TN73 Series

Low Dropout Regulators

Description

The TN73 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, TN73 series are widely used in a variety of equipment such as audio device, video device, communication device and so on.

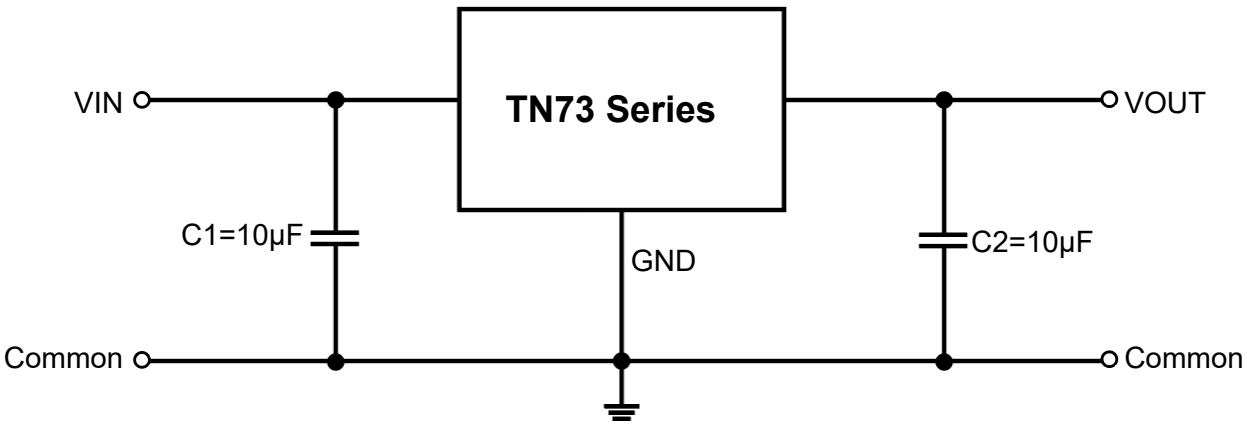
Features

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

Applications

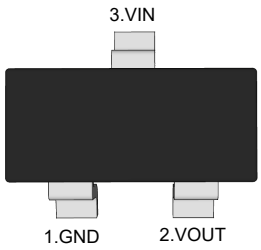
- Battery-Powered Equipment
- Ultra Low Power Microcontrollers
- Notebook Computers

Typical Application Circuit



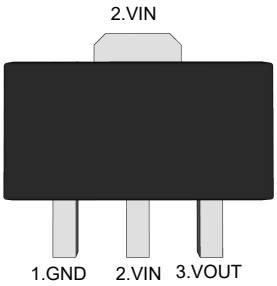
Pin Distribution

SOT-23



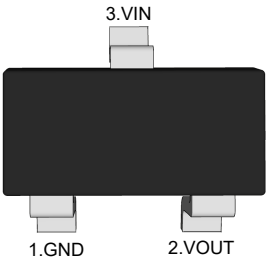
(Top View)

SOT-89



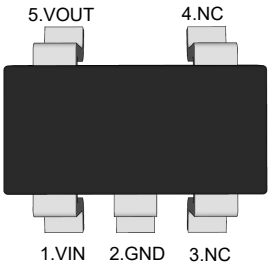
(Top View)

SOT-23-3



(Top View)

SOT-23-5



(Top View)

Functional Pin Description

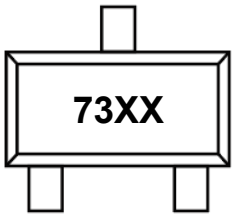
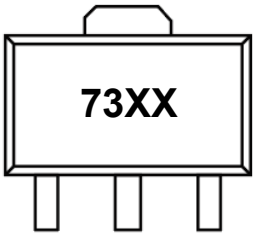
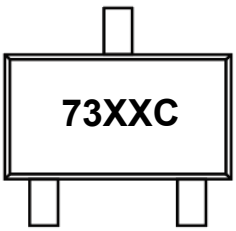
Pin Name	Pin Function
NC	NO Connected
GND	Ground
VOUT	Output Voltage
VIN	Power Input Voltage

