

## Description

The TN73A series is a set of three-terminal low power high voltage regulators implemented in CMOS technology. They allow input voltages as high as 20V. They are available with several fixed output voltages ranging from 2.1V to 9.0V. Because of the low power dissipation, TN73A series are widely used in a variety of equipment such as audio device, video device, communication device and so on.

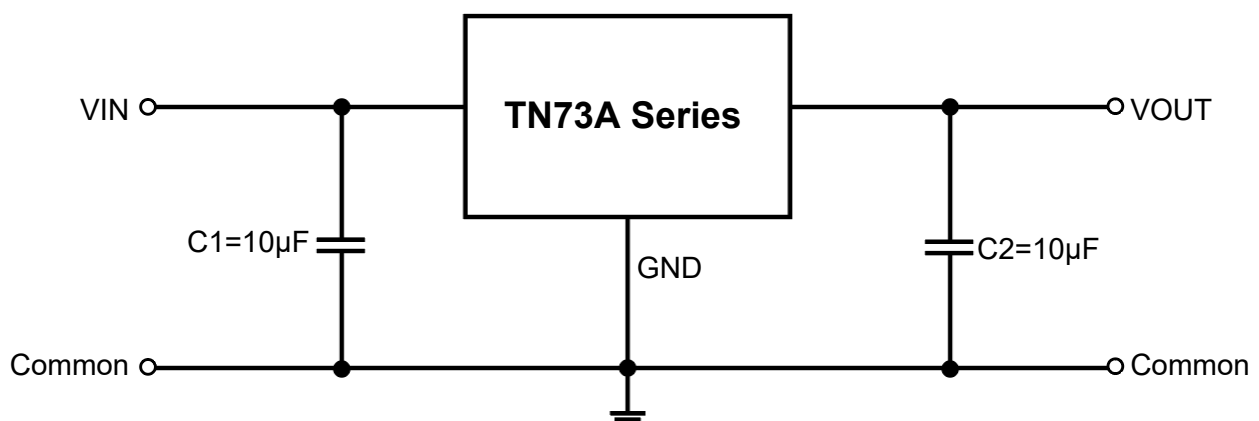
## Features

- High Input Voltage Range: up to 20V
- Maximum Output Current: 300mA
- Fixed Standard Fixed Output Voltage Options: 2.8V, 3V, 3.3V, 3.6V, 4V, 4.4V, 5V, 9V
- Low Quiescent current: 1.5 $\mu$ A
- PSRR=dB@1KHz
- Low Dropout: 300mV(Max.)@100mA
- Low Output Voltage Accuracy:  $\pm 2\%$
- Low Power Consumption
- Low Temperature Coefficient
- Available Packages: SOT-23, SOT-23-3, SOT-89, SOT-23-5

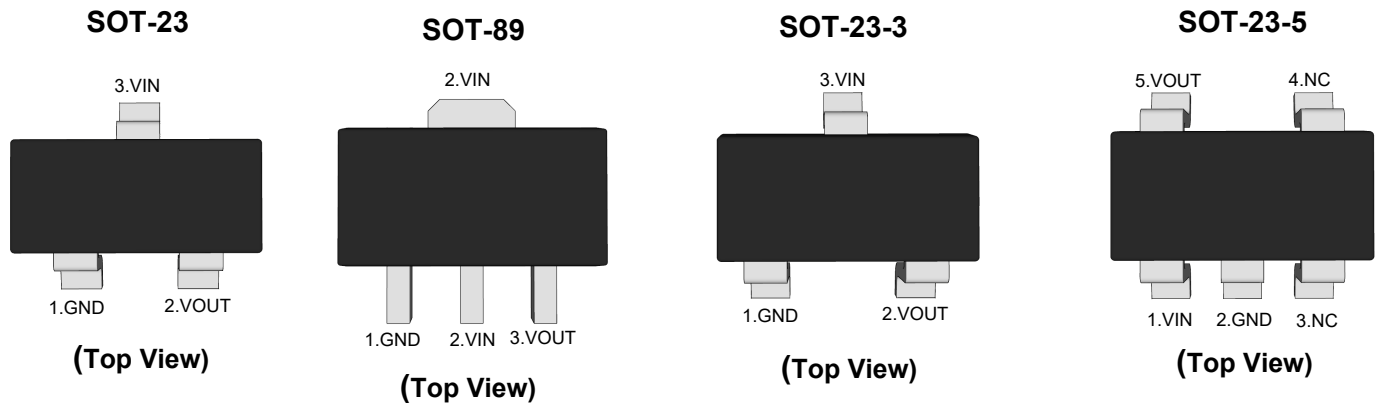
## Applications

- Battery-Powered Equipment
- Ultra Low Power Microcontrollers
- Notebook Computers

