

## High Efficiency, synchronous PFM step-up DC-DC converter

### General Description

ME2188 Series is a PFM Step-up DC/DC converter IC with low supply current by CMOS process. High frequency noise that occurs during switching is reduced by using advanced circuit designed, output voltage is programmable in 0.1V steps between 1.9V~5.0V and maximum frequency is 320KHz(TYP.). A low ripple, high efficiency step-up DC/DC converter can be constructed of ME2188 with only two external components. ME2188 is suitable for use with battery-powered instruments with low noise and low supply current.

### Features

- High efficiency: 93%
- Maximum frequency: 320KHz
- Low Quiescent Current: 7.5 $\mu$ A
- Input Voltage: 0.9V ~ 5.0V
- Output Voltage Range: 1.9V ~ 5.0V
- High Accuracy:  $\pm$  2%
- Low ripple and Low noise

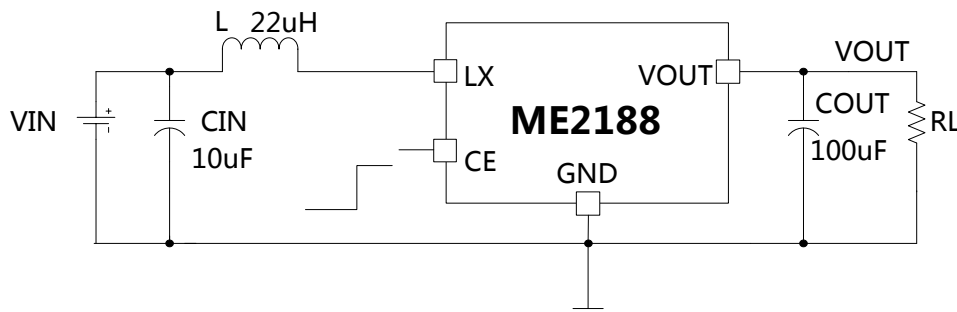
### Typical Application

- Power source for battery-powered equipment
- Power source for Wireless mouse, toys, Cameras, VCRs, PDAs, MP3, and Led lighting etc

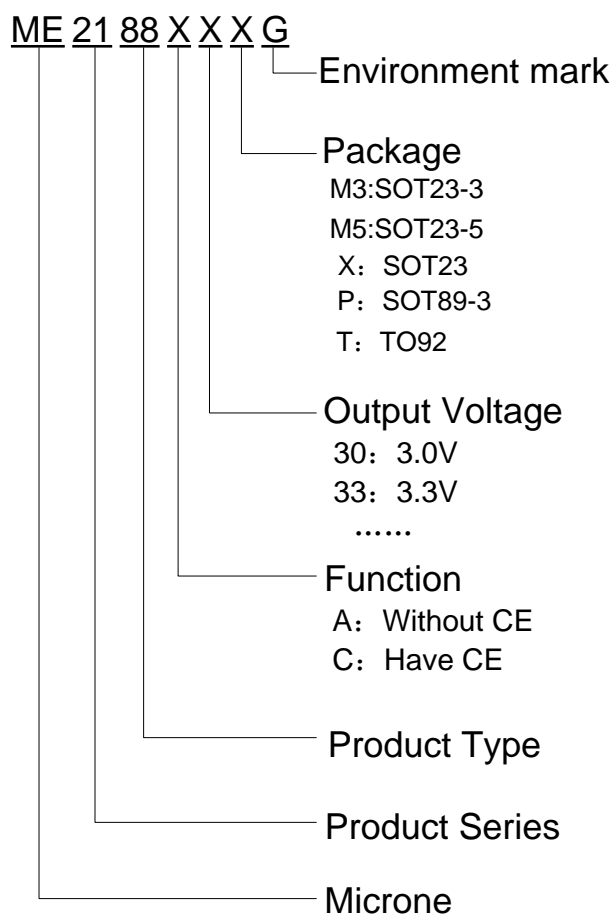
### Package

- 5-pin SOT23-5
- 3-pin SOT23、SOT23-3、SOT89-3、TO92

### Typical Application Circuit



## Selection Guide

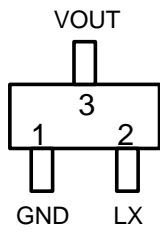


product series	product description
ME2188A22M3G	V <sub>OUT</sub> =2.2V, Without CE pin, Package: SOT23-3
ME2188A22TG	V <sub>OUT</sub> =2.2V, Without CE pin, Package : TO-92
ME2188A22XG	V <sub>OUT</sub> =2.2V, Without CE pin, Package : SOT23
ME2188A24TG	V <sub>OUT</sub> =2.4V, Without CE pin, Package : TO-92
ME2188A33M3G	V <sub>OUT</sub> =3.3V, Without CE pin, Package: SOT23-3
ME2188A33XG	V <sub>OUT</sub> =3.3V, Without CE pin, Package : SOT23
ME2188A33PG	V <sub>OUT</sub> =3.3V, Without CE pin, Package : SOT89-3
ME2188A33TG	V <sub>OUT</sub> =3.3V, Without CE pin, Package : TO-92
ME2188C33M5G	V <sub>OUT</sub> =3.3V, Have CE pin, Package : SOT23-5

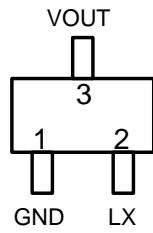
**NOTE:** At present ,there are thirteen kinds of voltage value: 2.2V、2.3V、2.4V、2.5V、2.7V、2.8V、3.0V、3.3V、3.6V、3.7V、4.0、4.5V、5.0V。

If you need other voltage and package, please contact our sales staff.

