

## ■ Description

The MST53XXB series is a high voltage, ultralow-power, low dropout voltage regulator. The device can deliver 100mA output current with a dropout voltage of 300mV and allows an input voltage as high as 35V. The typical quiescent current is only 1.6 $\mu$ A. The device is available in fixed output voltages of 1.8, 3.0, 3.3, 3.6, 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

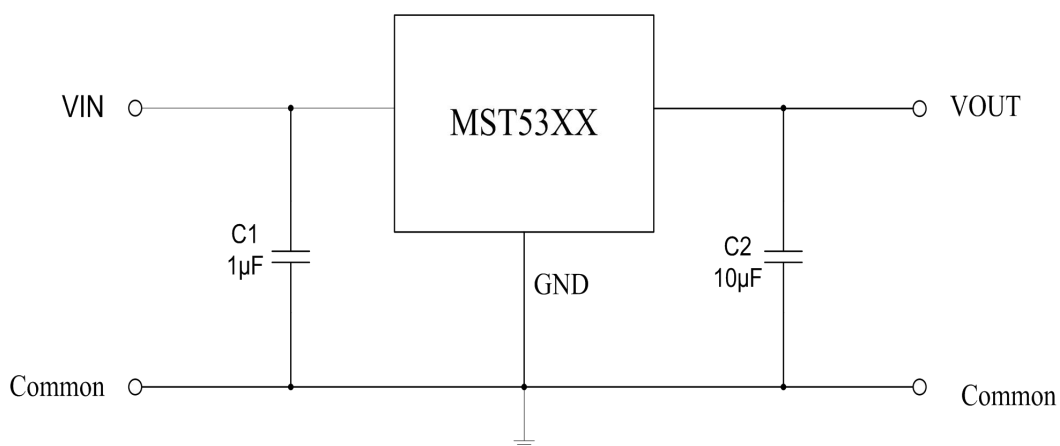
- Battery-powered equipment
- Smoke detector and sensor
- Microcontroller Applications
- Home Appliance

## ■ Features

- Low Quiescent Current : 1.6  $\mu$ A
- High Input Voltage : Up to 35V
- High Output Current :  $\geq$ 200mA
- Low Dropout Voltage :
  - 30mV@10mA
  - 300mV@100mA
  - 600mV@200mA
- Fixed Output Voltages : 1.8, 3.0, 3.3, 3.6, and 5.0V
- High-accuracy Output Voltage
- MST53XXB  $\pm$ 2%
- Good Transient Response
- Integrated Short-Circuit Protection
- Integrated Thermal Protection
- Available Packages :

MST53XXBTE	SOT23-3
MST53XXBTG	SOT23-5
MST53XXBTS	SOT89-3

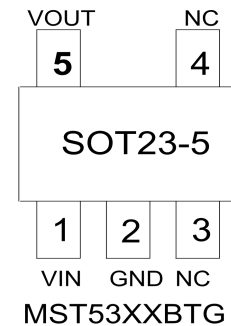
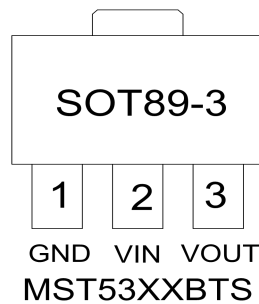
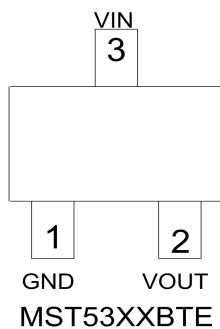
## ■ Application Circuits



