

# *Specification*

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## LiFePO4 battery pack

Cell model: LE-LPB13530180

Battery model: SL-4850P

**Edition: V2.1**

**Release date: Sep 2017**

## **Declaration**

1. The specification details the performance of the LiFePO<sub>4</sub> battery pack. Please read the specification carefully before operations and please abide by relevant industrial safety regulations. We will not be responsible for any damage to the product due to improper operations or use under conditions that are not prescribed in the specification.
2. As the product version upgrades or other reasons, this document is subject to change without notice. Unless otherwise agreed, this document only as a guide, all statements, information, and recommendations in this document do not constitute any express or implied warranty.

## 1 Scope (适用范围)

This specification is applied to the reference battery in this Specification .

本说明书适用于本书中所提及的电池。

## 2 Product Specification (产品技术规格)

Table 1 (表 1)

Cell 单体电芯	No. (序号)	Item (项目)	General Parameter (常规参数)		Remark (备注)
	1	Rated Capacity (额定容量)	Typical (标称容量)	50AH	Standard discharge (0.2C <sub>5</sub> A) after Standard charge (标准充电后 0.2C <sub>5</sub> A 标准放电)
			Minimum (最小容量)	50AH	
	2	Nominal Voltage (正常电压)	3.2V		Mean Operation Voltage (即工作电压)
	3	Internal Impedance (内阻)	≤2mΩ		Internal resistance measured at AC 1KHz after 50% charge (半电态下用交流法测量内阻) The measure must uses the new batteries that within one week after shipment and cycles less than 5 times (使用出货后不到一个星期及循环 次数少于 5 次的新电池测量)
	4	Dimension (尺寸)	Thickness/厚度: Max30mm		Initial Dimension (初始尺寸)
			Width/宽度: Max135mm		
			Hight/高度: Max180mm		
	5	Weight (重量)	1200g		Approx
	6	Standard charge (标准充电)	Constant Current 0.2C <sub>5</sub> A Constant Voltage 3.65V 0.02C <sub>5</sub> A cut-off (持续电流: 0.2C <sub>5</sub> A 持续电压: 3.65V 截止电流: 0.02C <sub>5</sub> A)		Charge time : Approx 10H (充电时间: 大约 10 小时)
7	Rapid Charge 快速充电	Constant Current 1C <sub>5</sub> A Constant Voltage 3.65V 0.01C <sub>5</sub> A cut-off (持续电流: 1C <sub>5</sub> A 持续电压: 3.65V 截止电流: 0.01C <sub>5</sub> A)		Charge time : Approx 2.5 H (充电时间: 大约 2.5 小时)	
8	Standard discharge (标准放电)	Constant current 0.2C <sub>5</sub> A end voltage 2.8 V (持续电流: 0.2C <sub>5</sub> A 截止电压: 2.8V)		5A	
9	Maximum discharge current 最大放电持续电流	Constant current 2C <sub>5</sub> A end voltage 2.5 V (持续电流 2C <sub>5</sub> A 截止电压: 2.5V)		50A	
10	Volumetric specific energy (体积比能量)	212WH/L		Approx	
11	Gravimetric specific energy (质量比能量)	152WH/KG		Approx	

Table 2(表 2)

No. (序号)	Item (项目)	General Parameter (常规参数)		Remark (备注)
1	Combination method (组合方式)	16S1P		
2	Rated Capacity (额定容量)	Typical (标称容量)	50Ah	Standard discharge after Standard charge (package) (标准充电后标准放电 (针对电池组))
		Minimum (最小容量)	50Ah	
3	Factory Voltage (出厂电压)	52.8-53.8V		Mean Operation Voltage (即工作电压)
4	Voltage at end of Discharge (放电终止电压)	42-43.5V		Discharge Cut-off Voltage (放电截止电压)
5	Charging Voltage (充电电压)	56.6-57.6V		
6	Internal Impedance (内阻)	≤100mΩ		Internal resistance measured at AC 1KHz after 50% charge (半电态下用交流法测量内阻) The measure must uses the new batteries that within one week after shipment and cycles less than 5 times (使用出货后不到一个星期及循环次数少于 5 次的新电池测量)
7	Standard charge (标准充电)	Constant Current 10A Constant Voltage see No.5 0.01CA cut-off (持续电流: 10A 持续电压: 见序号 5 截止电流: 0.01CA)		Charge time : Approx 6 h (充电时间: 大约 6 个小时)
8	Standard discharge (标准放电)	Constant current: 10A end voltage see NO.4 (持续电流: 10A 截止电压: 见序号 4)		
9	Maximum Continuous Charge Current (最大充电持续电流)	50A		

