

Description

The TN54B 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.

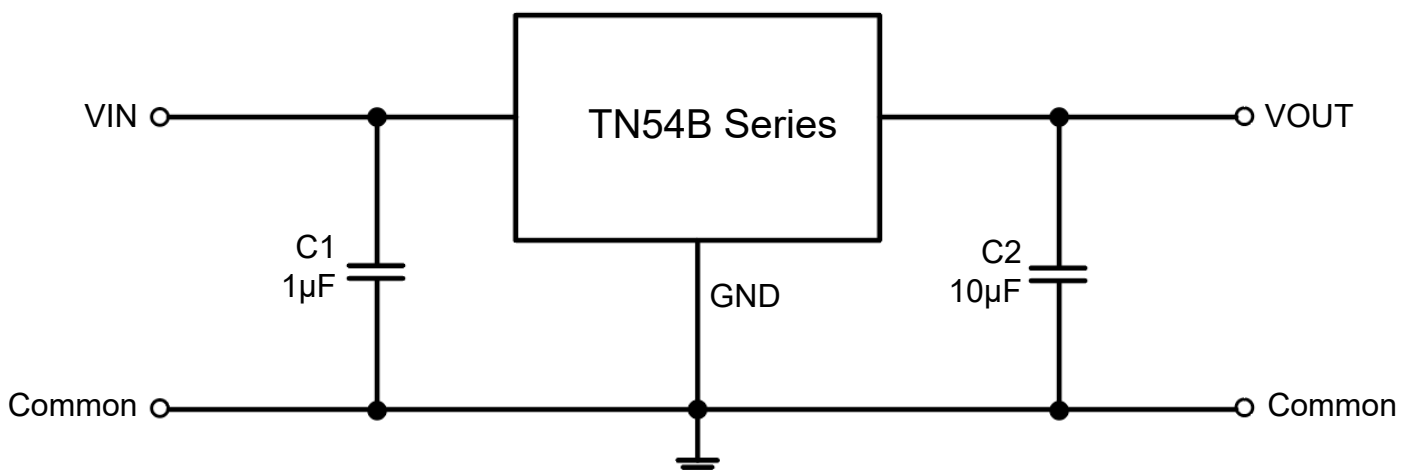
Features

- 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-23-5

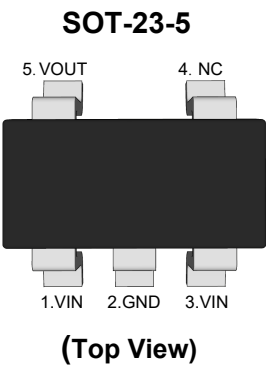
Applications

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

Typical Application Circuit



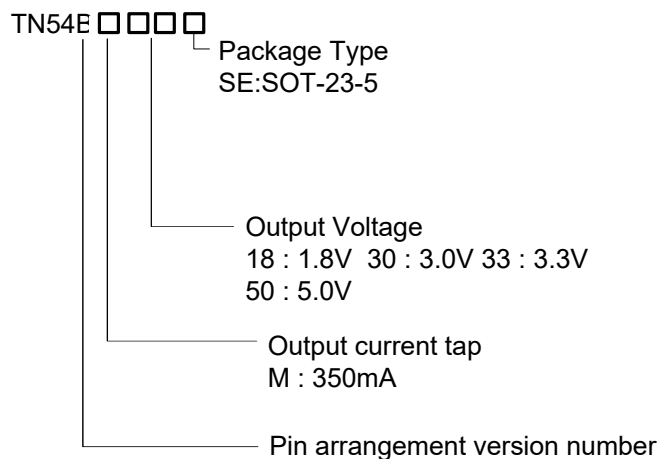
Pin Distribution

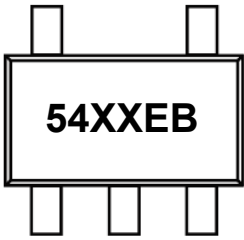


Functional Pin Description

| Pin Name | Pin Function |
|----------|---|
| EN | Chip Enable (Active High). Note that this pin is high impedance |
| NC | NO Connected |
| GND | Ground |
| VOUT | Output Voltage |
| VIN | Power Input Voltage |

