

BM1601D Series

■ PIN CONFIGURATION

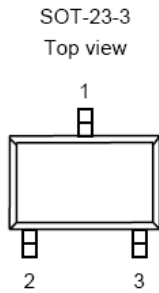


Table 1 BM1601D Series (SOT-23-3 PKG)

PIN NO.	PIN NAME	FUNCTION
1	V_{OUT}	Output voltage pin
2	V_{SS}	GND pin
3	LX	External inductor connection pin

Table 2 BM1601D Series (SOT-23-3 PKG)

PIN NO.	PIN NAME	FUNCTION
1	V_{OUT}	Output voltage pin
2	V_{SS}	GND pin
3	EXT	External transistor connection pin

Table 3 BM1601D Series (SOT-23-5 PKG)

PIN NO.	PIN NAME	FUNCTION
1	EN	Shutdown pin “H”: Normal operation “L”: Step-up stopped
2	V_{OUT}	Output voltage pin
3	NC	(N.C.)
4	V_{SS}	GND pin
5	LX	External inductor connection pin

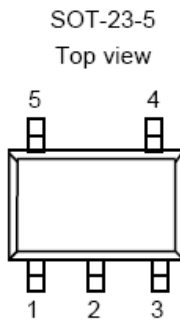


Table 4 BM1601D Series (SOT-23-5 PKG)

PIN NO.	PIN NAME	FUNCTION
1	EN	Shutdown pin “H”: Normal operation “L”: Step-up stopped
2	V_{OUT}	Output voltage pin
3	NC	(N.C.)
4	V_{SS}	GND pin
5	EXT	External transistor connection pin

Table 5 BM1601D Series (SOT-89-3 PKG)

PIN NO.	PIN NAME	FUNCTION
1	V_{SS}	GND pin
2	V_{OUT}	Output voltage pin
3	LX	External inductor connection pin

Table 6 BM1601D Series (SOT-89-3 PKG)

PIN NO.	PIN NAME	FUNCTION
1	V_{SS}	GND pin
2	V_{OUT}	Output voltage pin
3	EXT	External transistor connection pin

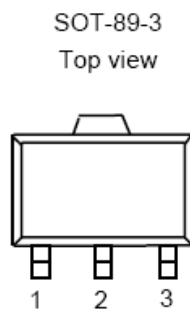


Table 7 BM1601D Series (SOT-89-5 PKG)

PIN NO.	PIN NAME	FUNCTION
1	NC	(N.C.)
2	V _{OUT}	Output voltage pin
3	EN	Shutdown pin “H”: Normal operation “L”: Step-up stopped
4	LX	External inductor connection pin
5	V _{SS}	GND pin

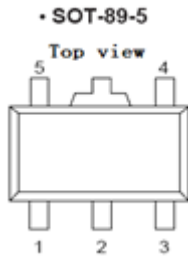


Table 8 BM1601D Series (SOT-89-5 PKG)

PIN NO.	PIN NAME	FUNCTION
1	NC	(N.C.)
2	V _{OUT}	Output voltage pin
3	EN	Shutdown pin “H”: Normal operation “L”: Step-up stopped
4	EXT	External transistor connection pin
5	V _{SS}	GND pin



Table 9 BM1601D Series (TO-92 PKG)

PIN NO.	PIN NAME	FUNCTION
1	V _{SS}	GND pin
2	V _{OUT}	Output voltage pin
3	LX	External inductor connection pin

■ ABSOLUTE MAXIMUM RATINGS

(Unless otherwise specified, T_a=25°C)

PARAMETER		SYMBOL	RATINGS	UNITS
V _{OUT} pin voltage		V _{OUT}	V _{SS} -0.3 ~ V _{SS} +8	V
EN pin voltage		EN	V _{SS} -0.3 ~ V _{SS} +8	V
LX pin voltage		V _{LX}	V _{SS} -0.3 ~ V _{SS} +8	V
LX pin current		I _{LX}	1000	mA
Power dissipation	SOT-23-3	PD	250	mW
	SOT-23-5		250	mW
	SOT-89-3		500	mW
	TO-92		500	mW
Operating temperature		T _{opr}	-40 ~ +85	°C
Storage temperature		T _{stg}	-40 ~ +125	°C
Soldering Temperature & Time		T _{solder}	260°C, 10s	

