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## Description

The ZCC56XXB series is a high voltage , ultralow-power regulator. The device can allows an input voltage as high as 60V. The typical quiescent current is only 2μA. The device is available in fixed output voltages of 3.3V and 5.0V.

The device features integrated short-circuit and thermal shutdown protection.

Although designed primarily as fixed voltage regulators, the device can be used with external components to obtain variable voltages.

## Application

- Battery-powered equipment
- Smoke detector and sensor
- Microcontroller Applications
- Home Appliance

## Features

- Low Quiescent Current: 2μA

ZCC56XXBTE ZCC56XXBTE-A ZCC56XXBTE-B ZCC56XXBTE-C	SOT23-3
ZCC56XXBTS ZCC56XXBTS-A ZCC56XXBTS-B ZCC56XXBTS-C	SOT89-3
ZCC56XXBTG	SOT23-5

ut Voltage: Up to 70V

- High Output Current: ≥100mA
- Dropout Voltage:
  - 70mV@10mA
  - 700mV@100mA
- Fixed Output Voltages: 3.3V and 5.0V
- High-accuracy Output Voltage
- ZCC 56XXB ±2%
- Good Transient Response
- Integrated Short-Circuit Protection
- Integrated Thermal Protection
- Available Packages:

i  
g  
h  
  
l  
n  
p

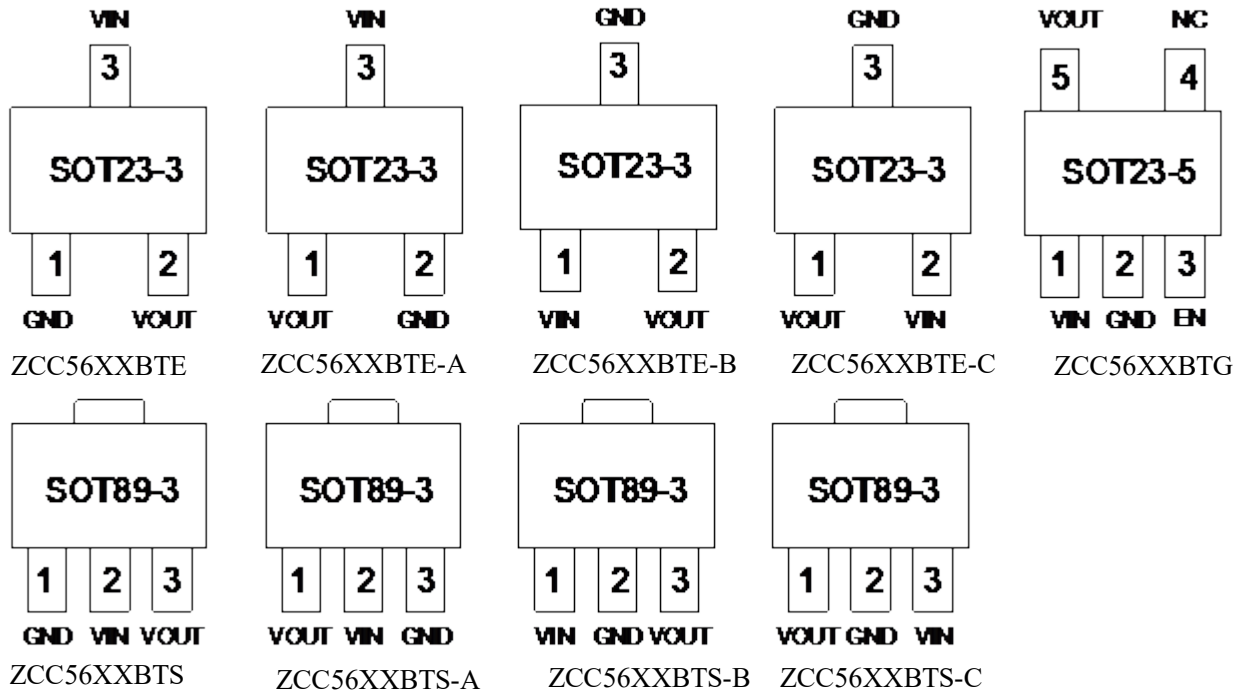
## Pin Descriptions

SOT23-3				SOT23-5	PIN NAME	DESCRIPTION
ZCC56XX BTE	ZCC56XX BTE-A	ZCC56XX BTE-B	ZCC56XX BTE-C	ZCC56XX BTG		
1	2	3	3	2	GND	Ground Pin
2	1	2	1	5	VOUT	Output Pin
3	3	1	2	1	VIN	Intput Pin
				3	EN	Enable pin
				4	NC	No connection
SOT89-3						

