

## Adjustable High Output Voltage High Efficiency Step-Up DC/DC Converter

### ■ INTRODUCTION

The SMD301 is a CMOS step-up switching DC/DC converter, which allows the duty ratio to be automatically switched according to the load (light load: 50%, high output current: 75%), enabling products with a low ripple over a wide range, high efficiency, and high output current. With the SMD301, a step-up switching DC/DC converter can be configured by using an external coil, capacitor, diode and NMOS. This feature, along with the mini package and low current consumption, makes the SMD301 ideal for applications such as the power supply unit of portable equipment.

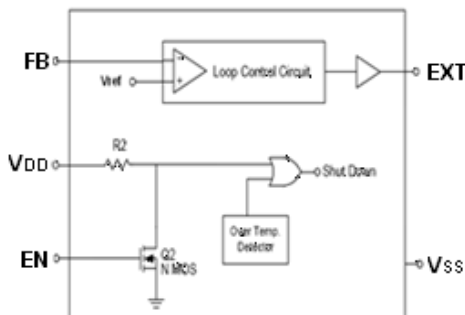
### ■ FEATURES

- Low voltage operation: Oscillation start voltage at 0.8V
- Duty ratio: 50/75%, built-in auto switching
- External parts: Coil, capacitor, diode, NMOS
- High efficiency: 85% (typ.)
- Output voltage Adjustable
- Providing Flexibility for Using External Power Switches
- Zero Shutdown Mode Supply Current
- 6 $\mu$ A Quiescent (Switch-off) Supply Current
- Small SOT-23-5, SOT-89-5 Package

### ■ APPLICATIONS

- PDA
- LCD Panel
- Portable Instrument
- DSC
- RF-Tags
- Wireless Equipment

### ■ BLOCK DIAGRAM

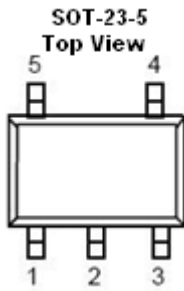


### ■ ORDERING INFORMATION

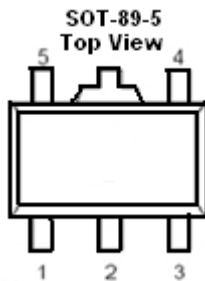
#### SMD301 ① ② ③ ④

DESIGNATOR	SYMBOL	DESCRIPTION
①	A	Output Voltage Adj, EXT
	B	Output Voltage Adj, EXT, EN
②③④	Integer	FB, Voltage EXP: $V_{FB}=1.25V$ , Number125
		EXP: $V_{FB}=3.3V$ , Number nothing
⑤	M	Package: SOT-23-5
	P	Package: SOT-89-5

## ■ PIN CONFIGURATION



PIN NUMBER (SOT-23-5)		PIN NAME	FUNCTION
SMD301A	SMD301B		
1	1	FB	Feedback Input Pin
2	2	V <sub>DD</sub>	IC power supply pin
-	3	EN	Chip Enable (Active High)
3	-	NC	No Connection
4	4	V <sub>SS</sub>	Ground
5	5	EXT	External transistor connection pin



PIN NUMBER (SOT-89-5)		PIN NAME	FUNCTION
SMD301A	SMD301B		
-	1	EN	Chip Enable (Active High)
1	-	NC	No Connection
2	2	V <sub>DD</sub>	IC power supply pin
3	3	FB	Feedback Input Pin
4	4	EXT	External transistor connection pin
5	5	V <sub>SS</sub>	Ground

## ■ ABSOLUTE MAXIMUM RATINGS

(Unless otherwise specified, T<sub>A</sub>=25°C)

PARAMETER		SYMBOL	RATINGS	UNITS
V <sub>DD</sub> pin voltage		V <sub>DD</sub>	V <sub>SS</sub> -0.3 ~ V <sub>SS</sub> +8	V
EN pin voltage		EN	V <sub>SS</sub> -0.3 ~ V <sub>SS</sub> +8	V
Power dissipation	SOT-23-5	PD	400	mW
	SOT-89-5		600	mW
Operating temperature		T <sub>opr</sub>	-40 ~ +85	°C
Storage temperature		T <sub>stg</sub>	-55 ~ +150	°C
Soldering Temperature & Time		T <sub>solder</sub>	260°C, 10s	