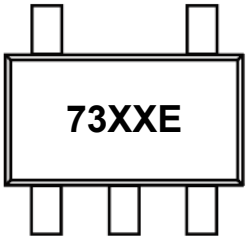
Ordering Information

TN73□□□□□

- Package Type
  SA : SOT-23 SC : SOT-23-3
  SQ : SOT-89 SE : SOT-23-5
- Output Voltage
  28 : 2.8V 30 : 3V
  33 : 3.3V 36 : 3.6V
  40 : 4V 44 : 4.4V
  50 : 5V 90 : 9V
- Output current tap
  L: 300mA
- Revision:A/Blank

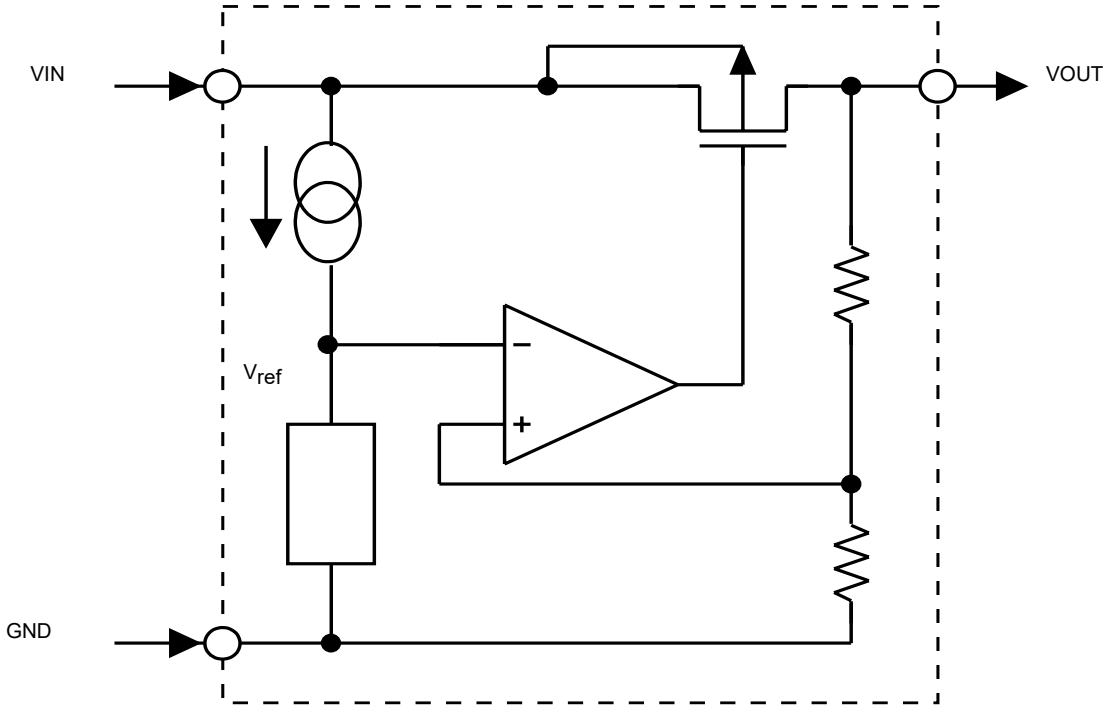
Ordering Information Continue

Orderable Device	Package	Reel (inch)	Package Qty (PCS)	Eco Plan Note	MSL Level	Marking Code
TN73L28SA	SOT-23	7	3000	RoHS & Green	MSL1	 XX:Output Voltage e.g. 30:3.0V
TN73L30SA						
TN73L33SA						
TN73L36SA						
TN73L40SA						
TN73L44SA						
TN73L50SA						
TN73L90SA						
TN73L28SQ	SOT-89	7/13	1000/3000	RoHS & Green	MSL1	 XX:Output Voltage e.g. 30:3.0V
TN73L30SQ						
TN73L33SQ						
TN73L36SQ						
TN73L40SQ						
TN73L44SQ						
TN73L50SQ						
TN73L90SQ						
TN73L28SC	SOT-23-3	7	3000	RoHS & Green	MSL3	 XX:Output Voltage e.g. 30:3.0V
TN73L30SC						
TN73L33SC						
TN73L36SC						
TN73L40SC						
TN73L44SC						
TN73L50SC						
TN73L90SC						

TN73L28SE	SOT-23-5	7	3000	RoHS & Green	MSL3	 XX:Output Voltage e.g. 30:3.0V
TN73L30SE						
TN73L33SE						
TN73L36SE						
TN73L40SE						
TN73L44SE						
TN73L50SE						
TN73L90SE						

