

5V 输入双节串联锂电池升压充电芯片

FEATURES

- 输入工作电压范围 4.6V~6V, VIN 耐压 20V
- 升压充电效率 95%
- 最大支持 15W 功率
- 充电电池电压 2 串 8.4V
- 充电电压精度 $\pm 1\%$
- 涓流/恒流/恒压充电
- 恒流充电电流外部电阻可调
- 恒流充电精度 $\pm 10\%$
- 输入自适应充电 4.6V, 自动调节输入电流, 自适应适配器负载
- 支持充电 NTC 温度保护
- 电池反灌保护, 静态功耗 0 μ A
- 750KHz 开关频率
- LED 充电显示
- ESD 4KV
- 封装: ESOP8, (DFN3*3/DFN2*3 待定), QFN4*4
- 兼容 IP2325 (ESOP8), IP2326 (QFN4*4 的简化应用) 两节锂电应用;

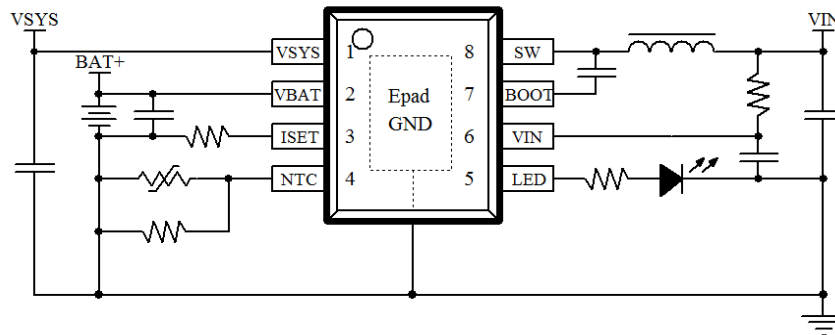
APPLICATIONS

- 双节锂电池/锂离子电池充电

DESCRIPTION

- BC915 是一款支持双节串联锂电池/锂离子电池的升压充电管理 IC。
- BC915 集成功率 MOS, 采用同步开关架构, 集成功率 MOS, 使其在应用时仅需极少的外围器件, 并有效减小整体方案的尺寸, 降低 BOM 成本。
- BC915 的升压开关充电转换器工作频率 750KHz; 5V 输入, 8V/1A 输出转换效率 95%;
- BC915 具有输入限压功能, 可以智能调节充电电流, 自适应适配器负载能力。
- BC915 支持外接电阻来调整充电电压; BC915 集成 NTC 保护功能, 配合 NTC 电阻。

PACKAGE AND APPLICATION



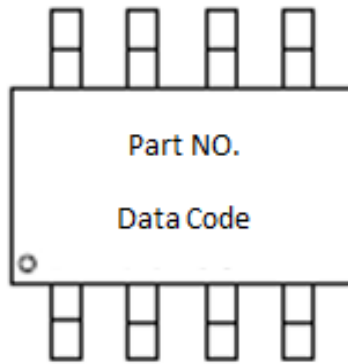
ESOP8 PACKAGE

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ORDERING INFORMATION

Orderable Part Number	Package Type	Package Qty	Op Temp(°C)
BC915	ESOP8	3000	-40~85
BC915	DFN3*3_10/DFN2*3_8	3000	-40~85
BC915	QFN4*4	3000	-40~85

MARK INFORMATION



ABSOLUTE MAXIMUM RATINGS (1)

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

参数	值	符号	单位
输入电压范围	V_{IN}	-0.3~18	V
电池电压范围	VBAT	-0.3~8.4	V
结温范围	T_J	-40 ~ 150	°C
存储温度范围	T_{stg}	-60 ~ 150	°C
人体模型 (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)