## Typical Application Circuit



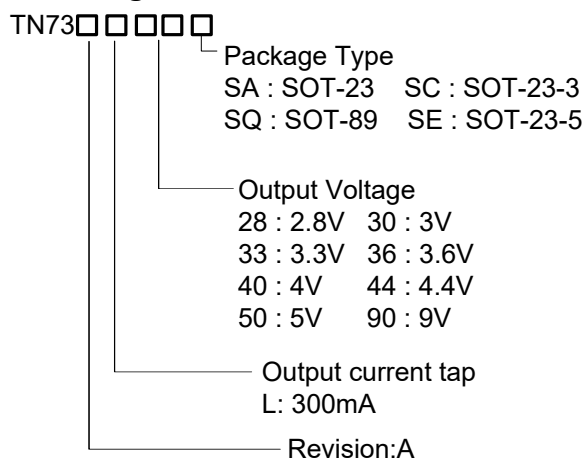
### Pin Distribution



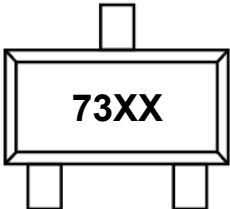
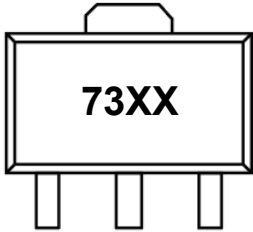
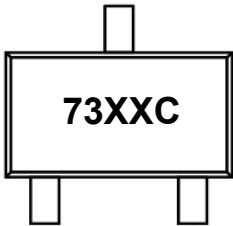
### Functional Pin Description

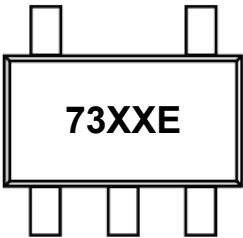
Pin Name	Pin Function
NC	NO Connected
GND	Ground
VOUT	Output Voltage
VIN	Power Input Voltage

### Ordering Information



### Ordering Information Continue

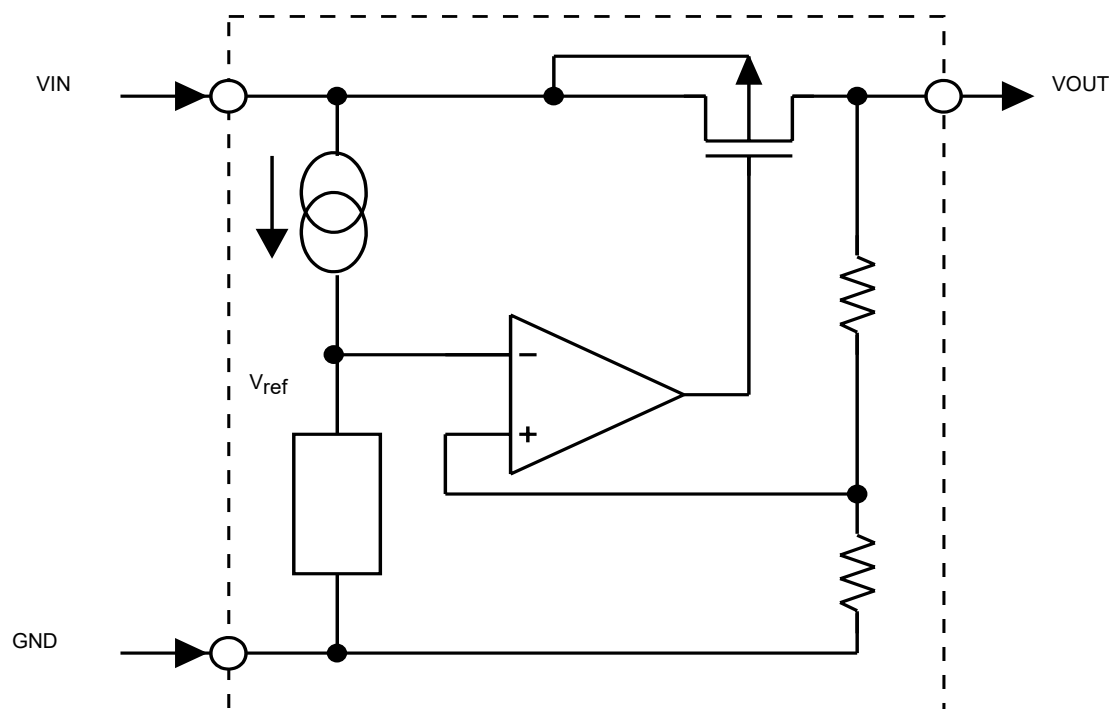
Orderable Device	Package	Reel (inch)	Package Qty (PCS)	Eco Plan <sup>Note</sup>	MSL Level	Marking Code
TN73AL28SA	SOT-23	7	3000	RoHS & Green	MSL1	 <p><b>73XX</b></p> <p>XX:Output Voltage e.g. 30:3.0V</p>
TN73AL30SA						
TN73AL33SA						
TN73AL36SA						
TN73AL40SA						
TN73AL44SA						
TN73AL50SA						
TN73AL90SA						
TN73AL28SQ	SOT-89	7/13	1000/3000	RoHS & Green	MSL1	 <p><b>73XX</b></p> <p>XX:Output Voltage e.g. 30:3.0V</p>
TN73AL30SQ						
TN73AL33SQ						
TN73AL36SQ						
TN73AL40SQ						
TN73AL44SQ						
TN73AL50SQ						
TN73AL90SQ						
TN73AL28SC	SOT-23-3	7	3000	RoHS & Green	MSL3	 <p><b>73XXC</b></p> <p>XX:Output Voltage e.g. 30:3.0V</p>
TN73AL30SC						
TN73AL33SC						
TN73AL36SC						
TN73AL40SC						
TN73AL44SC						
TN73AL50SC						
TN73AL90SC						