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℃ 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}=10μF, C_{OUT}=10μF, T_A=25℃ , unless otherwise noted.)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Input Voltage	V_{IN}		--	--	20	V
Output Voltage Accuracy	ΔV_{OUT}	I_{OUT}=10mA	-2	--	+2	%
Max. Output Current	I_{OUT}		300	--	--	mA
Quiescent Current	I_Q	I_{OUT}=0mA	--	1.5	3	μA
Dropout Voltage [Note1]	V_{DROP}	2.8V≤V_{OUT}<3.0V, I_{OUT}=10mA	--	30	55	mV
		3.0V≤V_{OUT}<3.3V, I_{OUT}=100mA	--	210	300	
		3.3V≤V_{OUT}<3.6V, I_{OUT}=100mA	--	195	300	
		3.6V≤V_{OUT}<4.0V, I_{OUT}=100mA	--	180	300	
		4.0V≤V_{OUT}<4.4V, I_{OUT}=100mA	--	170	300	
		4.4V≤V_{OUT}<5.0V, I_{OUT}=100mA	--	160	300	
		5.0V≤V_{OUT}<9.0V, I_{OUT}=100mA	--	150	300	
		9.0V≤V_{OUT}, I_{OUT}=100mA	--	130	300	
Line Regulation	ΔV_{LINE}	V_{IN}=V_{OUT}+2 to20V, I_{OUT}=1mA	--	--	0.2	%/V
Load Regulation	ΔV_{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°C≤T_A≤85°C	--	100	--	ppm/°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 ℃, 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 :