■ ELECTRICAL CHARACTERISTICS

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

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Output voltage	V_{OUT}	—	$V_{\text{OUT(S)}} \times 0.98$	V_{OUT}	$V_{\text{OUT(S)}} \times 1.02$	V
Input voltage	V_{IN}	—	—	—	6	V
Operation start voltage	V_{ST1}	$I_{\text{OUT}} = 1 \text{ mA}$	—	—	0.9	V
Oscillation start voltage	V_{ST2}	No external parts, voltage applied to V_{OUT} LX pulled up to V_{OUT} via 300Ω resistor	—	—	0.8	V
Current consumption 1	I_{SS1}	$V_{\text{OUT}} = 0.95 \times V_{\text{OUT}}$	—	20	40	μA
		$V_{\text{OUT}}: 3.0\text{V}$ $V_{\text{OUT}}: 5.0\text{V}$	—	30	60	μA
Current consumption 2	I_{SS2}	$V_{\text{OUT}} = V_{\text{OUT}} + 0.5 \text{ V}$	—	6	10	μA
Current consumption during shutdown	I_{SSS}	$V_{\text{EN}} = 0 \text{ V}$	—	—	1.0	μA
Switching current	I_{SW}	$V_{\text{LX}} = 0.4 \text{ V}$	—	250	—	mA
Switching transistor leakage current	I_{SWQ}	No external parts, $V_{\text{LX}} = V_{\text{OUT}} = 8 \text{ V}$, $V_{\text{EN}} = 0 \text{ V}$	—	—	1.0	μA
Line regulation	ΔV_{OUT1}	$V_{\text{IN}} = 0.4 \times V_{\text{OUT}} \sim 0.6 \times V_{\text{OUT}}$	—	20	50	mV
Load regulation	ΔV_{OUT2}	$I_{\text{OUT}} = 10 \text{ μA} \sim 50\text{mA}$	—	20	50	mV
Maximum Oscillation frequency	f_{OSC}	$V_{\text{OUT}} = 0.95 \times V_{\text{OUT}}$, measure waveform at LX pin	—	100	—	KHz
Duty ratio 1	Duty1	$V_{\text{OUT}} = 0.95 \times V_{\text{OUT}}$, measure waveform at LX pin	70	78	85	%
Duty ratio 2	Duty2	Measure waveform at LX pin with light load	—	66	—	%
Efficiency	EFFI	—	—	86	—	%
Shutdown pin input voltage	V_{SH}	$V_{\text{OUT}} = 0.95 \times V_{\text{OUT}}$, judge oscillation at LX pin	0.75	—	—	V
	V_{SL1}	$V_{\text{OUT}} = 0.95 \times V_{\text{OUT}}$, judge stop at LX pin	—	—	0.3	V
Shutdown pin input current	I_{SH}	$V_{\text{EN}} = 6\text{V}$	-0.1	—	0.1	μA
	I_{SL}	$V_{\text{EN}} = 0\text{V}$	-0.1	—	0.1	μA

Remark: $V_{\text{IN}} = V_{\text{OUT(S)}} \times 0.6$ applied, $I_{\text{OUT}} = V_{\text{OUT(S)}} / 250 \Omega$

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

V_{ST1} only is suitable for BM1601D

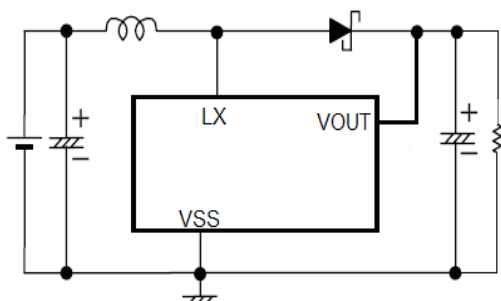
$V_{\text{OUT(S)}}$ specified above is the set output voltage value, and V_{OUT} is the typical value of the actual output voltage.

