

## PFM Step-Up DC-DC Converter

### General Description

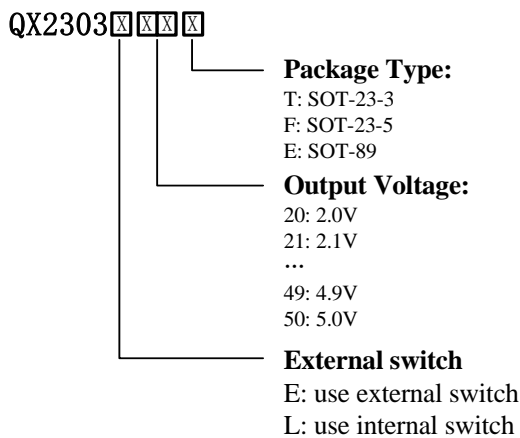
The QX2303 Series are PFM step-up DC-DC converters with very low ripple noise due to the high operation frequency. The maximum operation frequency is 260KHz.

Only three components are required to realize the conversion from the battery voltage to a selected output voltage.

A driver pin (EXT) is provided for driving external power transistor to extend the output current capability where large current is required.

Enable pin (EN) is also provided so that the circuit can be powered down.

### Ordering Information



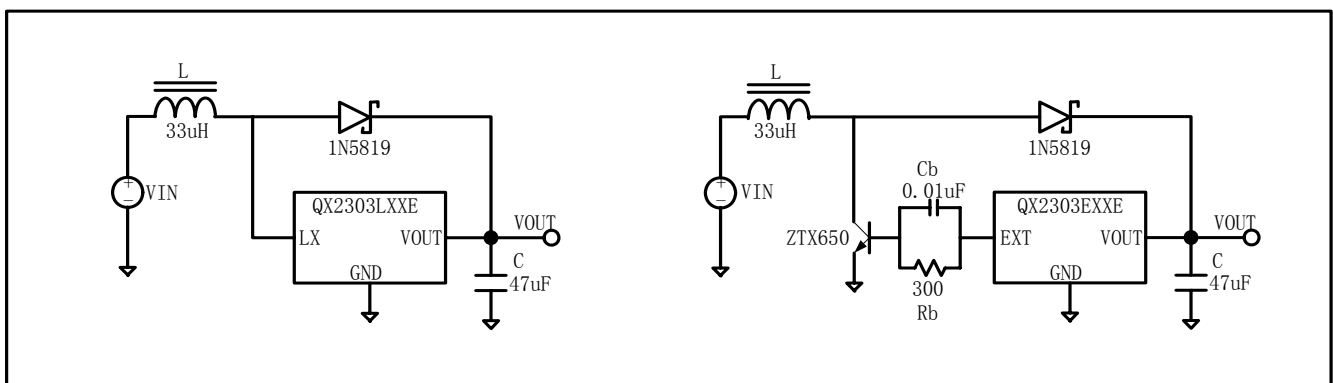
### Features

- 260KHz Maximum Operation Frequency
- 2.0V to 5.0V Output Voltage With 0.1V Step
- Low Start-up Voltage: 0.8V at 1mA
- $\pm 2.5\%$  Output Voltage Accuracy
- Up to 87% Efficiency
- Output current: 300mA at 2.5V input, 3.3V output
- Low Ripple and Low Noise
- Output Current Extendable by External Switch