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

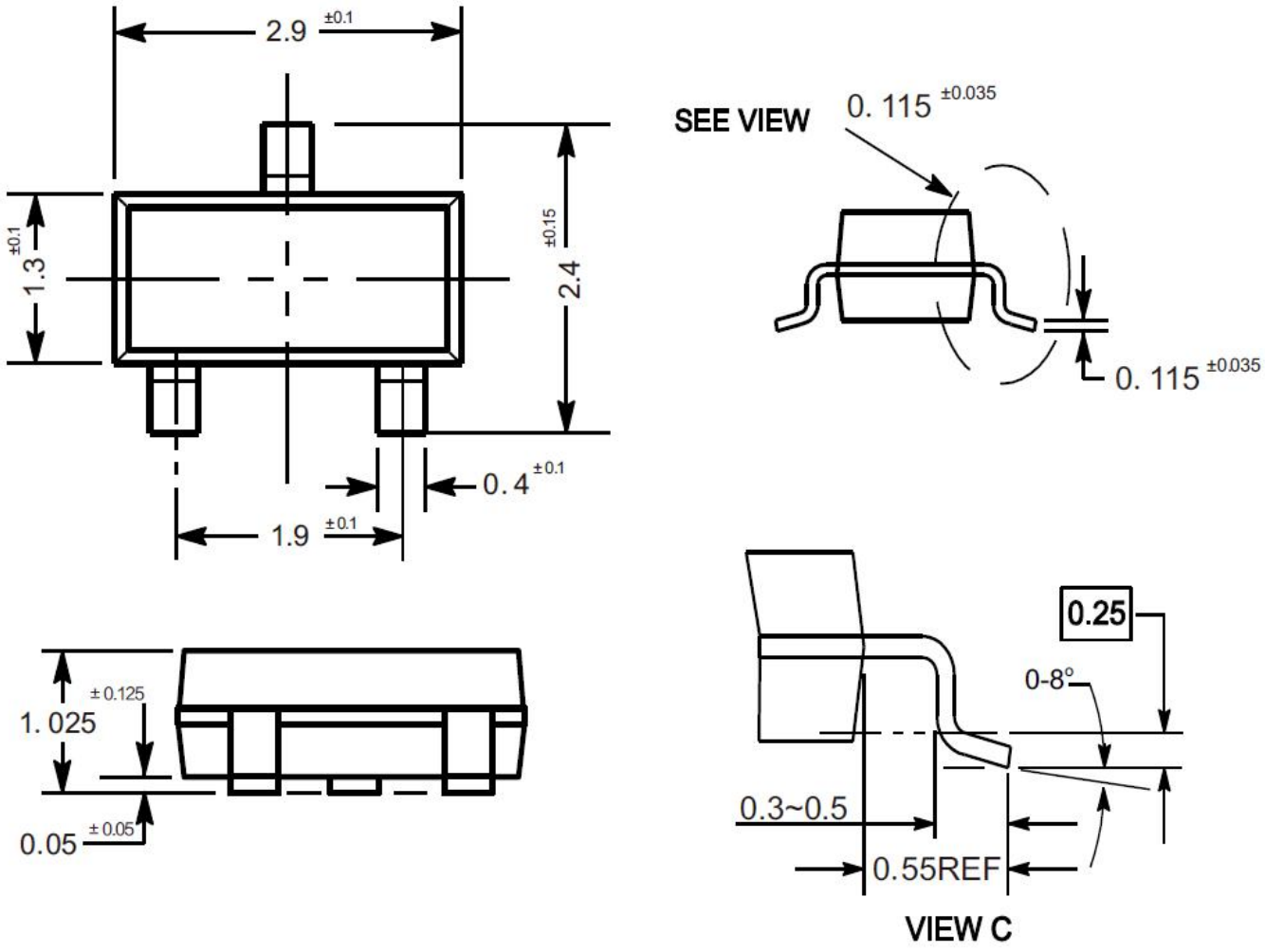
Layout Consideration

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 TN73 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