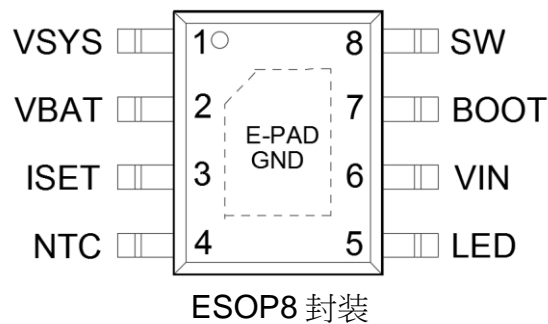
THERMAL METRIC			UNIT
热阻 (ESOP8)	θ_{JA}	45	°C/W
热阻 (DFN3*3)	θ_{JA}	65	°C/W
热阻 (QFN4*4)	θ_{JA}	55	°C/W

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

RECOMMENDED OPERATING CONDITIONS

参数	符号	最小值	典型值	最大值	单位
输入电压	V_{IN}	4.5	5	6	V

*超出这些工作条件，器件工作特性不能保证。

PINOUT


Package			Name	Function
DFN10	ESOP8	QFN24		
1	1	19, 20	VSYS	输出电压端，外接 22uF 电容
2	2	21, 22	VBAT	电池端
3	3	11	ISET	充电电流设置端，外接电阻

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4	4	4	NTC	电池温度检测，拉高或者拉低，终止充电，可以复用做均衡控制端，一旦外部均衡芯片检测到电池电压偏差较大，可以通过 NTC 来终止充电，或者开启充电
5	5	6	LED	LED 显示端
6	6	13	VIN	充电输入端
7	7	14	BOOT	Bootstrap 端,自举电路引脚
8	8	15, 16, 17	SW	Switching 端, DC/DC 开关节点, 链接电感
EPAD	EPAD	EPAD, 18	GND	系统地和功率地
		1,2,3,5,7,8,9,10,12 23,24	NC	

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

ELECTRICAL CHARACTERISTICS

Conditions are $-40^{\circ}\text{C} \leq (T_j = T_A) \leq 125^{\circ}\text{C}$ and $4.5\text{ V} \leq V_{\text{IN}} \leq 5.5\text{ V}$ unless otherwise noted. Typical value is at 25°C . All voltages are with respect to GND unless otherwise noted. 除特殊说明外， $T_A=25^{\circ}\text{C}$ ， $L=2.2\mu\text{H}$ ， $V_{\text{IN}}=5\text{V}$ ， $V_{\text{OUT}}=7.4\text{V}$