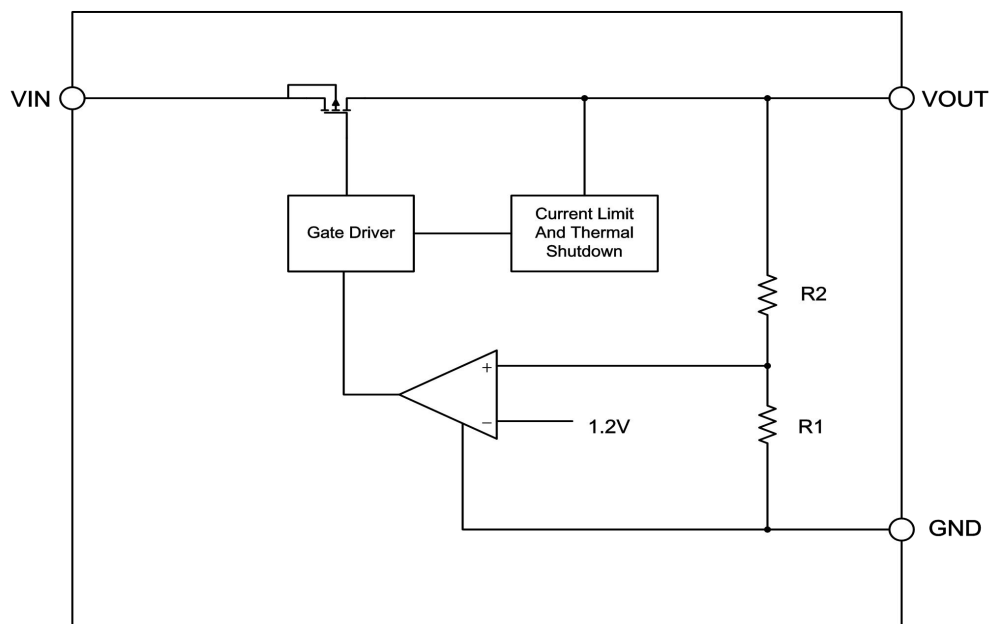
## Pin Descriptions

Pin Number			Pin Name	Description
SOT23-3	SOT89-3/TO92	SOT23-5		
1	1	2	GND	Ground Pin
2	3	5	VOUT	Output Pin
3	2	1	VIN	Input Pin

## Packages and Pin Assignments



## Functional Block Diagram



## ■ Absolute Maximum Ratings

Item	Description	Min	Max	Unit
Voltage	VIN Pin to GND Pin	-0.3	35	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
	TO92	200		°C/W
Power Dissipation	SOT89	600		mW
	SOT23-3	300		mW
	SOT23-5	400		mW
	TO92	600		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

