Description

The TN54C Series is a high input voltage,low quiescent current,low-dropout linear regulator able to provide 300mA load current.

The LDO features very fast response against line voltage transient and load current transient, and ensures no overshoot voltage during the LDO start up and short circuit recovery.

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

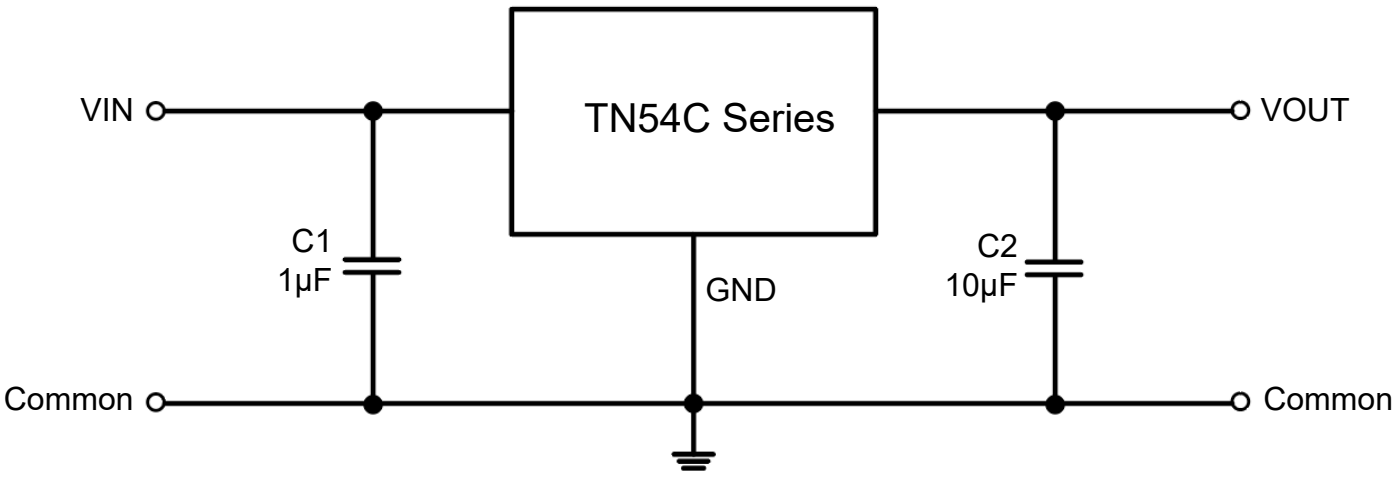
Features

- Low Quiescent Current: 2.1uA
- High Input Voltage Rating: Up to 55V
- Maximum Output Current: 350mA
- Low Dropout: 350mV @ 100mA
- High PSRR: 85dB at 1KHz
- Fixed Output Voltages: 1.8V,3V,3.3V,5V
- Fast Transient Response
- Current Limiting Protection
- Thermal Shutdown Protection
- Available Packages: SOT-23, SOT-23-3, SOT-89 and TO-252

Applications

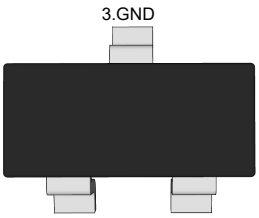
- Battery-Powered Equipment
- Smoke Detector and Sensor
- Micro Controller Applications

Typical Application Circuit



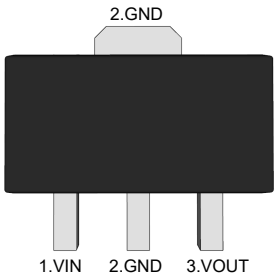
Pin Distribution

SOT-23



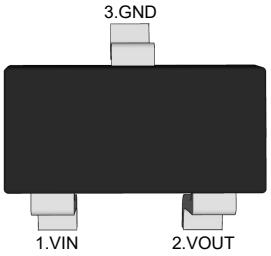
(Top View)

SOT-89



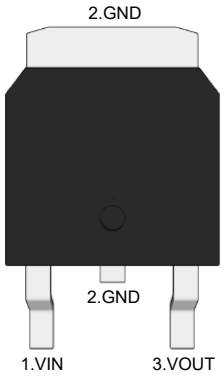
(Top View)

SOT-23-3



(Top View)

TO-252



(Top View)

Functional Pin Description

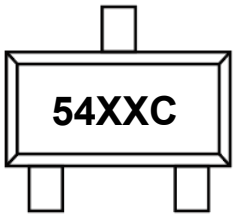
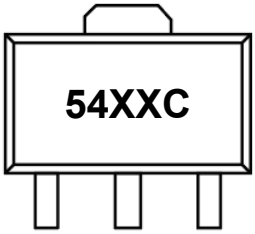
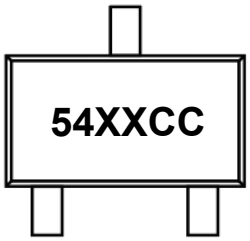
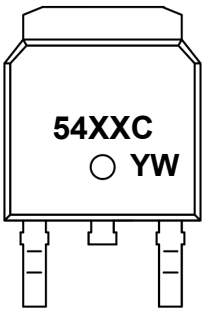
Pin Name	Pin Function
GND	Ground
VOUT	Output Voltage
VIN	Power Input Voltage

