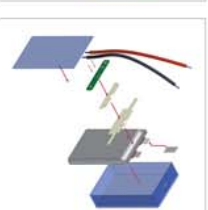
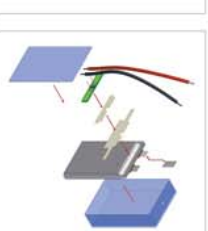
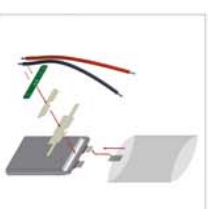


Cell + IN + TW + PCB + Wire (I)

Cell + IN + TW + PCM + Wire (J)

Cell + IN + TW + PCB + Wire + Tube (K)

Cell + IN + TW + NO PCB + Wire + Tube (L)



Cell + IN + TW + PCM + Wire + Tube (M)

Cell + IN + TW + PCB + Wire + Plastic Case (N)

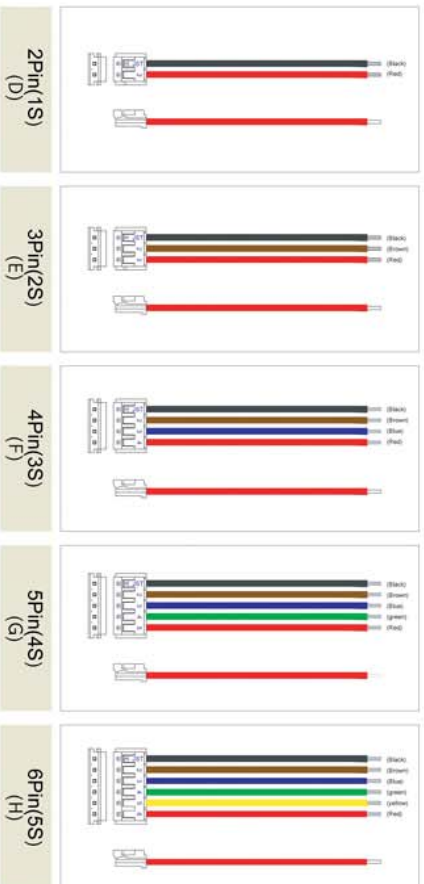
Cell + IN + TW + PCM + Wire + Plastic Case (O)

1. IN : Insulator
2. TW : Tab Welding
3. PCB : Printed Circuit Board
4. PCM : Protection Circuit Module
5. Tube : Shrink Wrapping



# Product Ordering Information

## Connector code



Above information is just for easy understanding of part number structure with basic conceptual drawings. Availability and/or components in assembly codes and connector codes can be changed without prior notice to customer by Kokam. All detail specifications shall be decided with the basic part number through technical discussions with Kokam.



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## Products List

### Small & Medium Capacity

#### 1. High power cell

PART #	Model	Dimension(mm)			Weight (g)	Capacity (mAh)	Max. Discharge Rate (C)	
		Thickness	Width	Height			Continuous	Pulse
035020-0101A	SLPB 283452H	2.7 ± 0.2	33.5 ± 0.5	52.0 ± 0.5	10.0 ± 0.5	350	20	40
074020-0101A	SLPB 533459H4	5.0 ± 0.2	33.5 ± 0.5	58.5 ± 0.5	19.5 ± 0.5	740	20	40
150020-0101A	SLPB 723870H4*	7.2 ± 0.2	37.5 ± 0.5	70.0 ± 0.5	37.0 ± 1.5	1,500	20	40
200020-0101A	SLPB 486495P	5.0 ± 0.2	64.0 ± 0.5	98.0 ± 0.5	66.0 ± 1.8	2,000	20	40
320020-0101A	SLPB 8043128H	7.6 ± 0.2	42.5 ± 0.5	127.5 ± 0.5	84.0 ± 2.5	3,200	20	40
480020-0101A	SLPB 11043140H4*	11.0 ± 0.2	42.5 ± 0.5	140.0 ± 0.5	115.0 ± 4.0	4,800	20	40
062015-0101A	SLPB 393459H3	4.2 ± 0.2	33.5 ± 0.5	58.5 ± 0.5	16.0 ± 0.5	620	15	30
074015-0101A	SLPB 483459H3	4.6 ± 0.2	33.5 ± 0.5	58.5 ± 0.5	18.0 ± 0.5	740	15	30
091015-0101A	SLPB 593459H3	5.8 ± 0.2	33.5 ± 0.5	58.5 ± 0.5	22.0 ± 0.5	910	15	30
125015-0101A	SLPB 554374H	5.4 ± 0.2	42.5 ± 0.5	73.5 ± 0.5	32.0 ± 1.0	1,250	15	30
200015-0101A	SLPB 834374H	8.3 ± 0.2	42.5 ± 0.5	73.5 ± 0.5	49.0 ± 1.5	2,000	15	30
014508-0101A	SLB 452128	4.5 ± 0.3	20.5 ± 0.5	27.5 ± 0.5	3.7 ± 0.2	145	8	16
032008-0101A	SLB 602335H	6.0 ± 0.2	22.5 ± 0.5	34.5 ± 0.5	7.0 ± 0.2	320	8	16
150008-0101A	SLB 603870H	6.5 ± 0.2	37.5 ± 0.5	69.5 ± 0.5	32.0 ± 1.0	1,500	8	16
200008-0101A	SLPB 396495H	3.8 ± 0.2	64.0 ± 0.5	95.0 ± 0.5	45.0 ± 1.3	2,000	8	16
070007-0101A	SLPB 393459H	4.0 ± 0.2	33.5 ± 0.5	58.5 ± 0.5	15.5 ± 0.5	700	7	14