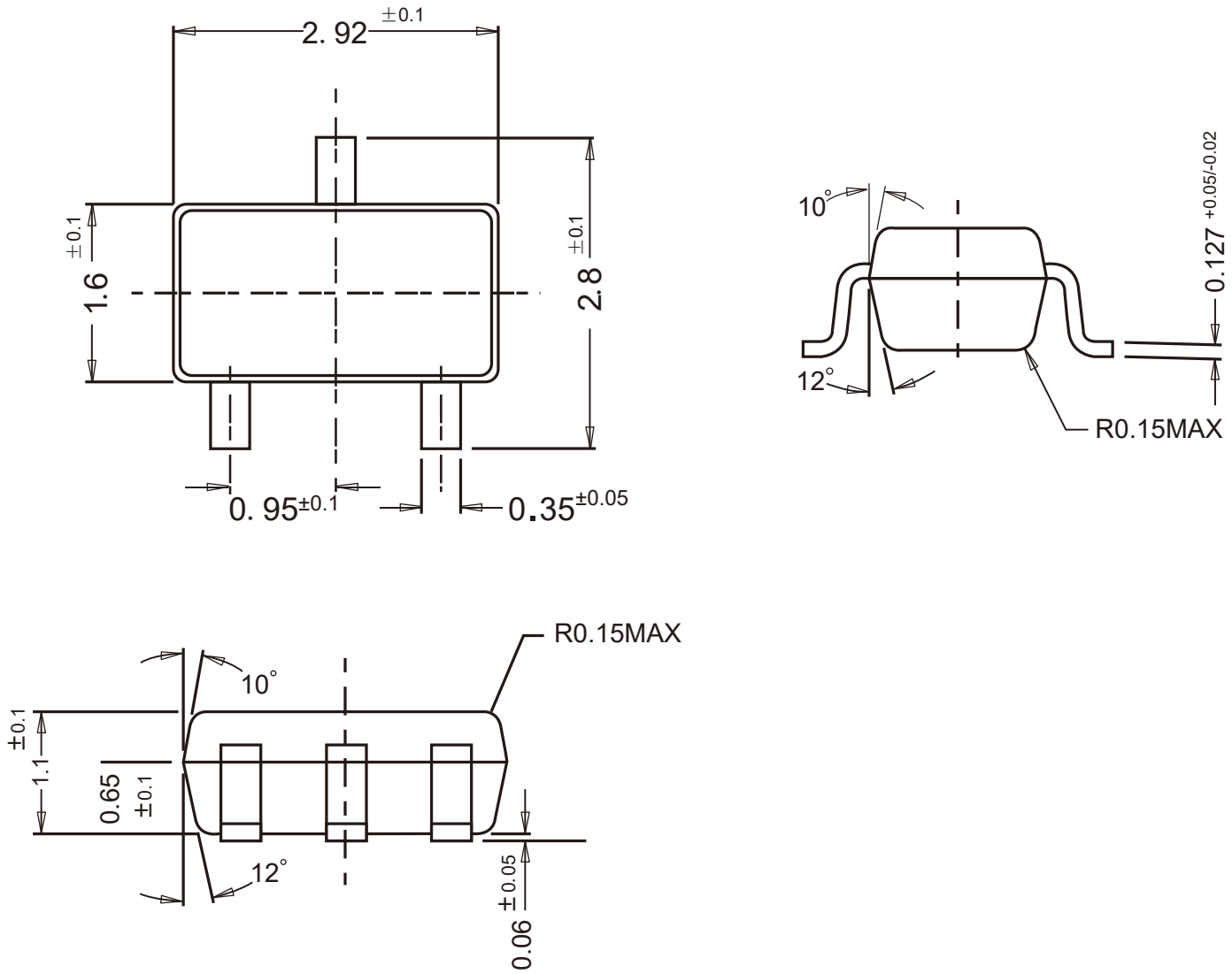
Dimensions in mm



Package Outline

SOT-23-3

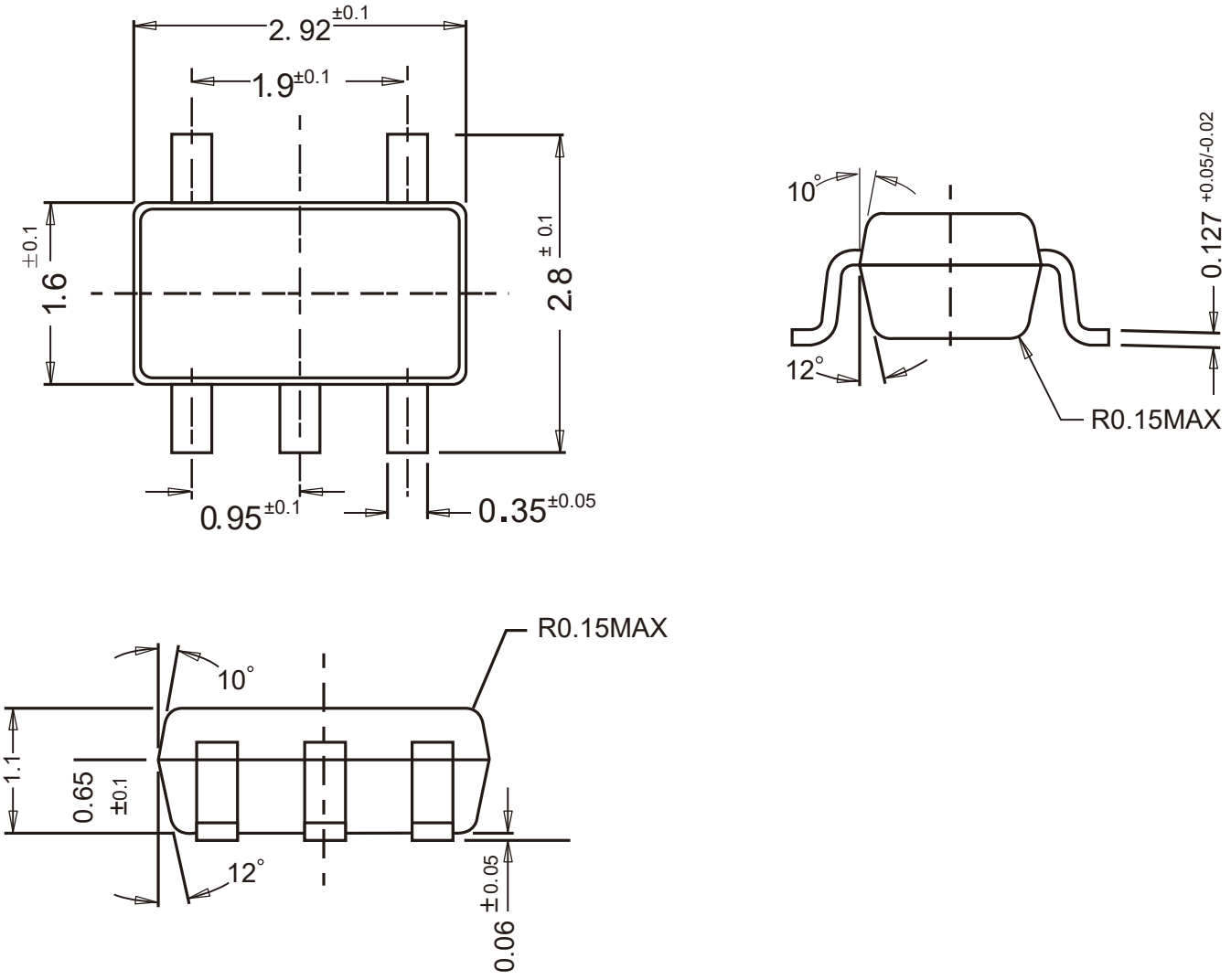
Dimensions in mm



Package Outline

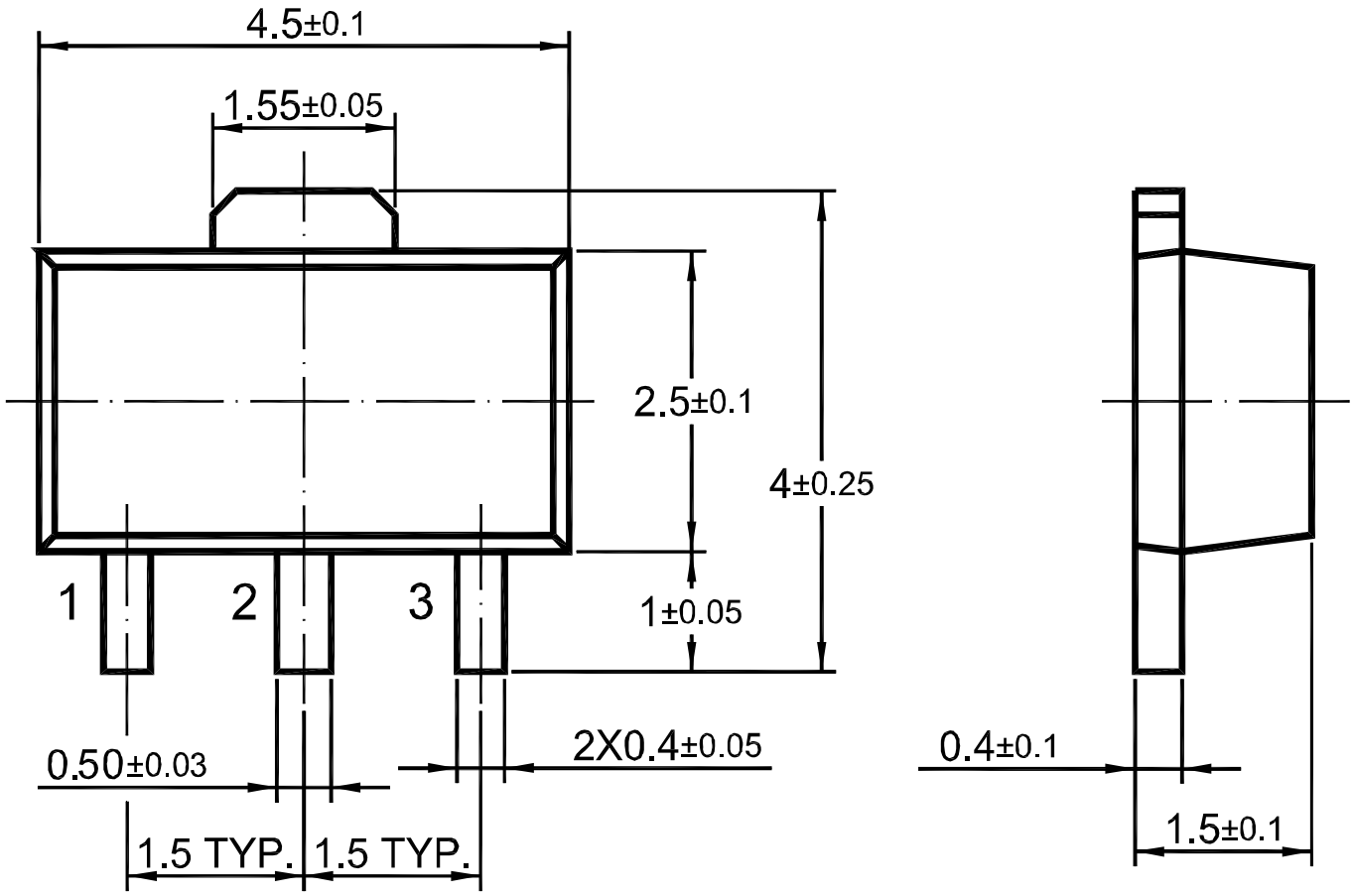
SOT-23-5

Dimensions in mm



Package Outline

SOT-89 Dimensions in mm



Contact Information

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For additional information, please contact your local Sales Representative.

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