Ordering Information

TN54C□□□□

- Package Type
  SA:SOT-23 SC:SOT-23-3
  SQ:SOT-89 TE:TO-252
- Output Voltage
  18 : 1.8V 30 : 3.0V 33 : 3.3V
  50 : 5.0V
- Output current tap
  M : 350mA
- Pin arrangement version number

Ordering Information Continue

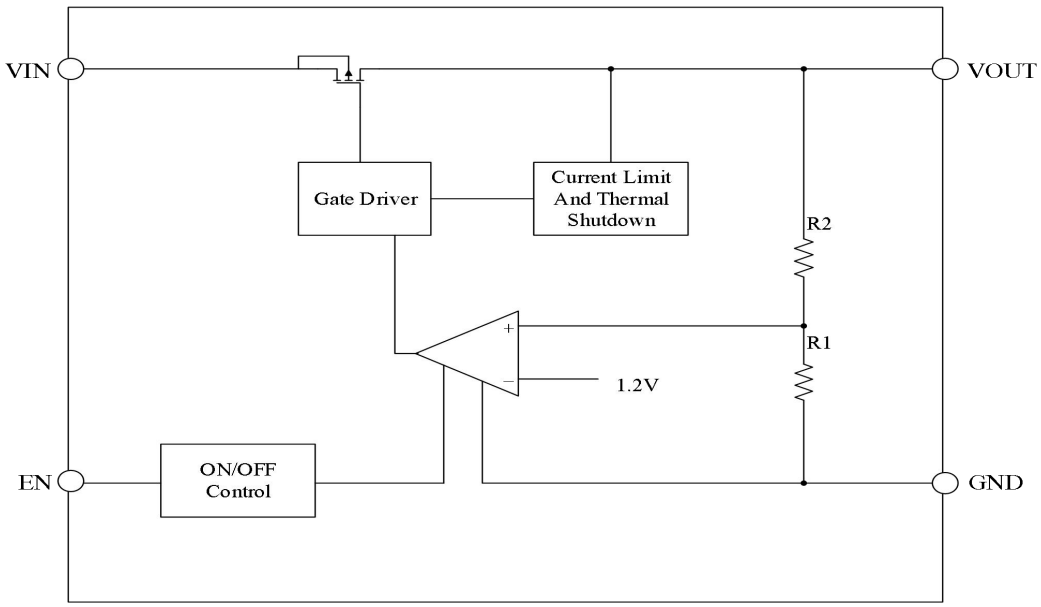
Orderable Device	Package	Reel (inch)	Package Qty (PCS)	Eco Plan Note	MSL Level	Marking Code
TN54CM18SA	SOT-23	7	3000	RoHS & Green	MSL1	 XX:Output Voltage e.g. 30:3.0V
TN54CM30SA						
TN54CM33SA						
TN54CM50SA						
TN54CM18SQ	SOT-89	7/13	1000/3000	RoHS & Green	MSL1	 XX:Output Voltage e.g. 30:3.0V
TN54CM30SQ						
TN54CM33SQ						
TN54CM50SQ						
TN54CM18SC	SOT-23-3	7	3000	RoHS & Green	MSL3	 XX:Output Voltage e.g. 30:3.0V
TN54CM30SC						
TN54CM33SC						
TN54CM50SC						
TN54CM18TE	TO-252	13	2500	RoHS & Green	MSL3	 XX:Output Voltage e.g. 30:3.0V
TN54CM30TE						
TN54CM33TE						
TN54CM50TE						

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
VIN to GND Voltage		-0.3 ~ +55	V
VOUT to GND Voltage		-0.3 ~ +6	V
VOUT to VIN Voltage		-55 ~ +0.3	V
EN to GND Voltage		-0.3 ~ +55	V
Output Current		Internally limited	--
Power Dissipation	SOT-23	300	mW
	SOT-23-3	400	mW
	SOT-89	600	mW
	TO-252	2000	mW
Thermal Resistance,Junction-to-Ambient	SOT-23	380	°C/W
	SOT-23-3	300	°C/W
	SOT-89	180	°C/W
	TO-252	50	°C/W
Operating Ambient Temperature		-40 ~ +85	°C
Junction temperature		150	°C
Storage temperature range		-40 ~ +150	°C