## ■ ELECTRICAL CHARACTERISTICS

(Unless otherwise specified,  $T_A = 25^\circ\text{C}$ )

PARAMETER	SYMBOL	CONDITONS	MIN	TYP	MAX	UNITS
Feedback Voltage	$V_{FB}$	—	$V_{FB(s)} \times 0.98$	$V_{FB}$	$V_{FB(s)} \times 1.02$	V
Input voltage	$V_{IN}$	—	—	—	6	V
Oscillation start voltage	$V_{ST}$	No external parts, voltage applied to $V_{OUT}$ LX pulled up to $V_{OUT}$ via 300 $\Omega$ resistor			0.8	V
Current consumption 1	$I_{SS1}$	$V_{DD} = 5V, FB = V_{SS}$ , Continuously Switching	—	30	60	$\mu\text{A}$
Current consumption 2	$I_{SS2}$	$V_{DD} = 5V, FB = V_{DD}$ , No Switching	—	6	10	$\mu\text{A}$
Shutdown Current	$I_{SSS}$	$V_{DD} = 5V, V_{EN} = 0V$	—	—	1.0	$\mu\text{A}$
Line regulation	$\Delta V_{OUT1}$	$V_{IN} = 0.4 \times V_{OUT} \sim 0.6 \times V_{OUT}$ ( $V_{OUT} = 5V$ )	—	20	50	mV
Load regulation	$\Delta V_{OUT2}$	$I_{OUT} = 10 \mu\text{A} \sim 50\text{Ma}$ ( $V_{OUT} = 5V$ )	—	20	50	mV
Oscillation frequency	$f_{OSC}$			100		KHz
Duty ratio 1	Duty1	$V_{OUT} = 0.95 \times V_{OUT}$ , measure waveform at LX pin	70	75	85	%
Duty ratio 2	Duty2	Measure waveform at LX pin with light load	—	50	—	%
Efficiency	EFF1			85		%
Shutdown pin input voltage	$V_{SH}$	$V_{OUT} = 0.95 \times V_{OUT}$ , judge oscillation at EXT pin	0.75	—	—	V
	$V_{SL1}$	$V_{OUT} = 0.95 \times V_{OUT}$ , judge stop at EXT pin	—	—	0.3	V
Shutdown pin input current	$I_{SH}$	$V_{EN} = 8V$	—	—	0.1	$\mu\text{A}$
	$I_{SL}$	$V_{EN} = 0V$	—	—	0.1	$\mu\text{A}$

Remark: 1、 $V_{IN} = V_{OUT(s)} \times 0.6$  applied,  $I_{OUT} = V_{OUT(s)} / 250 \Omega$ .

2、Shutdown function built-in type: EN pin is connected to  $V_{OUT}$ .

3、 $V_{OUT(s)}$  specified above is the set output voltage value, and  $V_{OUT}$  is the typical value of the actual output voltage.

## ■ STANDARD CIRCUITS

**Component:** Inductor: 22uH(Sumida)

Diode: IN5817、IN5819

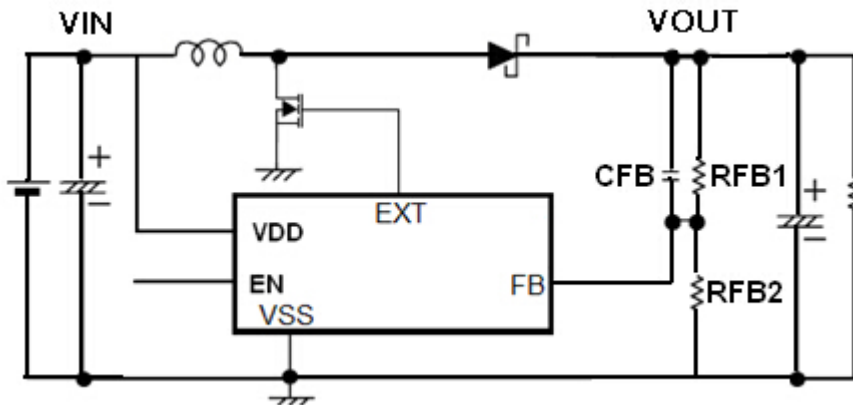
Capacitor: 47uF (Tantalum type)

