

# **SPECIFICATION SHEET**

## **Model: IP483338-VOC 630 mAh Li-ion Polymer Battery Pack**

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### **Version log**

<b>Rev.</b>	<b>Date</b>	<b>Status</b>	<b>Handled by</b>	<b>Comments</b>
A	2011.04.29	Release		

## 1 General

This document contains Autec specification for LP483338-VOC lithium-ion polymer battery. In the text, term Cell is used for an individual cell without any external protection devices. Battery pack is the assembled combination of cell, protection circuit, connector, over current and/or high temperature operating device(s), plastics and foil. Battery pack is ready made product that can be handled and replaced by the end user or technician. Autec reserves itself the right to make changes to this document.

## 2 Basic Description

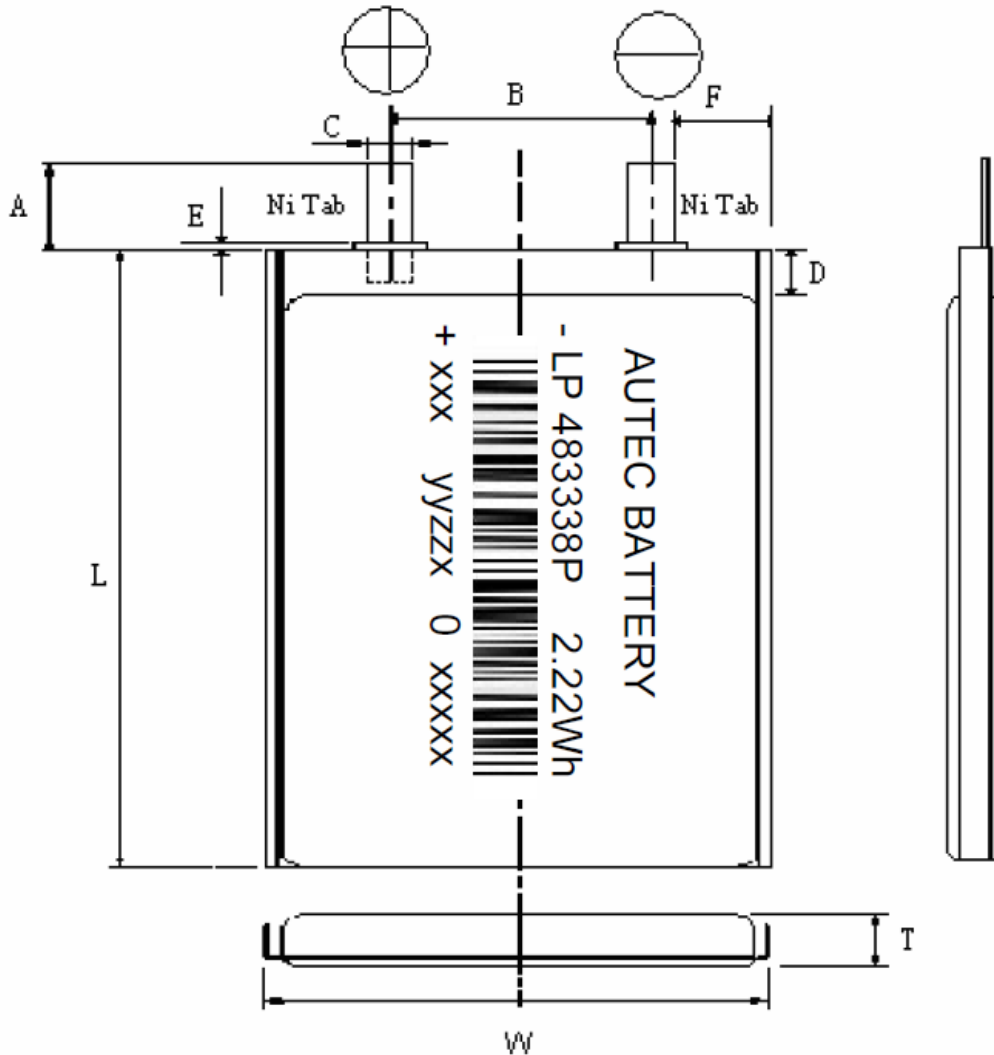
LP483338-VOC is a 630 mAh nominal Li-ion polymer battery pack. Basic description and drawing is as below.