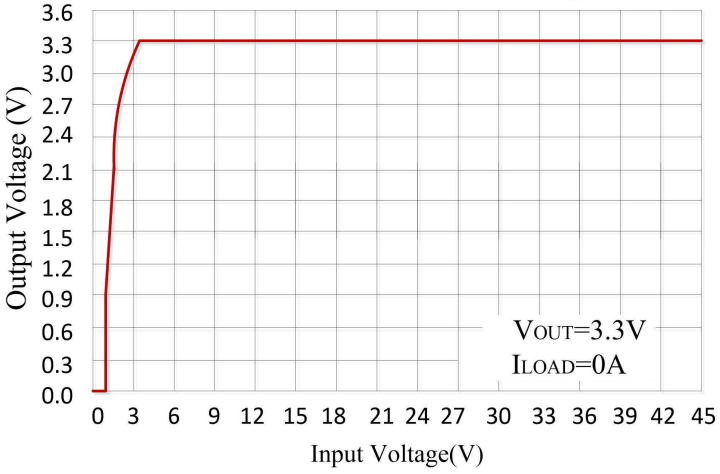
Electrical Characteristics

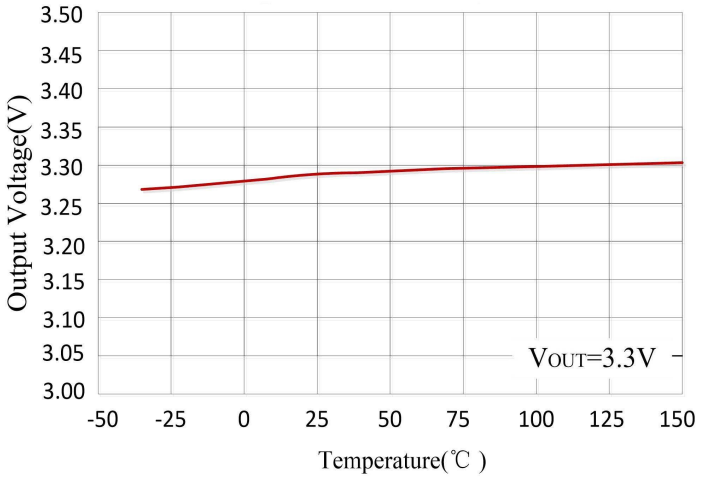
(V_{IN}=V_{OUT}+1, C_{IN}=1μF, C_{OUT}=10μF, T_A=25°C , unless otherwise noted.)

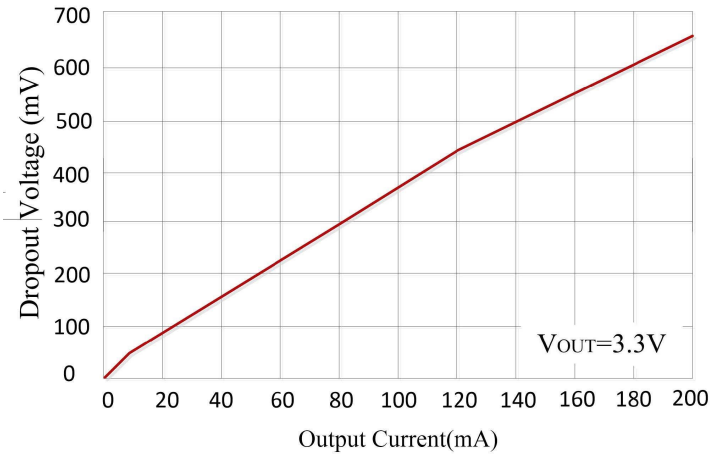
Parameter		Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Input Voltage		V_{IN}		3	--	45	V
Output Voltage Accuracy		ΔV_{OUT}	V_{IN}=12V, I_{OUT}=10mA	-2	--	+2	%
Quiescent Current		I_Q	V_{IN}=12V, I_{OUT}=0mA	--	2.1	--	μA
Maximum Output Current		I_{OUT_Max}		300	350	--	mA
Dropout Voltage		V_{DROP}	V_{IN}=V_{OUTNOM}-0.1V, I_{OUT}=10mA	--	35	--	mV
			V_{IN}=V_{OUTNOM}-0.1V, I_{OUT}=100mA	--	350	--	
Line Regulation		ΔV_{LINE}	V_{OUTNOM}+0.5V≤V_{IN}≤40V I_{OUT}=1mA	--	0.01	--	%/V
Load Regulation		ΔV_{LOAD}	V_{IN}=12V, 1mA<I_{OUT}<100mA	--	0.02	--	%/mA
Current Limit		I_{LIM}		--	500	--	mA
EN Input Threshold	Logic Low	V_{IL}		--	--	0.4	V
	Logic High	V_{IH}		1	--	--	V
Power Supply Rejection Ratio		PSRR	V_{IN}=12V,I_{OUT}=10mA f=1KHz,V_{OUT}=3.3V	--	85	--	dB
Thermal Shutdown Temperature		T_{SHDN}	Shutdown, Temp increasing	--	150	--	°C
Thermal Reset Temperature		T_{SHDN}	Reset, Temp increasing	--	140	--	°C