Continuous the table 2 (续表 2)

	No. (序号)	Item (项目)	General Parameter (常规参数)	Remark (备注)
Package 电池组	10	Maximum Continuous Discharge Current (最大放电持续电 流)	50A	
	11	Operation Temperature Range (工作温度范围)	Charge (充电) : 0~45℃	60±25%R.H. Bare Cell (单体电池储存湿度范围)
			Discharge (放电) : -20~55℃	
	12	Storage Temperature Range (储存温度范围)	Less than 12 months : -10~35℃ (小于 12 月: -10~35℃)	60±25%R.H. at the shipment state (出货状态时的湿度范围)
			less than 3 months: -10~45℃ (小于 3 个月: -10~45℃)	
			Less than 7 day : -20~65℃ (小于 7 天: -20~65℃)	
	13	Dimensions (尺寸)	442*385*132.5 mm	Include case
	14	Weight (重量)	25.5kg	Include case
15	Volumetric specific energy (体积比能量)	101 WH/L	Include case	
16	Gravimetric specific energy (质量比能量)	85WH/KG	Include case	

### 3 Battery Management System(电池管理系统)

#### 3.1 BMS Specification (电池管理系统说明)

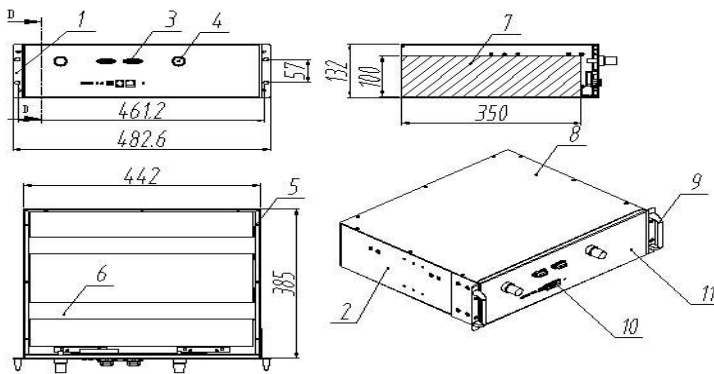
- The BMS is designed for 15/16 series lithium battery. (BMS 为 15/16 串锂离子电池设计)
- The BMS have all functions which are : (该 BMS 系统具有以下一些功能)
  - overcharge detection function (过充电保护功能)
  - over discharge detection function (过放电保护功能)
  - over current detection function (过电流保护功能)
  - short detection function (短路保护功能)
  - balance function (均衡功能)
  - communicate function (通讯功能)
  - Alarm function (告警功能)

### 3.2 BMS Protect parameter (电池管理系统保护参数)

#### 48V 15S 磷酸铁锂保护线路模块设定 Typical value specifications

Items	Details	Standard
Cell overcharge protection	Overcharge detection voltage	3.80±0.025V
	Overcharge detection delay time	Typical:1.0s
	Overcharge release voltage	3.34±0.02V
Cell over-discharge protection	Over-discharge detection voltage	2.5±0.02V
	Over-discharge detection delay time	Typical:1.0s
	Over-discharge release voltage	3.1±0.02V or charge release
Over-current protection	discharge Over-current protection current1	65±5A
	discharge Over-current detection delay time 1	1S
	discharge Over-current protection current2	75±5A
	discharge Over-current detection delay time2	≤100ms
	Charge OC protection current	65±5A
Short protection	Short protection current	150±10A
	Protection condition	Load short
	Detection delay time	≤800us
	Protection release condition	Charging release
Temperature(T) protection	Charge high T protection	65±5℃
	Charge high T recover	55±5℃
	Discharge high T protection	75±5℃
	Discharge high T recover	65±5℃
	Charge low T protection	-10±5℃
	Charge low T recover	-1±5℃
	Discharge low T protection	-25±5℃
	Discharge low T recover	-20±5℃
Balance	Balance threshold voltage	3.45V
Communication	It has RS232 and RS485 standard communication interface, it can real-time monitoring the capacity of battery bank, the voltage, current, environment temperature, and charging/discharging current.	
Alarm	It has over-temperature, over charge, under-voltage, over-current, short circuit alarm function.	