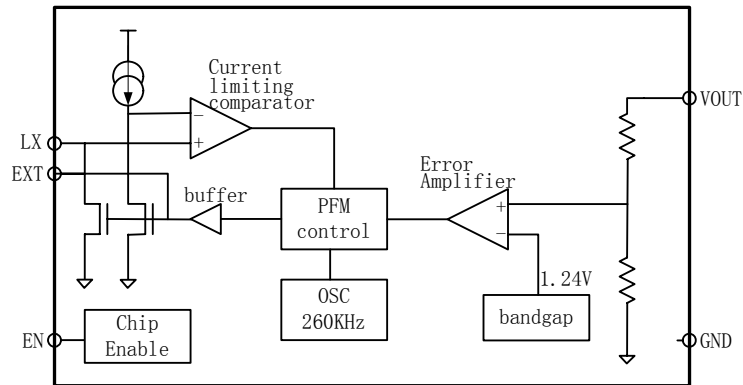
### Applications

- Power source for applications where a higher voltage than the battery voltage is required
- One to three cell battery devices
- Power source for cameras, camcorders, VCRs, PDAs, LED and hand held communication instrument

### Typical Applications

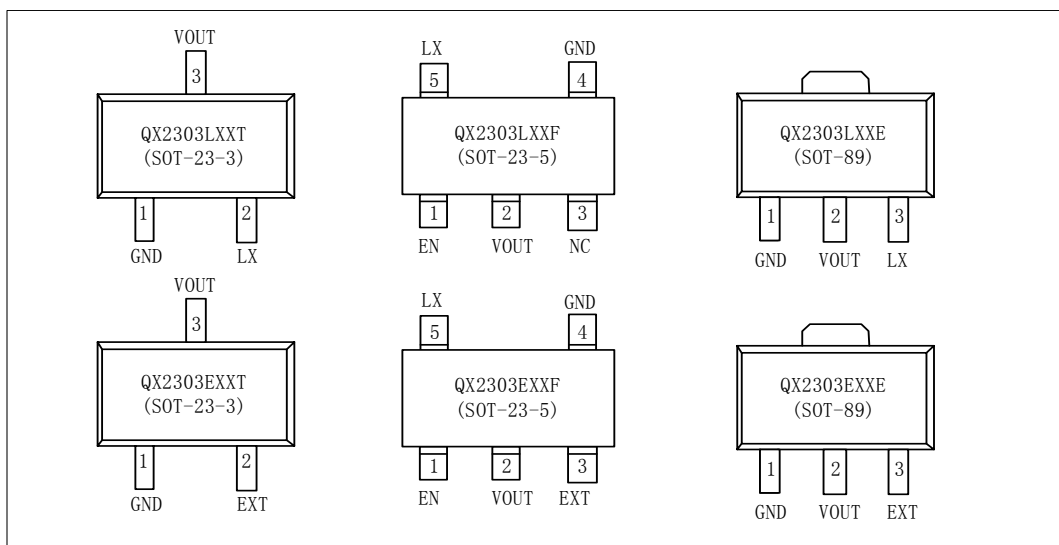


## Block Diagram



## Pin Assignment

Pin Name	Part Marking and Package Type						Description
	QX2303 LXXT SOT-23-3	QX2303 LXXF SOT-23-5	QX2303 LXXE SOT-89	QX2303 EXXT SOT-23-3	QX2303 EXXF SOT-23-5	QX2303 EXXE SOT-89	
	LX	2	5	3	-	5	
EXT	-	-	-	2	3	3	Buffer output for external transistor
VOUT	3	2	2	3	2	2	Output voltage
EN	-	1	-	-	1	-	Chip enable (active high)
GND	1	4	1	1	4	1	Ground
NC	-	3	-	-	-	-	No connection



## Absolute Maximum Ratings

Type	Symbol	Description	Value	Unit
Voltage	V <sub>max</sub>	Maximum voltage on VOUT and VLX pins	8	V
	V <sub>min-max</sub>	Voltage range on EXT and EN pins	-0.3-VOUT+0.3	V
Current	ILX <sub>max</sub>	Maximum current on LX pin	1000	mA
	IEXT <sub>max</sub>	Maximum current on EXT pin	100	mA
Power dissipation	Psot-23-3	Maximum Power dissipation for SOT-23-3 package	0.25	W
	Psot-23-5	Maximum Power dissipation for SOT-23-5 package	0.25	W
	Psot-89	Maximum Power dissipation for SOT-89 package	0.5	W
Thermal	T <sub>min-max</sub>	Operation temperature range	-20-85	°C
	T <sub>storage</sub>	Storage temperature range	-40-165	°C
ESD	VESD	ESD voltage for human body mode	2000	V