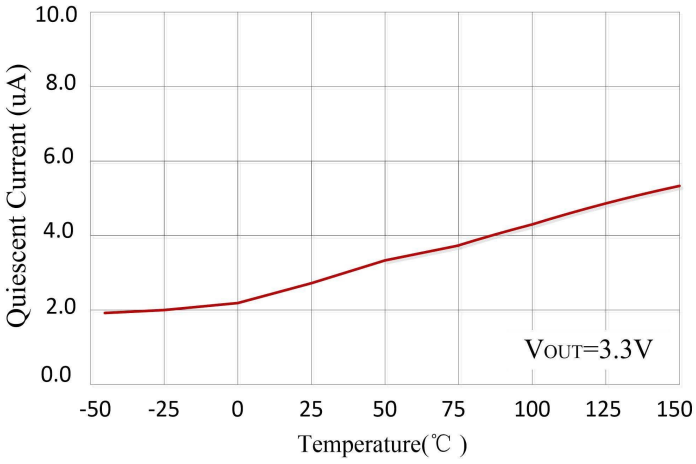
Typical Characteristic Curves

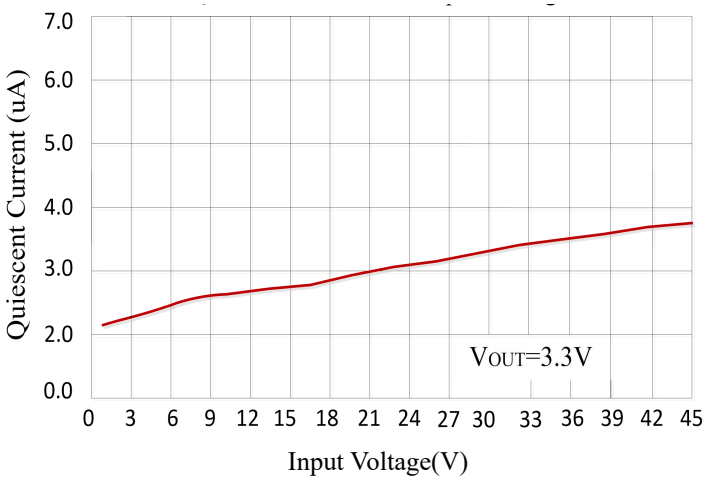
(Test Condition: T_A=25°C,I_{OUT}=1mA, C_{OUT}=10uF, unless otherwise noted.)