MOS: CE2312、XP151、XP161

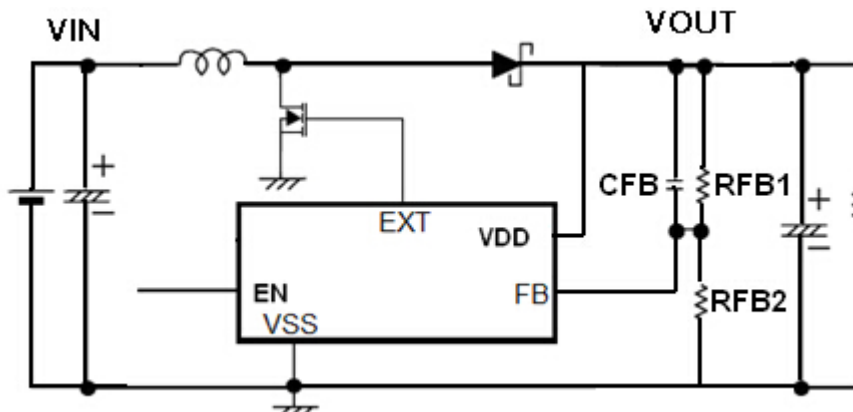
$R_{FB}$ : Set up so that  $R_{FB1}/R_{FB2} = (V_{OUT} - V_{FB}) / V_{FB}$  ( $V_{OUT}$ =set-up output voltage),  
Please use with  $R_{FB1} + R_{FB2} \leq 2M \Omega$

$C_{FB}$ : Set up that  $F_{zfb} = 1/(2 \times \pi \times C_{FB} \times R_{FB1})$  is within the Adjustments necessary  
in respect of L,CL.

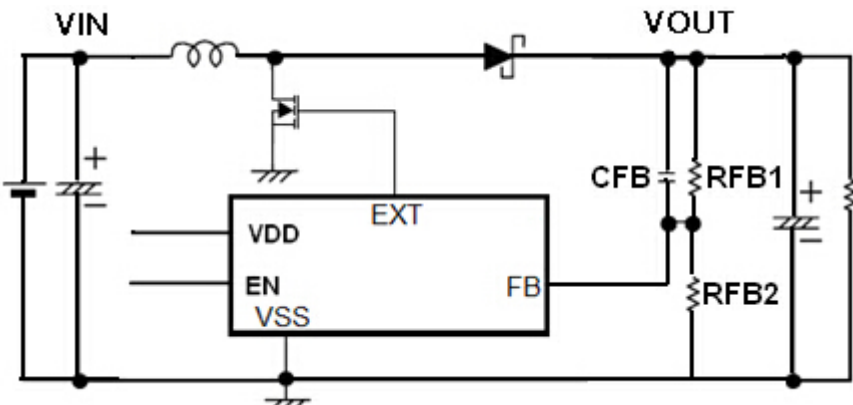
### 1、SMD301 Circuits 1:( $3V \leq V_{IN} \leq 8V$ )