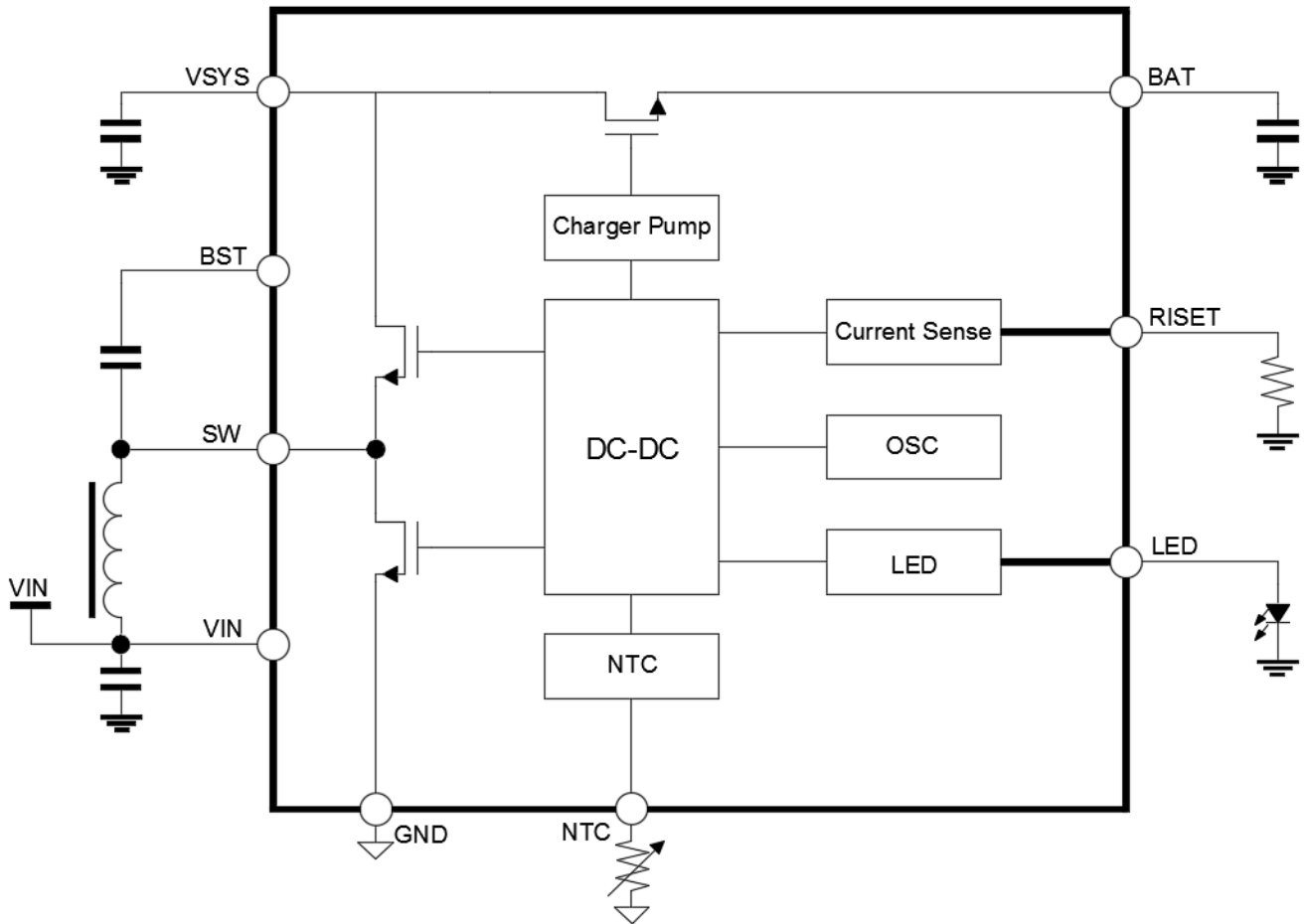
参数	符号	测试条件	最小值	典型值	最大值	单位
输入电压	V_{IN}		4.5	5	6	V
输入欠压	$V_{\text{IN_UVLO}}$			4.3		V
	迟滞			20		mV
输入过压	$V_{\text{IN_OVP}}$			5.8		V
	迟滞			0.2		V
输入静态电流	I_{q}	$V_{\text{IN}}=5\text{V}$ ， $V_{\text{BAT}}=10\mu\text{F}$	2	3		mA
电池反灌电流		$V_{\text{IN}}=0\text{V}$ ， $V_{\text{BAT}}=8.4\text{V}$		0		μA
开关频率				750		KHZ
涓流充电电流	I_{trick}	$V_{\text{BAT}} \leq 6\text{V}$		100		mA
涓流充电转恒流充电 电 阈 值	VTRKL	V_{BAT} rising		6		V
	VTRKL_HYS	V_{BAT} falling		5.7		V
短路电流				130		mA
短路转涓流阈值				2		V
迟滞				1.6		V
恒流电流		$I_{\text{BAT}}(\text{RISET}=3\text{K})$		1		A
恒流充电电流精度				± 10		%

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充电电压	VBAT			8.4		V
充电电压精度				±1		%
充电截止电流	Iterm	IBAT(RISET=3.9K) CC 10%		100		mA
充电截止检测时间	Tterm			1		s
Recharge 阈值	VBAT _{rechg}			8.05		V
温度环路阈值				120		°C
芯片过温		OTP		150		°C
		迟滞		20		°C