[ Remark ] \*New models

#### 2. High energy density cell

PART #	Model	Dimension(mm)			Weight (g)	Capacity (mAh)	Max. Discharge Rate (C)	
		Thickness	Width	Height			Continuous	Pulse
002002-0101A	SLB 455018	4.50 ± 1.0	8.00 ± 2.0	25.0 ± 1.0	Max.1.0	20	2	5
004002-0101A	SLPB 104330	0.80 ± 0.2	43.0 ± 1.0	30.0 ± 1.0	Max.2.0	48	2	5
056002-0101A	SLPB 353452	3.50 ± 0.2	33.5 ± 0.5	52.0 ± 0.5	12.0 ± 1.0	560	2	5
064002-0101A	SLPB 393452	3.95 ± 0.2	33.5 ± 0.5	52.0 ± 0.5	13.5 ± 1.0	640	2	5
064002-0101A	SLPB 353459	3.50 ± 0.2	33.5 ± 0.5	58.5 ± 0.5	13.0 ± 1.0	645	2	5
072002-0101A	SLPB 433452	4.35 ± 0.2	33.5 ± 0.5	52.0 ± 0.5	15.0 ± 1.0	720	2	5
074002-0101A	SLPB 393459	3.95 ± 0.2	33.5 ± 0.5	58.5 ± 0.5	15.0 ± 2.0	740	2	5
080002-0101A	SLPB 523452	4.80 ± 0.2	33.5 ± 0.5	52.0 ± 0.5	16.5 ± 2.0	800	2	5
083502-0101A	SLPB 433459	4.35 ± 0.2	33.5 ± 0.5	58.5 ± 0.5	16.5 ± 2.0	835	2	5
093002-0101A	SLPB 483459	4.80 ± 0.2	33.5 ± 0.5	58.5 ± 0.5	18.0 ± 2.0	930	2	5
102002-0101A	SLPB 523462	5.25 ± 0.2	37.5 ± 0.5	62.0 ± 0.5	20.0 ± 2.0	1,020	2	5
110002-0101A	SLB573652	5.80 ± 0.2	37.5 ± 0.5	62.0 ± 0.5	21.0 ± 2.0	1,100	2	5
210002-0101A	SLPB 356495	3.50 ± 0.2	64.0 ± 0.5	95.0 ± 0.5	43.0 ± 2.0	2,100	2	5
240002-0101A	SLPB 396495	3.95 ± 0.2	64.0 ± 0.5	95.0 ± 0.5	48.5 ± 2.0	2,400	2	5
270002-0101A	SLPB 456495	4.35 ± 0.2	64.0 ± 0.5	95.0 ± 0.5	54.5 ± 2.0	2,700	2	5
300002-0101A	SLPB 486495	4.80 ± 0.2	64.0 ± 0.5	95.0 ± 0.5	60.5 ± 2.0	3,000	2	5
330002-0101A	SLPB 526495	5.40 ± 0.2	64.0 ± 0.5	95.0 ± 0.5	66.0 ± 2.0	3,300	2	5

\* Cells made by order

# Products list

## Large capacity

### 1. High energy density cell

Part #	Model	Capacity (Ah)	Dimension (mm)			Weight (g)	Max. Discharge Rate (C)		Energy Density (Wh / Kg)
			Thickness	Width	Height		Continuous	Pulse	
500001-0101A	SLPB 50106100	5	5.0 ± 0.2	106 ± 2.0	100 ± 2.0	115 ± 5.0	1	5	177
800001-0101A	SLPB 75106100	8	7.5 ± 0.3	106 ± 2.0	100 ± 2.0	155 ± 5.0	1	5	190
800001-0101A	SLPB 68106100	8	6.8 ± 0.3	106 ± 2.0	100 ± 2.0	150 ± 5.0	1	2	196
016K01-0101A	SLPB 75106205	16	7.5 ± 0.3	106 ± 2.0	205 ± 2.0	330 ± 10	1	2	180
025K01-0101A	SLPB 60216216	25	6.5 ± 0.3	215 ± 2.0	220 ± 2.0	620 ± 20	1	5	155
030K01-0101A	SLPB 68216216	30	6.8 ± 0.3	215 ± 2.0	220 ± 2.0	700 ± 20	1	5	156
040K01-0101A	SLPB 90216216	40	9.0 ± 0.5	215 ± 2.0	220 ± 2.0	935 ± 30	1	5	163
070K01-0101A	SLPB 53460330	70	5.3 ± 0.3	455 ± 2.0	325 ± 2.0	1700 ± 50	1	5	160
100K01-0101A	SLPB 70460330	100	7.2 ± 0.3	455 ± 2.0	325 ± 2.0	2320 ± 70	1	3	163
200K01-0101A	SLPB 140460330	200	14.0 ± 0.5	485 ± 2.0	340 ± 2.0	4400 ± 130	1	2	168

### 2. High power cell

Part #	Model	Capacity (Ah)	Dimension (mm)			Weight (g)	Max. Discharge Rate (C)		Energy Density (Wh / Kg)
			Thickness	Width	Height		Continuous	Pulse	
500005-0101A	SLPB 30205130H	5	3.1 ± 0.3	206 ± 2.0	130 ± 2.0	164 ± 6.0	5	10	113
750005-0101A	SLPB 41205130H	7.5	4.2 ± 0.3	206 ± 2.0	130 ± 2.0	226 ± 9.0	5	10	123
011K05-0101A	SLPB 55205130H	11	5.6 ± 0.3	206 ± 2.0	130 ± 2.0	292 ± 12	5	10	139
031K05-0101A	SLPB 78216216H	31	8.4 ± 0.5	215 ± 2.0	220 ± 2.0	860 ± 40	5	10	133
040K05-0101A	SLPB 100216216H	40	10.7 ± 0.5	215 ± 2.0	220 ± 2.0	1100 ± 40	5	10	135
070K05-0101A	SLPB 60460330H	70	5.8 ± 0.3	455 ± 2.0	325 ± 2.0	1950 ± 80	5	10	133
100K05-0101A	SLPB 80460330H	100	8.1 ± 0.3	455 ± 2.0	325 ± 2.0	2700 ± 100	5	8	137
200K02-0101A	SLPB 160460330H	200	17.0 ± 0.5	485 ± 2.0	340 ± 2.0	5260 ± 260	2	4	141