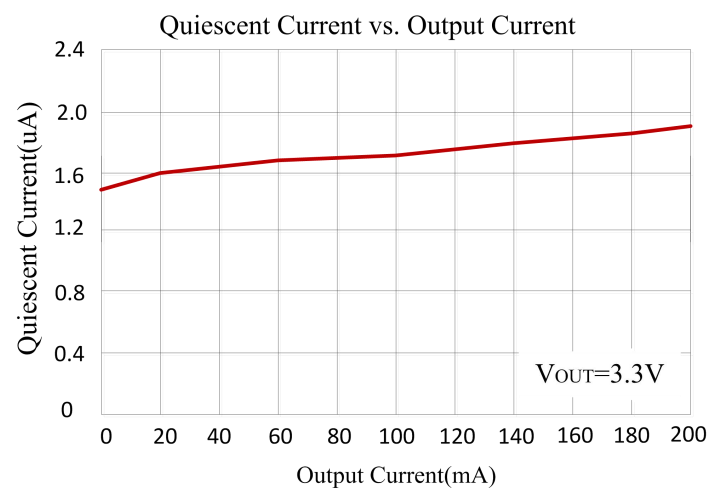
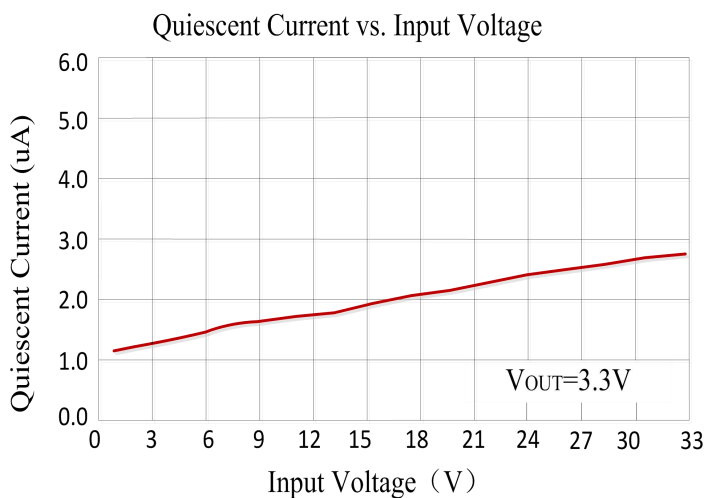
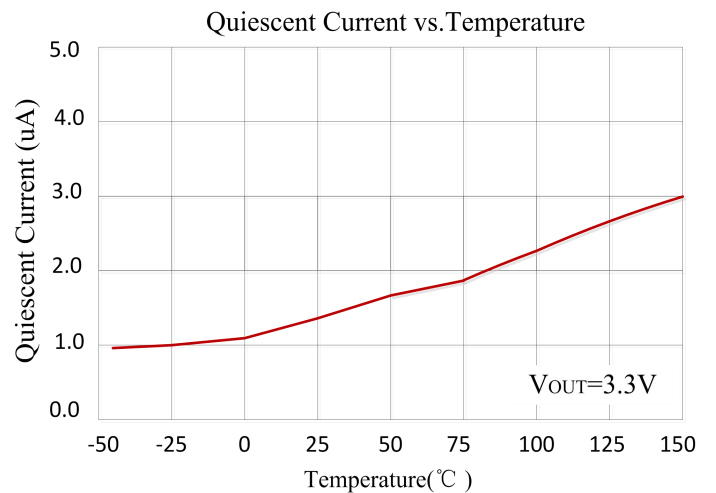
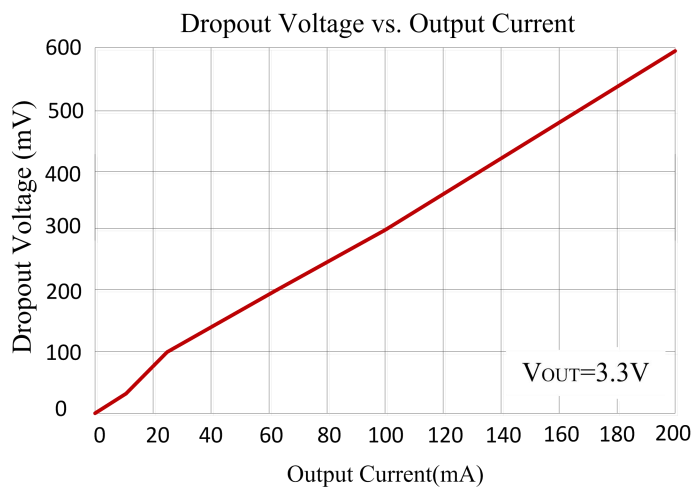
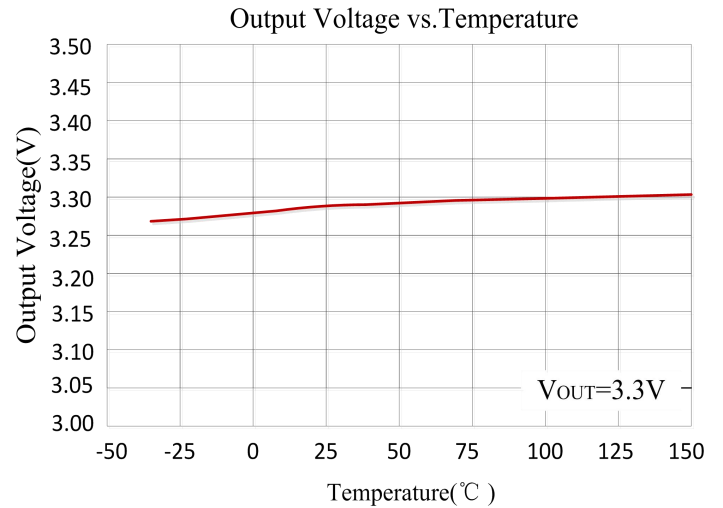
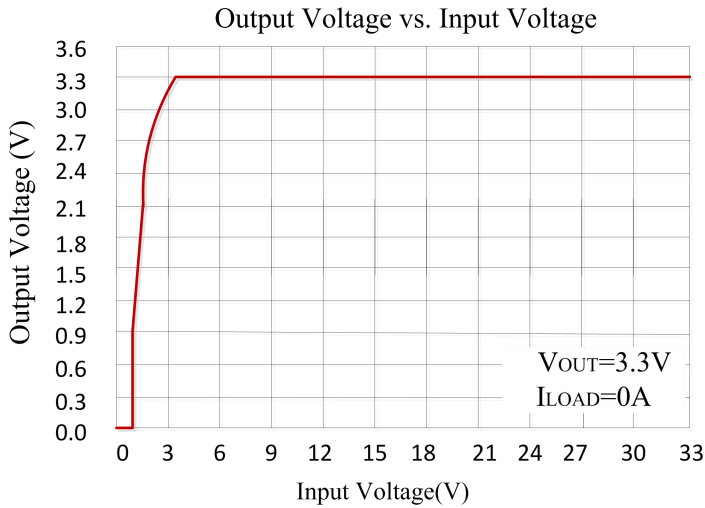
( At  $T_A=25^{\circ}\text{C}$ ,  $C_{IN}=1\mu\text{F}$ ,  $V_{IN}=V_{OUTNOM}+1.0\text{V}$ ,  $C_{OUT}=10\mu\text{F}$ , Unless Otherwise Noted )

