5V input double-cell series lithium battery boost charging chip

FEATURES

- The input operating voltage range is 4.5V~6V and the VIN withstand voltage is 20V.
- Boost Charge Efficiency: 95%.
- The maximum support is 18W power.
- Rechargeable battery voltage: 2 strings 8.4V.
- Charge Voltage Accuracy ±1%.
- Trickle/CC/CV charging.
- The preset charging current is 1.14A, which can be increased via an external resistor.
- Constant current charging accuracy ±10%.
- Input adaptive charging 4.5V, automatic adjustment of input current, adaptive adapter load.
- Support charging NTC temperature protection
- Battery backfill protection, quiescent power consumption 0uA.
- 750KHz switching frequency.
- LED charging display.
- ESD 4KV.
- Package:ESOP8,

• APPLICATIONS

Dual-cell Li-Battery/Li-ion battery charging

• DESCRIPTION

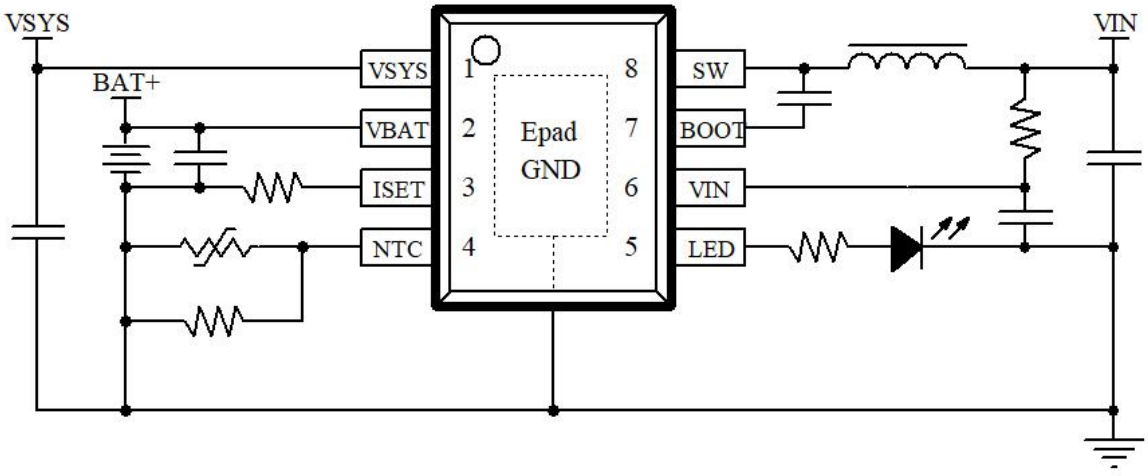
The BC915_E is a boost charge management IC that supports dual-cell series Li-ion/Li-ion batteries .

The BC915_E integrated power MOS, using a synchronous switching architecture, integrates the power MOS, so that it requires only a few peripheral components for the application, and effectively reduces the size of the overall solution and reduces the BOM cost.

BC915_E's step-up switching charging converter works at 750KHz; 5V input, 8V/1A output conversion efficiency 95%. The BC915_E features a preset current of 1.14A, while the BC915_E allows adjustment of the charging current via external resistors. and adapt to the load capacity of the adapter.

BC915_E supports external resistors to adjust the charging current; The BC915_E has integrated NTC protection with NTC resistors.

APPLICATION



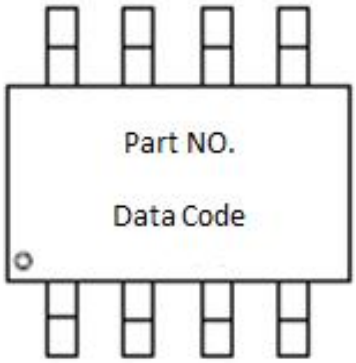
BC915_E ESOP8 PACKAGE

5V input double-cell series lithium battery boost charging chip

ORDING INFORMATION

Orderable Part Number	Package Type	Package Qty	Op Temp(°C)
BC915_E	ESOP8	3000	-40~85
BC915_E（Customize）	DFN3*3_8	3000	-40~85

MARK INFORMATION



ABSOLUTE MAXIMUM RATINGS (1)

Over recommended operating free-air temperature range (unless otherwise noted)

Parameter	value	symbol	unit
Input voltage range	V_{IN}	-0.3~18	V
Battery voltage range	VBAT	-0.3~20	V
Junction temperature range	T_J	-40 ~ 150	℃
Storage temperature range	T_{stg}	-60 ~ 150	℃
Human Body Model (HBM)	ESD	4K	V

(1) Stresses beyond those listed under *Absolute Maximum Ratings* may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions* is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