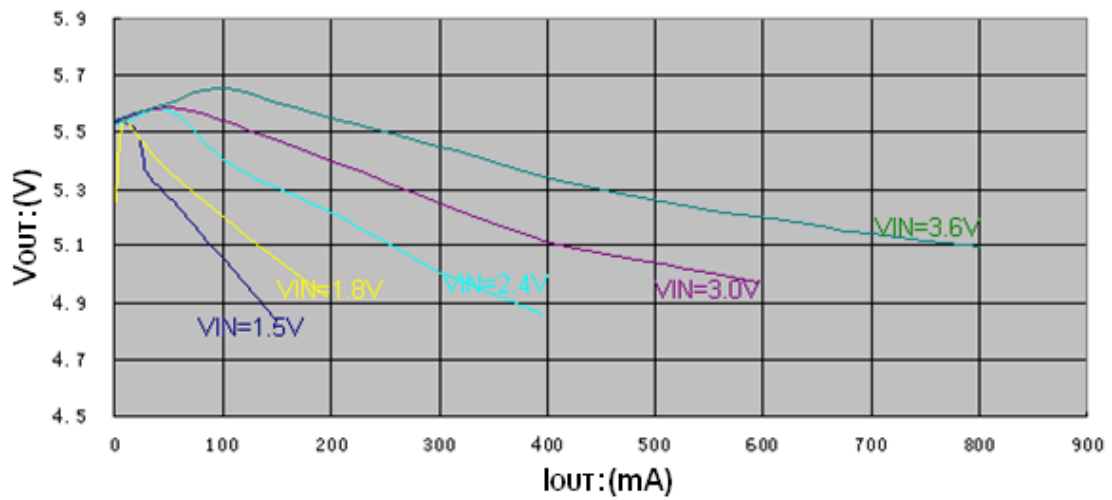
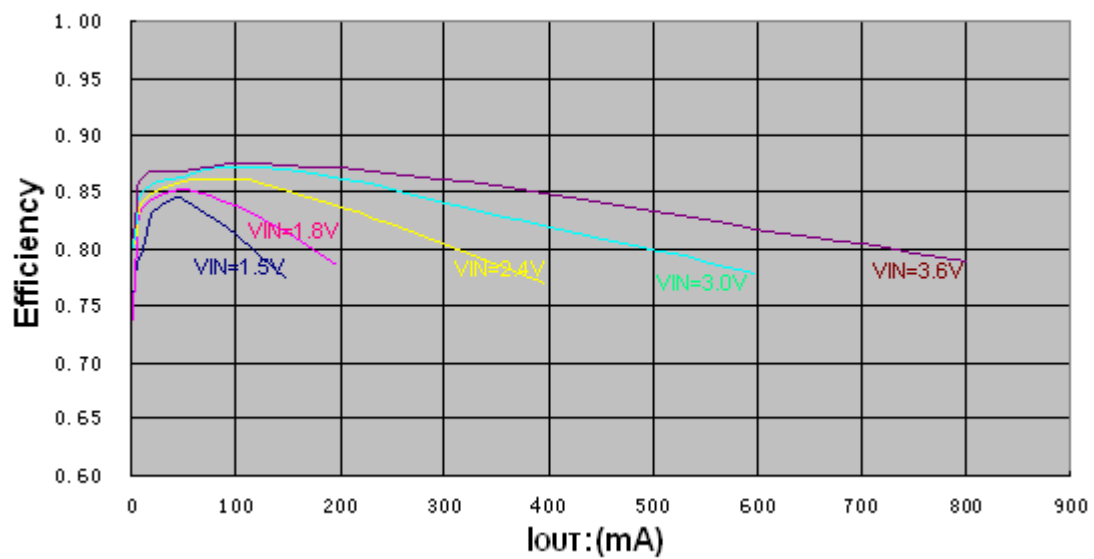
### 2、SMD301 Circuits 2:( $V_{IN} \leq 3V$ )