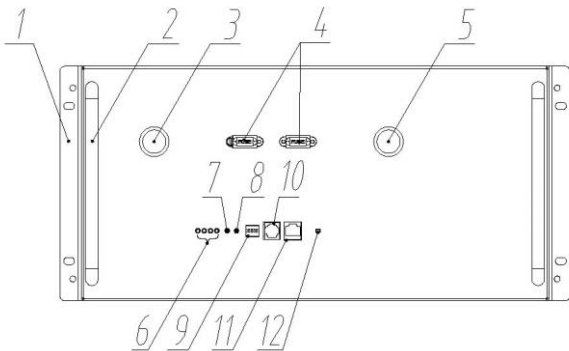
## 4. Case Structure of Battery Pack



序号	零件名称	材料及规格	数量	备注
1	挂耳 contact	Q195/2	2	外购
2	底座 base	Q195/1.2	1	外购
3	保险管 fuse-wire	703C/30A	2	外购
4	接线柱 connect	555	2	外购
5	下固定支架 support	Q195/2	6	外购
6	上固定支架 support	Q195/2	2	外购
7	电池组 battery	51.2V/50AH	1	自购
8	盖板 lid	Q195/1.2	1	外购
9	扶手 contact		2	外购
10	保护板 Circuitboard		1	外购
11	前面板 facial	Q195/1.2	1	外购

### 技术要求

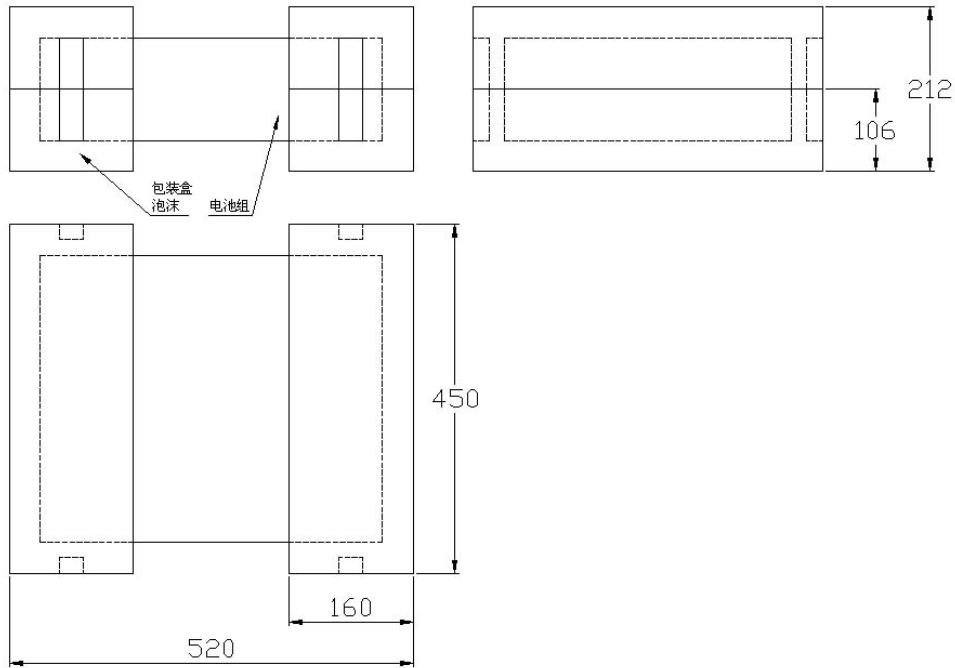
- 1、机箱内外表面亚光黑漆处理，漆面亮泽光滑；
- 2、所有加工表面不得有毛刺飞边；
- 3、前面板印刷字样颜色为白色。



No	Description	Silk-screen	Function Definition
1	Hanger		For mounting the battery pack
2	Handle		
3	Binding post(red)	+	Positive terminal
4	Fuse	FUSE	
5	Binding post(black)	-	Negative terminal
6	LED	CAPACITY	Capacity indicator
7	LED	ALM	Alarm indicator
8	LED	RUN	Operation indicator
9	Dial switch	ADS	Set the address
10	RS232 port	RS232	RS232 bus interface
11	RS485 port	RS485	RS485 bus interface
12	Reset button	RST	For reset the battery