■ STANDARD CIRCUITS

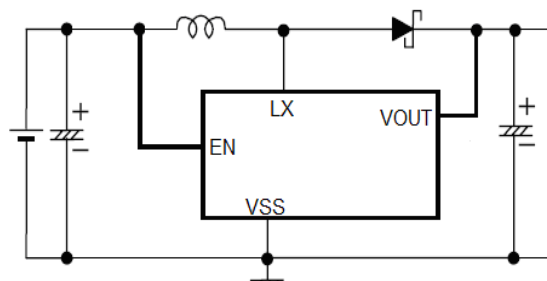
Component: Inductor: 47 μ H(Sumida)
Capacitor: 47 μ F/16V(Tantalum)
NMOS: XP151、XP161

Diode: IN5817、IN5819
Transistor: 2SD1628G、2SD3279
Base Resistor(Rb): 1K Ω

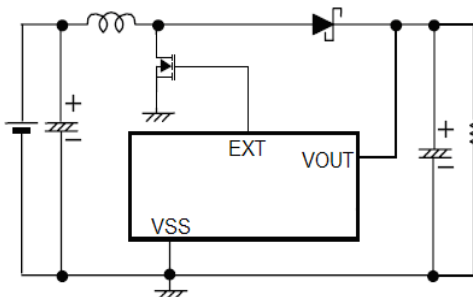
1、BM1601D Circuits:



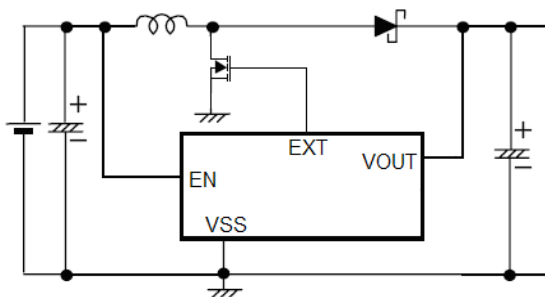
2、BM1601D Circuits:



3、BM1601D Circuits:



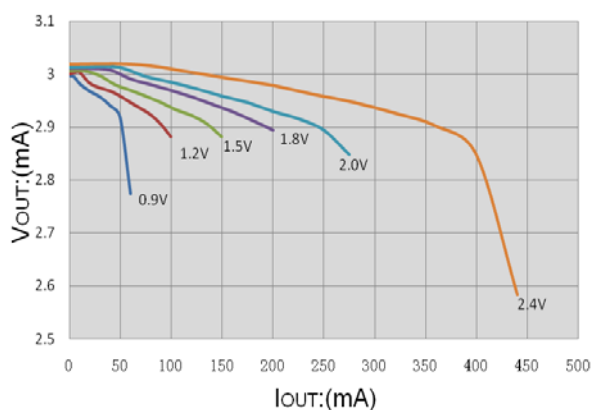
4、BM1601D Circuits:



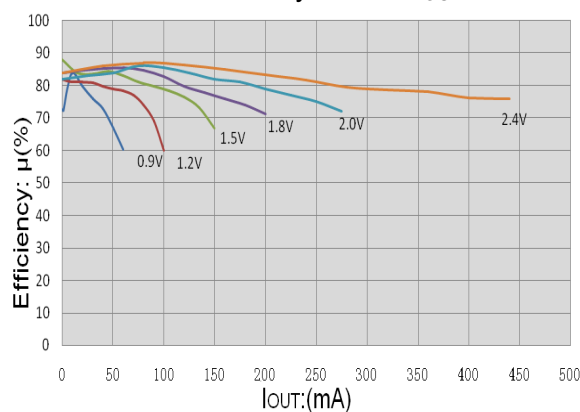
■ TYPICAL PERFORMANCE CHARACTERISTICS

1. BM1601D:

a、 V_{OUT} vs. I_{OUT} :

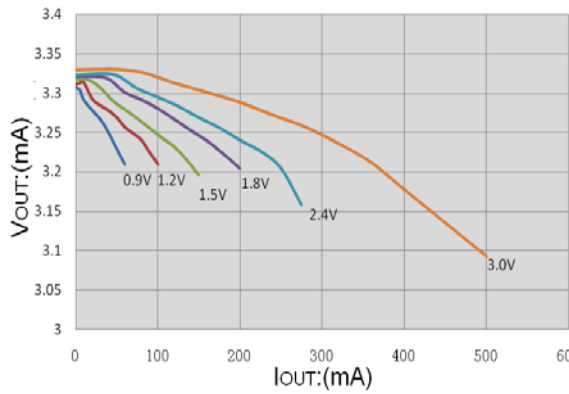


b、Efficiency vs. I_{OUT} :