### 2.1 Cell Datasheet

NO.	ITEM	SPECIFICATION	REMARK
1	Model	LP483338-VOC	
2	Cell Weight	17.5g	Approximately
3	Nominal Voltage	3.7V	
4	Full Charged Voltage	4.2V	
5	Cut-off Voltage	3.0V	
6	Operating Temperature	Charging: 15°C ~ 45°C Discharging: -20°C ~ 60°C	
7	Nominal Capacity	630mAh	Measured at 0.2C
8	Minimal Capacity	600mAh	Measured at 0.2C
9	Charge Current	Standard: 0.5C Rapid: 1.0C	0.05C cut-off current
10	Charge Time	Standard: 3.5 hours Rapid: 2.5 hours	Approximately
11	Discharge Current	Standard: 0.2C Maximum: 2.0C	

12	Storage Temperature	Less than 1 month: -20°C ~ 45°C Less than 6 months: -20°C ~ 35°C	
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## 2.2Cell Drawing



ITEM	DESCRIPTION	SPECIFICATION	REMARK
T	Cell Thickness	4.80mm Max	
W	Cell Width	33.0mm Max	
L	Cell Length	38.0mm Max	
A	Tab Length	9.0±2.0mm	
B	Distance Between Tabs	10.0±1.0mm	
C	Tab Width	3.0±0.1mm	
D	Top Sealing Width	2.5±0.5mm	
E	Sealant Length	0.2 ~ 2.0mm	

### 3 Electrical Characteristics

Test should be conducted with new batteries within one week after production and the cells shall not be cycled more than five times before the test. Unless otherwise defined, test and measurement shall be done under temperature of  $23\pm 5^{\circ}\text{C}$  and relative humidity of  $60\%\pm 20\%$ . If it is judged that the test results are not affected by such conditions, the tests may be conducted at temperature  $23\pm 5^{\circ}\text{C}$  and humidity  $40\sim 80\%\text{RH}$ .

NO.	ITEM	TESTING METHOD AND CONDITION	CRITERIA
1	Standard Charge	Charging the cell initially with constant current at 0.5C at $23 \pm 2^{\circ}\text{C}$ , after cell voltage reach to 4.2V then Charge with constant voltage at 4.2V (accuracy $4.20 \pm 0.05\text{V}$ ) till charge current declines to 0.05C.	N.A.
2	Minimum Rated Capacity	The capacity means the discharge capacity of the cell, which is measured with discharge current of 0.2C with 3.0V cut-off voltage after the standard charge.	$\geq 600\text{mAh}$
3	Cycle Life	Testing Condition: Step 1: Fully charge the cell by 1C. Step 2: Standby 10min. Step 3: Discharge the cell by 1C to 3.0V. Step 4: Standby 10min. Step 5: Repeat step 1 to step 4 for 300 times. Record the first and last discharging capacity of the test and calculate the percentage of capacity retention.	300cycles: $\geq 80\%$
4	Self-Discharge	Cell shall be stored at $23 \pm 5^{\circ}\text{C}$ ambient temperature for 30 days, then measure the residual capacity at 0.2C and calculate the percentage of capacity retention.	Residual Capacity: $\geq 90\%$
5	Cell Voltage	As of shipment.	3.7V – 3.9V
6	Temperature Characteristics	Fully charge the cell by 0.2C at $20\pm 5^{\circ}\text{C}$ until, then store the cell in an oven for 2 hours, then discharge the cell by current 0.2C to 2.75V. The temperature of the oven is at $55\pm 2^{\circ}\text{C}$ or $-22\pm 2^{\circ}\text{C}$ . Measure the discharging time.	Discharging Time: $\geq 40\text{ min}$

## 4 Mechanical Characteristics

NO.	ITEM	TESTING METHOD AND CONDITION	CRITERIA
1	Vibration	Cell (as of shipment) vibrated for 90 minutes for each of the three mutually perpendicular planes with total excursion of 1.15mm and with frequency of 10 Hz to 55 Hz	No leakage, Recoverable Capacity: ≥90% (Standby 3 hours).
2	Drop	The cell is to be dropped from a height of 1 meter 2 times onto concrete ground.	No explosion, no fire, no leakage.

## 5 Protection Circuit Module

### 5.1 Schematics

### 5.2 BOM of PCM

NO.	SIGN	COMPONENTS AND SPECIFICATION	QTY	REMARK
1	U1	BQ27541DRZ	1	
2	U2	R5402N120KD	1	
3	U3	FS8025	1	
4	R2,R3,R4,R5,R8,R9	100Ω_J_1/16W_50V	6	
5	R11	1kΩ_J_1/16W_50V	1	

6	R12	0.01Ω_F_1/4W_200V	1	
7	R6,R7	1MΩ_J_1/16W_50V	2	
8	R10	330Ω_J_1/16W_50V		
9	C2,C3,C5,C6,C7,C8, C9,C10	X7R_104_16V_K	8	
10	C1,C4	X5R_474_10V_K	2	
11	R1	10kΩ_J_B=3380K	1	
12	D1,D2	VDZ5.6B_5.6V	2	ROHM DIODES
		BZT52C5V6LP		
13	SOLDER	SM988	20mg	
14	PCB1	FR-4,1OZ,4Layers,33*6.4*1.0mm	1	
15	PCB2	FR-4,1OZ,2layers,8.4*4.8*0.8mm	1	
16				