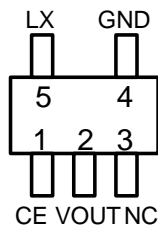
## Pin Configuration & Pin Assignment



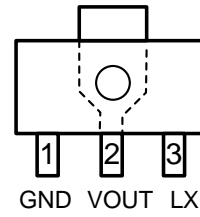
SOT23



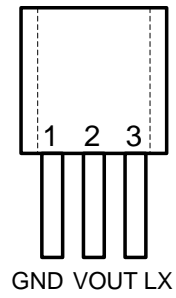
SOT23-3



SOT23-5



SOT89-3

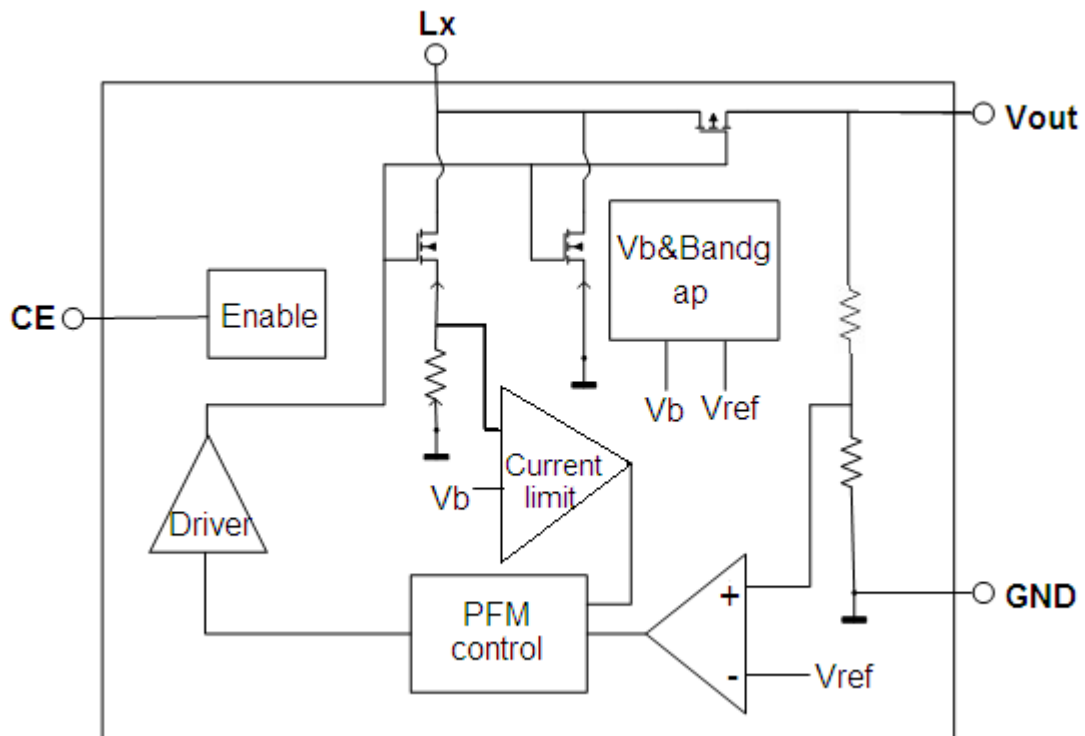


TO92

## Pin Assignment

PIN Number				Pin Name	Description
SOT23/ SOT23-3	SOT23-5	SOT89-3	TO92		
2	5	3	3	LX	Switch pin
3	2	2	2	VOUT	Voltage output
-	1	-	-	CE	Chip enable
1	4	1	1	GND	Ground
-	3	-	-	NC	NC

## Block Diagram



## Absolute Maximum Ratings

Parameter	Symbol	Ratings	Units
CE pin input voltage	VCE	-0.3~6	V
LX pin voltage	LX	-0.3~6	V
LX pin current	ILXmax	1000	mA
VOUT pin voltage	VOUT	-0.3~6	V
Continuous Total Power Dissipation	SOT23-3	0.54	W
	SOT23-5	0.6	
	SOT89-3	1.25	
	TO92	0.83	
	SOT23	0.38	
Thermal resistance(Junction to air)	SOT23-3	230	°C/W
	SOT23-5	210	
	SOT89-3	100	
	TO92	150	
	SOT23	330	
Operating Ambient Temperature Range	T <sub>OPR</sub>	-40~85	°C
Storage Temperature Range	T <sub>STG</sub>	-55~150	°C
Maximum junction temperature	T <sub>J</sub>	-40~150	°C
Welding temperature	TL	260	°C