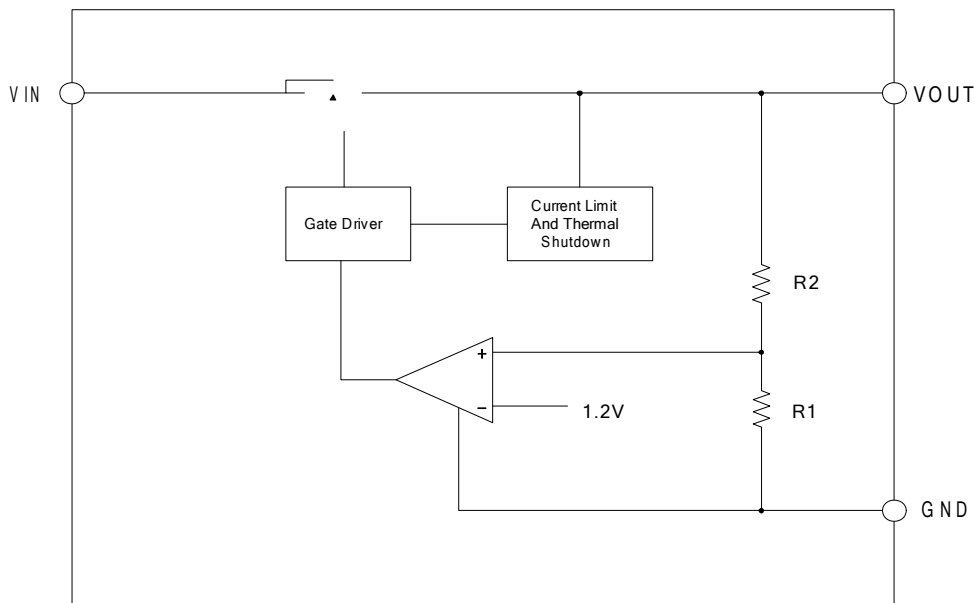


ZCC56XXBTS	ZCC56XXBTS-A	ZCC56XXBTS-B	ZCC56XXBTS-C	PIN NAME	DESCRIPTION
1	3	2	2	GND	Ground Pin
3	1	3	1	VOUT	Output Pin
2	2	1	3	VIN	Input Pin

## ■ Packages and Pin Assignment



## ■ Functional Block Diagram



## ■ Absolute Maximum Ratings

Item	Description	Min	Max	Unit
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Voltage	VIN Pin to GND Pin	-0.3	60	V
	VOUT Pin to GND pin	-0.3	6	V
	VOUT Pin to VIN Pin	-35	0.3	V
Current	Peak output	Internally limited		
Temperature	Operating Ambient Temperature	-40	85	°C
	Storage Temperature	-40	150	°C
	Operating virtual junction Temperature	-	150	°C
Thermal Resistance (Junction to Ambient)	SOT89	180		°C/W
	SOT23-3	380		°C/W
	SOT23-5	300		°C/W
Power Dissipation	SOT89	600		mW
	SOT23-3	300		mW
	SOT23-5	400		mW
Electrostatic discharge rating	Human Body Model (HBM)	4		kV
	Charged Device Model (MM)	100		V

Note: Stresses exceeding the range specified under “Absolute Maximum Ratings” may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.

## ■ Electrical characteristics

(At  $T_A=25^\circ\text{C}$ ,  $C_{IN}=1\mu\text{F}$ ,  $V_{IN}=V_{OUTNOM}+1.0\text{V}$ ,  $C_{OUT}=10\mu\text{F}$ , unless otherwise noted)

Symbol	Parameter	Test Conditions	MIN	TYP	MAX	UNIT
$V_{IN}$	Input Voltage		—	—	60	V
$I_{GND}$	Quiescent Current	VIN=12V, No load	—	1.8	—	$\mu\text{A}$
$V_{OUT(ZCC56XXB)}$	Output Voltage	VIN=12V, $I_{OUT}=10\text{mA}$	-2%		2%	$V_{OUT}$