## Electronic Characteristics

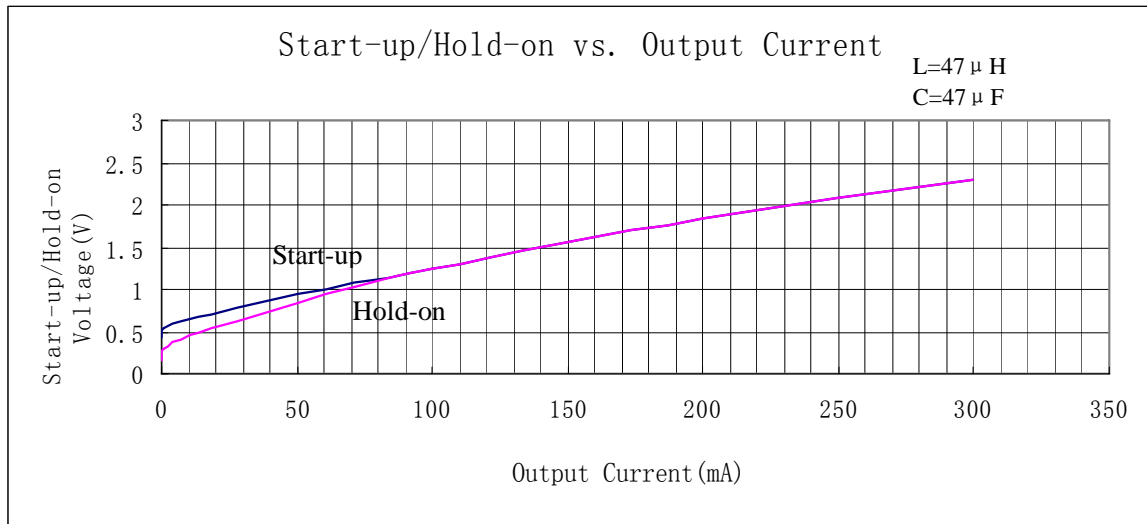
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Output voltage accuracy	$\Delta$ V <sub>OUT</sub>		-2.5		2.5	%
Maximum input voltage	V <sub>INMAX</sub>		0.7		VOUT	V
Start-up voltage	V <sub>START</sub>	I <sub>LOAD</sub> =1mA, V <sub>IN</sub> :0→2V			0.85	V
Hold-on voltage	V <sub>HOLD</sub>	I <sub>LOAD</sub> =1mA, V <sub>IN</sub> :2→0V	0.6			V
Maximum oscillation frequency	F <sub>MAX</sub>		200	260	280	KHz
Oscillator duty cycle	DC <sub>OSC</sub>		75	80	85	%
Efficiency	$\eta$			84	87	%
Current limit	I <sub>LIMIT</sub>		600	800	1000	mA
Input current at no load	I <sub>IN0</sub>	V <sub>IN</sub> =1.8V V <sub>OUT</sub> =3.0V		20		uA
		V <sub>IN</sub> =1.8V V <sub>OUT</sub> =5.0V		25		uA
Input standby current	I <sub>INQ</sub>	No load, EN="low"			1	uA
EN "High" voltage level			0.4*VOUT			V
EN "low" level					0.2	V