## Electrical Characteristics

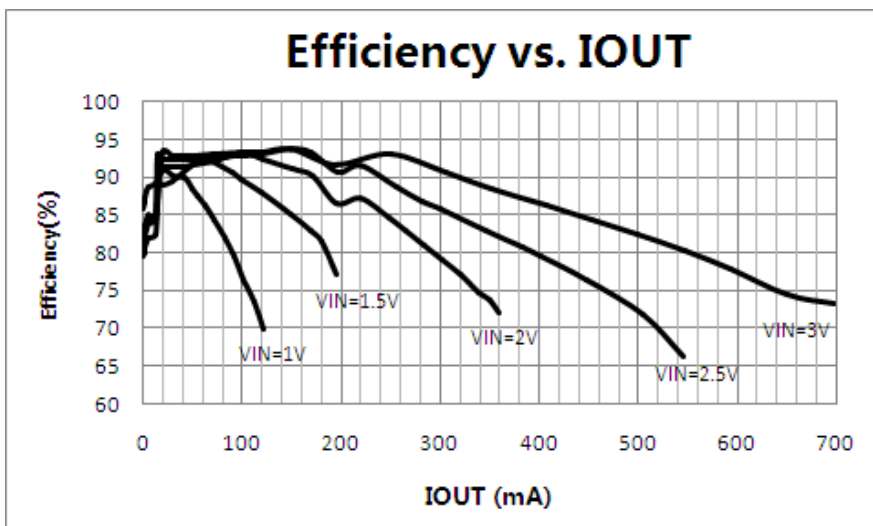
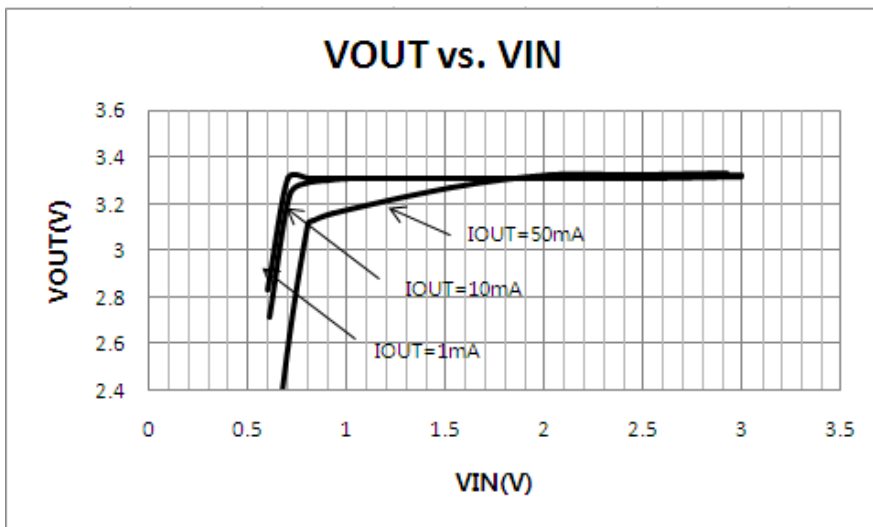
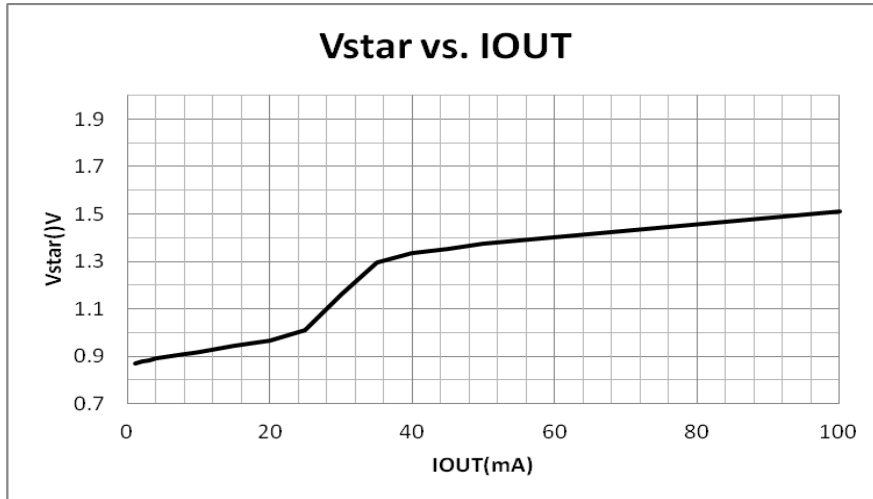
TA = 25 °C, VIN = VEN = 2V, VOUT = 3.3V, L = 22uH, CIN = 10uF, COUT = 100uF, unless otherwise noted.