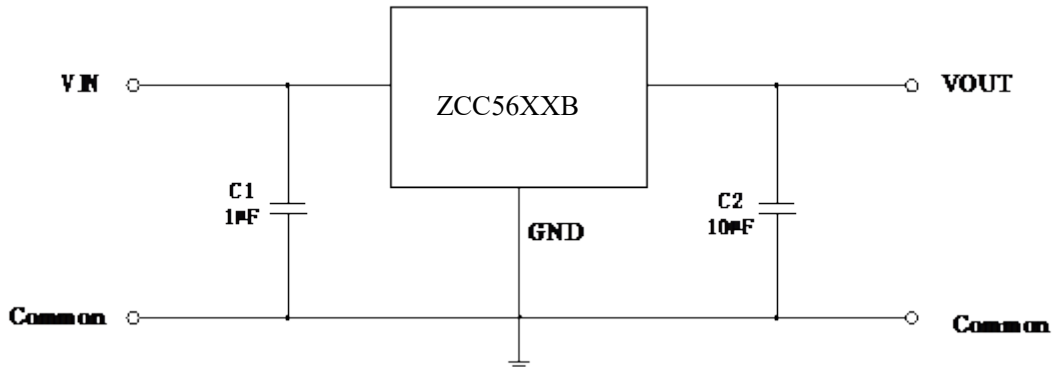


$I_{OUT\_MAX}$	Output Current		—	200	—	mA
$V_{DROPO}$	Dropout Voltage* <sup>1</sup> (ZCC5650)	$I_{OUT}=10mA$ , $\Delta V_{OUT} = - V_{OUTNOM} * 2\%$	—	70	—	mV
		$I_{OUT}=100mA$ , $\Delta V_{OUT} = - V_{OUTNOM} * 2\%$	—	700	—	mV
	Dropout Voltage* <sup>1</sup> (ZCC5633)	$I_{OUT}=10mA$ , $\Delta V_{OUT} = - V_{OUTNOM} * 2\%$	—	70	—	mV
		$I_{OUT}=100mA$ , $\Delta V_{OUT} = - V_{OUTNOM} * 2\%$	—	700	—	mV
$\Delta V_{OUT}$	Load Regulation	$1mA \leq I_{OUT} \leq 100mA$	—	20	—	mV
$\frac{\Delta V_{OUT}}{\Delta V_{IN}} \times 100 / V_{OUT}$	Line Regulation	$I_{OUT}=1mA$ , $V_{IN}=(V_{OUTNOM}+1V)$ to $V60$	—	0.2	—	%/V
$I_{LIMIT}$	Current Limit	$V_{IN}=(V_{OUTNOM}+1V)$ to $60V$ $R_{LOAD}=V_{OUTNOM}/1A$	—	400	—	mA
$T_{SHDN}$	Thermal Shutdown Threshold		—	125	—	°C

Note: \*1 Dropout Voltage is the voltage difference between the input and the output at which the output voltage drops 2% below its nominal value.