## 5 Packaging of Battery Pack

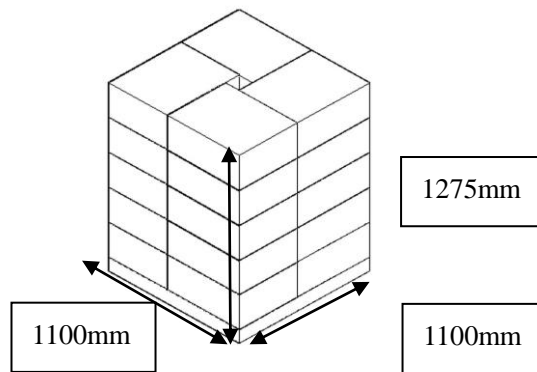
5.1. Inner packing material: EPE foam, overall dimension: 520\*450\*212mm



5.2. Seven layers of corrugated packaging on the outside, overall dimension: 535\*465\*230mm

## 6 Transportation

6.1 Placing on pallet during transportation, 4 boxes on each layer, and a total of 5 layers.

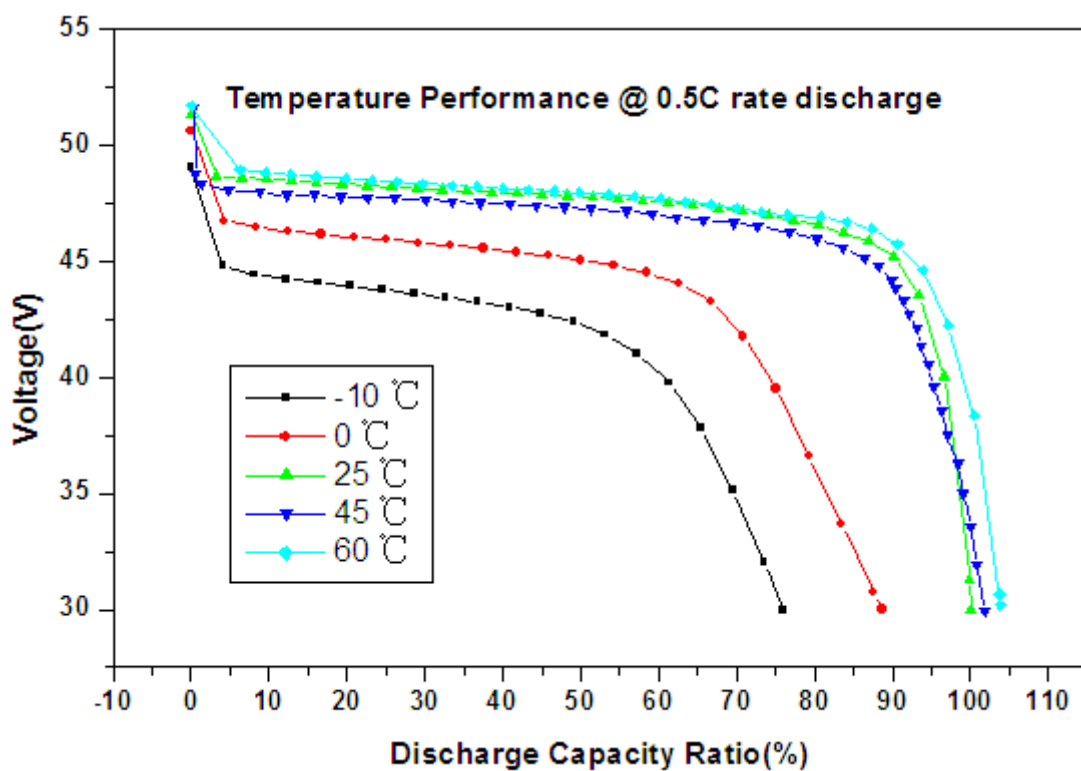
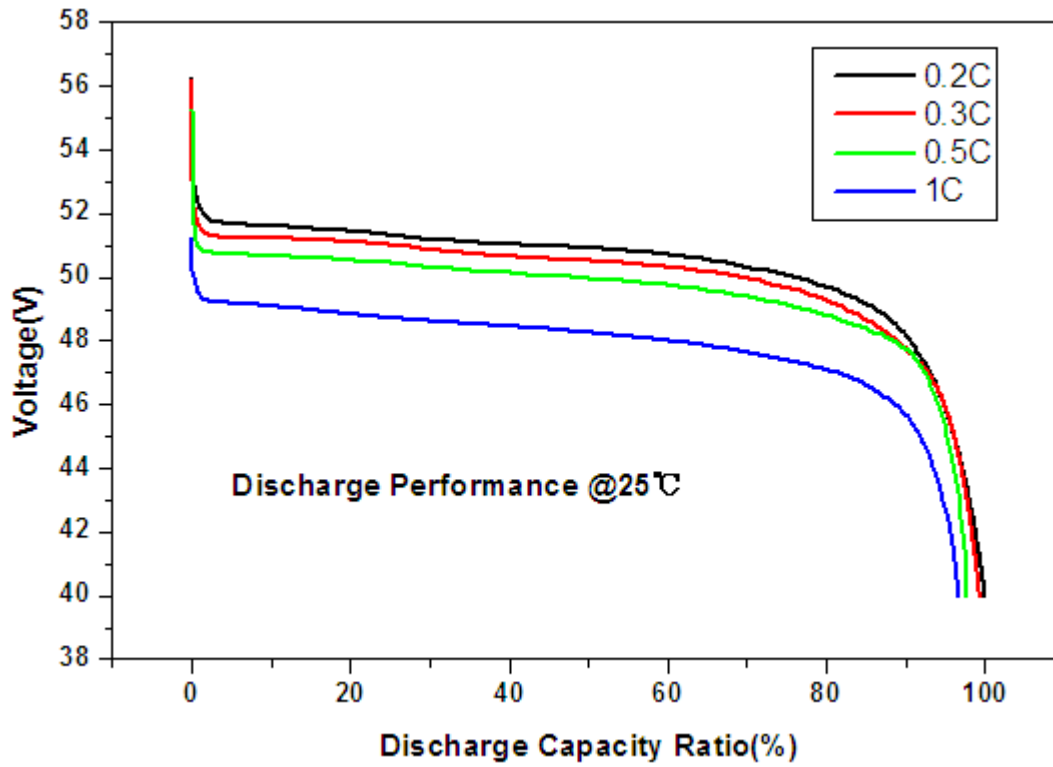