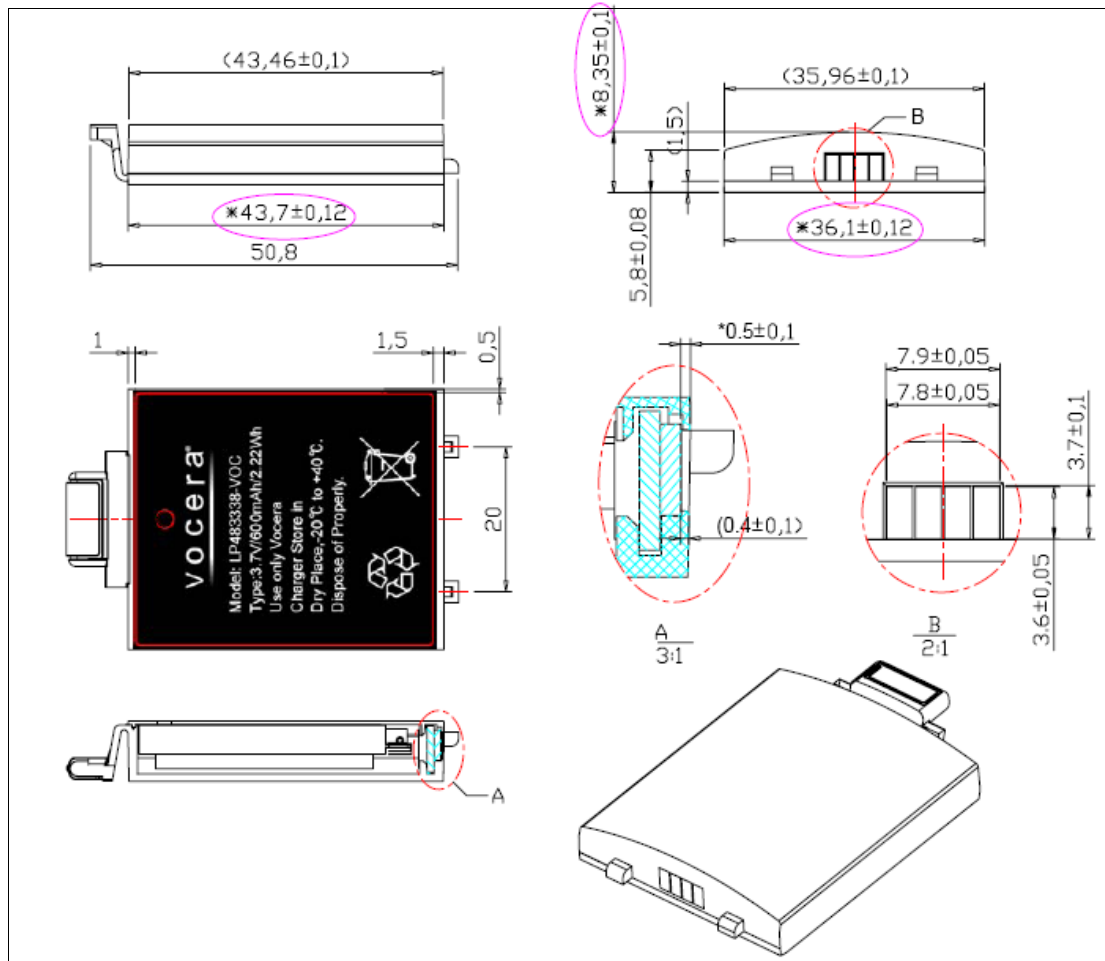
### 5.3 Protection IC Parameters

Parameters of R5402N120KD

NO.	ITEM	CRITERIA
1	Over-charge detection Voltage	4.325±0.025V
2	Over-charge detection delay time	0.7-1.3s
3	Over-discharge detection Voltage	2.30±0.058V
4	Over-discharge detection delay time	14-26ms
5	Over-discharge Current Protection Current	1.5-5.0A
6	Over-discharge Current Protection delay time	8-16ms
7	Short Protection delay time	230-500us
8	Self-Discharge Current	200uA MAX
9	PCM Impedance	≤85mΩ

## 6 Battery Pack

### 6.1 Pack Drawing



### 6.2 Battery BOM

NO.	MATERIAL	COMPONENTS	QTY.	REMARK
1	CELL	LP483338-VOC	1	
2	PCM	BS4302	1	
3	FRAME	Vocera only	1	
4	LABEL	Vocera only	1	

## 7 Appendix

### Handling Precautions and Guidelines

#### For Lithium-Ion Batteries

Subject to Change Without Notice

**Preface-** This document of “Handling Precautions and Guideline” shall be applied to the cells manufactured by Autec Power Systems (APS).