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
$V_{IN}$	Input Voltage		—	—	35	V
$I_{GND}$	Quiescent Current	$V_{IN}=12\text{V}$ , No load	—	1.6	—	$\mu\text{A}$
$V_{OUT}$	Output Voltage	$V_{IN}=12\text{V}$ , $I_{OUT}=10\text{mA}$	$V_{OUTNOM}$ * 0.98	$V_{OUTNOM}$	$V_{OUTNOM}$ * 1.02	V
$I_{OUT\_MAX}$	Output Current		200	250	—	mA
$V_{DROP}$	Dropout Voltage* <sup>1</sup> (MST5350)	$I_{OUT}=10\text{mA}$ , $\Delta V_{OUT} = -V_{OUTNOM} * 2\%$	—	30	—	mV
		$I_{OUT}=100\text{mA}$ , $\Delta V_{OUT} = -V_{OUTNOM} * 2\%$	—	300	—	mV
		$I_{OUT}=200\text{mA}$ , $\Delta V_{OUT} = -V_{OUTNOM} * 2\%$	—	600	—	mV
	Dropout Voltage* <sup>1</sup> (MST5333)	$I_{OUT}=10\text{mA}$ , $\Delta V_{OUT} = -V_{OUTNOM} * 2\%$	—	30	—	mV
		$I_{OUT}=100\text{mA}$ , $\Delta V_{OUT} = -V_{OUTNOM} * 2\%$	—	300	—	mV
		$I_{OUT}=200\text{mA}$ , $\Delta V_{OUT} = -V_{OUTNOM} * 2\%$	—	600	—	mV
$\Delta V_{OUT}$	Load Regulation	$1\text{mA} \leq I_{OUT} \leq 100\text{mA}$	—	20	—	mV
$\frac{\Delta V_{OUT} \times 100}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	$I_{OUT}=1\text{mA}$ , $V_{IN}=(V_{OUTNOM}+1\text{V})$ to 35V	—	0.2	—	%/V
$I_{LIMIT}$	Current Limit	$V_{IN}=(V_{OUTNOM}+1\text{V})$ to 35V $R_{LOAD}=V_{OUTNOM}/1\text{A}$	—	450	—	mA
$T_{SHDN}$	Thermal Shutdown Threshold		—	125	—	$^{\circ}\text{C}$

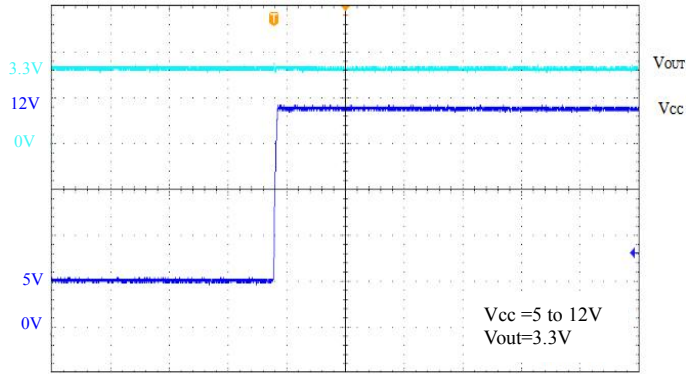
**Note :** \*1 Dropout Voltage is the voltage difference between the input and the output at which the output voltage drops 2% below its nominal value .

## Typical Performance Characteristics

Test Condition:  $T_A=25^\circ\text{C}$ ,  $V_{in}=12\text{V}$ ,  $I_{out}=1\text{mA}$ ,  $C_{OUT}=10\mu\text{F}$ , unless otherwise note