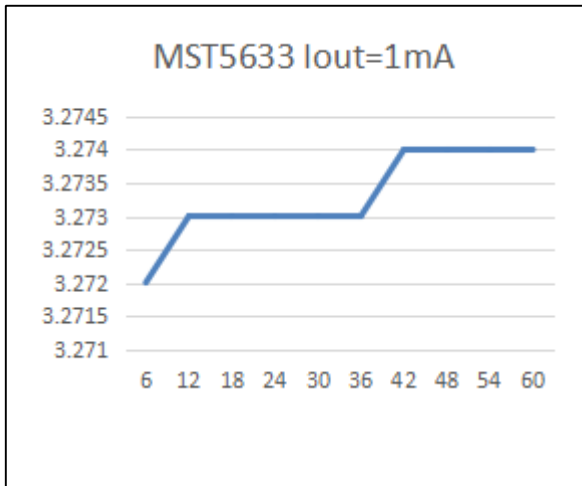


## Application Circuits

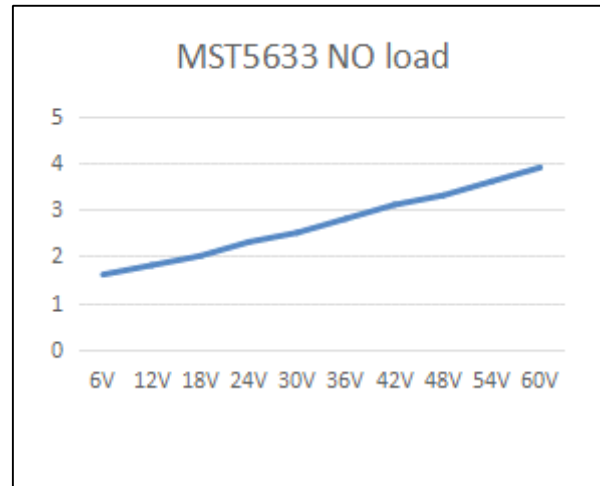


## Typical Performance Characteristics

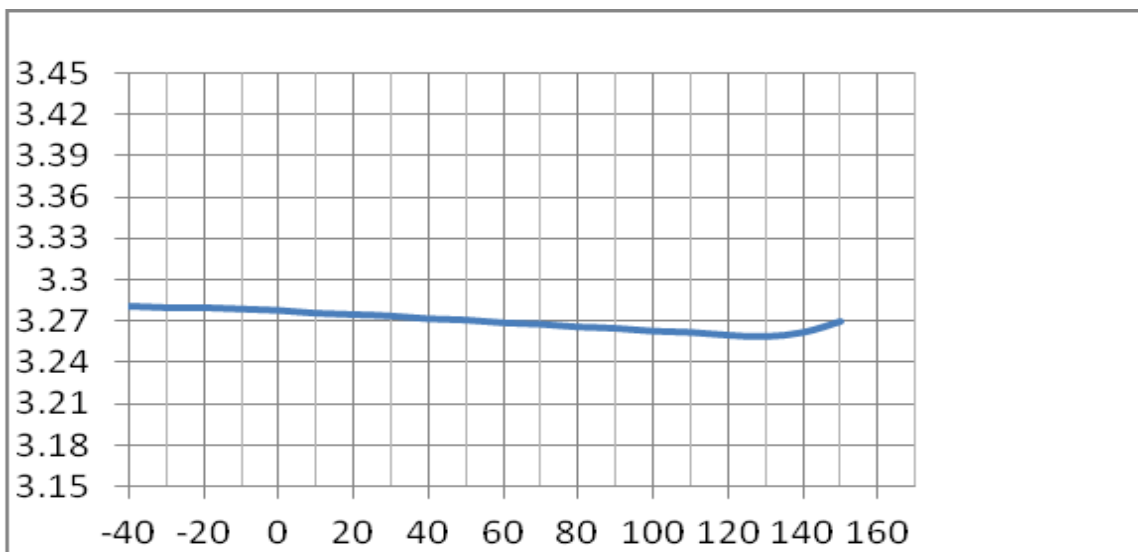
Test Condition:  $T_A=25^{\circ}\text{C}$ ,  $V_{IN}=V_{OUTNOM}+1.0\text{ V}$ ,  $I_{OUT}=1\text{mA}$ ,  $C_{OUT}=10\mu\text{F}$ , unless otherwise noted.



Output Voltage vs. Input Voltage



Quiescent Current vs. Input Voltage

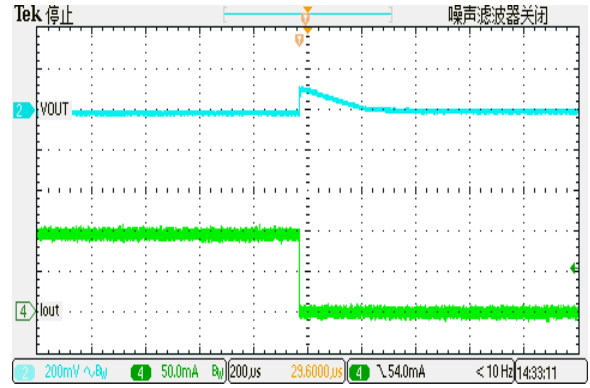
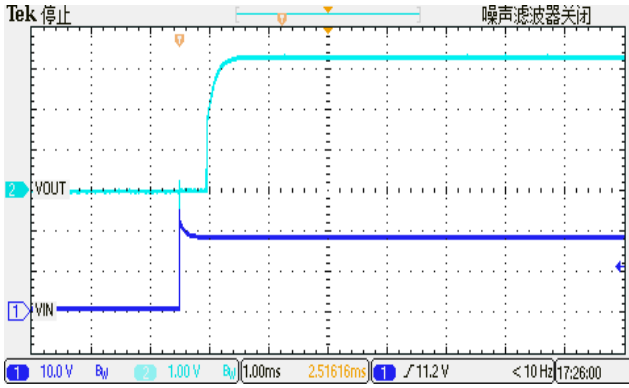


Output Voltage vs. Temperature

## Startup

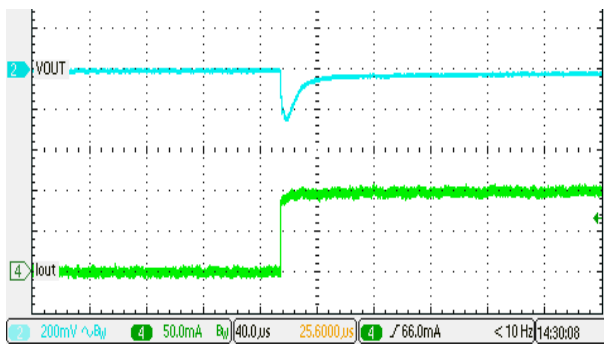
$V_{IN}=24\text{V}$ , No Load,  $C_{OUT}=10\mu\text{F}$

$V_{IN}=12.0\text{V}$ ,  $C_{OUT}=10\mu\text{F}$ ,  $I_{OUT}=100\text{mA}$  to  $10\text{mA}$