Symbol	Parameter	Test Conditions	MIN	TYP	MAX	UNIT
	Start voltage	ILOAD=1mA, VIN:0→2V	0.7	0.9	1.1	V
	Hold voltage	ILOAD=1mA, VIN:2→0V	0.5			V
	Maximum input voltage		0.9		5	V
	Output voltage accuracy		-2		+2	%
	Power adjustment	VIN=Voutx0.4~x0.6, IOUT=10mA		5	20	mV
	Load adjustment	IOUT=0~100mA, VIN=2V		20	30	mV
	Quiescent Current	VOUT=VOUT+0.5		7.5	15	uA
	Shutdown current	VCE=0V		0	0.5	uA
	Current limit		800	1000	1200	mA
	No load input current	VIN=1.5V, VOUT=2.2V		10	15	uA
	Efficiency			93	96	%
	oscillation frequency			320		KHz
	Oscillation signal duty cycle	DCosc		74		%
	EN input high level			0.7		V
	EN input low level				0.2	V

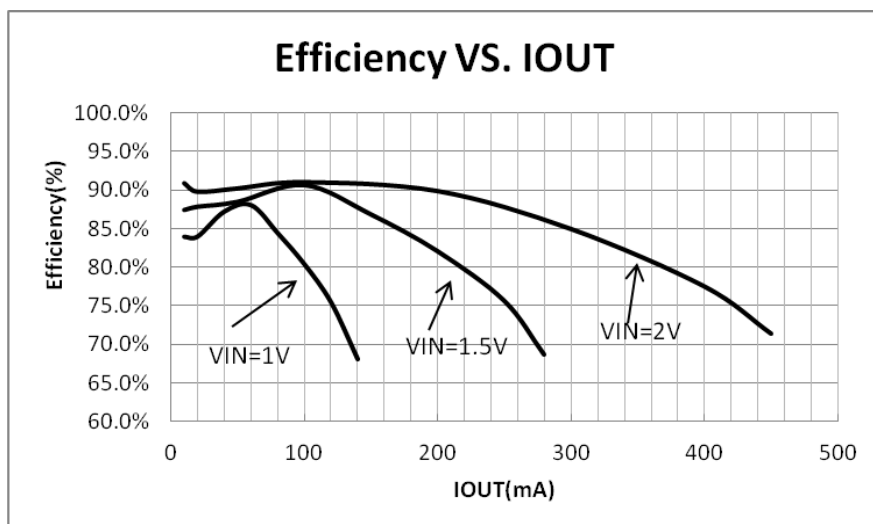
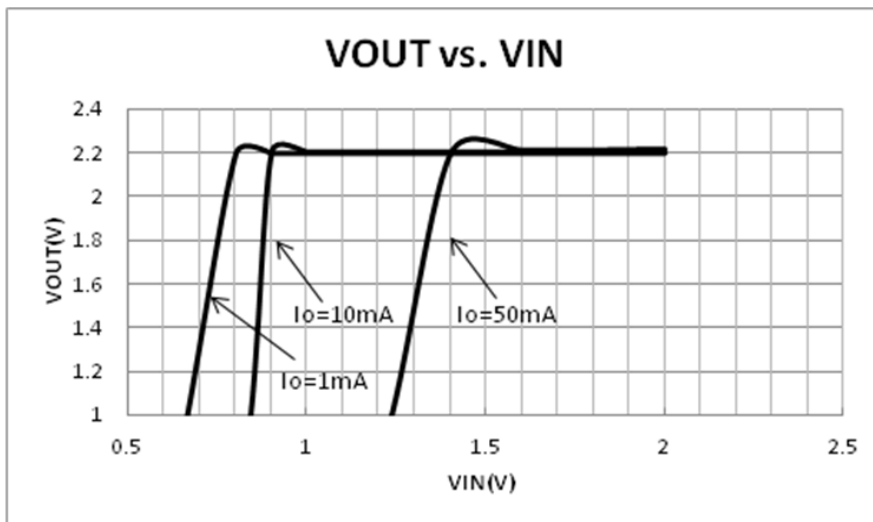
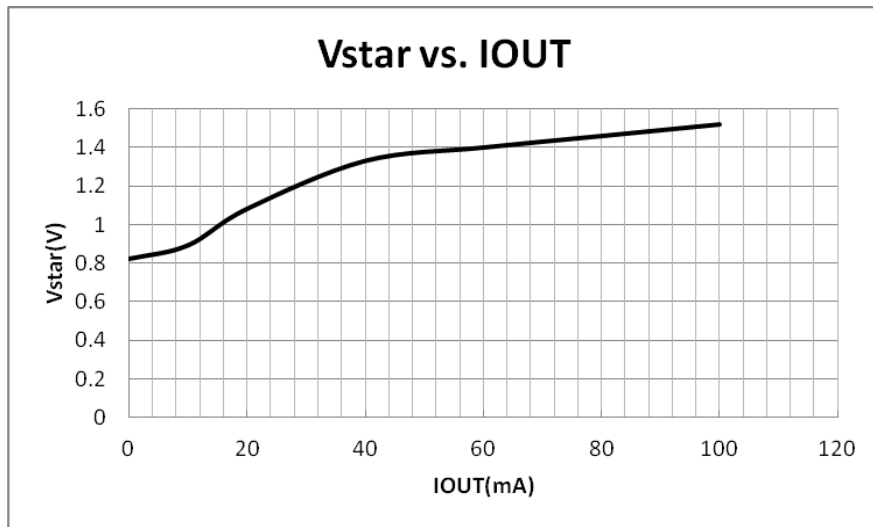
## Type Characteristics

L=22uH, CIN=10uF, COUT=100uF, TA = 25 °C, unless otherwise noted.