TN73AL28SE	SOT-23-5	7	3000	RoHS & Green	MSL3	 <p><b>73XXE</b></p> <p>XX: Output Voltage e.g. 30:3.0V</p>
TN73AL30SE						
TN73AL33SE						
TN73AL36SE						
TN73AL40SE						
TN73AL44SE						
TN73AL50SE						
TN73AL90SE						

**Note:**

RoHS: TN defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials.

Green: TN defines "Green" to mean Halogen-Free and Antimony-Free.

**Function Block Diagram**


### Absolute Maximum Ratings

Ratings at 25°C ambient temperature unless otherwise specified.

Parameter		Value	Unit
Supply Voltage		-0.3 ~ +22	V
Power Dissipation	SOT-23	180	mW
	SOT-23-3	200	mW
	SOT-23-5	200	mW
	SOT-89	500	mW
Thermal Resistance, Junction-to-Ambient	SOT-23	550	°C/W
	SOT-23-3	500	°C/W
	SOT-23-5	500	°C/W
	SOT-89	200	°C/W
Operating Ambient Temperature		-40 ~ +85	°C
Storage temperature range		-50 ~ +125	°C
ESD Voltage	HBM	2	KV

Note: 1. Exceed these limits to damage to the device, exposure to absolute maximum rating conditions may affect the reliability of the chip.

### Recommended Operating Conditions

Parameter	Value	Unit
Supply Voltage	20	V
Maximum Output Current	300	mA
Operating Ambient Temperature	-40 ~ +85	°C