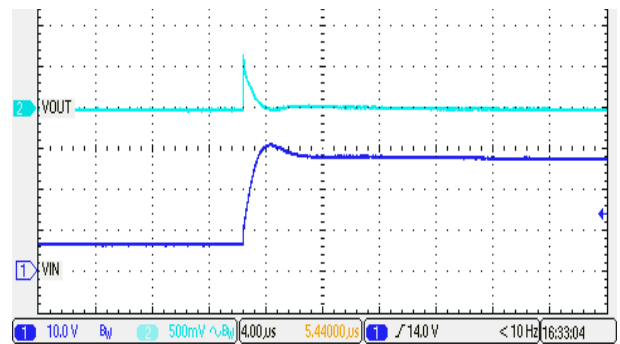


## Transient Response

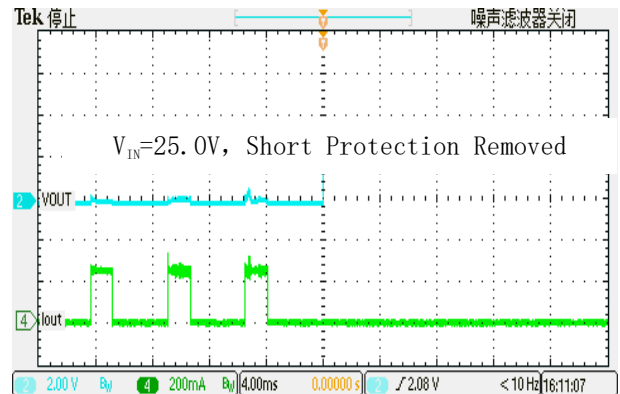
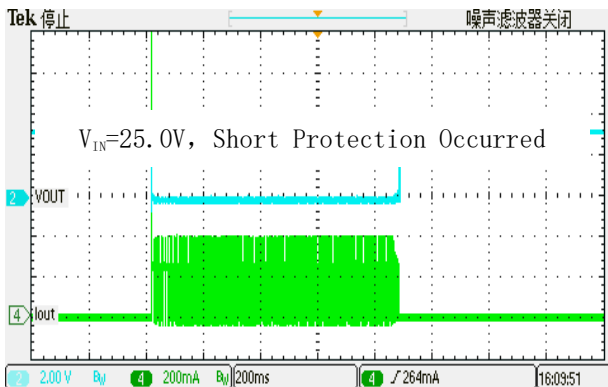
Load Transient  
 $V_{IN}=12.0V$ ,  $C_{OUT}=10\mu F$ ,  $I_{OUT}=10mA$  to  $100mA$