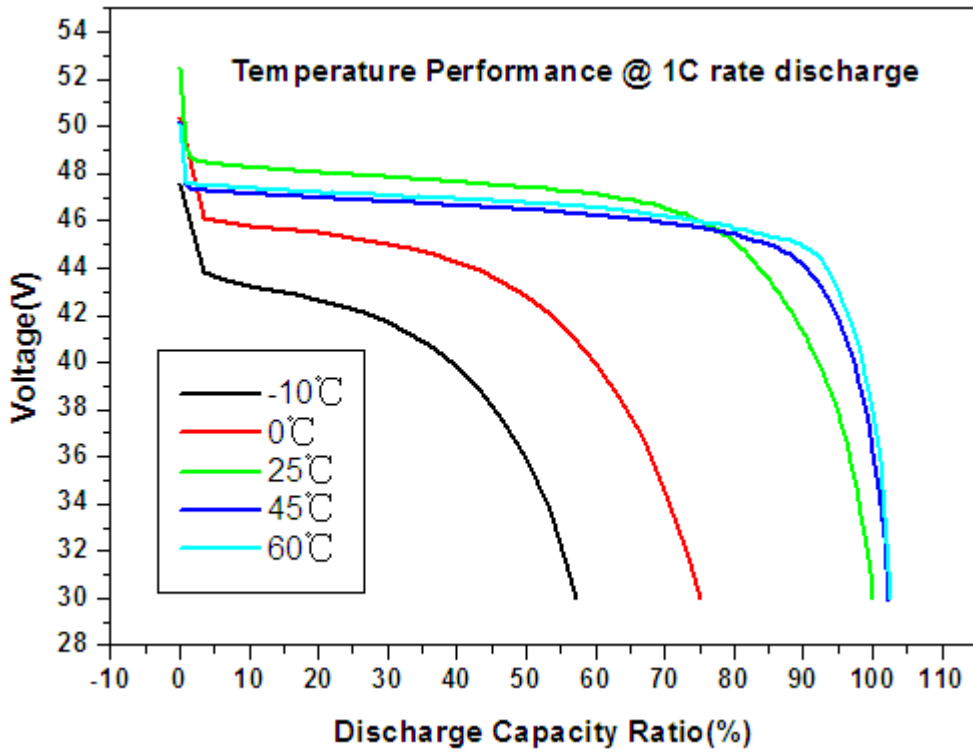
6.2 Shall pay attention to moisture and dampness during transportation, avoiding the extrusion and collision so as to preventing the battery from damaging.