- ME2188A33

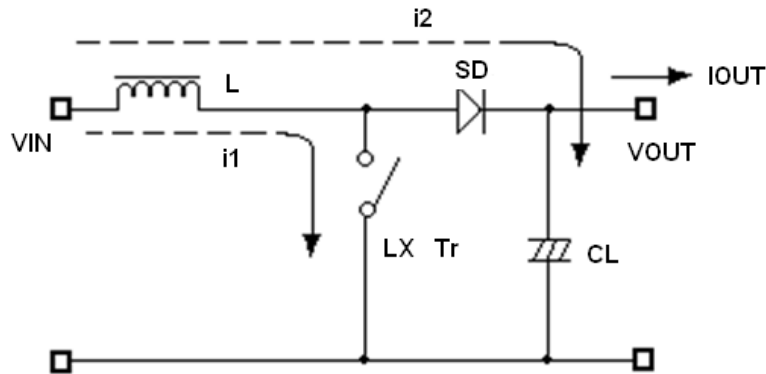


● ME2188A22



## Operation Description

ME2188 step-up DC/DC converter charges energy in the inductor when Lx Transistor is on, and discharges the energy with the addition of the energy from input power source thereto, so that a higher output voltage than the input voltage is obtained. Following is the operation diagram.



Switching DC/DC Step up Converter operating process

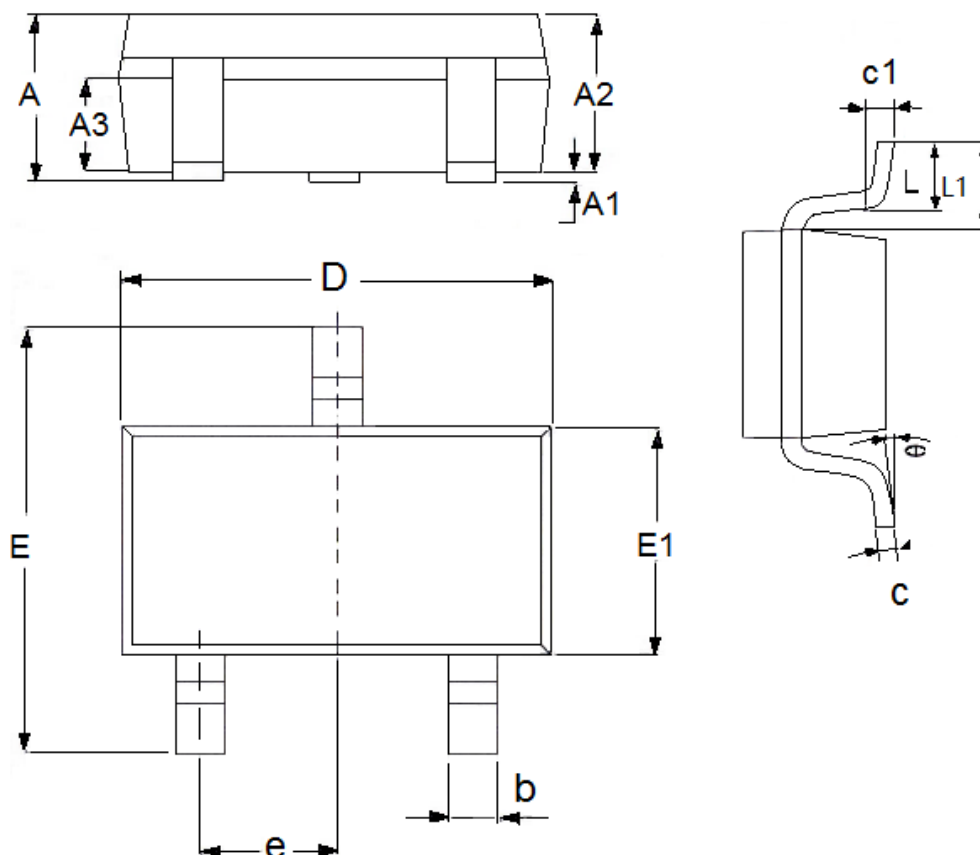
### PCB Layout:

Set external components as close as possible to the IC and minimize the connection between the components and the IC. In particular, when an external component is connected to VOUT Pin, make minimum connection with the capacitor.

Make Vss pin sufficient grounding, otherwise, the zero level within IC will varied with the switching current. This may result in unstable operation of IC.