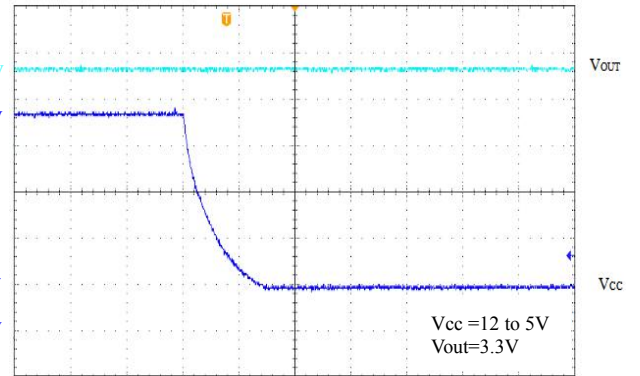


Line Transient Response



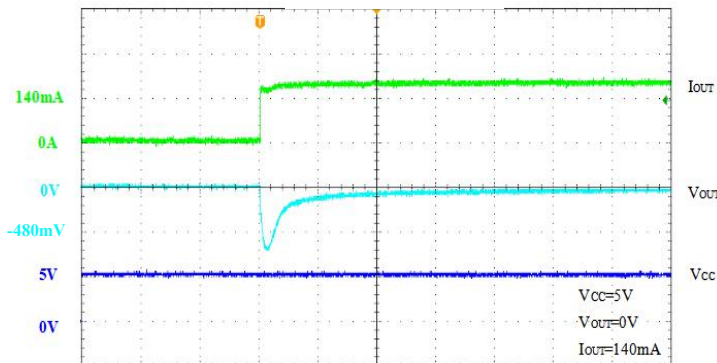
Time(4 $\mu$ s/div)

Line Transient Response



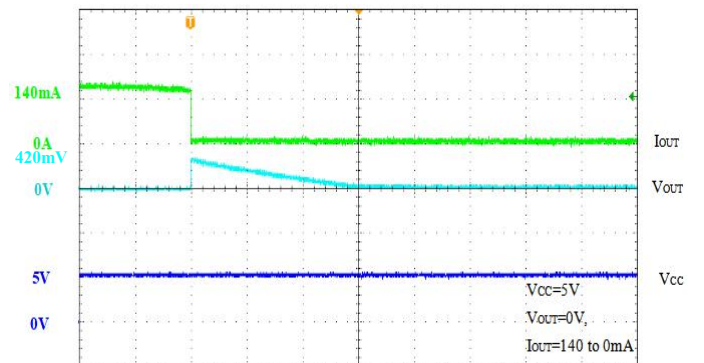
Time(4 $\mu$ s/div)

Load Transient Response



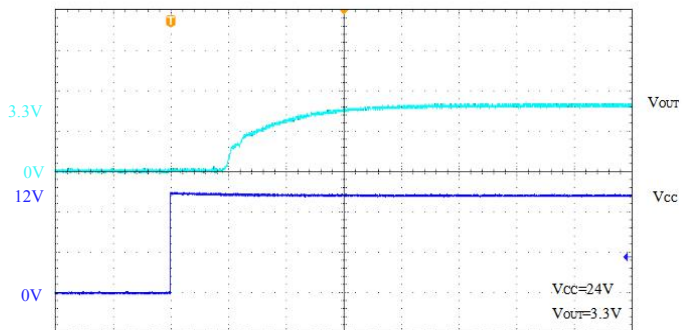
Time(200 $\mu$ s/div)

Load Transient Response



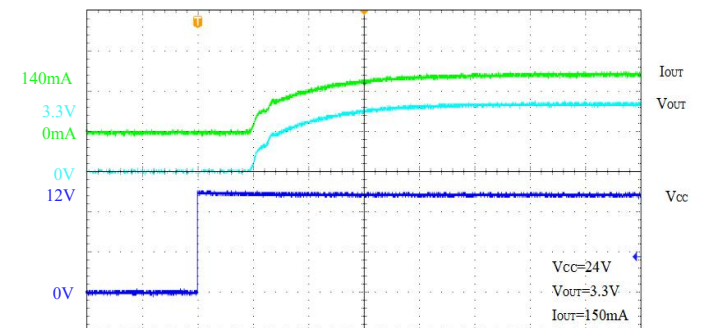
Time(200 $\mu$ s/div)

Start Up



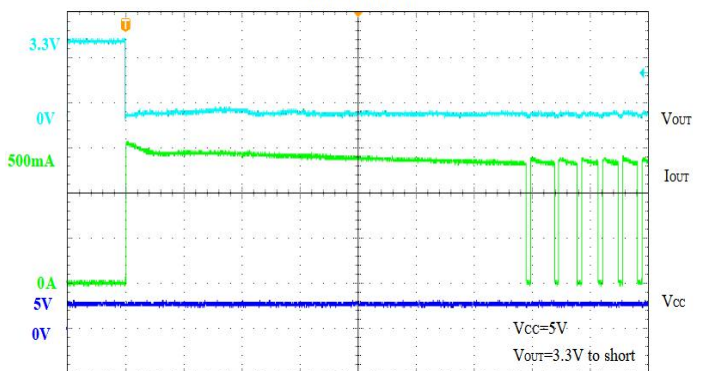
Time(800 $\mu$ s/div)