Line Transient  
 $V_{IN}=6.3V$  to  $30V$ ,  $C_{OUT}=10\mu F$ ,  $I_{OUT}=1mA$



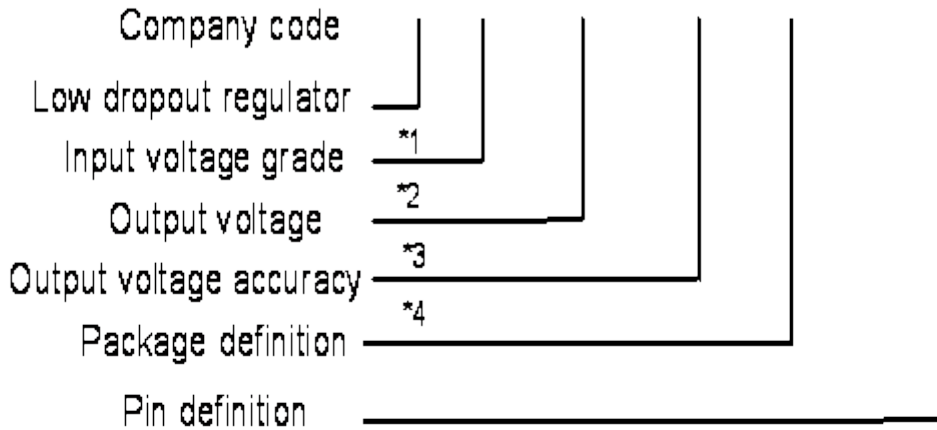
## Short Protection



## ■ Marking Information



# ZCC 56XXBTE-A



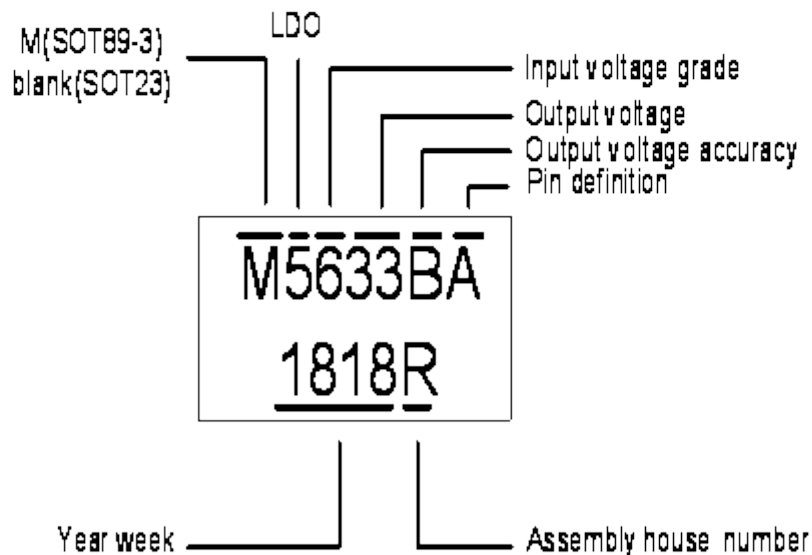
Note:

(\*1) 4-60V

(\*2) 33(3.3V) 50(5.0V)

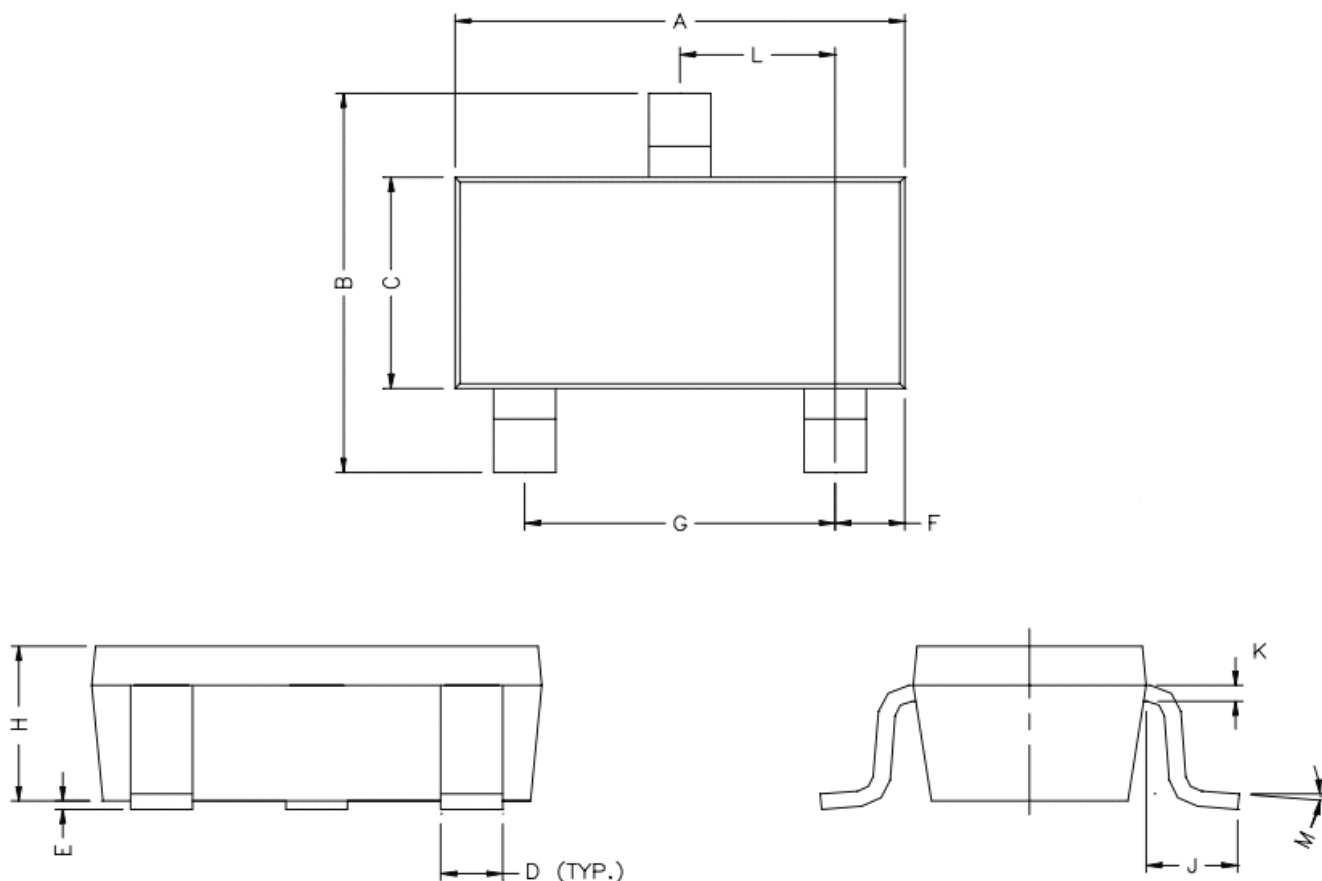
(\*3) A(±1%) B (±2%) C (±3%)