### 3. Ultra high power cell

Part #	Model	Capacity (Ah)	Dimension (mm)			Weight (g)	Max. Discharge Rate (C)		Peak Power Density (W / Kg)
			Thickness	Width	Height		Continuous	Pulse	
720005-0101A	SLPB 45205130P	7.2	4.5 ± 0.5	206 ± 2.0	130 ± 2.0	226 ± 10	5	20	2600
012K05-0101A	SLPB 70205130P	12	7.0 ± 0.5	206 ± 2.0	130 ± 2.0	354 ± 15	5	20	1850

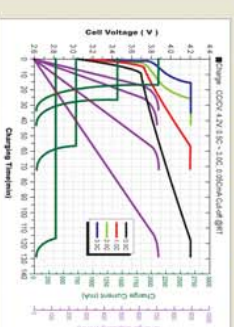
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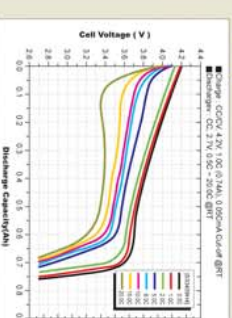
## Performance Data(Small & Medium Capacity)

### High Power Cell

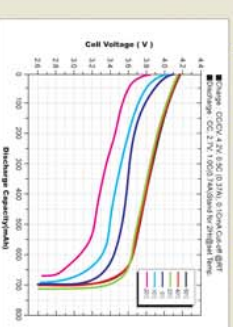
Charge Characteristics SLPB53459H4



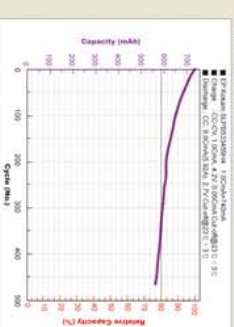
Discharge characteristics SLPB53459H4



Temperature characteristics SLPB53459H4

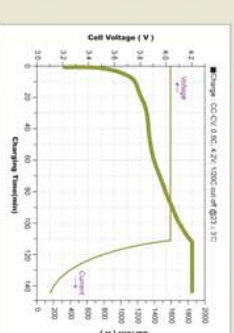


Cycle Life @DD0100%

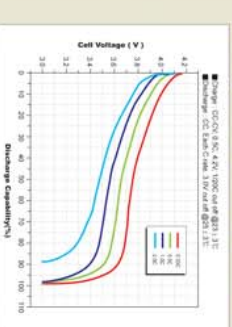


### High Energy Density Cell

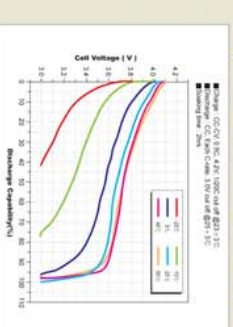
Charge Characteristics SLPB526495



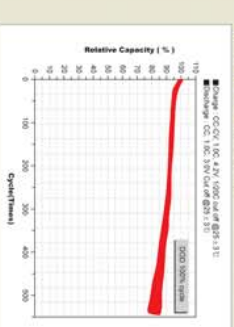
Discharge characteristics SLPB526495



Temperature characteristics SLPB526495



Cycle Life @DD0100%





## Safety Data(Small & Medium Capacity)

### Overcharge Test

#### 1. Condition

1) Cell : Full Charged State    2) Overcharge Condition : CC-CV, 1.0C, 12V&18V

#### 2. Result

Manufacturer	Company A	Company B	Company C	Kokam		Remarks
Condition	12V (0.85A)	12V (2.5A)	12V (2.1A)	12V (0.74A)	18V (0.74A)	
Result	Fire & Explosion	Fire & Explosion	Fire & Explosion	Pass		
Start voltage (V)	4.187	4.188	4.177	4.164	4.164	Before current applying
Max. Temp (V)	101.3	107.9	100.2	91.3	103.4	Immediately before fire
Charging time (min)	55	58	51	62	59	Till max temp
Voltage (V)	11.944	11.942	12.129	12.057	18.066	@ max temp

### Heating Test

#### 1. Heating Conditions

1) Cell : Full Charged State

2) Test Condition : Raise at a rate of  $5 \pm 2^\circ\text{C}/\text{min}$ , until  $150^\circ\text{C} \pm 2^\circ\text{C}$     Stand for 30 minutes  $150^\circ\text{C} \pm 2^\circ\text{C}$

#### 2. Result

Manufacturer	Company A	Company B	Company C	Kokam		Remarks
Total	5	5	5	5	5	
Test Cell (EA)						
Pass	-	-	2	5		
Fail	5	5	3	-		
Result	Fire & Explosion	Fire & Explosion	Fire & Explosion	Pass		
OCV	4.150	4.151	4.185	4.164		
Fire Point Time(min)	12	37	21	-		Stand for 30minutes $150^\circ\text{C} \pm 2^\circ\text{C}$
Ambient Max Temp(°C)	-	140.4	147.8	-		Immediately before fire
Cell Max Temp(°C)	-	159.3	168.6	-		Immediately before fire

### Nail Penetration Test

#### 1. Penetration Conditions

1) Cell : Full Charged State    2) Test Condition : Nail Diameter  $\phi$  3mm / Nail Stroke Distance 45mm