Start Up



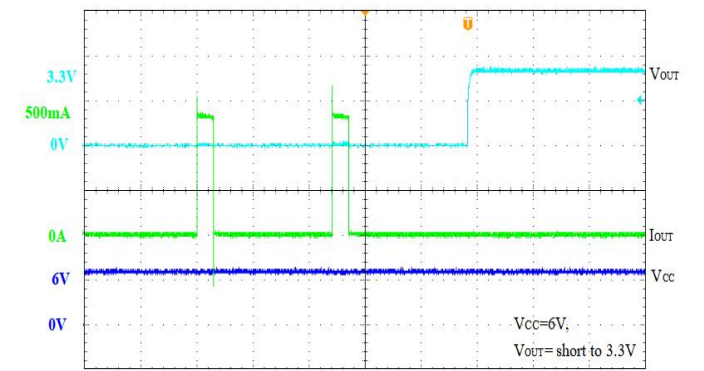
Time(800 $\mu$ s/div)

Short Circuit Protection



Time(20ms/div)

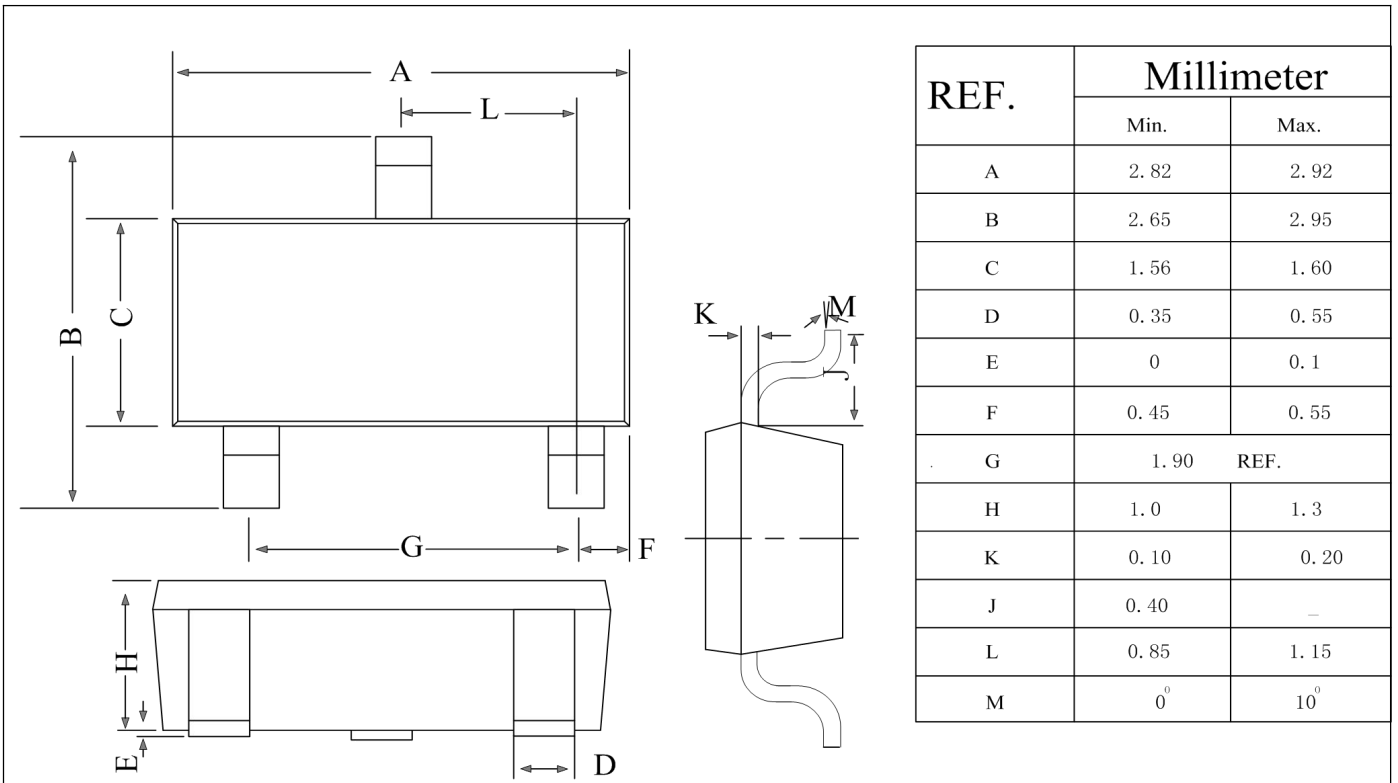
Short Circuit Protection



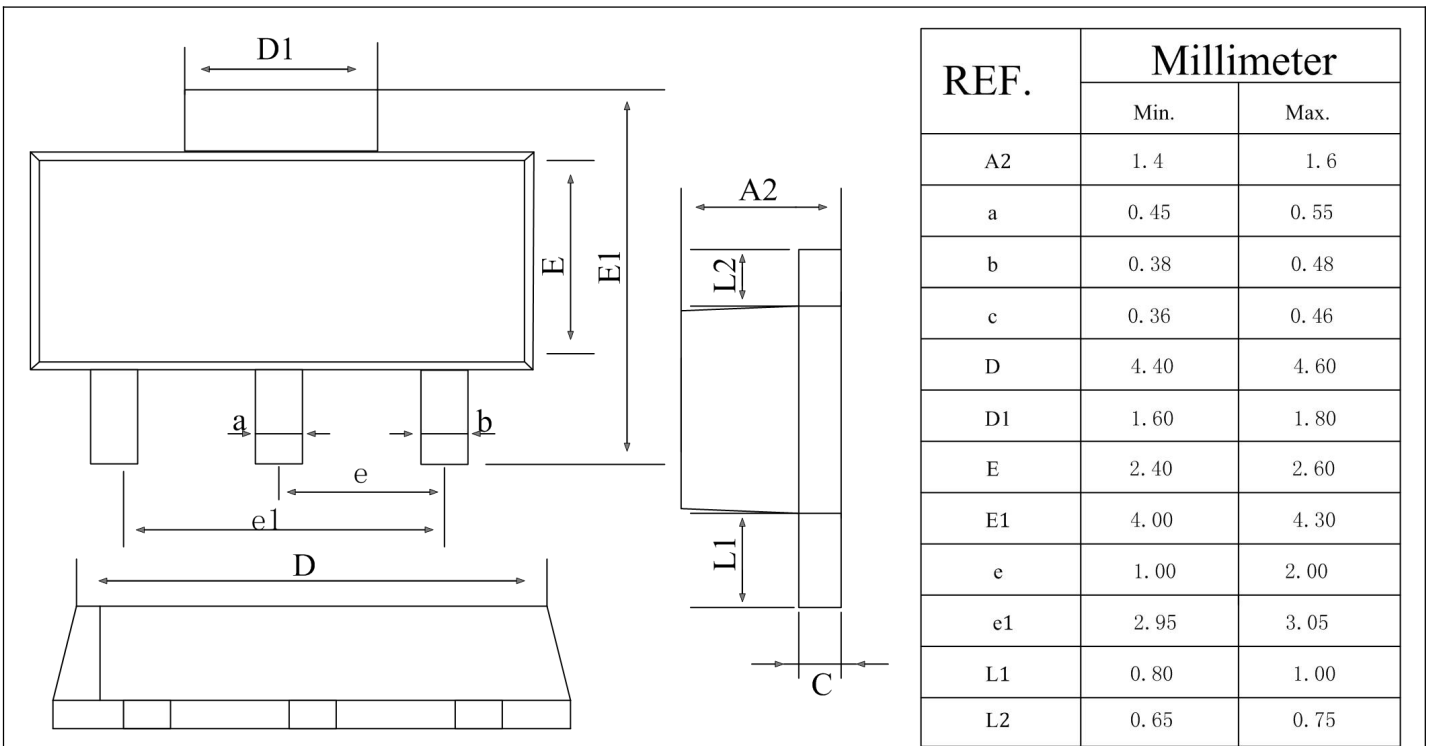
Time(2ms/div)