### Electrical Characteristics

( $V_{IN}=V_{OUT}+2$ ,  $C_{IN}=10\mu F$ ,  $C_{OUT}=10\mu F$ ,  $T_A=25^{\circ}C$ , unless otherwise noted.)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Input Voltage	$V_{IN}$		--	--	20	V
Output Voltage Accuracy	$\Delta V_{OUT}$	$I_{OUT}=10mA$	-2	--	+2	%
Max. Output Current	$I_{OUT}$		300	--	--	mA
Quiescent Current	$I_Q$	$I_{OUT}=0mA$	--	1.5	3	$\mu A$
Dropout Voltage <sup>Note1</sup>	$V_{DROP}$	$2.8V \leq V_{OUT} < 3.0V$ , $I_{OUT}=10mA$	--	30	55	mV
		$3.0V \leq V_{OUT} < 3.3V$ , $I_{OUT}=100mA$	--	210	300	
		$3.3V \leq V_{OUT} < 3.6V$ , $I_{OUT}=100mA$	--	195	300	
		$3.6V \leq V_{OUT} < 4.0V$ , $I_{OUT}=100mA$	--	180	300	
		$4.0V \leq V_{OUT} < 4.4V$ , $I_{OUT}=100mA$	--	170	300	
		$4.4V \leq V_{OUT} < 5.0V$ , $I_{OUT}=100mA$	--	160	300	
		$5.0V \leq V_{OUT} < 9.0V$ , $I_{OUT}=100mA$	--	150	300	
		$9.0V \leq V_{OUT}$ , $I_{OUT}=100mA$	--	130	300	
Line Regulation	$\Delta V_{LINE}$	$V_{IN}=V_{OUT}+2$ to 20V, $I_{OUT}=1mA$	--	--	0.2	%/V
Load Regulation	$\Delta V_{LOAD}$	$1mA < I_{OUT} < 300mA$	--	37	100	mV
Short Current	$I_{SHORT}$	$V_{OUT}=0V$	--	250	--	mA
Limit Current	$I_{LIMIT}$	$V_{IN}=V_{OUT} + 2V$ , $I_{OUT}=1mA$	--	530	--	mA
Power Supply Rejection Ratio	PSRR	$V_{OUT}=3V$ , $I_{OUT}=100mA$ , $f=1KHz$	--	33	--	dB
VOUT Temperature Coefficient	$\frac{\Delta V_{OUT}}{V_{OUT} \times \Delta T_A}$	$V_{IN}=V_{OUT}+2V$ , $I_{OUT}=10mA$ $-40^{\circ}C \leq T_A \leq 85^{\circ}C$	--	100	--	ppm/ $^{\circ}C$

**Note 1.** The dropout voltage is defined as  $V_{IN} - V_{OUT}$ , when  $V_{OUT}$  is 98% of the normal value of  $V_{OUT}$ .

## Functional Description

### Input Capacitor

A 1μF ceramic capacitor is recommended to connect between VIN and GND pins to decouple input power supply glitch and noise. The amount of the capacitance may be increased without limit. This input capacitor must be located as close as possible to the device to assure input stability and less noise. For PCB layout, a wide copper trace is required for both VIN and GND.

### Output Capacitor

An output capacitor is required for the stability of the LDO. The recommended minimum output capacitance is 10μF, ceramic capacitor is recommended, and temperature characteristics are X7R or X5R. Higher capacitance values help to improve load/line transient response. The output capacitance may be increased to keep low undershoot/overshoot. Place output capacitor as close as possible to VOUT and GND pins.

### Thermal Considerations

For continuous operation, do not exceed absolute maximum junction temperature. The maximum power dissipation depends on the thermal resistance of the IC package, PCB layout, rate of surrounding airflow, and difference between junction and ambient temperature. The maximum power dissipation can be calculated by the following formula :

$$P_{D(MAX)} = (T_{J(MAX)} - T_A) / R_{\theta JA}$$

Where  $T_{J(MAX)}$  is the maximum operation junction temperature 125 °C,  $T_A$  is the ambient temperature and the  $R_{\theta JA}$  is the junction to ambient thermal resistance.

The power dissipation definition in device is :