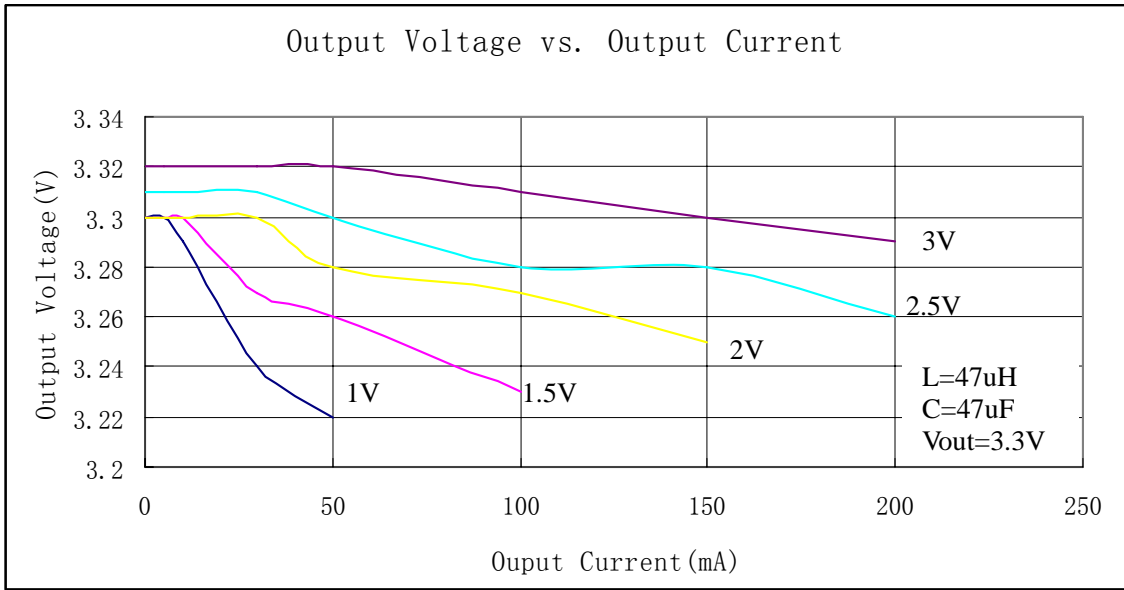
# QX2303

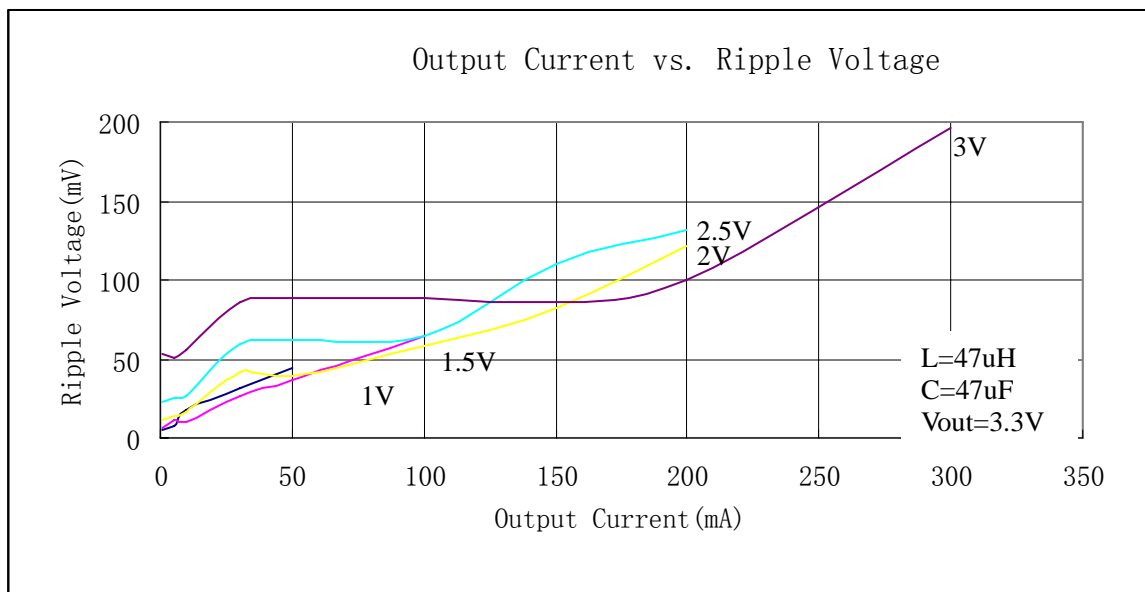
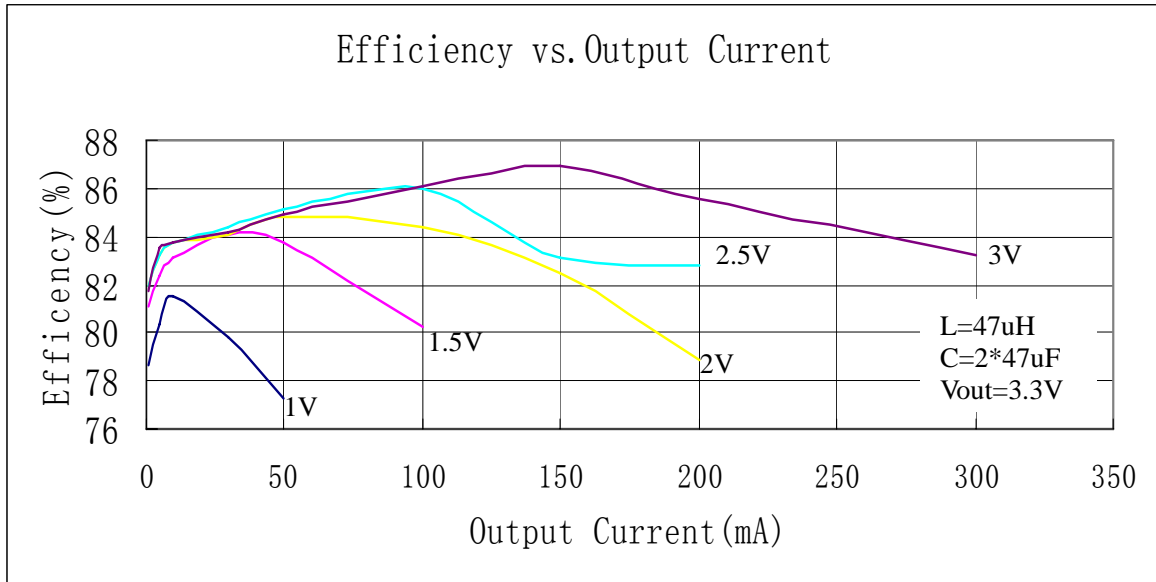