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FUNCTIONAL BLOCK DIAGRAM



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9 LED 显示模式

模式 1：单色灯

	充电	充满	FAULT
LED1	常亮	灭	闪 1Hz

10 充电电流设置

充电电流大小设置： $(IBAT * R ISET) / 2K = 1.5V$

11 充电 NTC

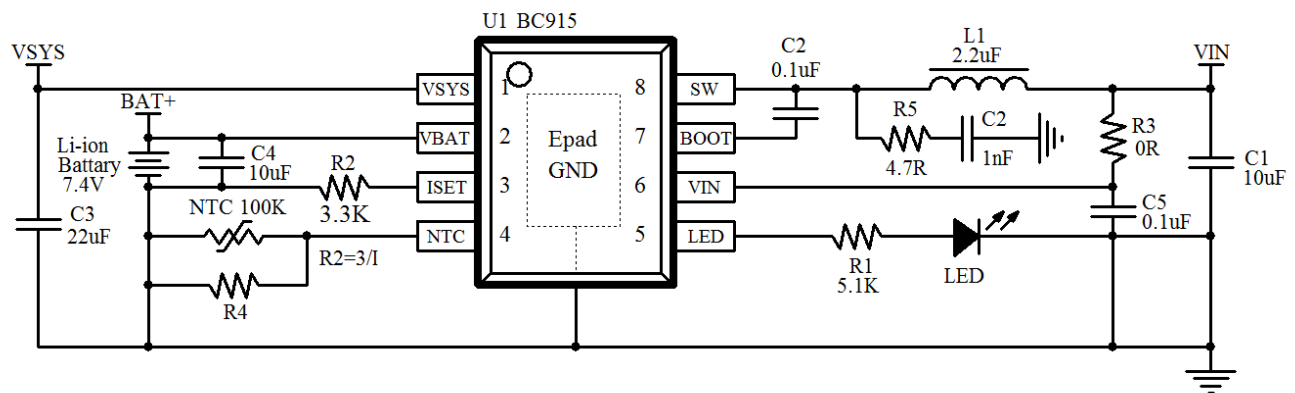
BC915 支持 NTC 保护功能，可配合 NTC 电阻来检测电池温度；BC915 通过 NTC 引脚放出 22uA 电流，然后检测该电流在 NTC 电阻上产生的电压，来判断温度高低，当检测温度超过设定的温度时，关闭充电。BC915 检测到 NTC 引脚电压在 0.45V，表示电池温度过高，停止充电。检测到 NTC 引脚电压上升到大于 1.84V，表示电池温度过低，停止充电。

如果不需要 NTC 功能，将 NTC 引脚接 51K 电阻到地

举例：RNTC=100K 热敏电阻(B=4100)，R2=82K，对应的温度和 NTC 引脚电压

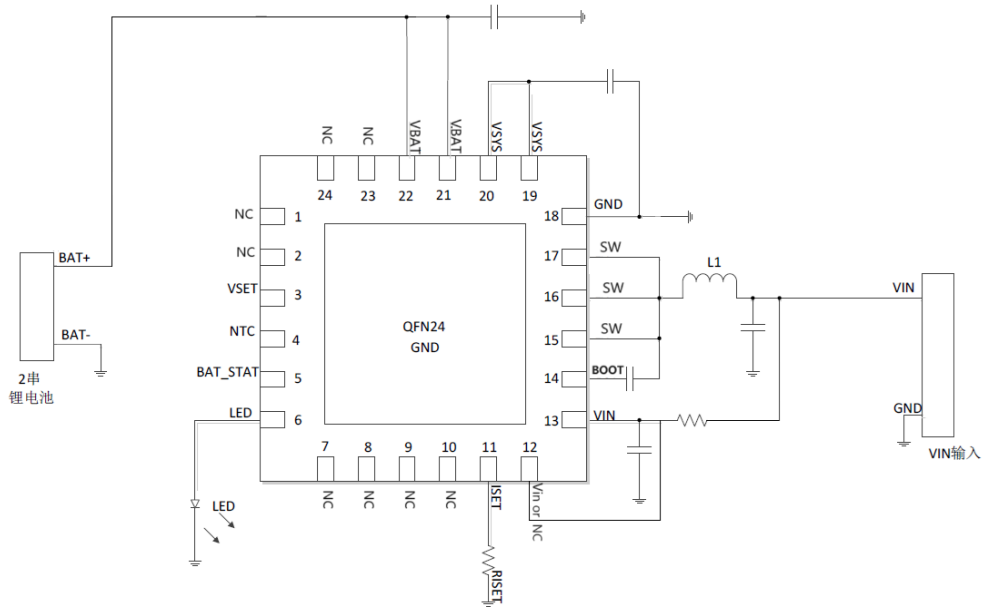
温度(度)	RNTC 电阻阻值	R2//RNTC 阻值	NTC 引脚电压
0	246.7K	66.3K	1.84V
45	41.2K	27.8K	0.56V
55	28.4K	21.1K	0.45V