(\*4) TE(SOT23-3) TS(SOT89-3) TG(SOT23-5)



## ■ Package Information

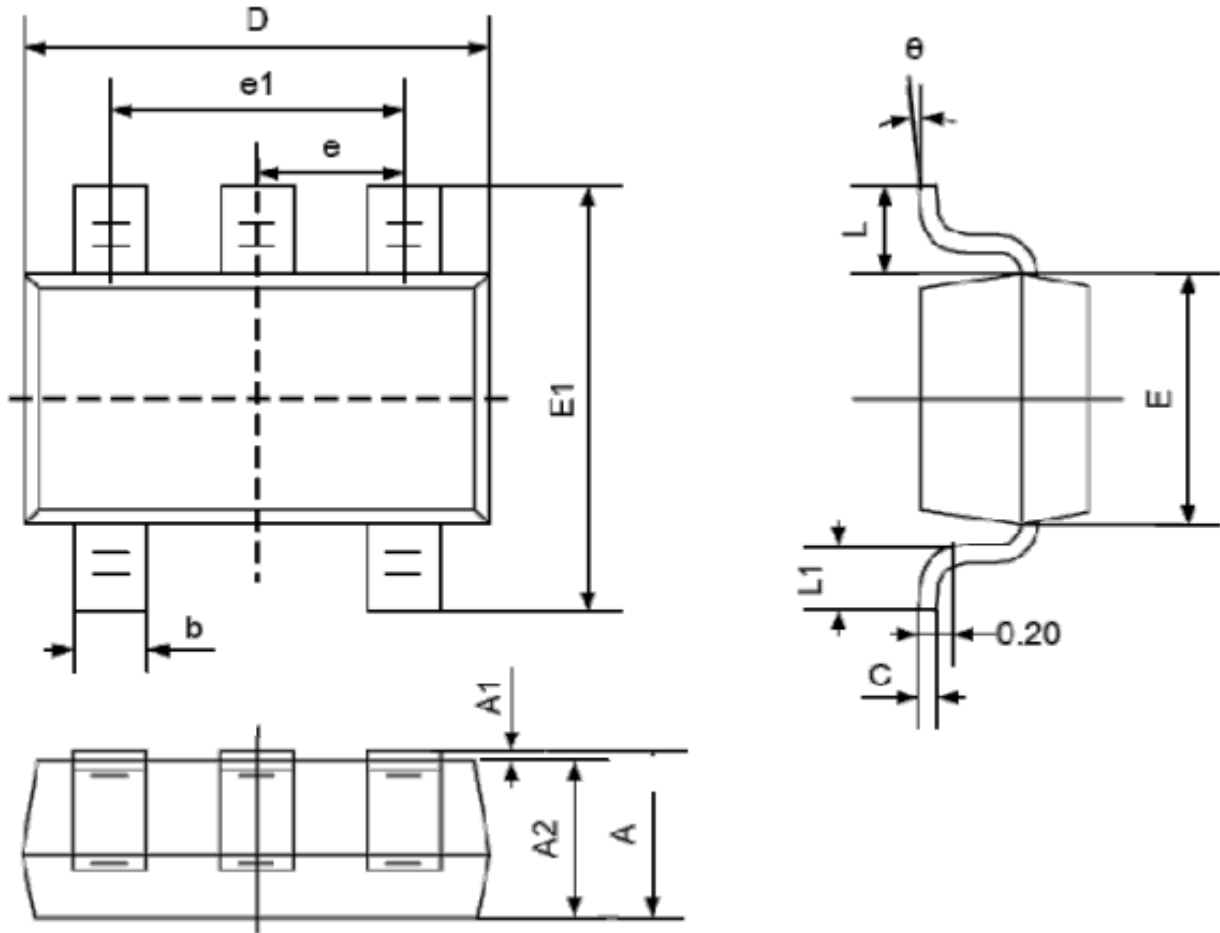
SOT23-3



REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	2.82	2.92	G	1.90	REF.
B	2.65	2.95	H	1.0	1.3
C	1.56	1.60	K	0.10	0.20
D	0.35	0.55	J	0.40	-
E	0	0.1	L	0.85	1.15
F	0.45	0.55	M	0°	10°