3) Nail Speed : 1.0m/min

#### 2. Result

Manufacturer	Company A	Company B	Company C	Kokam		Remarks
Total	3	3	3	3	3	
Test Cell (EA)						
Pass	-	3	3	3		
Fail	3	-	-	-		
Result	Fire / Explosion	Pass	Fire / Explosion	Pass		
OCV	4.145	4.156	4.172	4.174		

## Comparison of NiCd, NiMH with Kokam Battery

ITEM	Unit	Ni-cd		Ni-MH		Kokam	
		A	B	C	D	533459H4	8043128H
Cell							
	mAh	640	2200	760	3150	740	3200
	Voltage	1.2	1.2	1.2	1.2	3.7	3.7
	Wh / Kg	33	44	70	63	144	143
Energy							
	Ratio	1.0	1.3	2.1	1.9	4.3	4.3
Density							
	Wh / l	97	146	240	209	274	290
	Ratio	1.0	1.5	2.5	2.2	2.8	3.0
	10C / 0.5C	76%	11%	84%	34%	92%	95%
	Ratio	1.00	0.14	1.11	0.45	1.21	1.24
	15C / 0.5C	Fail	Fail	13%	Fail	92%	93%
Discharge							
	Ratio			1.0		7.3	7.4
	20C / 0.5C			Fail		90%	90%
	Ratio						
	3C / 0.5C	81%	88%	90%	94%	100%	100%
Recharge	Ratio	1.00	1.08	1.11	1.16	1.23	1.23

## Comparison of Other Lipo with Kokam Battery

MODEL	ITEM	Company A	Company B	Company C	Kokam	Remark
		503450	603496D	465690	SLPB33459H4	
DIMENSION @SSC100%						N = 10
	Thickness(mm)	5.40	6.90	4.70	5.00	
	Width(mm)	34.5	35.5	57.2	33.5	
	Length(mm)	50.5	96.0	90.5	58.7	
	Weight(g)	17.0	45.5	50.0	19.0	
RATED CAPACITY(mAh)		860	2,000	2,600	755	N = 5
	0.5C	880 / 100%	2,002 / 100%	2,725 / 100%	752 / 100%	
	2.0C	829 / 94.2%	1,875 / 93.6%	2,549 / 93.5%	730 / 97.1%	
	8.0C	788 / 89.5%	1,743 / 87.1%	2,431 / 89.2%	709 / 94.3%	
	12.0C	725 / 82.3%	1,608 / 80.3%	1,875 / 68.8%	703 / 93.5%	
	15.0C	15 / 1.7%	144 / 2.7%	61 / 2.2%	696 / 92.6%	
	20.0C	-	-	-	676 / 89.9%	
RATED CAPABILITY						
	0.5C	25.2 / 3.587	25.3 / 3.565	25.4 / 3.568	25.4 / 3.672	
	2.0C	35.1 / 3.396	32.7 / 3.402	35.6 / 3.390	29.3 / 3.426	
	8.0C	59.8 / 3.164	45.8 / 3.177	62.6 / 3.126	41.3 / 3.229	
	12.0C	72.6 / 3.026	67.6 / 3.066	74.7 / 2.919	46.9 / 3.245	
	15.0C	24.5 / 2.827	25.3 / 2.961	24.5 / 2.788	52.9 / 3.234	
	20.0C	-	-	-	59.9 / 3.135	

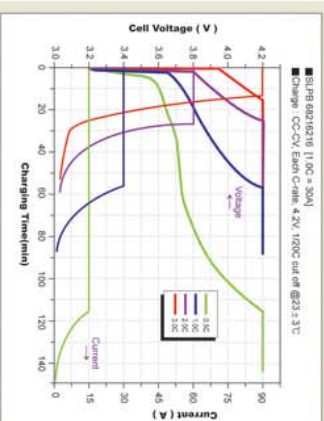
# Performance Data(Large cell)

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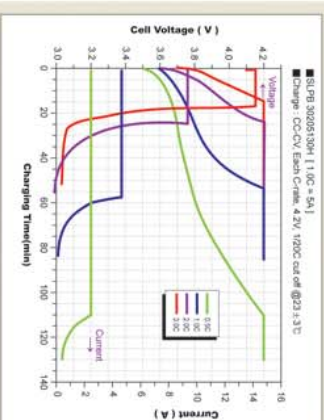
## High Energy Density Cell