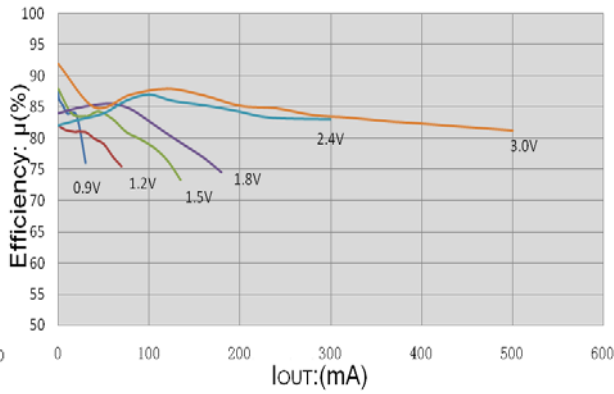


2. BM1601D-3.3V:

a、 V_{OUT} vs. I_{OUT} :

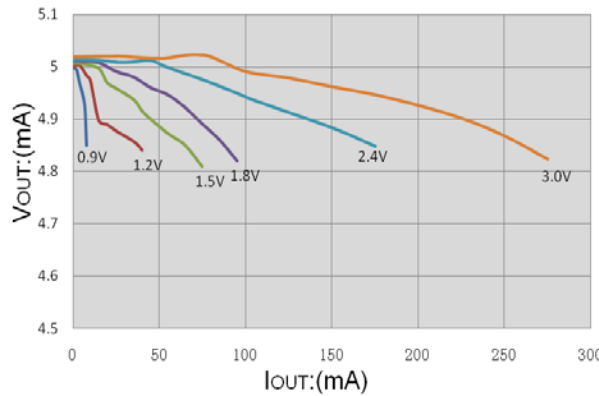


b、Efficiency vs. I_{OUT} :

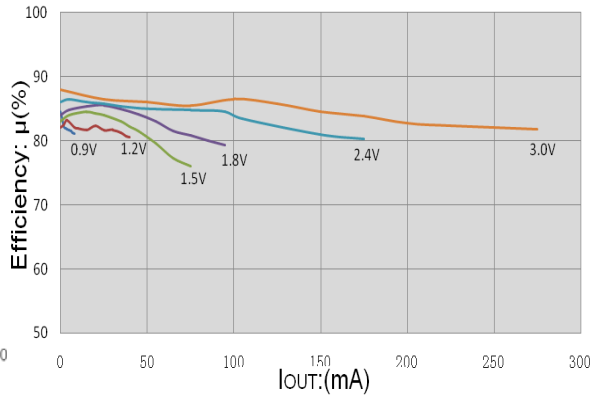


3. BM1601D-5.0V:

a、 V_{OUT} vs. I_{OUT} :

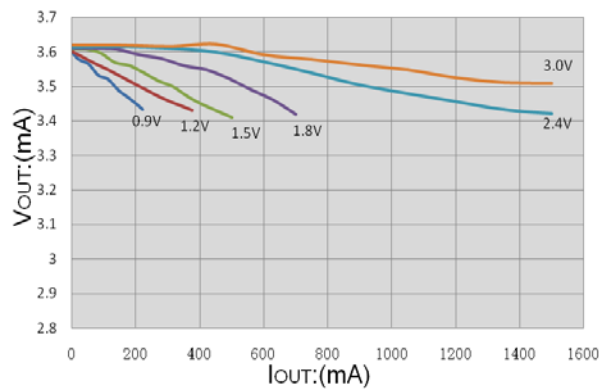


b、Efficiency vs. I_{OUT} :

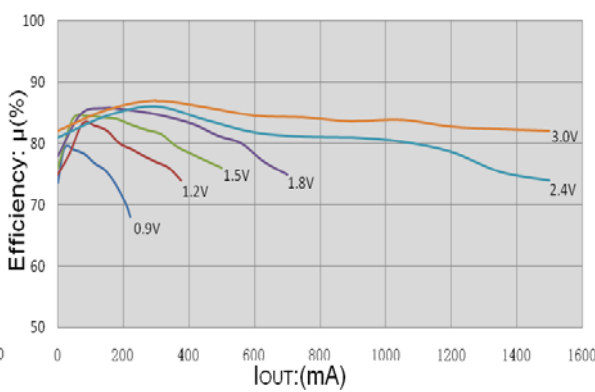


4. BM1601D-3.6V:

a、 V_{OUT} vs. I_{OUT} :