## Packaging Information

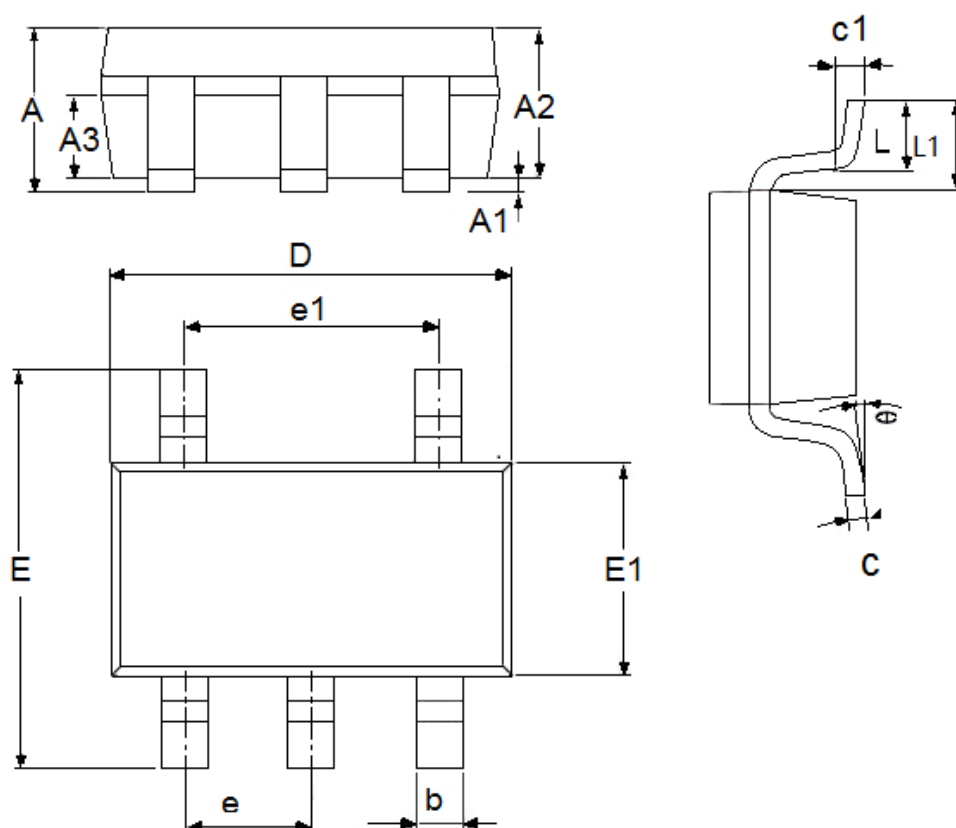
- Package Type:SOT23-3



DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	1.05	1.45	0.0413	0.0571
A1	0	0.15	0.0000	0.0059
A2	0.9	1.3	0.0354	0.0512
A3	0.6	0.7	0.0236	0.0276
b	0.25	0.5	0.0098	0.0197
c	0.1	0.25	0.0039	0.0098
D	2.8	3.1	0.1102	0.1220
E	2.6	3.1	0.1023	0.1220
E1	1.5	1.8	0.0591	0.0709
e	0.95(TYP)		0.0374(TYP)	
L	0.25	0.6	0.0098	0.0236
L1	0.59(TYP)		0.0232(TYP)	
θ	0	8°	0.0000	8°
c1	0.2(TYP)		0.0079(TYP)	