### Charge Characteristics

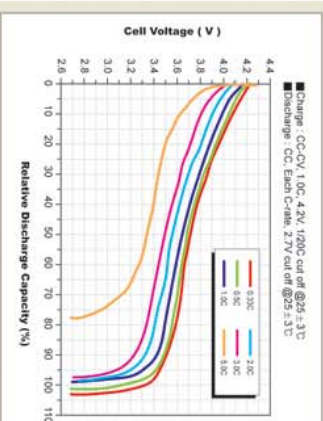


## High Power Cell

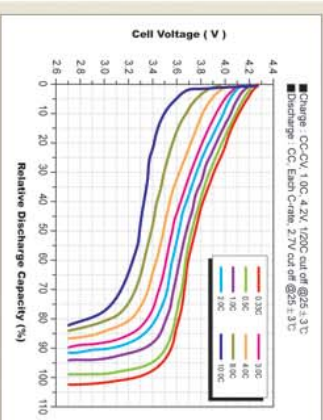
### Charge Characteristics



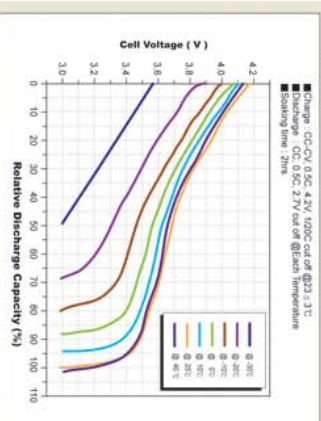
### Discharge Characteristics



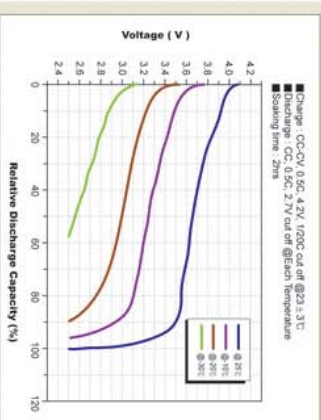
### Discharge Characteristics



### Temperature Characteristics

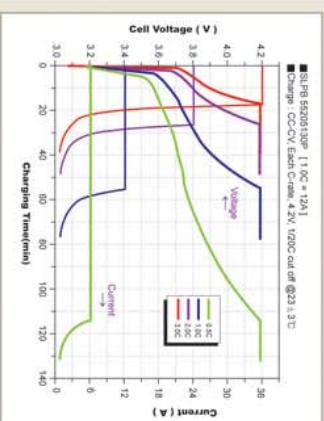


### Temperature Characteristics

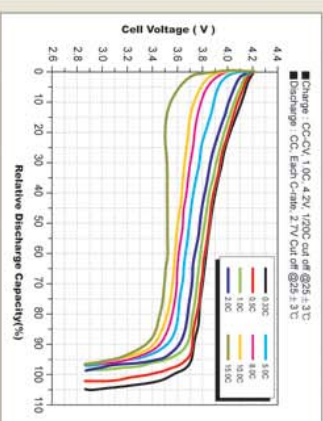


## Ultra High Power Cell

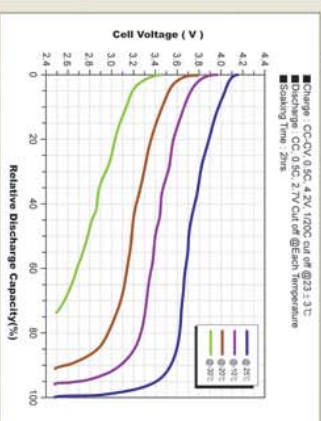
### Charge Characteristics



### Discharge Characteristics

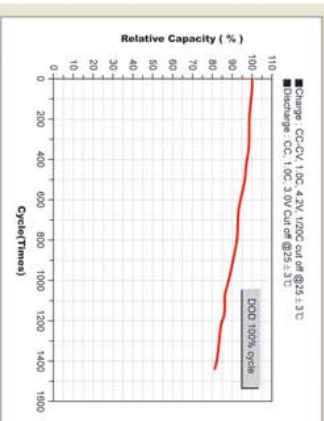


### Temperature Characteristics

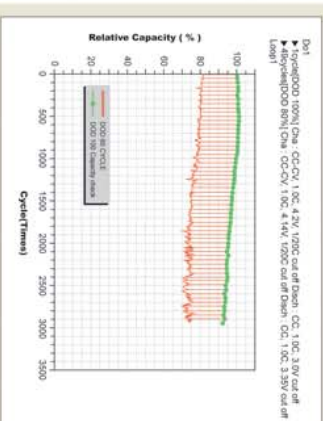


## Cycle Life

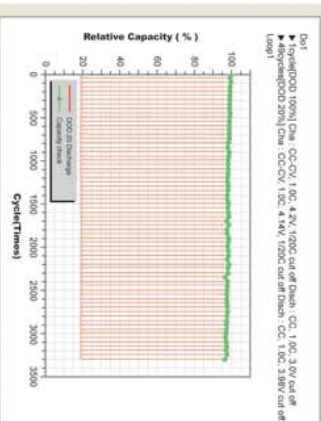
### @DOD 100%



### @DOD 80%



### @DOD 20%





## Safety Data(Large cell)

### Electrical Abuse

- Short circuit (60°C)
- Abuse Overcharge at 1C

### Mechanical Abuse

- Impact
- Drop Impact

### Thermal Abuse

- Heating

### Criteria

Level 3

Level 3

Level 3

### Results

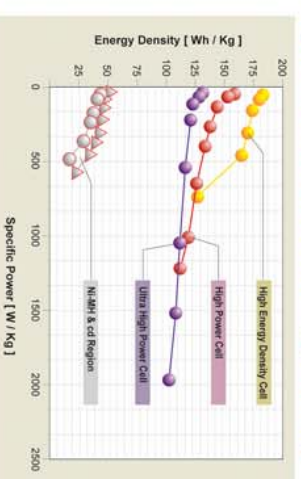
Level 1

Level 2

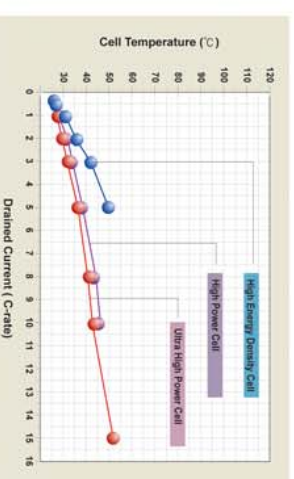
Level 2

Level	Level 0	Level 1	Level 2	Level 3	Level 4	Level 5
Criteria	Bulge	Leak	Smoke, < 180°C	Smoke, > 180°C	Fire	Explosion