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THERMAL CHARACTERISTICS

over operating free-air temperature range (unless otherwise noted)

THERMAL METRIC			UNIT
Thermal resistance（ESOP8）	θ_{JA}	45	°C/W
Thermal resistance（DFN3*3）	θ_{JA}	65	°C/W
Thermal resistance（QFN4*4）	θ_{JA}	55	°C/W

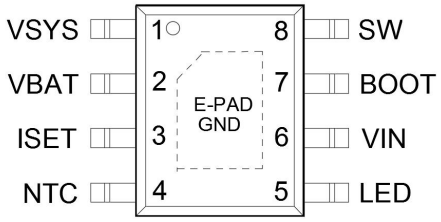
(1) The package thermal impedance is calculated in accordance with JESD 51-7.

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	MIN	Typical	MAX	UNIT
Input voltage	V_{IN}	4.5	5	6	V

*Beyond these operating conditions, the operating characteristics of the device cannot be guaranteed.

PINOUT



ESOP8

Package ESOP8	Name	Function
1	VSYS	Output voltage terminal, external 22uF capacitor
2	VBAT	Battery end
3	ISET	Charging current setting terminal, external resistor. The charging current is fixed at 1.14A without an external resistor, and connecting an external resistor allows increasing the charging current.
4	NTC	Battery temperature detection, pull up or down, terminate charging, can be reused as a balancing control terminal, once the external equalization chip detects that the battery voltage deviation is large, it can be terminated by NTC, or start charging.
5	LED	LED display end
6	VIN	Charging input
7	BOOT	Bootstrap end, Bootstrap circuit pins
8	SW	Switching end · DC/DC switch nodes, link inductors
EPAD	GND	systematically and powerfully

(1) G = Ground, I = Input, O = Output, P = Power

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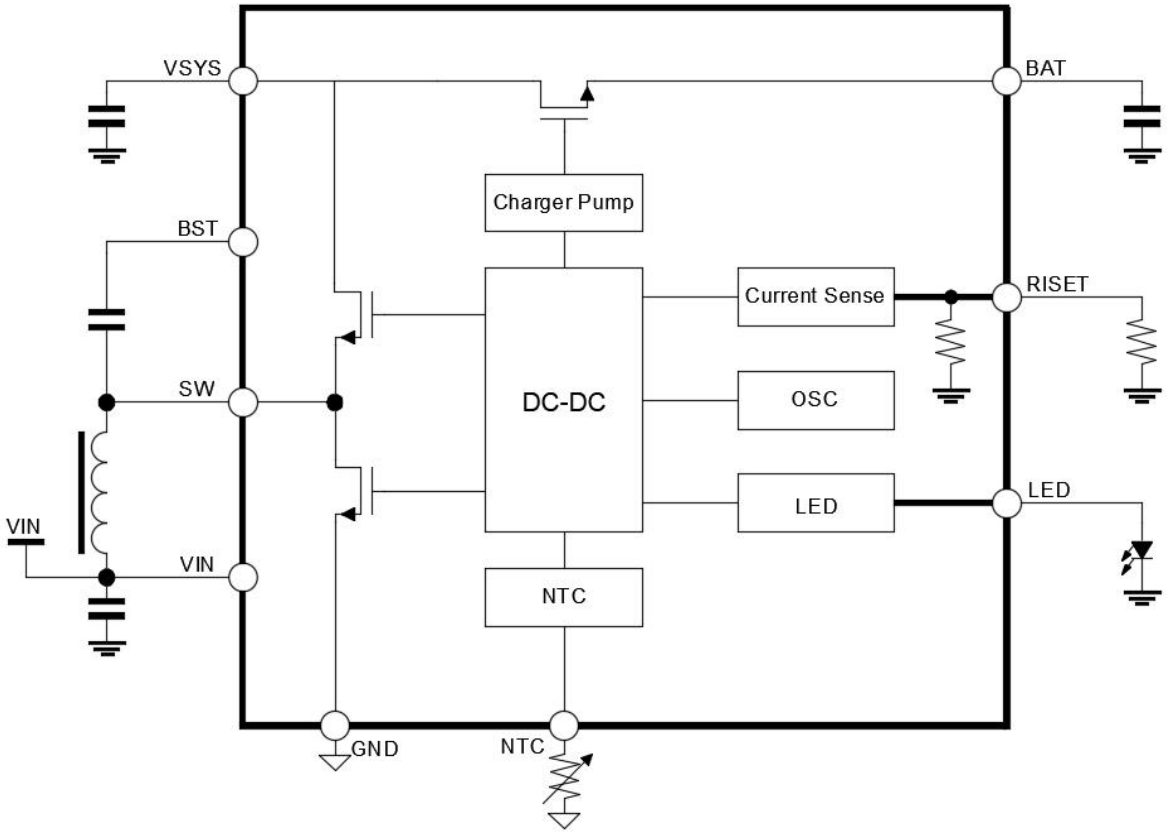
ELECTRICAL CHARACTERISTICS