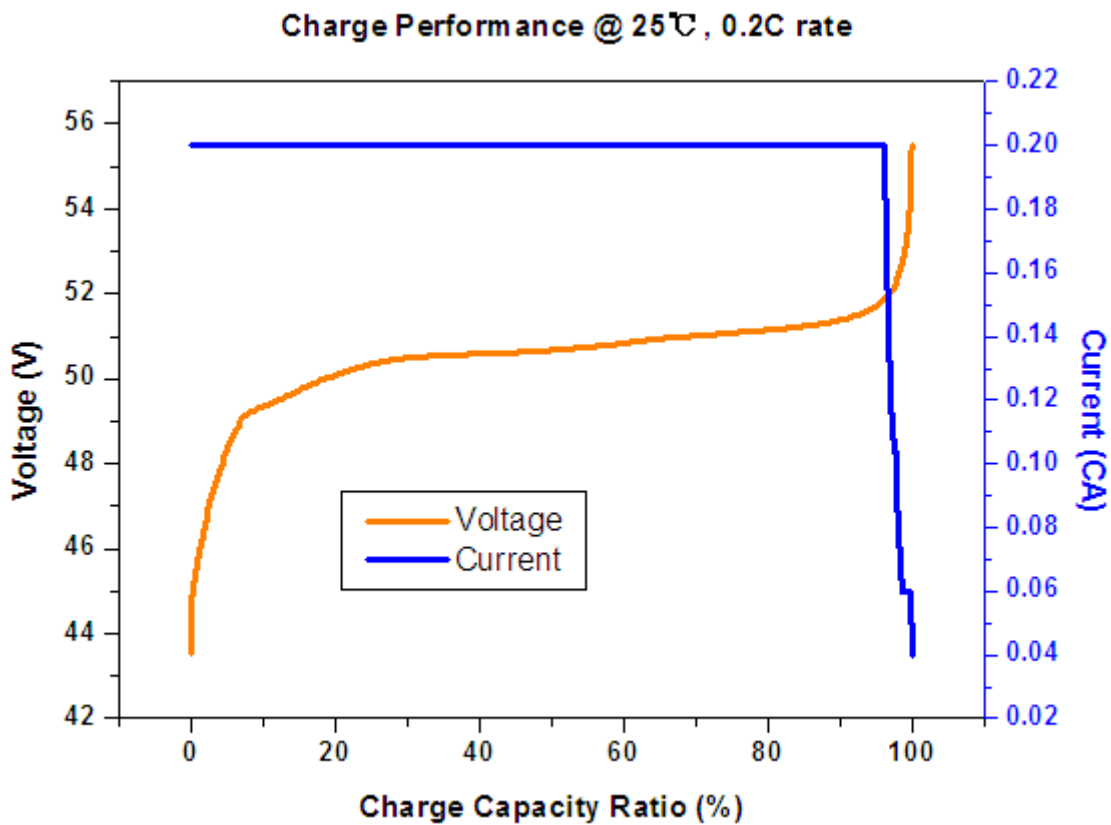
## 7. Appendix

### Discharge curve





**Charge curve**



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## Charge efficiency

48V Charge performance @ 25°C, 0.2C rate		
Charge time (min)	Charge capacity ratio(%)	Charge voltage(V)
0	0.0	43.5
30	9.8	49.3
60	19.7	50.1
90	29.5	50.5
120	39.4	50.6
150	49.2	50.7
180	59.1	50.8
210	68.9	51.0
240	78.8	51.1
270	88.6	51.3
300	95.1	54.4
330	100.0	54.4