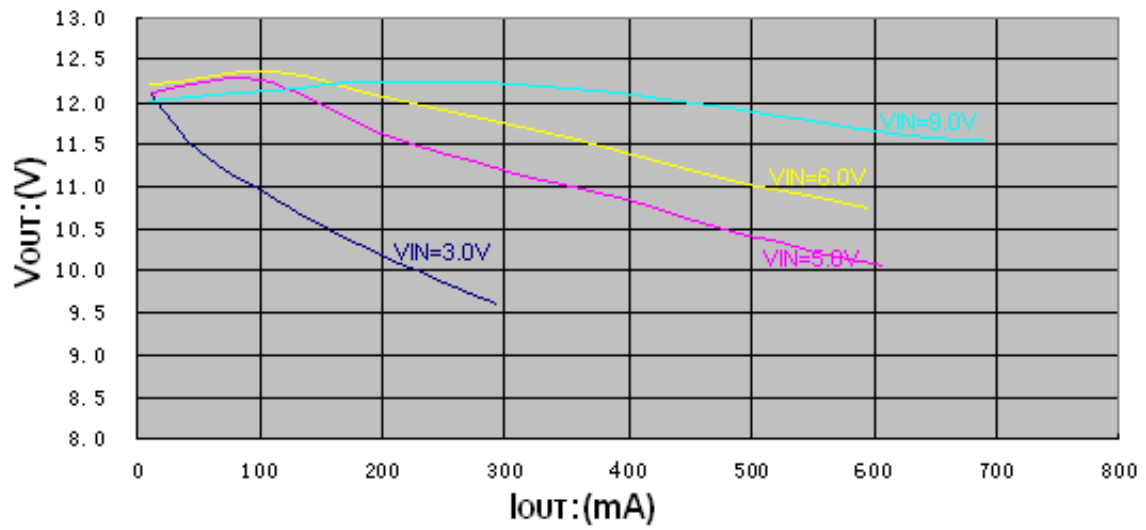
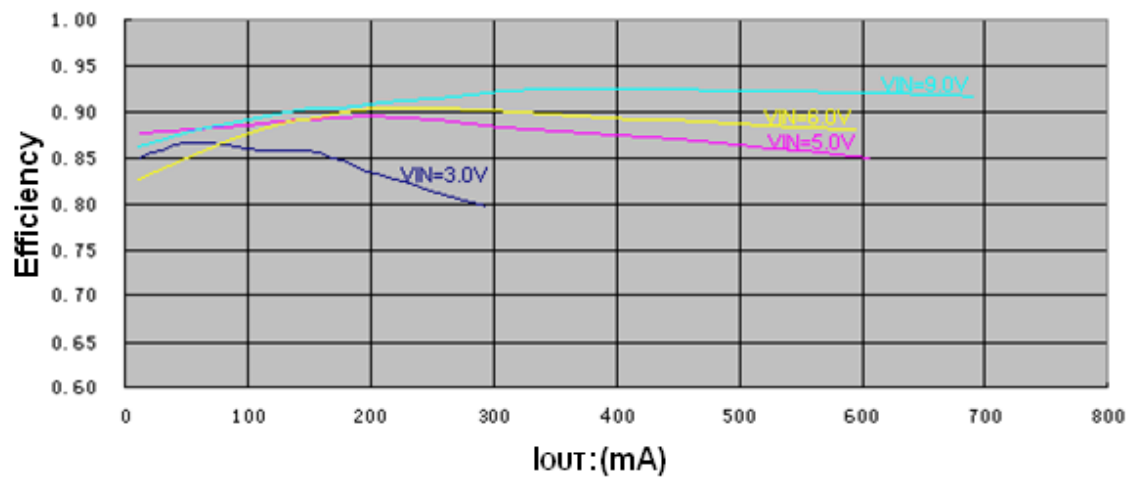


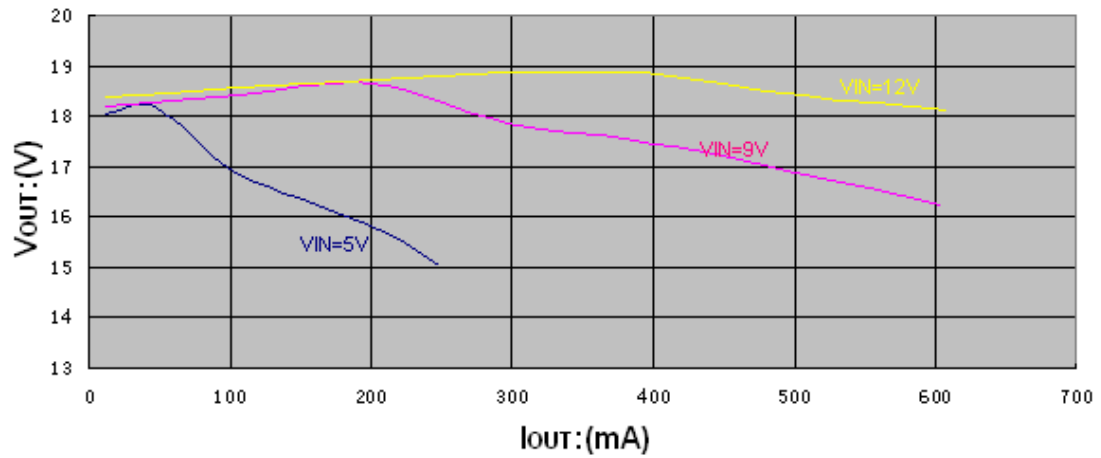
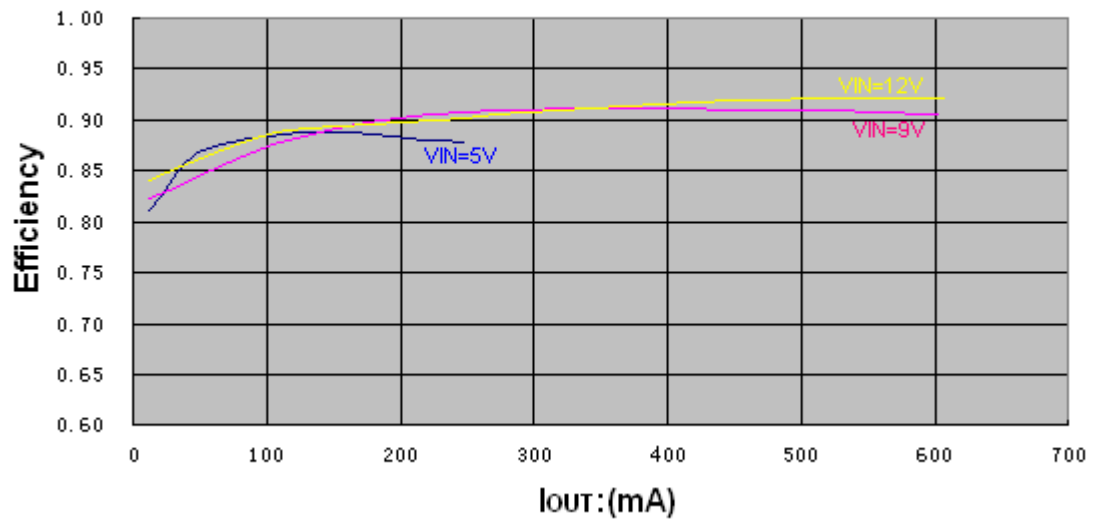
### 3、SMD301 Circuits 3:( $V_{IN} \geq 8V$ )