典型应用原理图



ESOP8 应用图

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QFN24 应用简化图

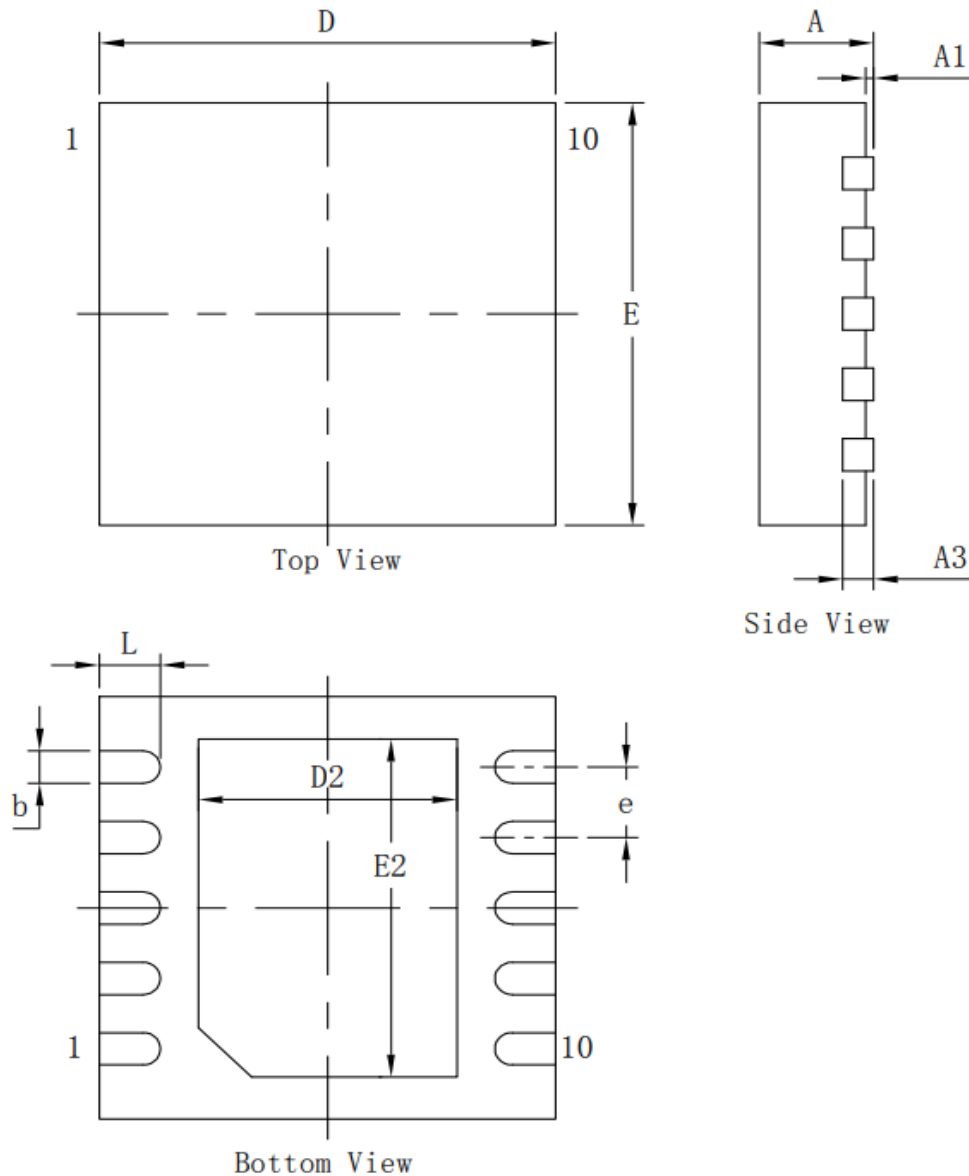
序号	元件名称	型号&规格	单位	用量	位置	备注
1	IC	BC915	PCS	1	U1	
2	电感	0630 一体成型	PCS	1	L1	饱和 Isat、温升电流 Idc 大于 5A, DCR 小于 20 毫欧, 感值 2.2uH @750KHz
3	贴片电容	0805 10uF 25V 10%	PCS	3	C1、C4	耐压值大于 16V, 需用贴片陶瓷电容
4	贴片电容	0603 1nF 50V 10%	PCS	1	C2	EMC 选用
5	贴片电容	0805 22uF 25V 10%	PCS	2	C3	耐压值大于 16V, 需用贴片陶瓷电容
6	贴片电容	0603 0.1uF 25V 10%	PCS	1	C5	
7	贴片电阻	0603 5.1K 5%	PCS	1	R1	用于调整 LED 亮度
8	贴片电阻	0603 3.3K 1%	PCS	1	R2	调整充电电流
9	贴片电阻	0603 0R 5%	PCS	1	R3	输入 RC 滤波
10	贴片电阻	0603 120K 1%	PCS	1	R4	调整温度保护范围
11	贴片电阻	0603 4.7R 5%	PCS	1	R5	EMC 选用
12	贴片 LED	0603	PCS	1	LED	LED 指示灯, 最大驱动能力 5mA
13	NTC 电阻	NTC 电阻	PCS	1	NTC	根据设计温度选择; 不使用时, 接 51K 电阻到地