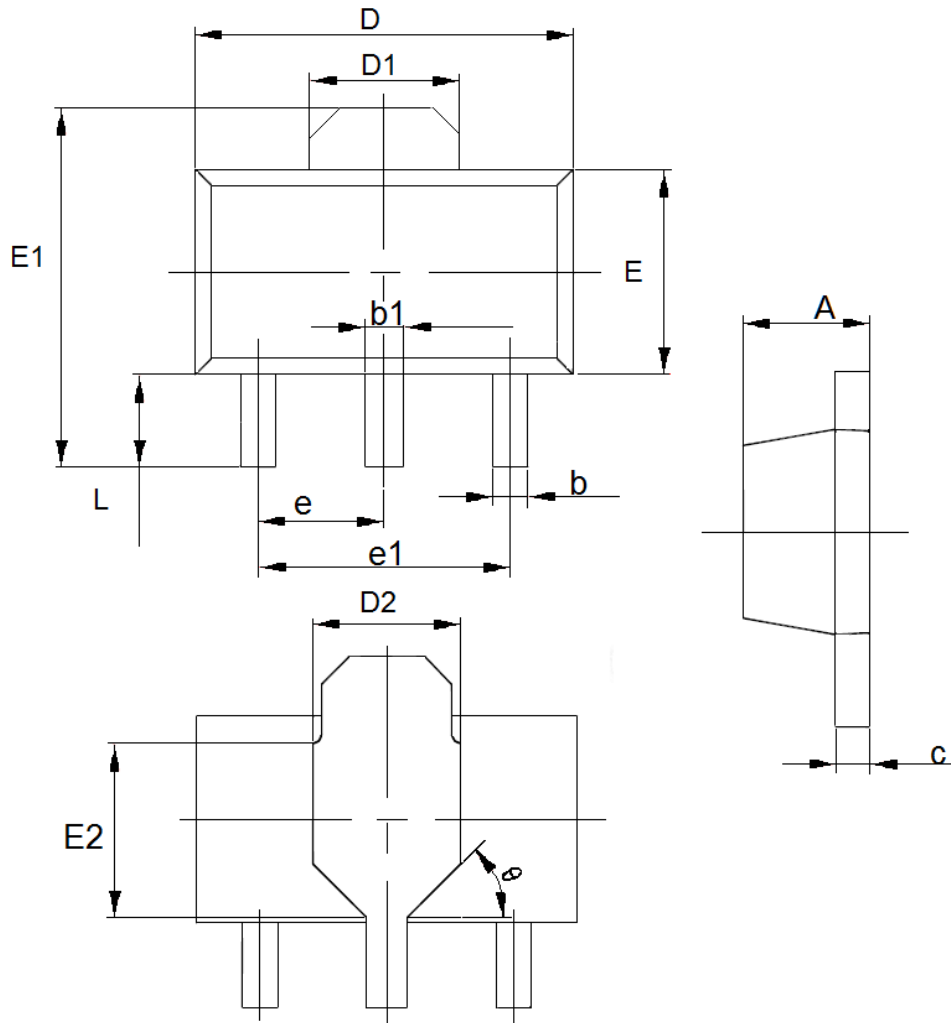


● Package Type:SOT23-5



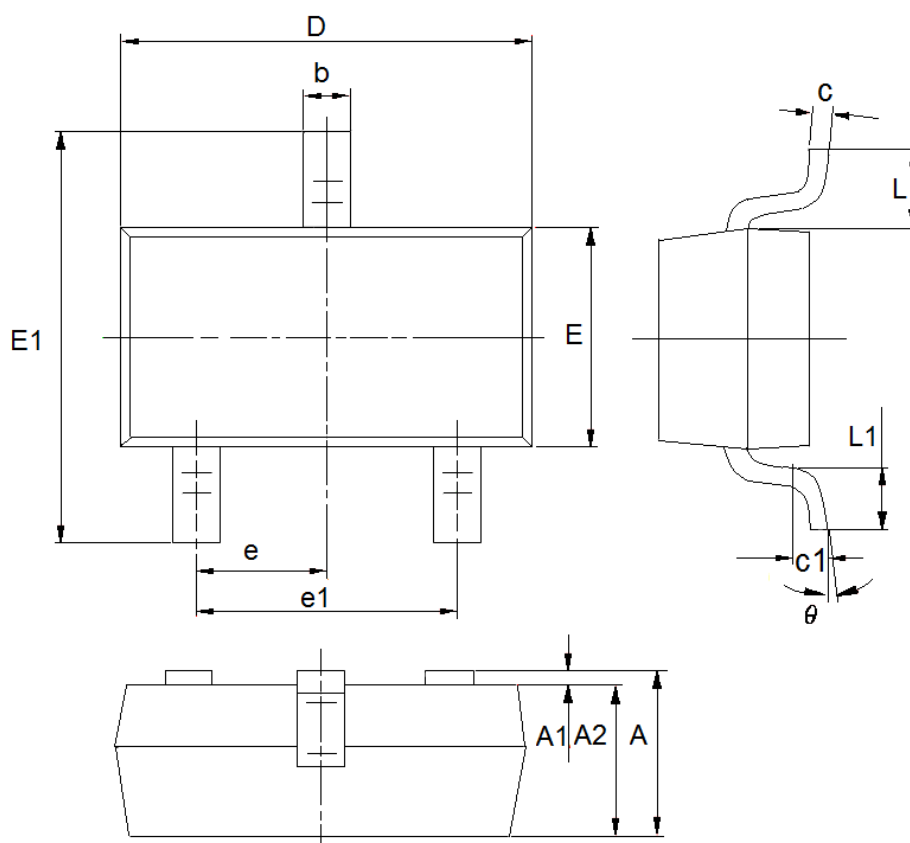
DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	1.05	1.45	0.0413	0.0571
A1	0	0.15	0.0000	0.0059
A2	0.9	1.3	0.0354	0.0512
A3	0.6	0.7	0.0236	0.0276
b	0.25	0.5	0.0098	0.0197
c	0.1	0.23	0.0039	0.0091
D	2.82	3.05	0.1110	0.1201
e1	1.9(TYP)		0.0748(TYP)	
E	2.6	3.05	0.1024	0.1201
E1	1.5	1.75	0.0512	0.0689
e	0.95(TYP)		0.0374(TYP)	
L	0.25	0.6	0.0098	0.0236
L1	0.59(TYP)		0.0232(TYP)	
$\theta$	0	8°	0.0000	8°
c1	0.2(TYP)		0.0079(TYP)	