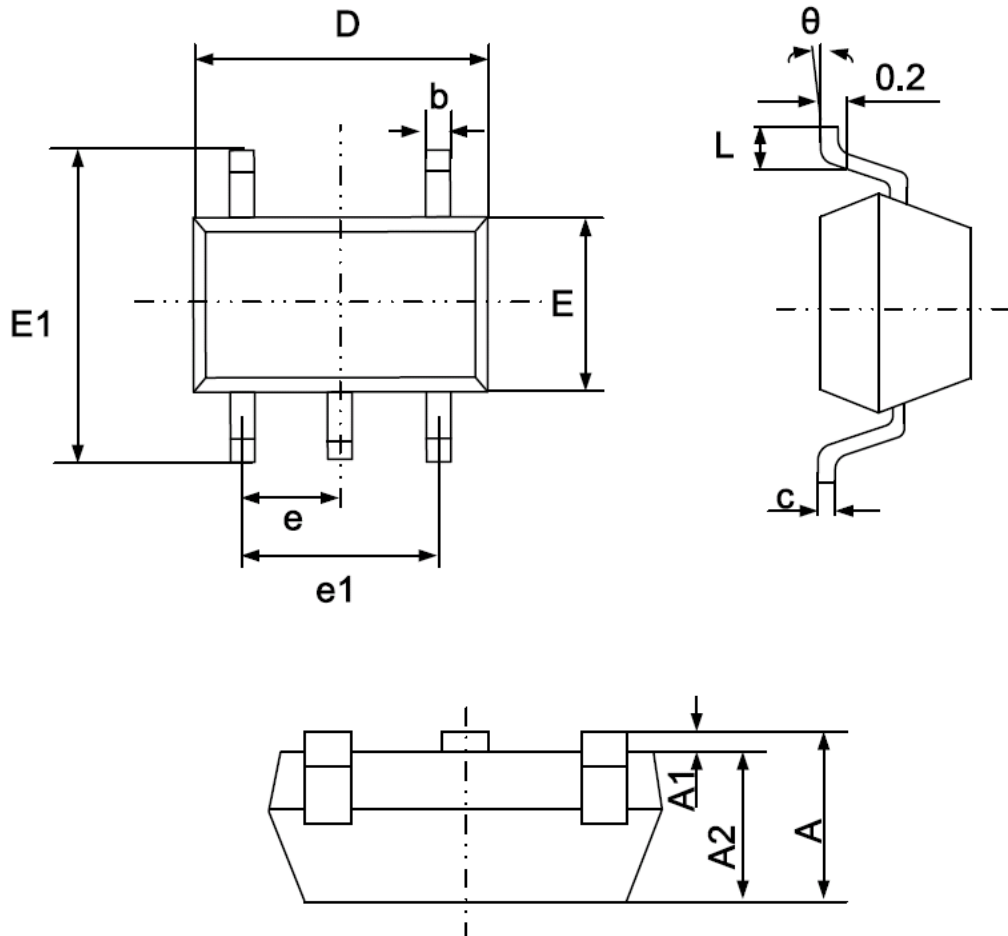
NOTE: Pin VDD can be connected to some other power supply (3V~8V)