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PACKAGE INFORMATION

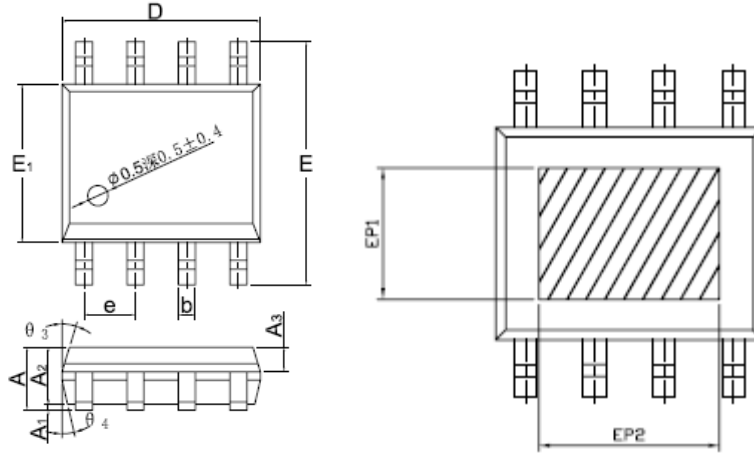
DFN3*3_10

标注 \ 尺寸	最小 (mm)	标准 (mm)	最大 (mm)	标注 \ 尺寸	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



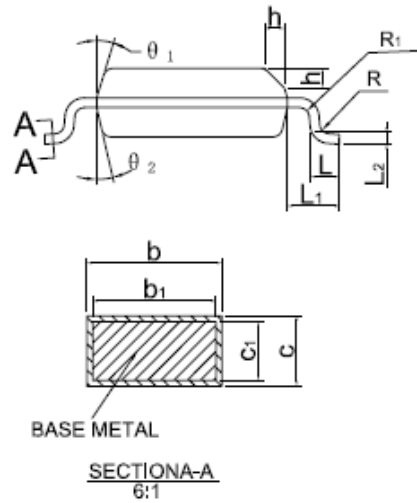
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ESOP8