## Specific Power vs. Energy Density



## Heat Generation with Drain Current Rate

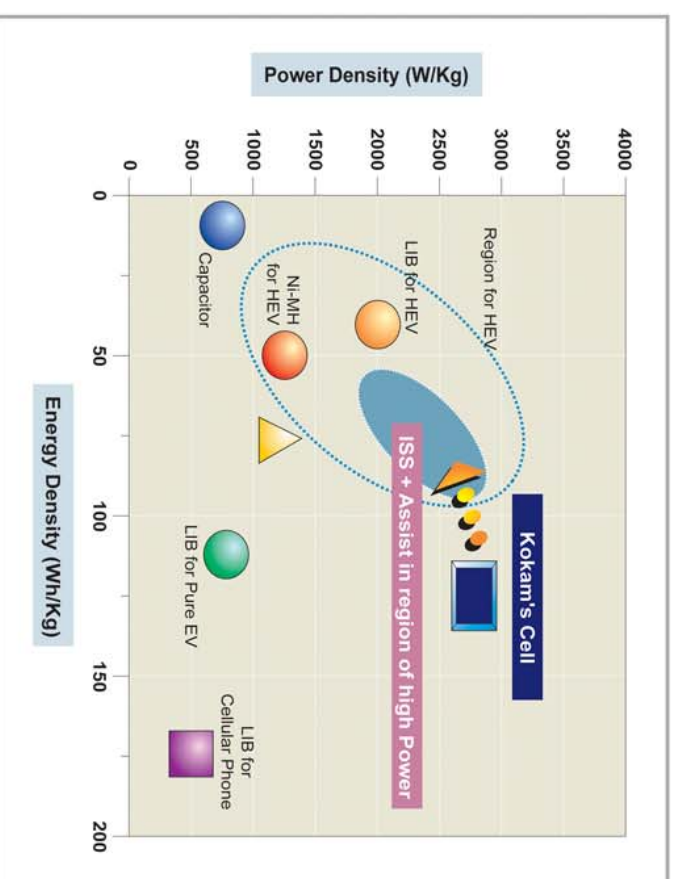


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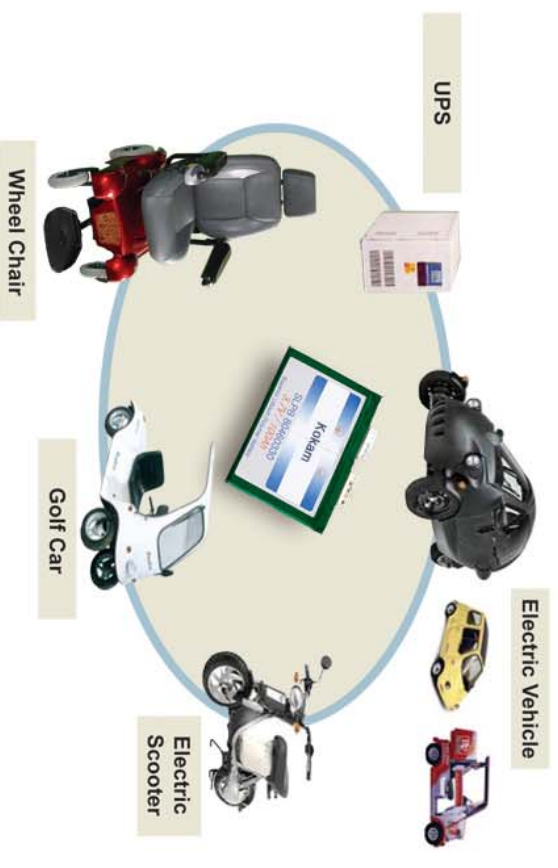
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## Comparison of LIB Performance for Power Use(Large cell)

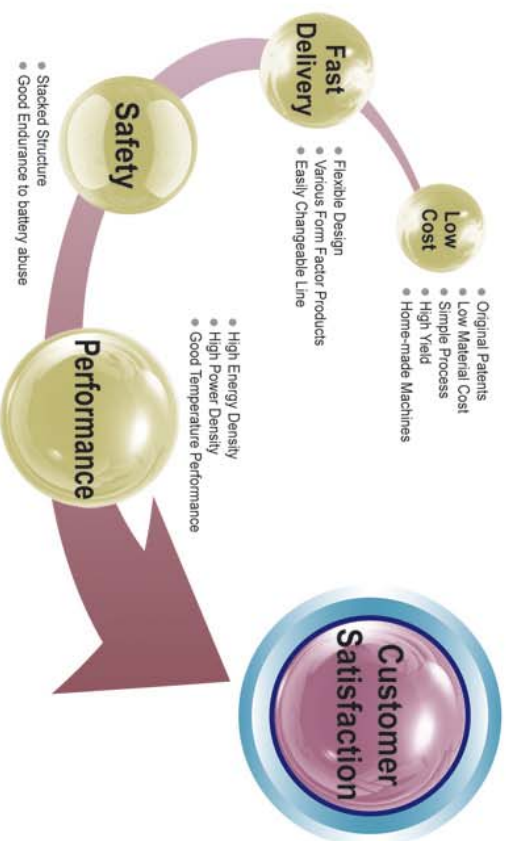
Item		Lithium - Ion Battery					Other Power Supply	
		Prismatic cell for Cellular Phone	Cell for Pure EV	Cylind. Cell HEV	Cell for Auto Bicycle	Kokam's Cell	Ni-MH for HEV of Prious	Capacitor
Energy Density	Wh / Kg	160	110	45	75	120	50	3
	Wh / l	360	240	100	170	240	150	4
Power Density	W / Kg	360	800	2000	1200	2900	1300	790
	W / l	760	1800	4300	2700	5900	2500	1220



# Large Cell Application Field



## Power of Superior Lithium Polymer Battery



## The Application of Innovation

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## Charger Collection



**Model : JJ Power**  
 Application : LiPo / Li-ion, NiCd / NiMH  
 Input voltage : DC 11-15V  
 Output voltage : 4.2V - 21V ( LiPo / Li-ion )  
 1.8V - 21.6V ( NiCd / NiMH )  
 Output current : 0.1 - 4.0 A  
 Charging method : CC/CV ( LiPo / Li-ion )  
 CC ( NiCd / NiMH )  
 Voltage selection : Auto / Manual