**■ TYPICAL PERFORMANCE CHARACTERISTICS****1.  $V_{OUT}$  vs.  $I_{OUT}$ : ( $V_{OUT} = 5.5V$ )****2. Efficiency vs.  $I_{OUT}$ : ( $V_{OUT} = 5.5V$ )**

**3.  $V_{OUT}$  vs.  $I_{OUT}$ : ( $V_{OUT} = 12V$ )****4. Efficiency vs.  $I_{OUT}$ : ( $V_{OUT} = 12V$ )**

5.  $V_{OUT}$  vs.  $I_{OUT}$ : ( $V_{OUT} = 18V$ )6. Efficiency vs.  $I_{OUT}$ : ( $V_{OUT} = 18V$ )

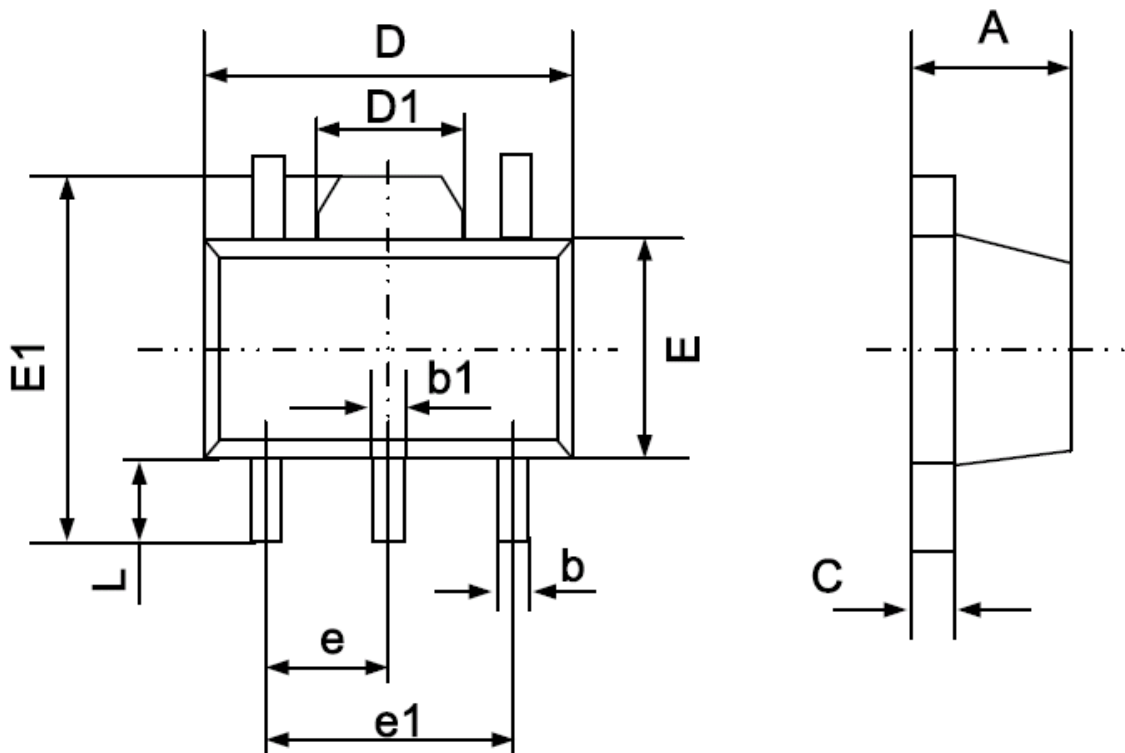
- Package information
- SOT-23-5 PACKAGE OUTLINE DIMENSIONS



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	0.500	0.012	0.020
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	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°



- SOT-89-5 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.360	0.560	0.014	0.022
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.400	1.800	0.055	0.071
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	2.900	3.100	0.114	0.122
L	0.900	1.100	0.035	0.043

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