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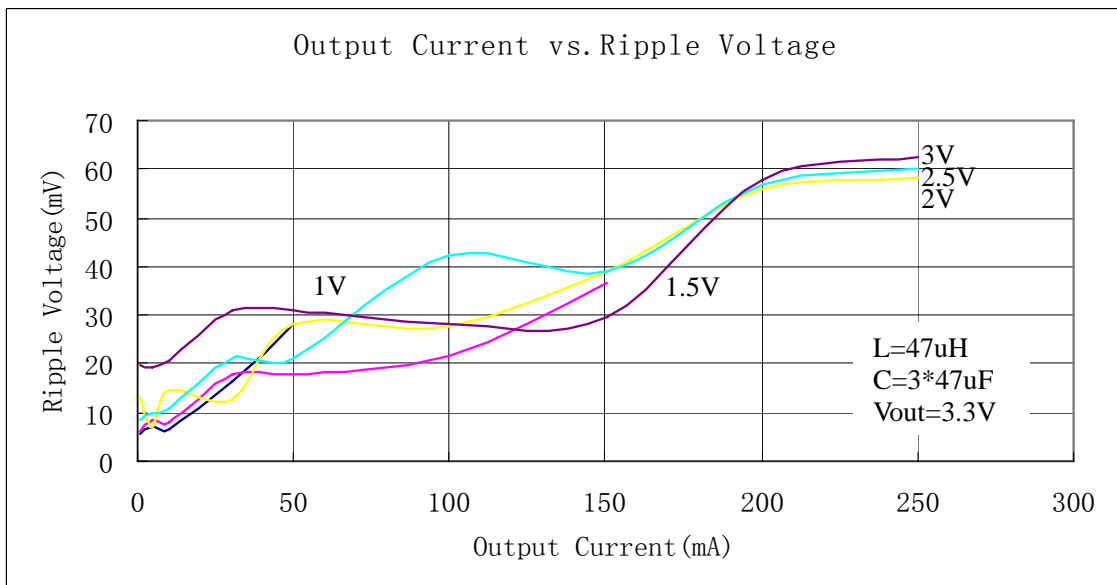