Conditions are -40°C ≤ (T_J =T_A) ≤ 125°C and 4.5 V ≤ V_{IN} ≤ 5.5 V unless otherwise noted. Typical value is at 25°C. All voltages are with respect to GND unless otherwise noted. Unless otherwise specified， TA=25℃，L=2.2uH，VIN=5V，VOUT=7.4V

Parameter	symbol	Test conditions	MIN	Typical	MAX	UNIT
Input voltage	V_{IN}		4.5	5	6	V
Input undervoltage	V_{IN_UVLO}			4.3		V
	Hysteresis			100		mV
Input overvoltage	V_{IN_OVP}			5.8		V
	Hysteresis			0.2		V
Enter quiescent current	I_Q	VIN=5V · VBAT=10uF	1	3	5	mA
Battery backflush current		VIN=0V · VBAT=6-8.4V		0		uA
Switching frequency				750		KHZ
Trickle charge current	Itrick	VBAT≤6V		120		mA
	Itrick	VBAT≤2V		60		mA
Trickle-current to constant-current charging threshold	VTRKL	VBAT rising		6		V
	VTRKL_HYS	VBAT falling		5.8		V
Short-circuit current				130		mA
Short-to-trickle threshold				2		V
Hysteresis				1.6		V
Constant current		IBAT(RISET=Float)		1.14		A
Constant current charging current accuracy				±10		%
Fill up the voltage	VBAT		8.316	8.4	8.484	V
Accuracy of full voltage				±1		%
Charge cut-off current		CC 10% RISET=Float		120		mA
Charge cut-off detection time	Tterm			4		mS
Recharge threshold	$VBAT_{rechg}$			8.05		V
Temperature loop threshold				120		℃
The chip is overheated		OTP		130		℃
		Hysteresis		10		℃

5V input double-cell series lithium battery boost charging chip

FUNCTIONAL BLOCK DIAGRAM



LED DISPLAY MODE

Mode 1: Monochrome light

	Charge	Fully charged	FAULT
LED1	Solid on	extinguish	flash1Hz

CHARGE CURRENT SETTING

Charge current size setting：

R= 3/(Icc-1.14)=3*（0.38+ 1/R）

Unit : R=KΩ Icc=A

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CHARGE NTC

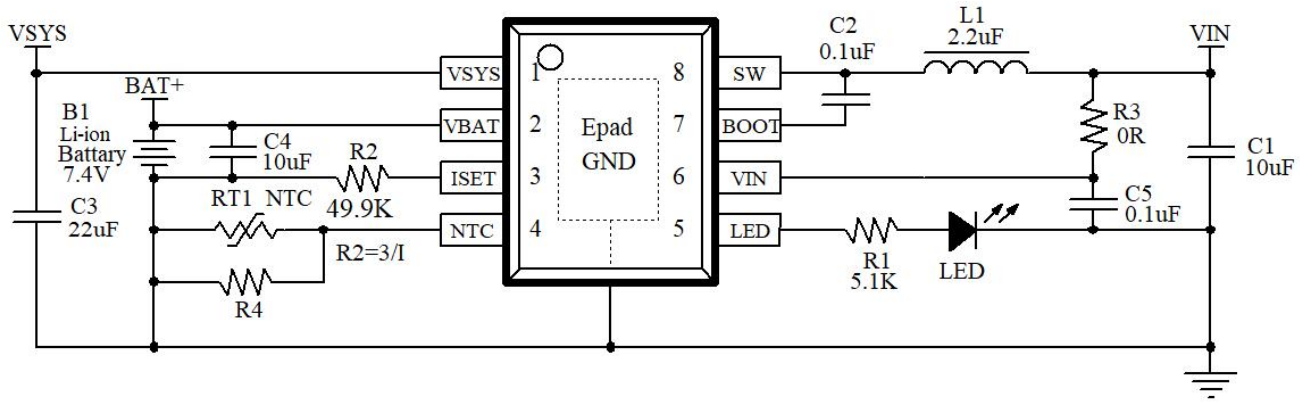
BC915_E supports NTC protection function, which can be used with NTC resistance to detect battery temperature; The BC915_E emits 20uA through the NTC pin, then detects the voltage generated by the current on the NTC resistor to determine the temperature, and turns off the charging when the detected temperature exceeds the set temperature. The BC915_E detects that the NTC pin voltage is at 0.45V, indicating that the battery temperature is too high and the charging stops. The NTC pin voltage is detected to rise to greater than 1.84V, indicating that the battery temperature is too low and charging is stopped.