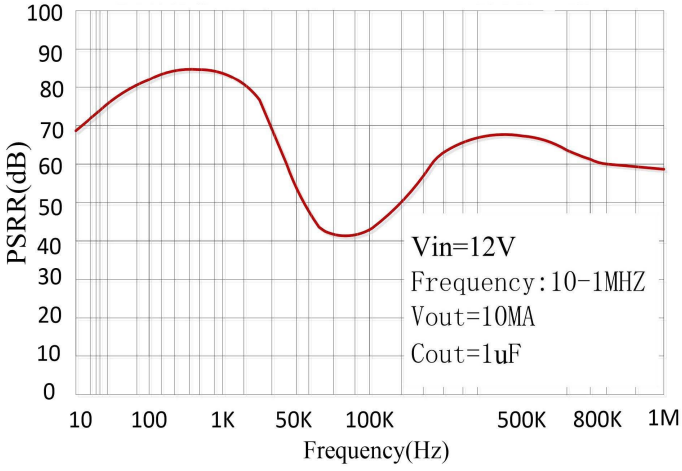




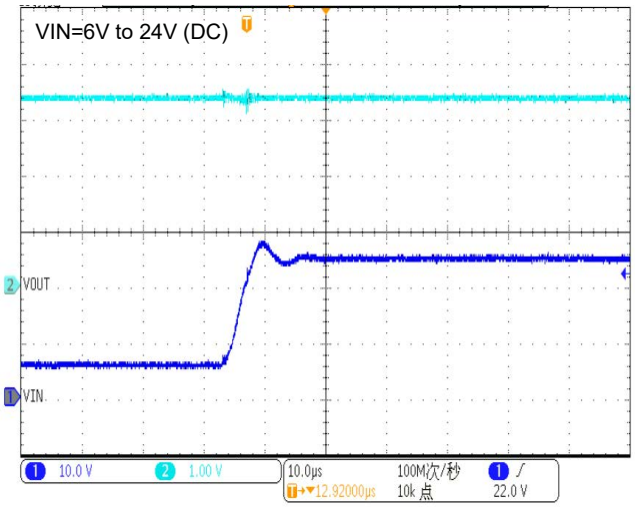




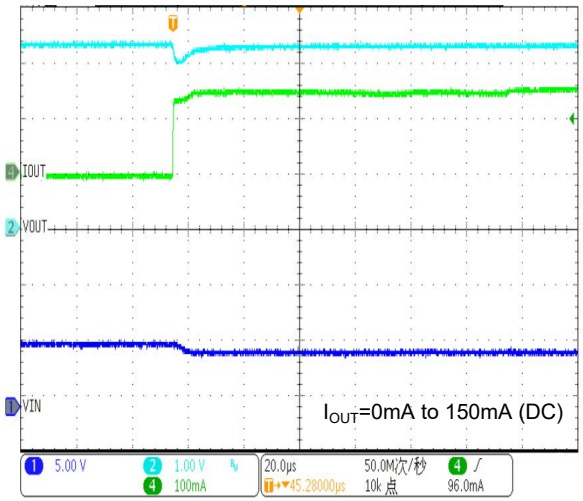




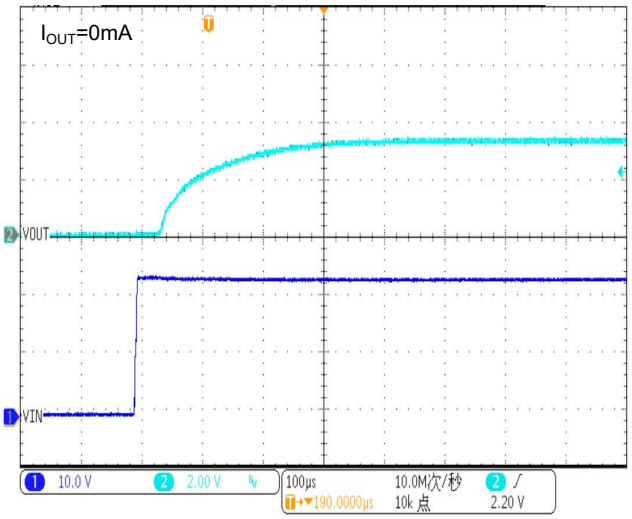
Line transient



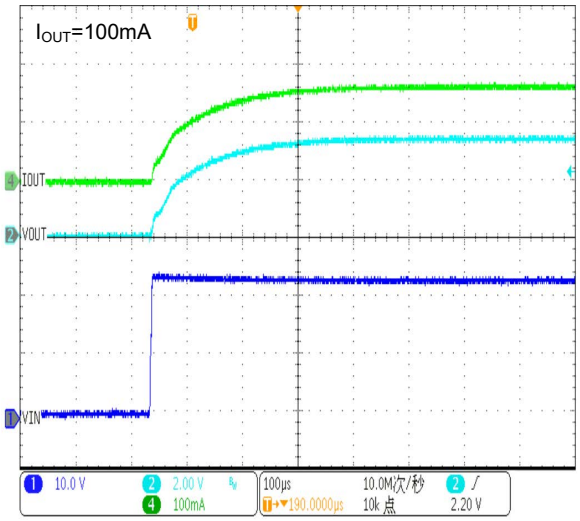
Load transient



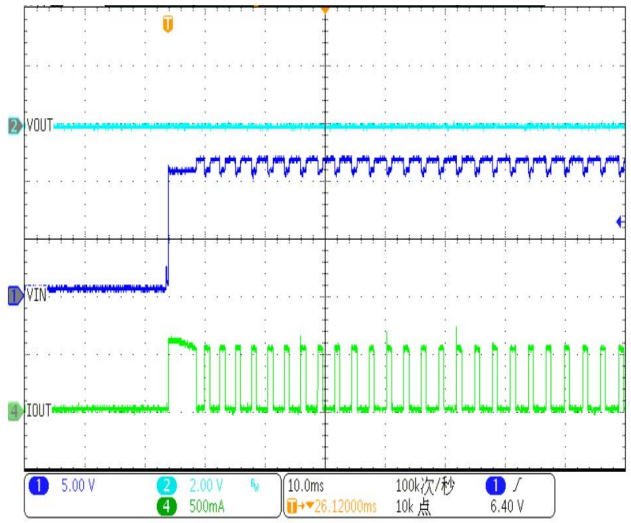
No-load start



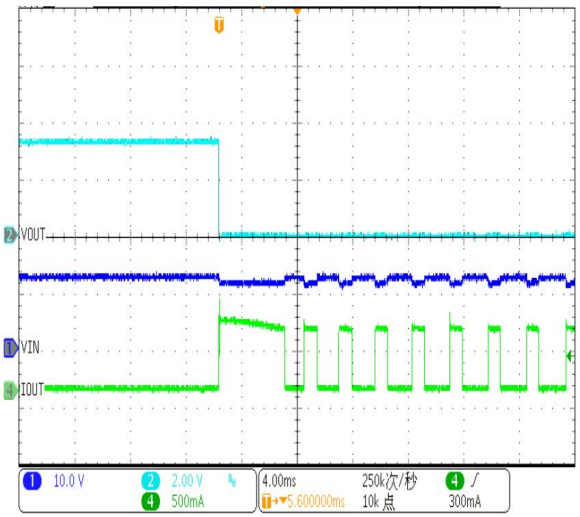
Start with load



Short-circuit Power-on



Power-on short



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.