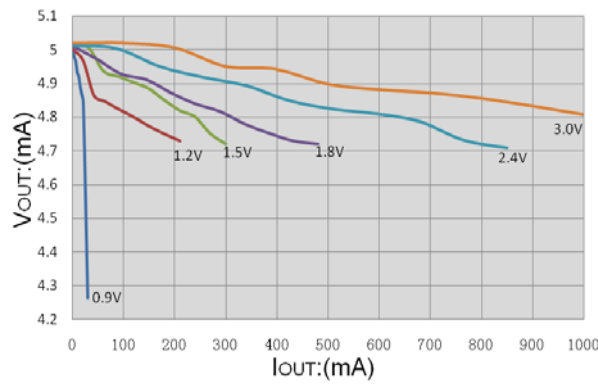


b、Efficiency vs. I_{OUT} :

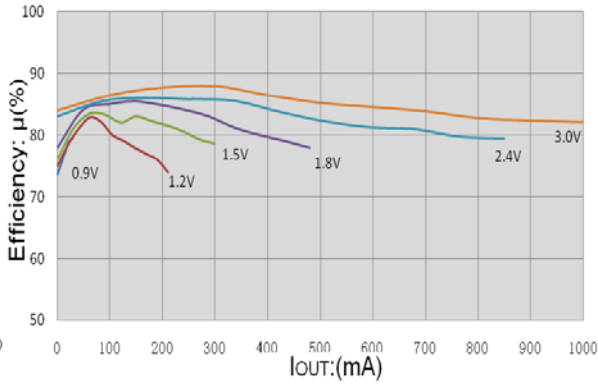


5. BM1601D-5.0V:

a、 V_{OUT} vs. I_{OUT} :

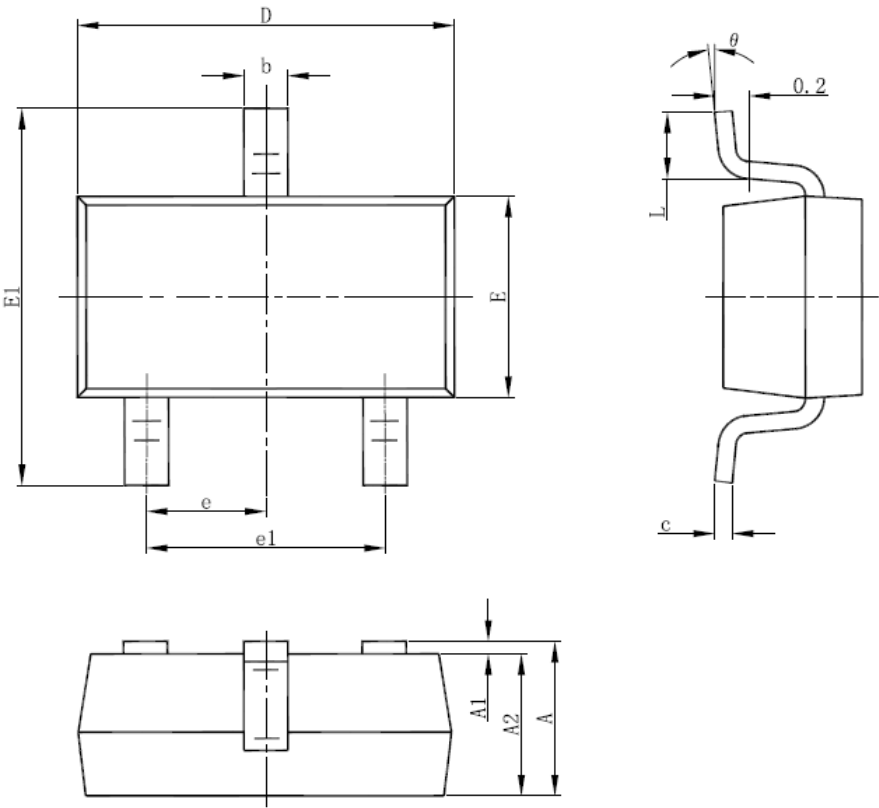


b、Efficiency vs. I_{OUT} :