If the NTC function is not required, connect the NTC pin to a 51K resistor to ground.

Example： RNTC=100K Thermistor(B=4100)， R4=120K， Corresponding temperature and NTC pin voltage

Temperature(°C)	RNTC Resistance value	R2//RNTC Resistance	NTC Pin voltage
0	246.7K	80.7K	1.85V
55	28.4K	22.7K	0.45V

SCHEMATIC DIAGRAM OF A TYPICAL APPLICATION



BC915_E Application diagram Without using R2, the charging current is 1.14A

5V input double-cell series lithium battery boost charging chip

BOM

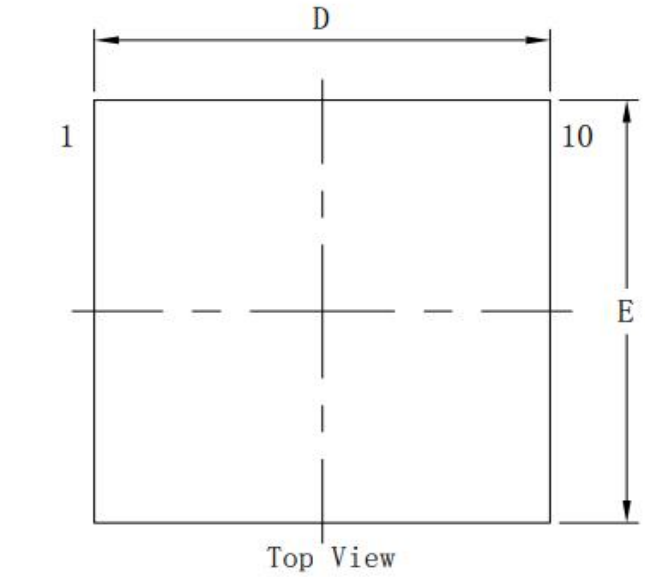
serial number	The name of the component	Model & Specification	unit	Dosage	location	remark
1	IC	BC915_E	PCS	1	U1	
2	inductance	0630 One-piece molding	PCS	1	L1	Saturation Isat, temperature rise current Idc is greater than 5A, DCR is less than 20 mOhm, and inductance is 2.2uH @750KHz
3	SMD capacitors	0805 10uF 25V 10%	PCS	2	C1、C4	If the withstand voltage value is greater than 16V, a chip ceramic capacitor is required
4	SMD capacitors	0603 1nF 50V 10%	PCS	1	C2	EMC selection
5	SMD capacitors	0805 22uF 25V 10 %	PCS	1	C3	If the withstand voltage value is greater than 16V, a chip ceramic capacitor is required
6	SMD capacitors	0603 0.1uF 25V 10%	PCS	1	C5	resistor in parallel
7	SMD resistors	0603 5.1K 5%	PCS	1	R1	Used to adjust LED brightness
8	SMD resistors	NC	PCS		R2	charging current 1.14A
	SMD resistors	0603 49.9K 1%	PCS	1	R2	BC915_E It is connected in parallel with the internal resistor of the chip to adjust the charging current to 1.2A.
9	SMD resistors	0603 0R 5%	PCS	1	R3	Input RC filtering
10	SMD resistors	0603 120K 1%	PCS	1	R4	Adjust the temperature protection range
11	SMD resistors	0603 4.7R 5%	PCS	1	R5	EMC selection
12	SMD LEDs	0603	PCS	1	LED	LED indicator with a maximum drive capacity of 5mA
13	NTC resistor	NTC 电阻	PCS	1	NTC	Select according to the design temperature; When not in use, connect a 51K resistor to ground

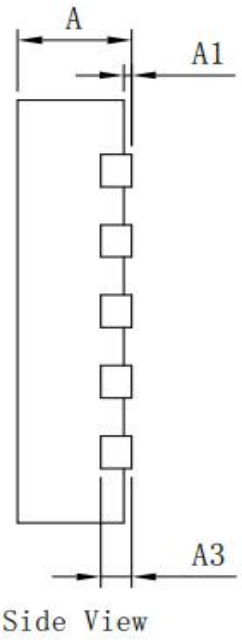
5V input double-cell series lithium battery boost charging chip