● Package Type:SOT89-3



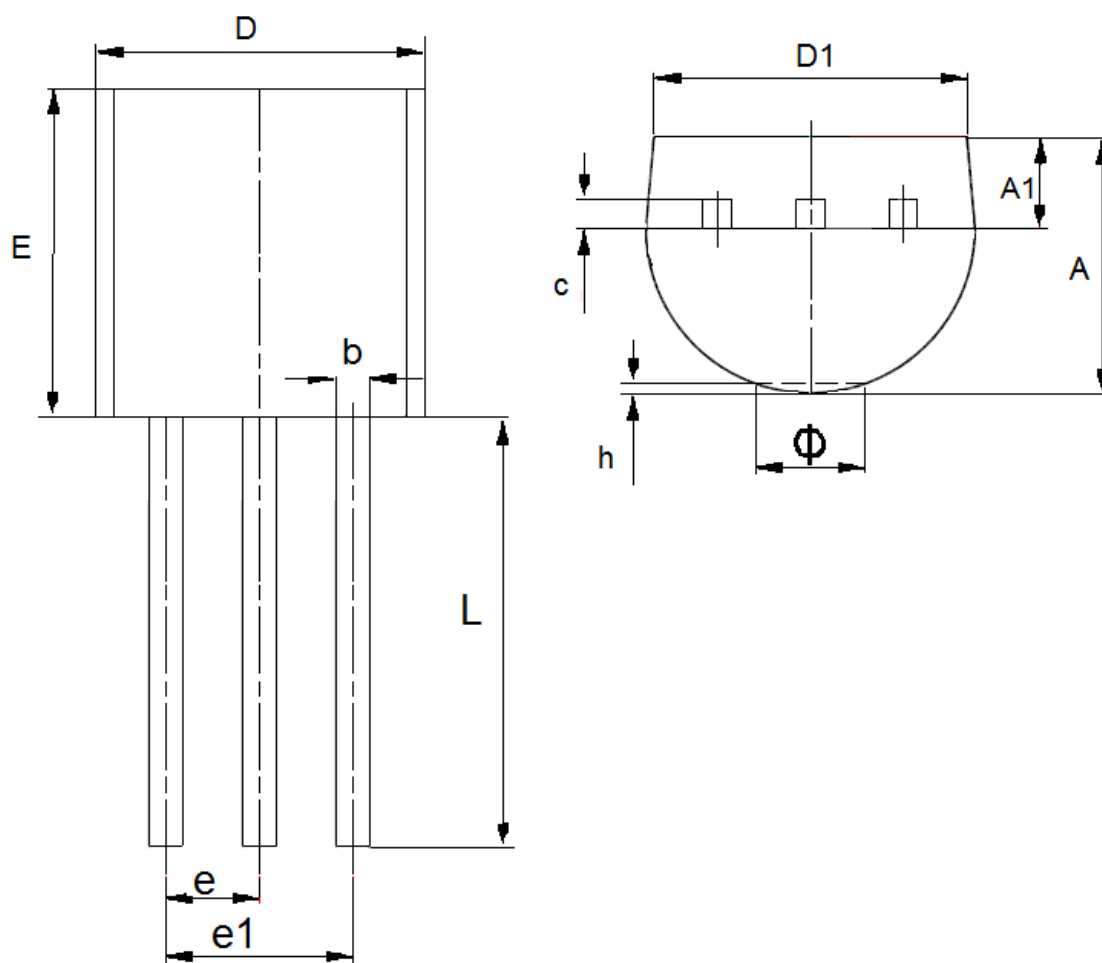
DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	1.4	1.6	0.0551	0.0630
b	0.32	0.52	0.0126	0.0205
b1	0.4	0.58	0.0157	0.0228
c	0.35	0.45	0.0138	0.0177
D	4.4	4.6	0.1732	0.1811
D1	1.55(TYP)		0.061(TYP)	
D2	1.75(TYP)		0.0689(TYP)	
e1	3.0(TYP)		0.1181(TYP)	
E	2.3	2.6	0.0906	0.1023
E1	3.94	4.4	0.1551	0.1732
E2	1.9(TYP)		0.0748(TYP)	
e	1.5(TYP)		0.0591(TYP)	
L	0.8	1.2	0.0315	0.0472
$\theta$	45°		45°	

● Package Type:SOT23



DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	0.9	1.15	0.0354	0.0453
A1	0	0.14	0.0000	0.0055
A2	0.9	1.05	0.0354	0.0413
b	0.28	0.52	0.0110	0.0205
c	0.07	0.23	0.0028	0.0091
D	2.8	3.0	0.1102	0.1181
e1	1.8	2.0	0.0709	0.0787
E	1.2	1.4	0.0472	0.0551
E1	2.2	2.6	0.0866	0.1024
e	0.95(TYP)		0.0374(TYP)	
L	0.55(TYP)		0.0217(TYP)	
L1	0.25	0.55	0.0098	0.0217
$\theta$	0	8°	0.0000	8°
c1	0.25(TYP)		0.0098(TYP)	

● Package Type:TO-92



DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	3.3	3.7	0.1299	0.1457
A1	1.1	1.4	0.0433	0.0551
b	0.38	0.55	0.015	0.0217
c	0.36	0.51	0.0142	0.0201
D	4.3	4.7	0.1693	0.185
D1	3.43	—	0.135	—
E	4.3	4.7	0.1693	0.185
e	1.27TYP		0.05TYP	
e1	2.44	2.64	0.0961	0.1039
L	14.1	14.5	0.5551	0.5709
h	0	0.38	0	0.015
Φ	—	1.6	—	0.063

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