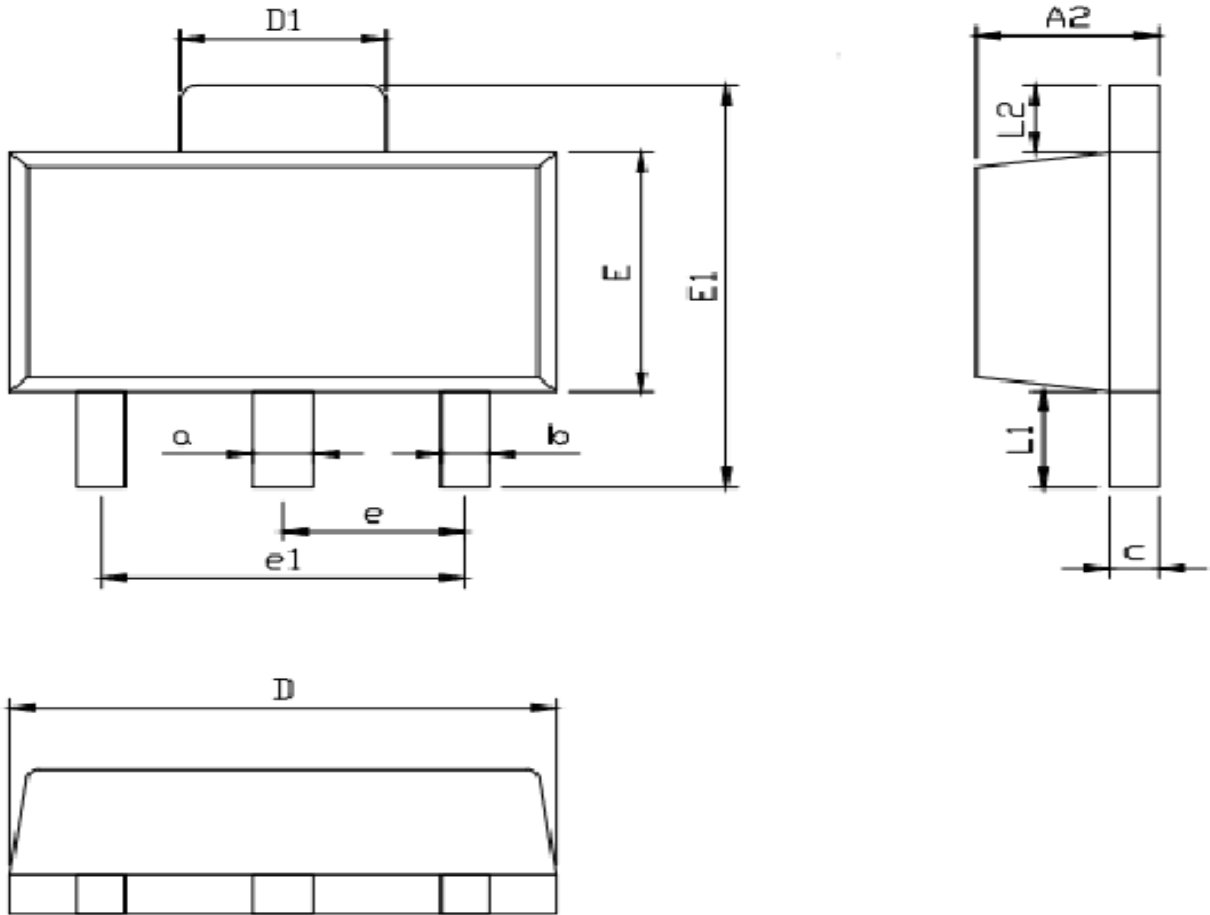
SOT23-5





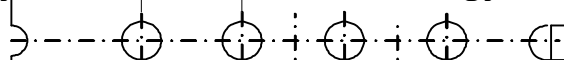
REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	1.05	1.25	E	1.5	1.7
A1	0	0.1	E1	2.65	2.95
A2	1.05	1.15	e	0.95 (BSC)	
b	0.3	0.5	e1	1.8	2.0
c	0.1	0.2	L	0.3	0.6
D	2.85	3.05	θ	0°	8°

SOT89-3



REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A2	1.4	1.6	E	2.40	2.60
a	0.45	0.55	E1	4.00	4.30
b	0.38	0.48	e	1.00	2.00
c	0.36	0.46	e1	2.95	3.05
D	4.40	4.60	L1	0.80	1.00
D1	1.60	1.80	<b>L2</b>	0.65	0.75

## ■ Packing information





Type	W(mm)	P(mm)	D(mm)	Qty (pcs)
SOT23-3 SOT23-5	12.0 $\pm$ 0.1 mm	8.0 $\pm$ 0.1 mm	330 $\pm$ 1 mm	3000pcs
SOT89-3	/	/	/	1000pcs