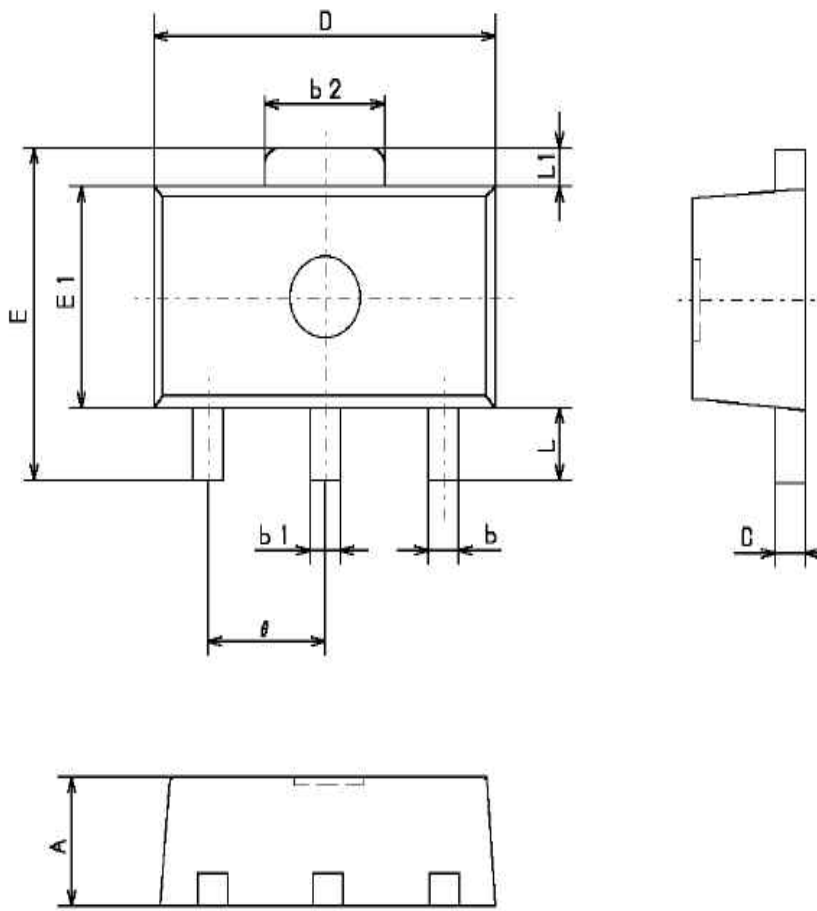
■ PACKAGE INFORMATION

● SOT-23-3



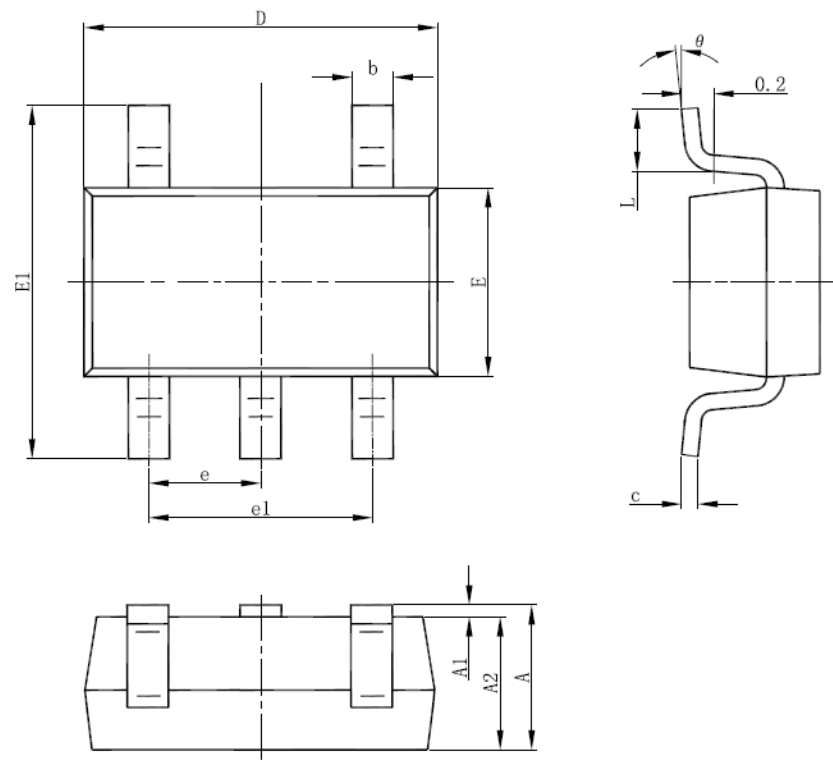
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