Current Limit and Short Circuit Protection

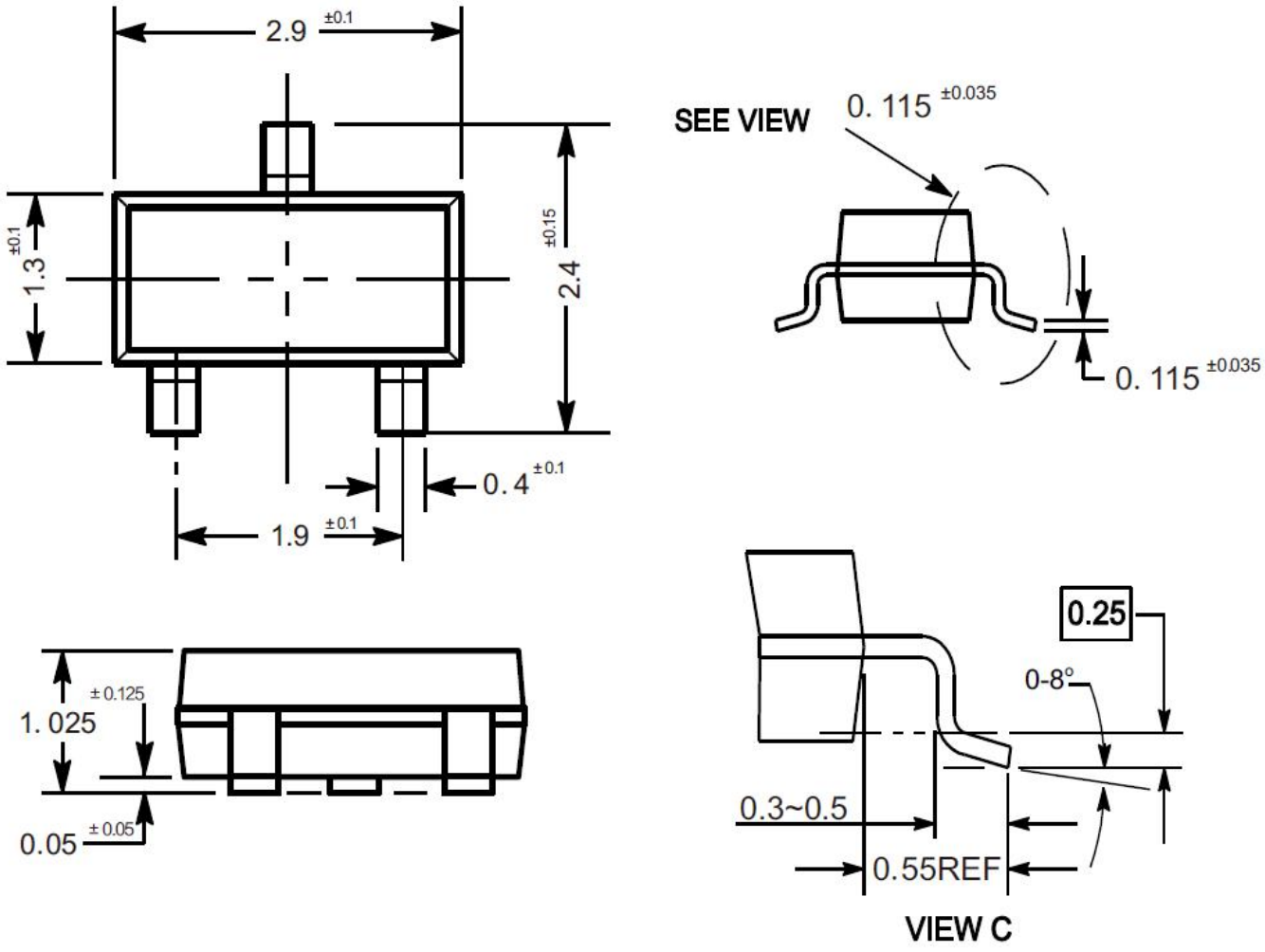
When output current at VOUT pin is higher than current limit threshold or the VOUT pin is direct short to GND, the current limit protection will be triggered and clamp the output current at a pre-designed level to prevent over-current and thermal damage.

Thermal Protection

The TN54C Series has internal thermal sense and protection circuits. When excessive power dissipation happens on the device, such as short circuit at the output pin or very heavy load current with a large voltage drop across the device, the internal thermal protection circuit will be triggered, and it will shut down the power MOSFET to prevent the LDO from damage. As soon as excessive thermal condition is removed and the temperature of the device drops down, the thermal protection circuit will lease the control of the power MOSFET, and the LDO device goes to normal operation.