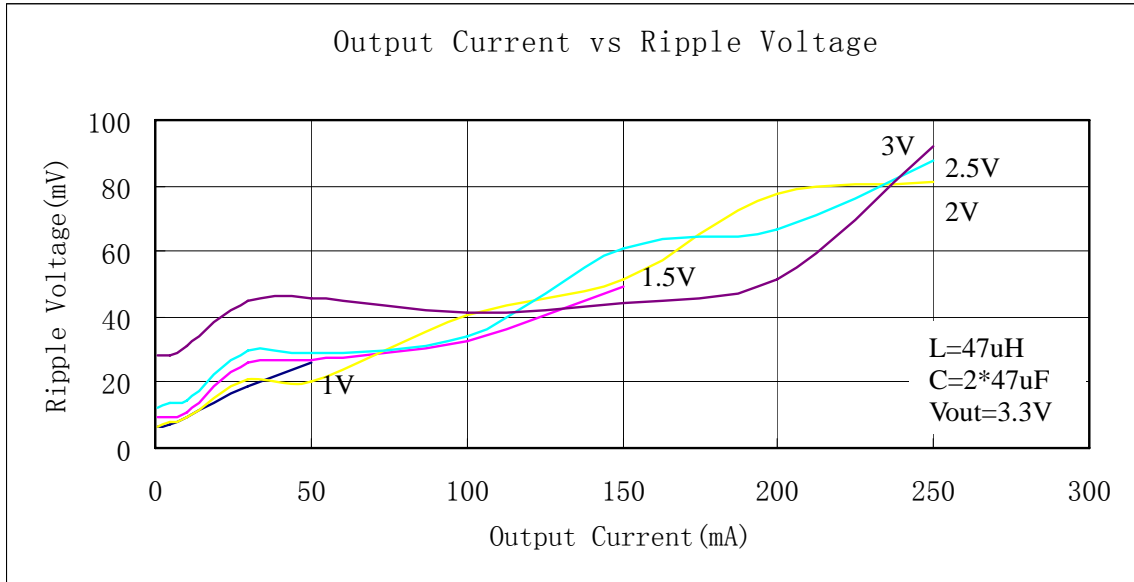
EN "high" input current					0.1	uA
EN "low" input current			-0.1			uA
EXT output current			-5		5	mA