**Model : Lipo 502**  
 Application : LiPo / Li-ion, NiCd / NiMH  
 Input voltage : DC 11-15V  
 Output voltage : 4.2V - 21V ( LiPo / Li-ion )  
 1.8V - 21.6V ( NiCd / NiMH )  
 Output current : 0.1 - 2.5 A  
 Charging method : CC / CV ( LiPo / Li-ion )  
 CC ( NiCd / NiMH )  
 Voltage selection : Auto / Manual



**Model : Lipo 402**  
 Application : LiPo  
 Input voltage : DC 11-15V  
 Output voltage : 4.2V - 16.8V  
 Output current : 0.1 - 1.5 A  
 Charging method : CC / CV  
 Voltage selection : Auto / Manual



**Model : 0402K01 / 0802K03 1202K02/ 1602K01**  
 Application : LiPo  
 Input voltage : AC100V - 250V  
 Input current : 0.3A  
 Output voltage : 4.2V ( 0402K01 )      Output current : 1.5A ( 0402K01 )  
 8.4V ( 0802K03 )      1.5A ( 0802K03 )  
 12.6V ( 1202K02 )      1.2A ( 1202K02 )  
 16.8V ( 1602K01 )      1.0A ( 1602K01 )  
 Charging method : CC / CV  
 Voltage selection : Fixed



**Model : Lipo-10A**  
**Specification**  
 Operation voltage range : 30.0 ~ 50vdc  
 Charging current : 10A  
 Polymer cell count : 5 ~ 8 Series  
 Individual cell voltage protection : Charge / Discharge  
 Calculation of SOC : LED display  
 Communication : RS-232C

**Model : Lipo-20A Individual Charger**  
**Specification**  
 Operation voltage range : 220VAC 50/60Hz  
 Charging current : ~ 20A  
 Polymer cell count : 1 ~ 7 Series

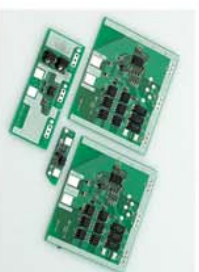
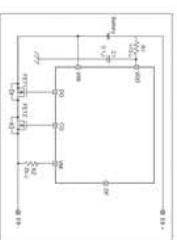


# Total Power Solution

## PCM (Protection Circuit Module)

### Functions

- Overcharge protection
- Overdischarge protection
- Over current protection
- Application range: 1 ~ 8 Series



No.	Part #	Battery Pack Configuration	Current Drain		Size
			Standard	Peak	
1	EK0101-0205S	1S1P	< 2 Amp	2 ~ 5 Amp	18mm x 4.0mm x 0.6t
2	EK0201-1218S	2S1P	< 12 Amp	15 ± 3 Amp	64mm x 10mm x 0.8t
3	EK0301-0205S	3S1P	< 2 Amp	2 ~ 5 Amp	24.5mm x 18mm x 1.0t
4	EK0201-0307S	2S1P	< 3 Amp	5.0 ± 2 Amp	60mm x 6.5mm x 0.8t
5	EK0101-0205S	1S1P	< 2 Amp	3.5 ± 1.5 Amp	30mm x 7.4mm x 0.8t
6	EK02NP-0610N	2S1P	< 6 Amp	6 ~ 10 Amp	58mm x 23mm x 0.8t
7	EK03NP-0713S	3S1P	< 7 Amp	9 ~ 13 Amp	58mm x 50mm x 0.8t
8	EK04NP-0713S	4S1P	< 7 Amp	9 ~ 13 Amp	58mm x 50mm x 0.8t

## Safety Guard



Safety Guard		2 Series (2S : 7.4V)	3 Series (3S : 11.1V)	4 Series (4S : 14.8V)
Cut off Voltage		8.5V	12.75V	17V
Maximum Limit of Current			20A	
Maximum Limit of Circuit Voltage			30V	
Operating Temp				-20°C ~ 70°C

## BMS(Battery Management System)

- Voltage, Current Measurement
- Temperature Measurement
- Upper and lower voltage cut-off
- Emergency shut-off
- Balancing of cells
- Calculation of SOC(State Of Charge)
- Communication interface via CAN-bus or RS232



One BMS module can manage 8cells. Totally, 160cells can be controlled by 20 BMS modules

# Advanced technology

## Great Safety

"SLPB" (Superior Lithium Polymer Battery)

We have taken it for granted that batteries have a responsibility of the great safety performance. "SLPB" has an excellent safety characteristics, which originates in Kokam's unique technology.

### UL CERTIFICATION (UL file No. MH27732)

- Model : SLPB 104330, SLPB 356495, SLPB 393462, SLPB 384374, SLPB 353452, SLPB 393452, SLPB 393459, SLPB 394374, SLPB 433452, SLPB 436495, SLPB 393456, SLPB 456495, SLPB 483452, SLPB 523452, SLB 452128, SLPB 523459, SLB 573852, SLPB 283452H, SLPB 393459H, SLB 603870H, SLPB 396495H, SLPB 393452H, SLPB 393452A, SLPB 554374H, SLPB 533459H4, SLPB 496495P, SLPB 8043128H, SLPB 526495, SLPB 834374H

### KERI CERTIFICATION (2000. 5)

(Korea Electrotechnology Research Institute)

## Technical Patents



Registered



Awarded "Iron Tower Industrial service merit" from Korea government



## Technical Power

Fundamental Kokam Lithium Rechargeable Battery Patents

(Registered in Korea, Japan, USA, Taiwan, Russia, Czech)

- Process Know-how

- Design and Manufacturing Know-how for the processing Machines (Apply for a Patent 19 Countries)



## New Product



### Model : SLPB78216216H 7S1P

Capacity : 31Ah  
Voltage : 25.9V  
Energy : 802.9Wh  
Dimension : 78\*230\*295mm  
Weight : 8.1kg



### Model : SLPB75106205 7S1P

Capacity : 16Ah  
Voltage : 25.9V  
Energy : 414.4Wh  
Dimension : 100\*150\*250mm  
Weight : 3.3kg