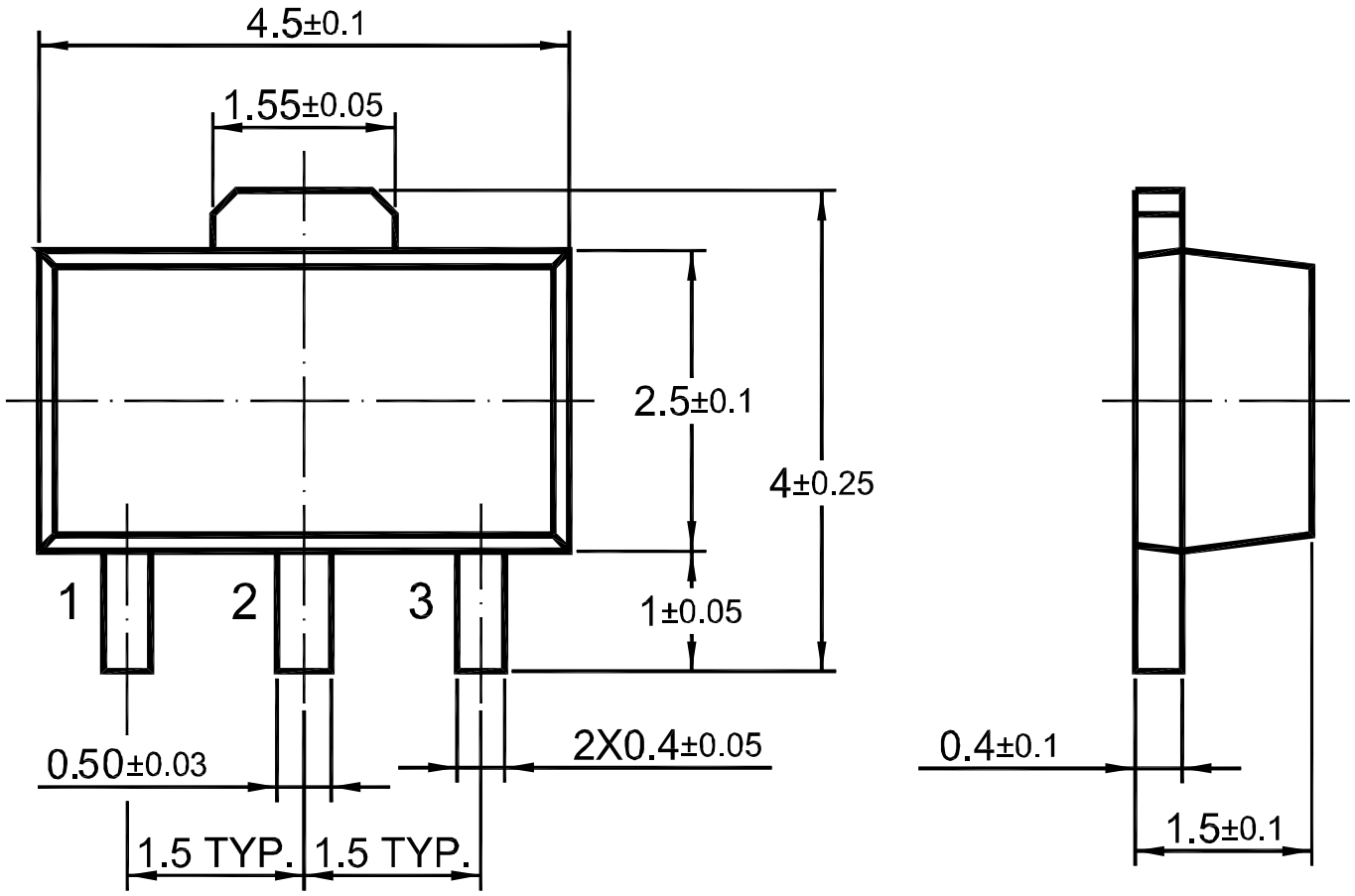
Package Outline

SOT-23
Dimensions in mm



Package Outline

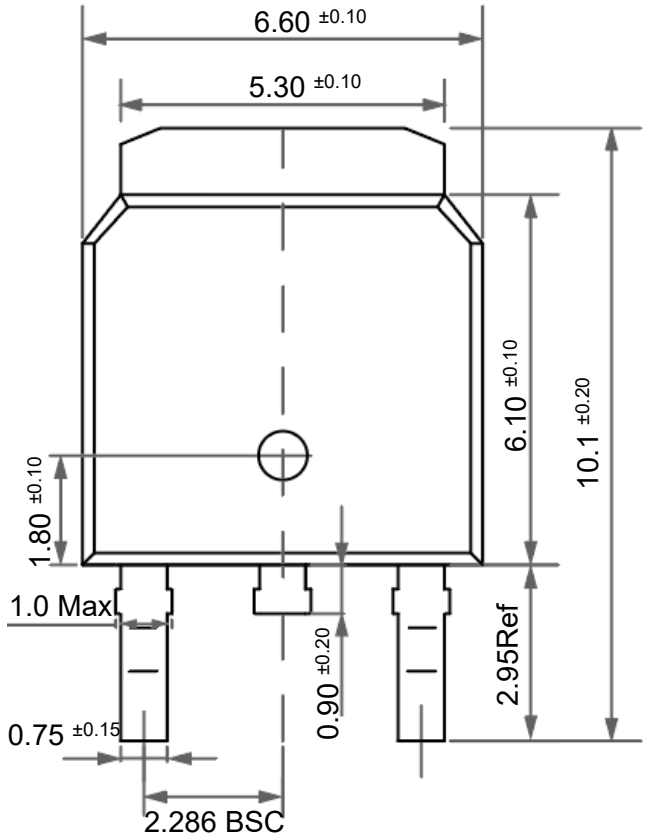
SOT-89
Dimensions in mm



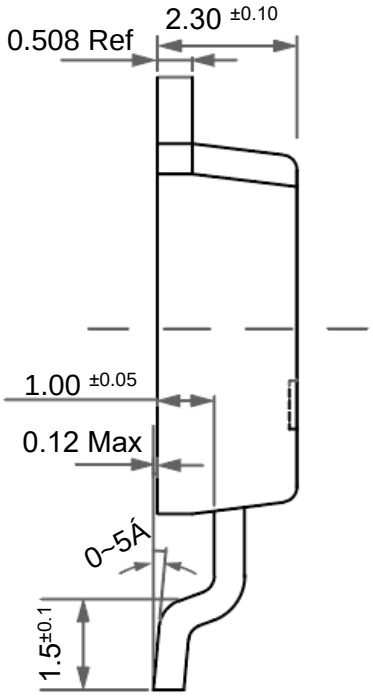
Package Outline

TO-252