## Typical Characteristics (Using Internal Switch Transistor)



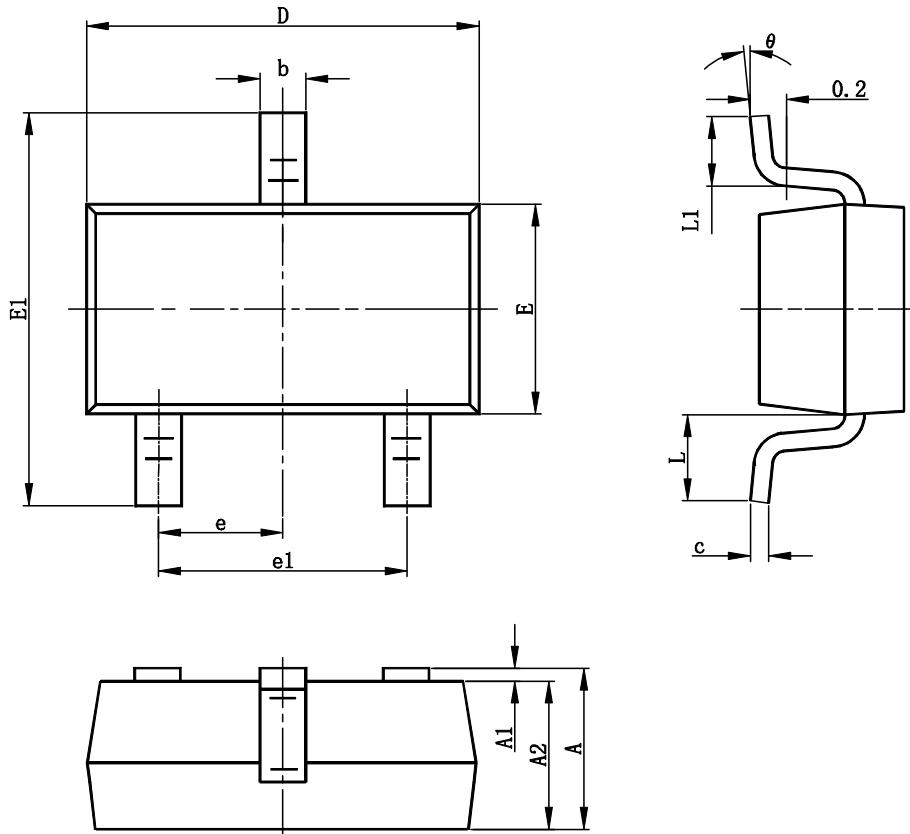






## Package Information

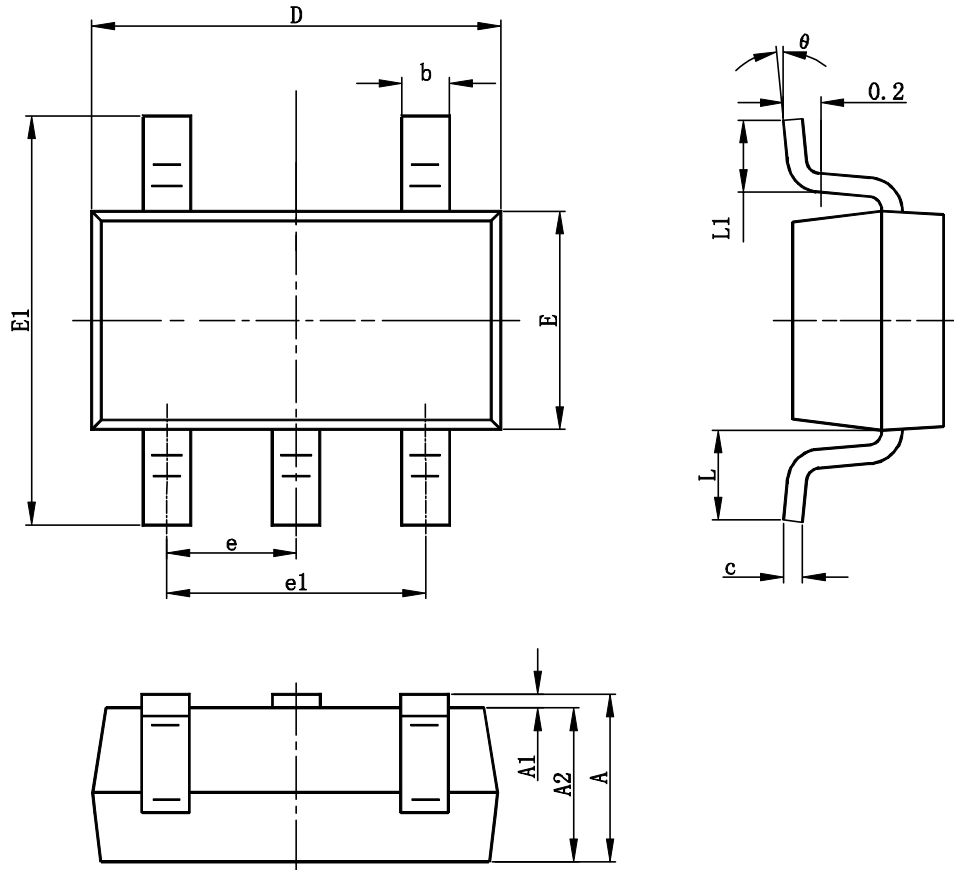
### SOT-23-3L PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
B	0.300	0.400	0.012	0.016
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950TYP		0.037TYP	
e1	1.800	2.000	0.071	0.079
L	0.700REF		0.028REF	
L1	0.300	0.600	0.012	0.024
?	0	8	0	8