$$P_D = (V_{IN} - V_{OUT}) \times I_{OUT} + V_{IN} \times I_Q$$

### Layout Consideration

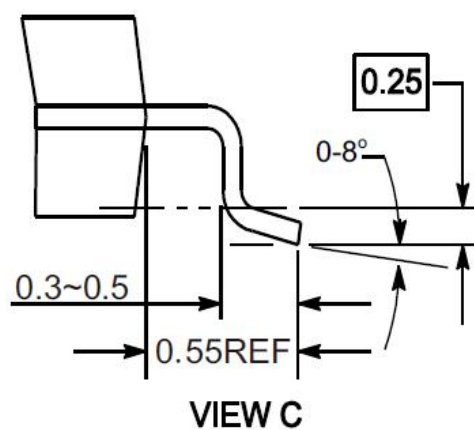
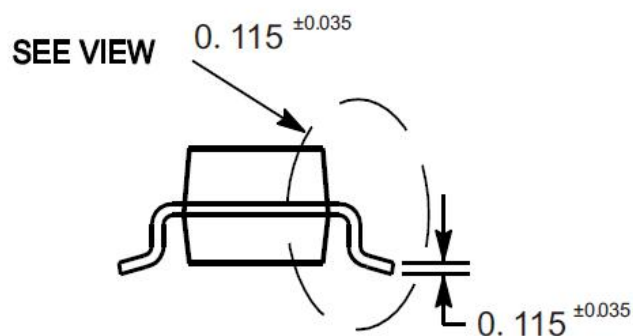
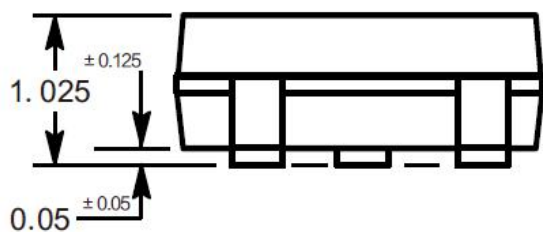
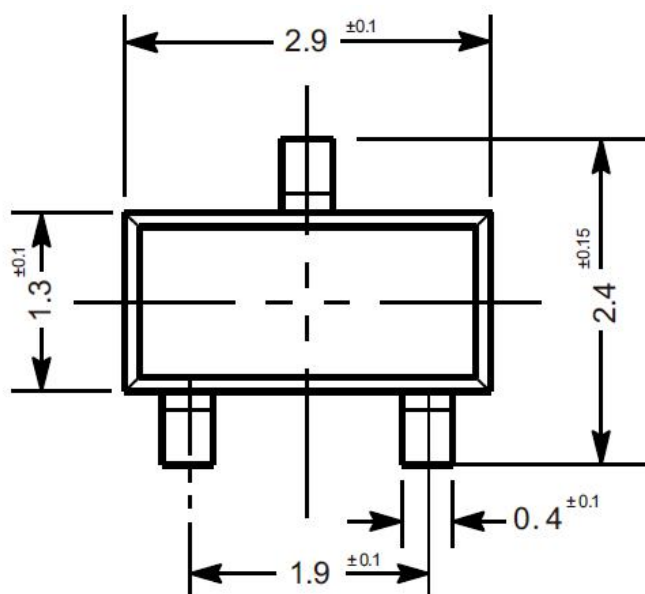
By placing input and output capacitors on the same side of the PCB as the LDO, and placing them as close as is practical to the package can achieve the best performance. The ground connections for input and output capacitors must be back to the TN73A Series ground pin using as wide and as short of a copper trace as is practical. Connections using long trace lengths, narrow trace widths, and connections through via must be avoided. These add parasitic inductances and resistance that results in worse performance especially during transient conditions.



### Package Outline

SOT-23

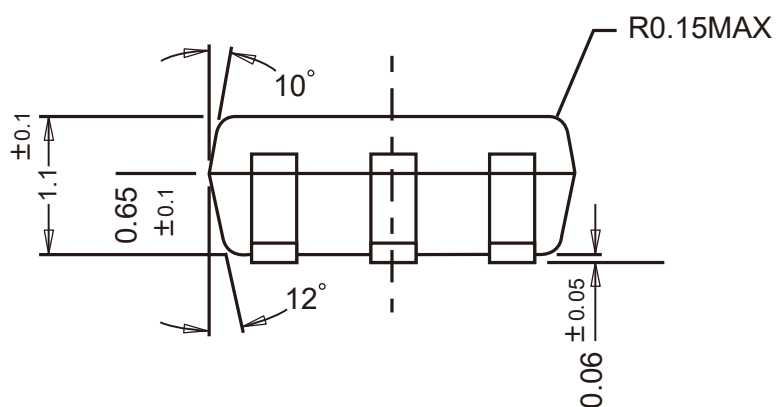
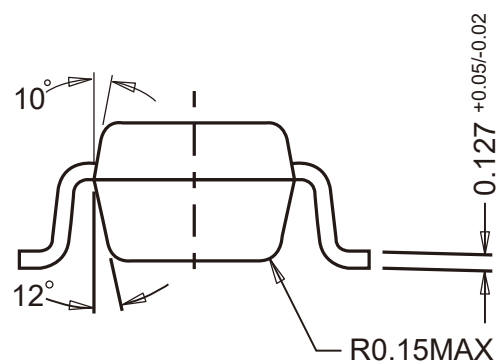
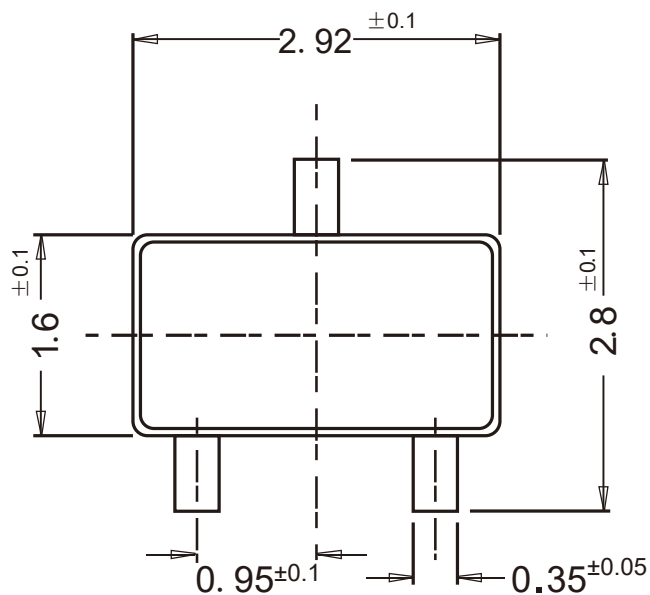
Dimensions in mm