**Note 1** – The customer is requested to contact APS in advance, if and when the customer needs other applications or operating conditions than those described in this document. Additional experimentation may be required to verify performance and safety under such conditions.

**Note 2** – Autec will take no responsibility for any accidents or problems when the cell is used in any way not covered in this specification.

**Note 3** – Autec will inform the customer of any improvements in written form regarding any updates related to the proper use and handling of the cell, if it is deemed necessary.

#### Charging

**Charging Current** – Charging current should be less than maximum charge current specified in the product specification. Charging with higher current than these recommended values may cause damage to the cell. Electrical, mechanical, and safety performance could be compromised and lead to excessive heat generation or leakage.

**Charging Voltage** – Charging should be done by voltages less than that specified in the product specification (4.2V/Cell). Charging beyond 4.25V, which is the absolute maximum voltage, must be strictly prohibited. The charger shall be designed to comply with these conditions. It is highly dangerous to charge with a higher voltage than the specified values; damage to the cell’s electrical, mechanical, or safety performances may result and lead to excess heat generation or leakage.

**Charging Temperature** – The cell shall be charged within the specified temperature range in the product specification.

**Prohibition of Reverse Charging** – reverse charging is prohibited; the cell needs to be connected correctly and the polarity has to be confirmed before wiring. In case of the cell being connected improperly, the cell cannot be charged. Simultaneously, the reverse charging may cause damage to the cell which may lead to degradation of cell performance and damage the safety attributes of the battery which could lead to excess heat generation or leakage.

#### Discharging

**Discharging Current** – the cell shall be discharged at less than the maximum discharge current



specified in the product specification. High discharging currents may reduce the discharging capacity significantly or cause over-heating to occur.

**Discharging Temperature** – The cell shall be discharged within the temperature range specified by this specification.

**Over-discharging** – It should be noted that the cell would be at an over-discharged state by its self-discharging characteristics when the cell is unused for a long time. In order to prevent over-discharging, the cell shall be charged periodically to maintain between 3.7V and 3.9V. Furthermore, over-discharging may cause loss of cell performance, base characteristics, or cell functions. The charger should be equipped with a device to prevent further discharging exceeding a cut-off voltage specified in the product specification. Also, the charger should be equipped with a device to control recharging procedures as follows: The cell pack shall start with a low current (0.01C) for 15-30minutes (i.e. pre-charging, before rapid charging starts) The rapid charging shall be started after the individual cell voltage of 3V has been reached within 15-30minutes that can be determined with the use of an appropriate timer from pre-charging. In the case that the voltage does not reach the 3V threshold within the pre-charging time frame, then the charger shall have functions to stop further charging and display the cell/pack is at an abnormal state.

#### **Storage**

The cell should be stored within the proper voltage and temperature range specified by the product specification.

#### **Other Notes**

*Prevention of short circuiting* - within the battery pack will be achieved with enough insulation layers between the wiring and the cells to maintain extra safety protection. The battery pack shall be structured with no short circuit within the battery pack, which may cause the generation of smoke or firing.

*Prohibition of Disassembly* – never disassemble cells; the disassembling may generate and internal short circuit in the cell, which may cause gassing, fining, explosions, or other problems.

*Electrolytes are harmful* – Lithium ion batteries should not have liquid electrolytes flowing, however in the case that the electrolyte comes into contact with the skin, eyes, or other body parts please seek medical attention immediately. Flush the area with fresh water and seek medical expertise.

*Prohibition of Dumping Cells into Fire* – never incinerate or dispose of cells into fire. The chemical reaction may result in an explosion.

*Prohibition of Cell Immersion into Liquids* – the cells should never be soaked with liquids such as water, seawater, drinks, juices, coffee, or any other liquid.

*Prohibition of Use of Damaged Cells* – the cells might be damaged during shipment by shock. If any abnormal features of the cells are found such as damage in the plastic envelop of the cell, deformation of the cell package, or odor/visual leak from the electrolyte, refrain from using the cell. If odor occurs as a result of electrolyte leakage, place cell away from fire and avoid using it to prevent damage.

**Warranty period:** Autech maintains a high quality standard. Lithium-ion batteries are granted a 1 year warranty period from date of shipment. This covers any areas that relate to the cell being damaged during the manufacturing process and does not cover the customer's misuse or abuse of the battery.