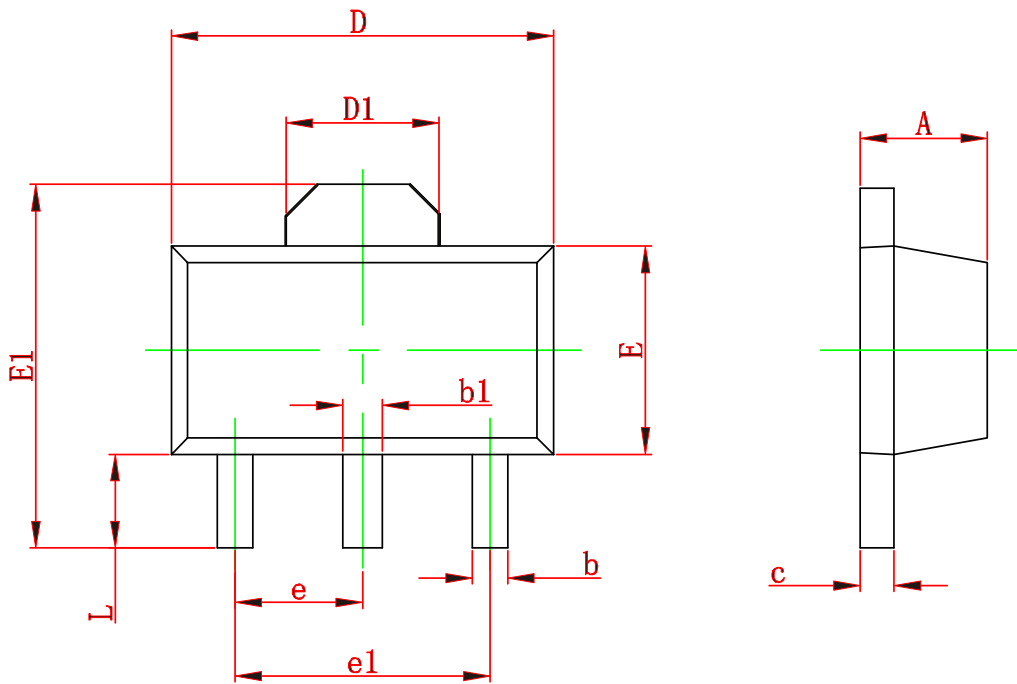


## SOT-23-5L PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeter		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.400	0.012	0.016
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950TYP		0.037TYP	
e1	1.800	2.000	0.071	0.079
L	0.700REF		0.028REF	
L1	0.300	0.600	0.012	0.024
?	0	8	0	8

## SOT-89-3L PACKAGE OUTLINE DIMENSIONS



Symbol	In Millimeter Dimensions		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.197
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF		0.061 REF	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP		0.060 TYP	
e1	3.000 TYP		0.118 TYP	
L	0.900	1.200	0.035	0.047