### Package Outline

SOT-23-3

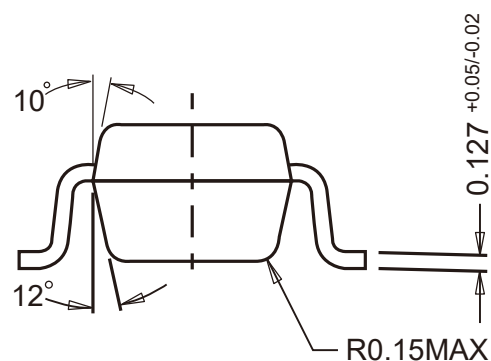
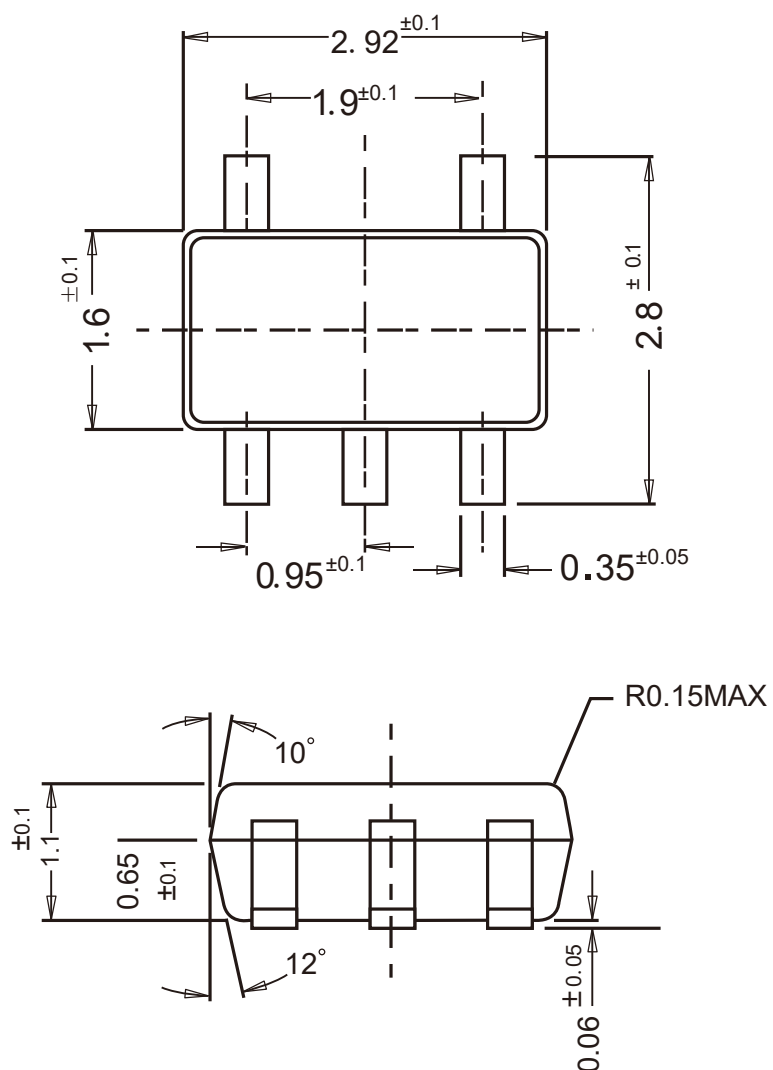
Dimensions in mm