## ■ Package Outline Dimensions

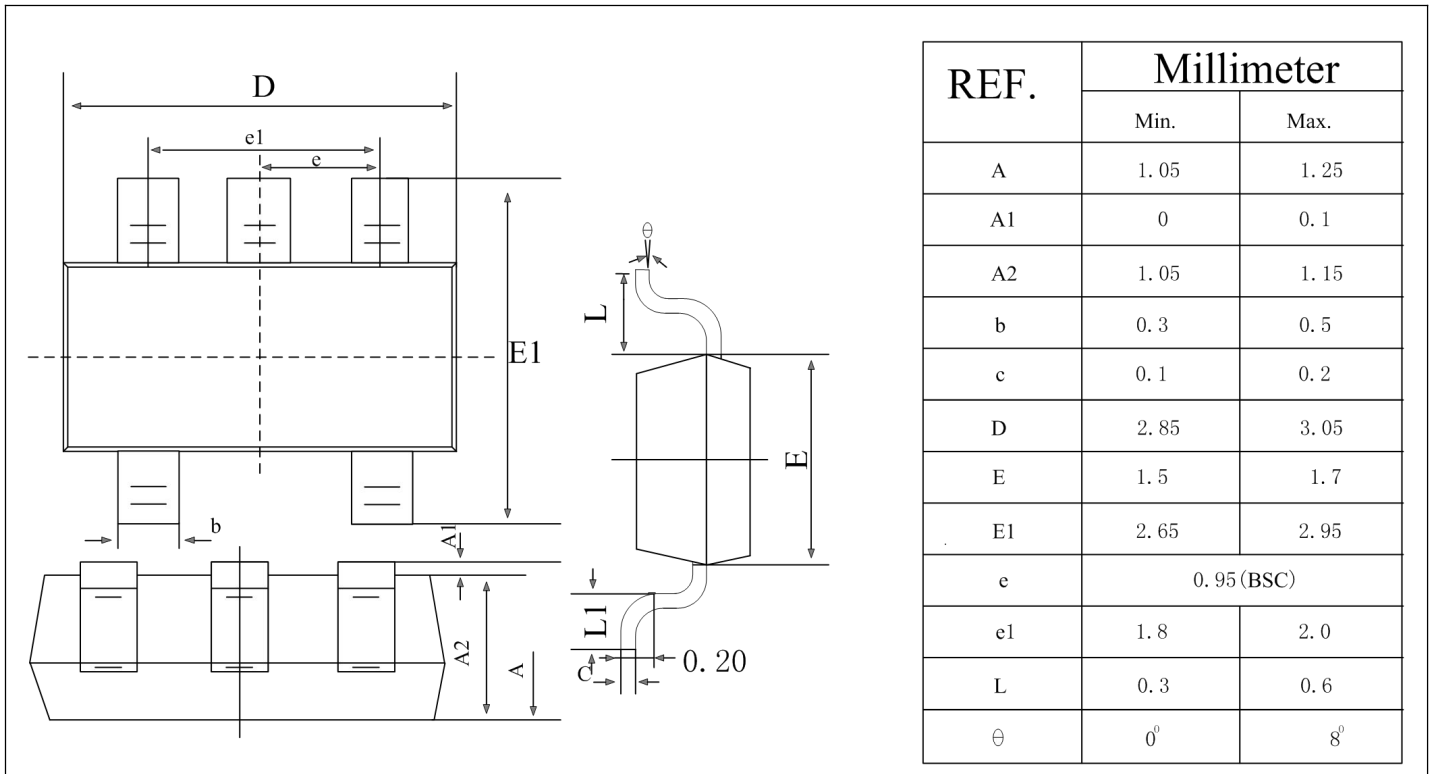
### SOT23-3



### SOT89-3

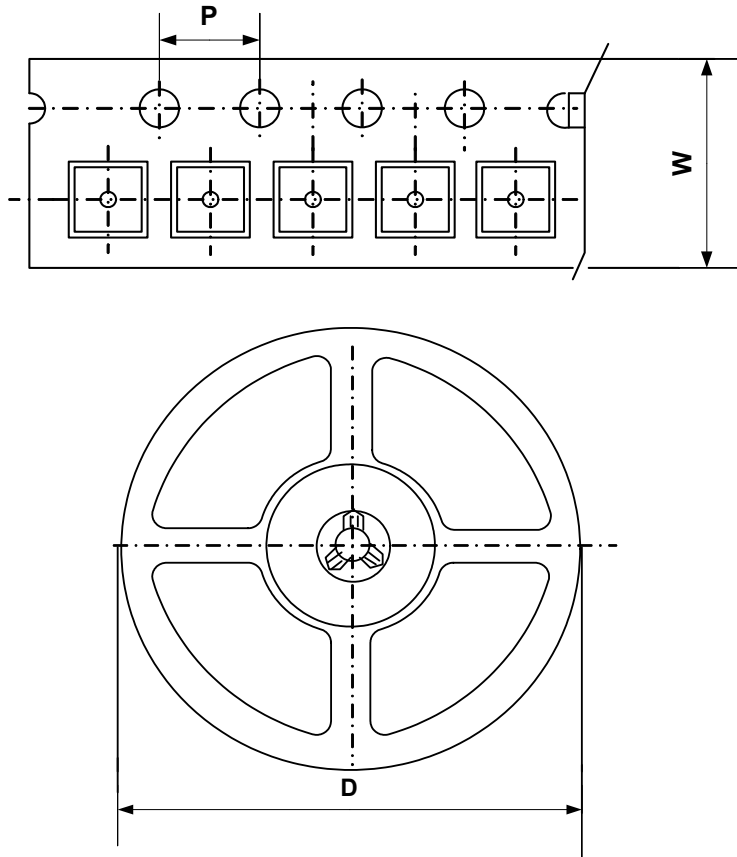


## SOT23-5





## ■ 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

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