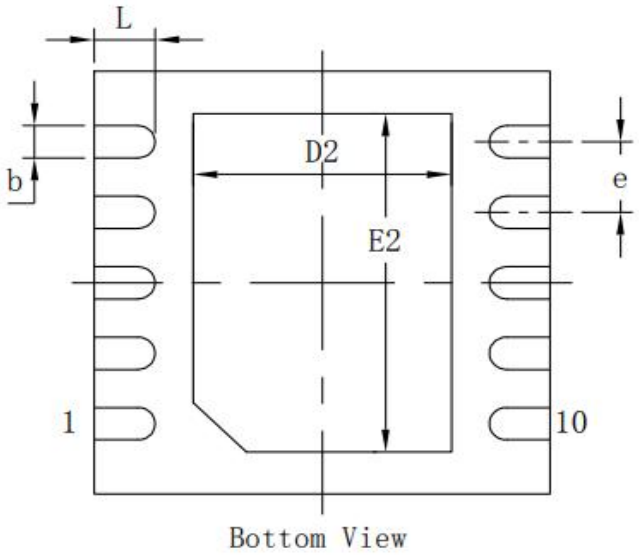
PACKAGE INFORMATION

DFN3*3_10

尺寸 / 标注	最小(mm)	标准(mm)	最大(mm)	尺寸 / 标注	最小(mm)	标准(mm)	最大(mm)
A	0.70	0.75	0.80	E	2.90	3.00	3.10
A1	-	-	0.05	D2	1.60	1.70	1.80
A3		0.203 REF		E2	2.30	2.40	2.50
b	0.18	0.23	0.28	e		0.50 TYP	
D	2.90	3.00	3.10	L	0.35	0.40	0.45







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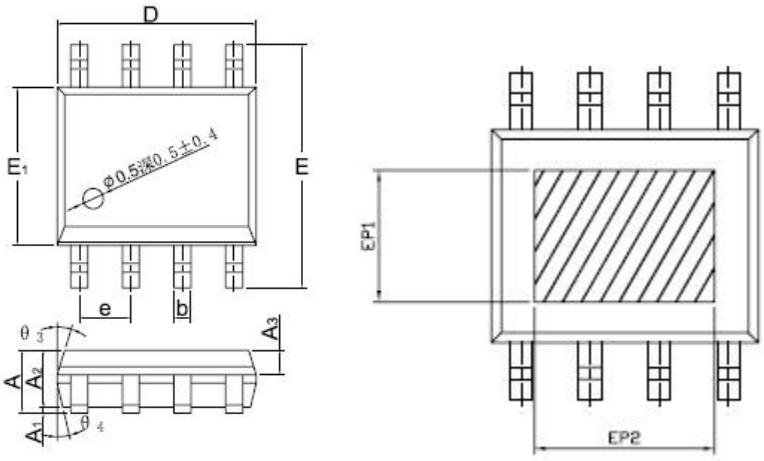
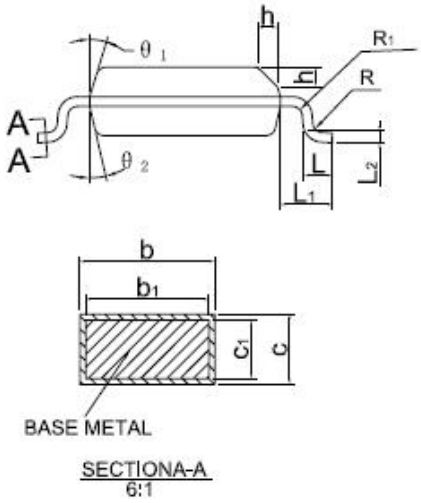
ESOP8





SECTIONA-A
6:1

DIMENSIONS IN MUILLIMETERS

SYMBOL	MIN	NOM	MAX
A	1.35	1.55	1.75
A1	0.00	——	0.10
A2	1.25	1.40	1.65
A3	0.50	0.60	0.70
b	0.39	——	0.49
b1	0.28	——	0.48
c	0.10	——	0.25
c1	0.10	——	0.23
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27BSC		
L	0.45	——	1.00
L1	1.04REF		
L2	0.25BSC		
R	0.07	——	——
R1	0.07	——	——
h	0.3	0.4	0.5
θ	0°	——	8°
θ1	11°	17°	19°
θ2	11°	13°	15°
θ3	15°	17°	19°
θ4	11°	13°	15°
EP1	2.40	——	——
EP2	3.30	——	——

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Revision history

Document revision history

Data	Version	Changes
26-May-2024	Ver0.1	First release
14- August-2024	Ver1.0	Version 1.0
18- May-2025	Ver1.4	The charging current is fixed at 1.2A without an external resistor
24- Dec-2025	Ver1.5	The model number is changed to BC915_E