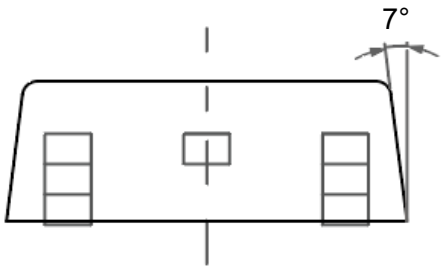
Dimensions in mm



Front View



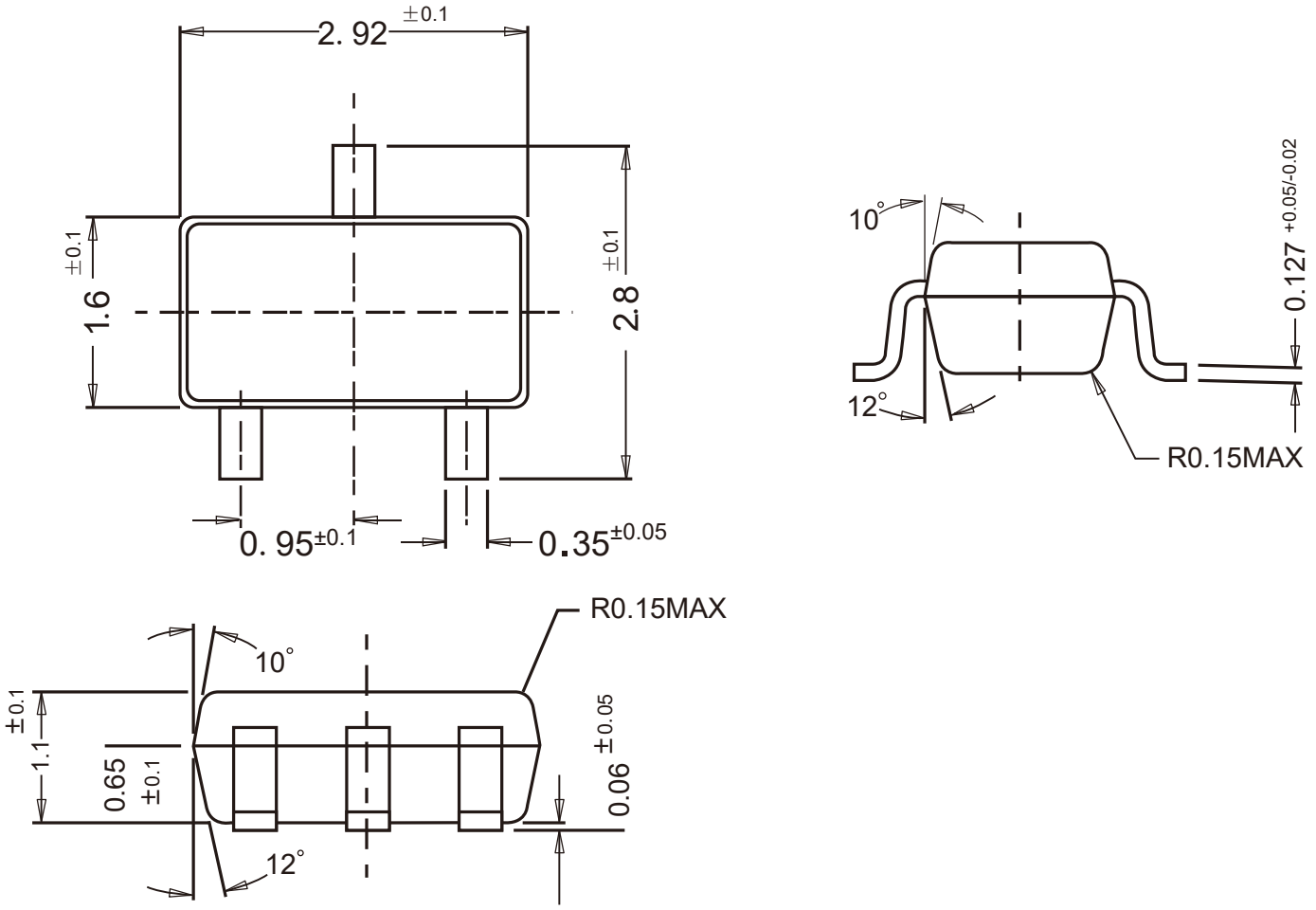
Side View



Bottom View

Package Outline

SOT-23-3 Dimensions in mm



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