### Package Outline

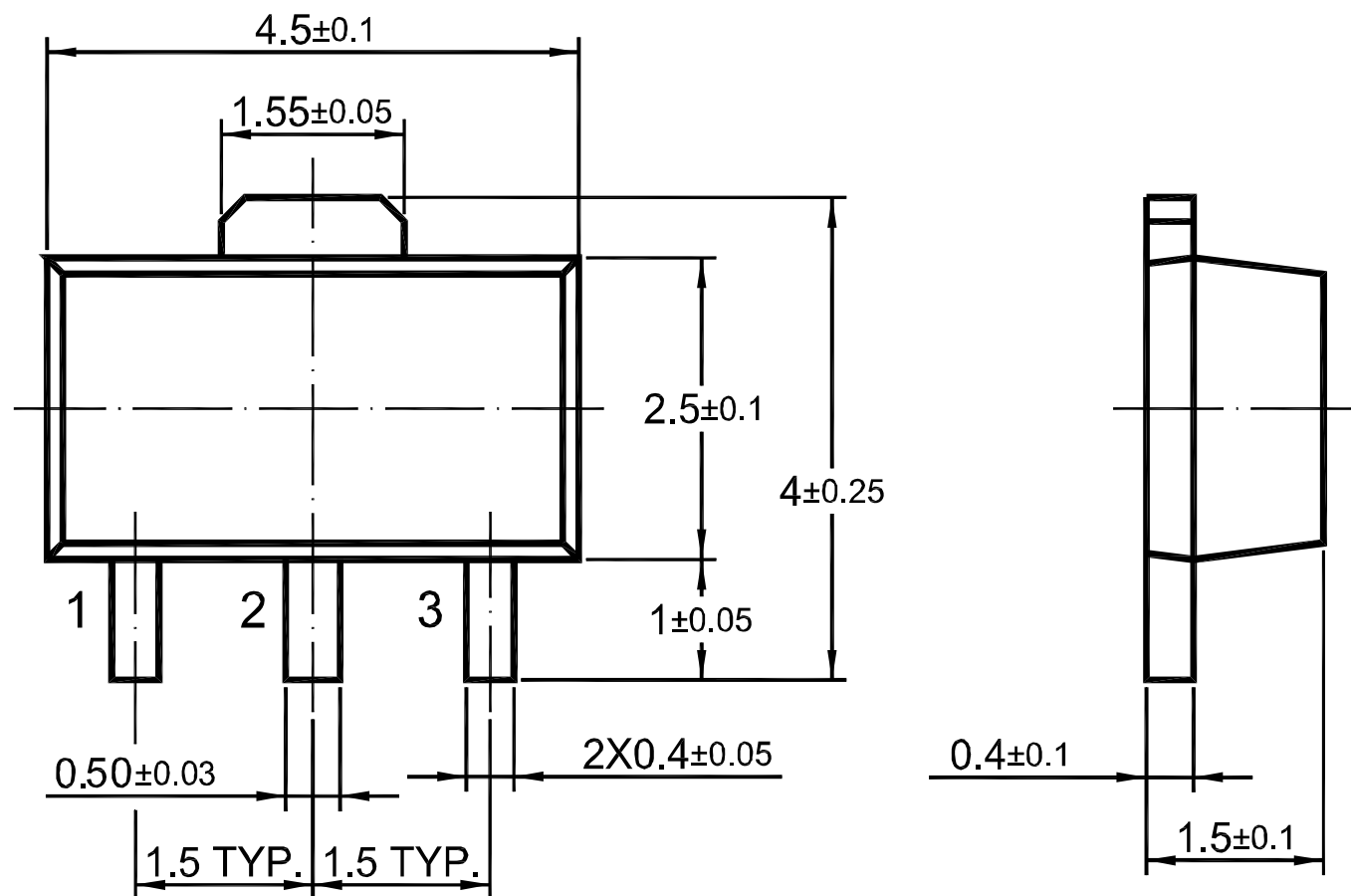
SOT-23-5

Dimensions in mm



### Package Outline


SOT-89 Dimensions in mm



### Contact Information

TANI website: <http://www.tanisemi.com> Email: [tani@tanisemi.com](mailto:tani@tanisemi.com)

For additional information, please contact your local Sales Representative.

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