### Model : SLPB60216216 7S1P

Capacity : 25Ah  
Voltage : 25.9V  
Energy : 647.5Wh  
Dimension : 78\*230\*295mm  
Weight : 7.0kg



### Model : SLPB60216216 13S1P

Capacity : 25Ah  
Voltage : 48.1V  
Energy : 1202.5Wh  
Dimension : 115\*230\*320mm  
Weight : 14kg



### Model : KSCH-0700-2946R1

Input Voltage : AC220V  
Output Voltage : DC29.4V  
Output Current : 6A  
Output Function : CC/CV/CUTOFF  
Dimension : 90\*142\*230mm  
Weight : 1.7kg



### Model : KSCH-1300-5466R1

Input Voltage : AC220V  
Output Voltage : DC54.6V  
Output Current : 6A  
Output Function : CC/CV/CUTOFF  
Dimension : 90\*142\*230mm  
Weight : 2.0kg

- Application : UPS, Wheel Chair, E-Scooter and other industrial use.
- Concluding remarks

- 1) Light weight
- 2) Small size & thin thickness
- 3) Excellent acceleration performance compare with lead acid battery.
- 4) Good performance in cold winter by excellent low temp. characteristics.
- 5) Excellent life cycle characteristics compare with lead acid battery.
- 6) Excellent nature friendly characteristics by disuse of a heavy metal. Easy to discard.
- 7) Low internal resistance(impedance).

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## Handling Precautions

### ⚠ Danger

1. Do not disassemble or modify the battery (may disable the built-in safety features in the battery and result in unexpected serious problems).
2. Do not connect the positive (+) and negative (-) terminals with metal objects such as wire.
3. Do not transport or store the batteries with metal objects such as necklace, hairpin, etc. (may result in short circuit and cause over - current to flow, causing the battery to overheat, emit smoke, bulge or ignite).
4. Do not throw the battery into a fire or heat it.
5. Do not dip the battery in water, seawater or any type of liquid.
6. Do not use or store the battery at high temperature, e.g., direct sunlight, inside cars during hot weather, or directly in front of heaters.
7. Do not apply impact to the battery or throw or drop it (may damage the battery structure, which in turn may result in heat generation, smoke emission or ignition of the battery).
8. Do not drive a nail into the battery or hit it with a hammer (any abnormal stress may cause unexpected accidents).
9. Ensure the correct connection of positive (+) and negative (-) terminals in the charger or any equipment in use.
10. The battery to be charged must be placed on a non-flammable, heat-resistant, and non-conductive surface. Keep flammable and volatile materials away from the charging area. Batteries must not be left in charging mode without supervision.
11. Do not charge the battery at more than 4.2V per cell (may damage the battery permanently and beyond repair).
12. Do not use chargers other than those recommended by Kokam. Follow the charging process specified by Kokam to avoid serious and/or permanent damage to the battery.
13. Do not discharge the battery at less than 2.7V per cell (may damage the battery permanently and beyond repair).
14. Do not connect the battery directly to an electric outlet or a cigarette lighter socket in a car (applying high voltage may generate excessive current and result in electric shock, thus possibly leading to leak of electrolyte, heat generation, smoke emission, or ignition).
15. Do not use the battery for purposes other than those specified (may compromise the guaranteed performance and/or shorten its service life).
16. Depending on the equipment where the battery is used, excessively high current may flow through the battery, possibly damaging it and resulting in leakage, heat generation, smoke emission or ignition.
16. In case electrolyte comes into contact with eyes, rinse thoroughly with clean water immediately and consult a physician.

### ⚠ Warning

1. Do not use the batteries together with primary batteries such as dry batteries, other types of rechargeable batteries such as Ni-Cd or Ni-MH or batteries with different capacity/voltage or produced by a different manufacturer.
2. Stop the charging process after the predetermined charging period has lapsed even though the batteries are not fully charged to avoid heat generation, smoke emission or ignition.
3. Do not put the battery in a microwave oven or a pressure cooker (excessive heat may damage the seal of the battery and result in heat generation, smoke emission or ignition).
4. In case of odor, heating, discoloration, deformation or any other change while using, charging, or storing the battery, take it out of the equipment or charger and stop using it.
5. If the battery leaks or smells, keep it away from any exposed flame to prevent the electrolyte from catching fire and cause heat generation, smoke emission or ignition.
6. Do not use the battery in areas with static electricity (more than the limit of the manufacturer's guarantee).
7. Operating Environment:  
Charging the battery : 0°C ~ +45°C  
Discharging the battery : -20°C ~ +60°C (SOC 50 %)  
Stored up to 30 days : -20°C ~ +35°C (SOC 50 %)  
Stored up to 90 days : -20°C ~ +35°C (SOC 50 %)

### ⚠ Caution

1. Do not store or use the battery in areas exposed to direct sunlight, inside cars during hot weather or sources of high temperature (may compromise its guaranteed performance and/or shorten its service life).
2. In case of abnormal appearance such as odor, discoloration, deformation or overheating, remove the battery from the device and stop using it.
3. Keep the battery out of reach of children, including the battery charger or equipment to prevent them from taking out the battery from the battery charger or equipment.
4. If the battery leaks, and its electrolyte comes into contact with clothing or skin, wash thoroughly with clean water immediately to avoid skin inflammation.
5. Follow the instructions of your equipment regarding the battery installation. In case of abnormality, remove the battery from the equipment to avoid misusing and wasting the battery.
6. The battery shall be delivered with 50% SOC for safety purposes. In case your equipment does not work under this condition, charge the battery fully before use.
7. In case of contaminated battery terminals, clean with a dry cloth before use to avoid problems such as insufficient power supply and/or charging failure.
8. Read and follow the instructions carefully for the specified charger on how to charge the battery.