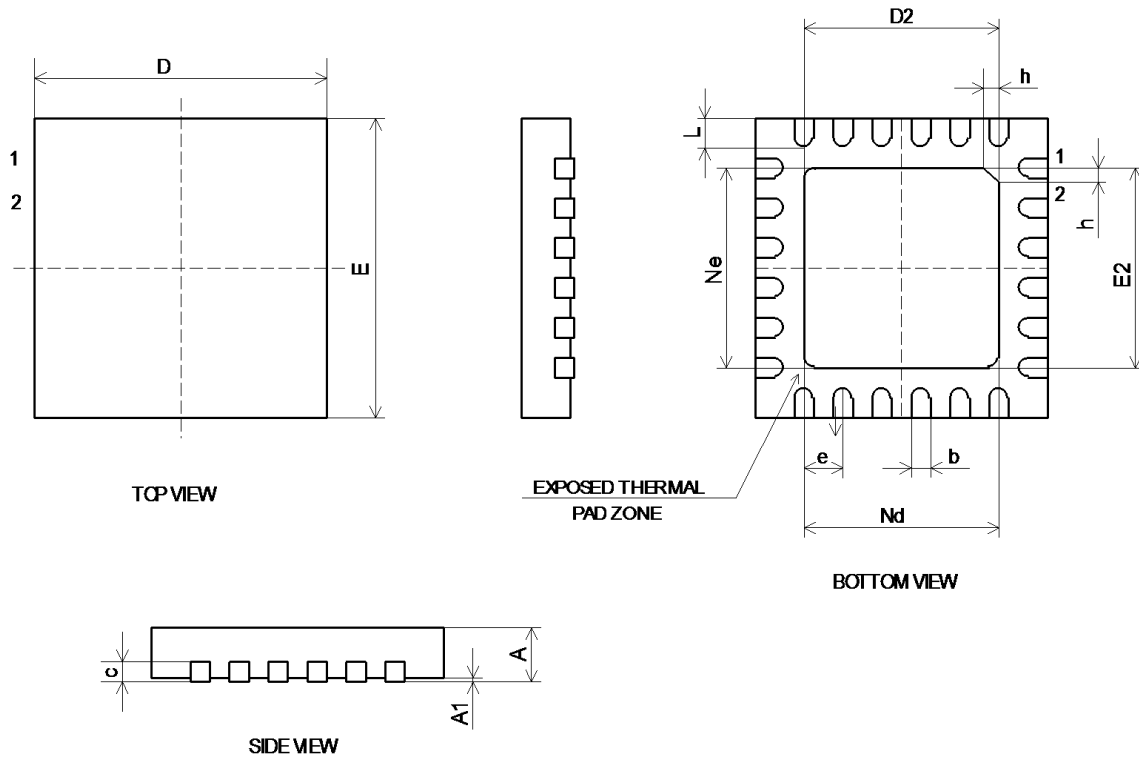
DIMENSIONS IN MILLIMETERS

SYMBOL	MIN	NOM	MAX
A	1,35	1,55	1,75
A ₁	0,00	—	0,10
A ₂	1,25	1,40	1,65
A ₃	0,50	0,60	0,70
b	0,39	—	0,49
b ₁	0,28	—	0,48
c	0,10	—	0,25
c ₁	0,10	—	0,23
D	4,80	4,90	5,00
E	5,80	6,00	6,20
E ₁	3,80	3,90	4,00
e	1,27BSC		
L	0,45	—	1,00
L ₁	1,04REF		
L ₂	0,25BSC		
R	0,07	—	—
R ₁	0,07	—	—
h	0,3	0,4	0,5
θ_1	0°	—	8°
θ_2	11°	17°	19°
θ_3	11°	13°	15°
θ_4	15°	17°	19°
θ_5	11°	13°	15°
EP1	2,40	—	—
EP2	3,30	—	—



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QFN4*4



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	-	0.02	0.05
b	0.18	0.25	0.30
c	0.18	0.20	0.25
D	3.90	4.00	4.10
D2	2.40	2.50	2.60
e	0.50BSC		
Ne	2.50BSC		
Nd	2.50BSC		
E	3.90	4.00	4.10
E2	2.40	2.50	2.60
L	0.35	0.40	0.45
h	0.30	0.35	0.40

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REVISION HISTORY

Document revision history

Data	Version	Changes
26-May-2024	Ver0.2	First release