• SOT-89-3



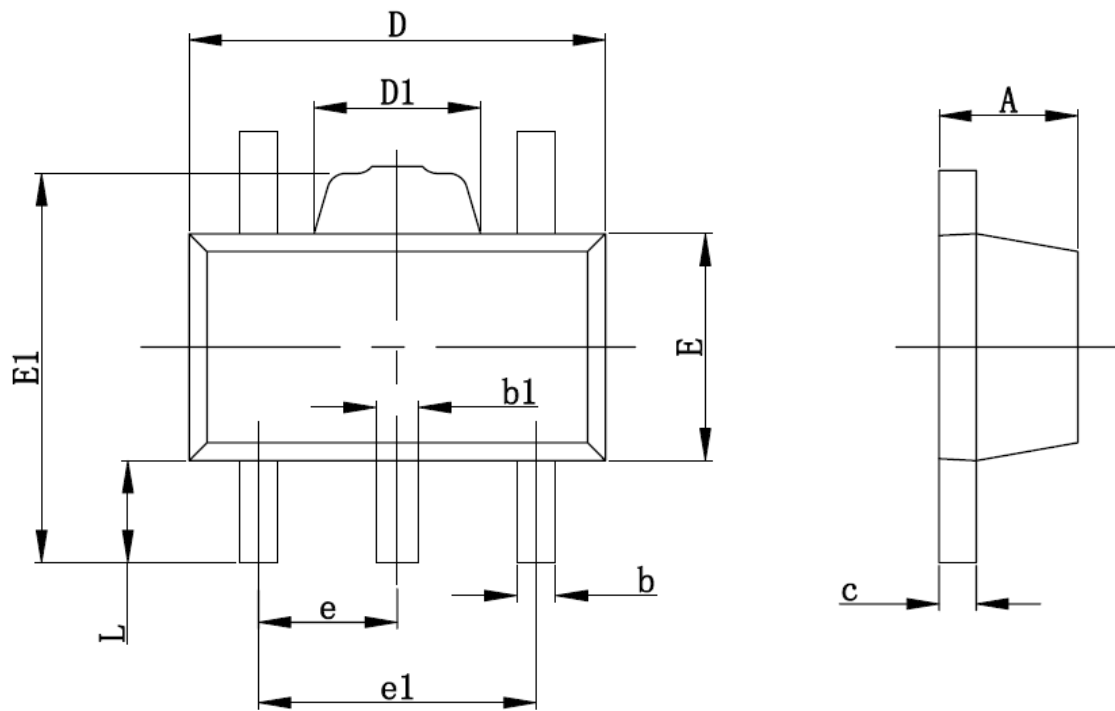
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.197
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF		0.061 REF	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP		0.060TYP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

• SOT- 23- 5



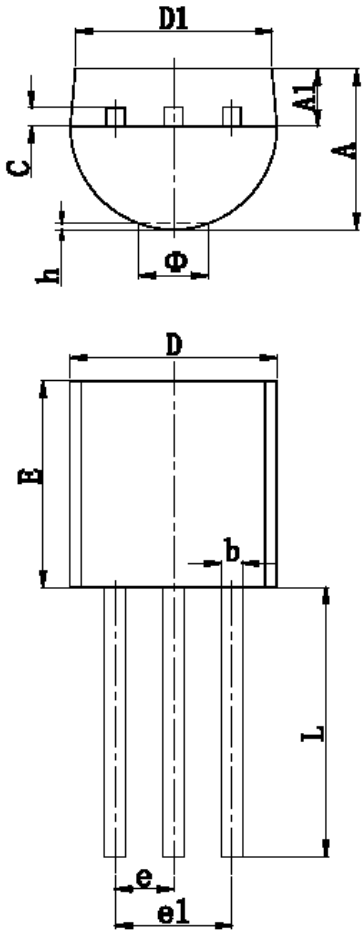
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
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



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	1.500TYP		0.060TYP	
e1	2.900	3.100	0.114	0.122
L	0.900	1.100	0.035	0.043

- TO-92



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	3.300	3.700	0.130	0.146
A1	1.100	1.400	0.043	0.055
b	0.380	0.550	0.015	0.022
c	0.360	0.510	0.014	0.020
D	4.400	4.700	0.173	0.185
D1	3.430		0.135	
E	4.300	4.700	0.169	0.185
e	1.270 TYP		0.050 TYP	
e1	2.440	2.640	0.096	0.104
L	14.100	14.500	0.555	0.571
Φ		1.600		0.063
h	0.000	0.380	0.000	0.015