Ordering Information



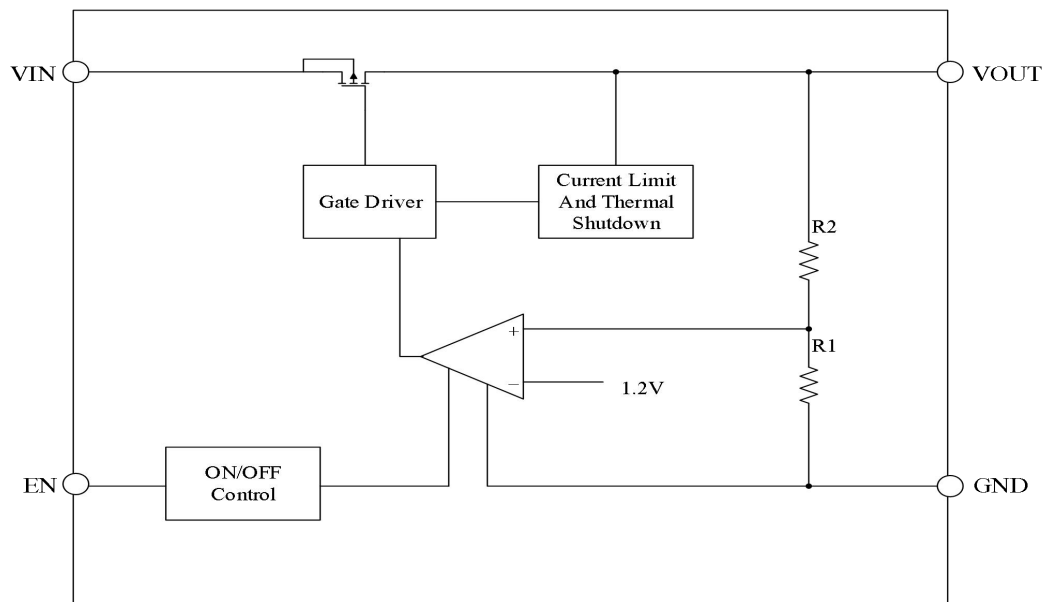
| Orderable Device | Package | Reel (inch) | Package Qty (PCS) | Eco Plan ^{Note} | MSL Level | Marking Code |
|------------------|----------|-------------|-------------------|--------------------------|-----------|---|
| TN54BM18SE | SOT-23-5 | 7 | 3000 | RoHS & Green | MSL3 |  XX:Output Voltage e.g. 30:3.0V |
| TN54BM30SE | | | | | | |
| TN54BM33SE | | | | | | |
| TN54BM50SE | | | | | | |

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 |
|--|--------------------|------|
| 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 | 400 | mW |
| Thermal Resistance,Junction-to-Ambient | 300 | °C/W |
| Operating Ambient Temperature | -40 ~ +85 | °C |
| Junction temperature | 150 | °C |
| Storage temperature range | -40 ~ +150 | °C |
| ESD(HBM) | 4 | KV |

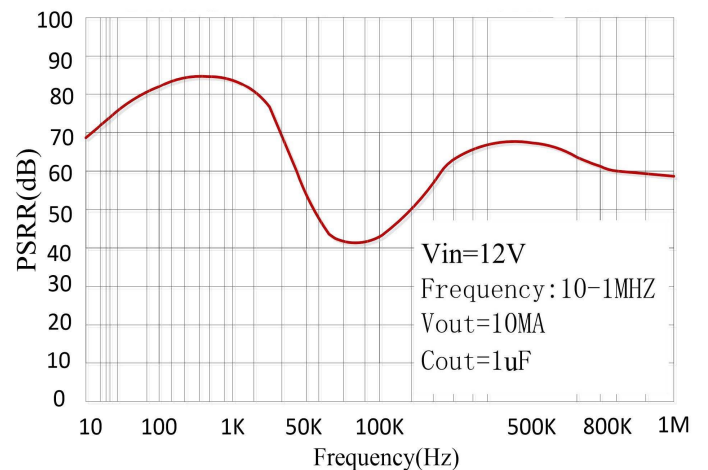
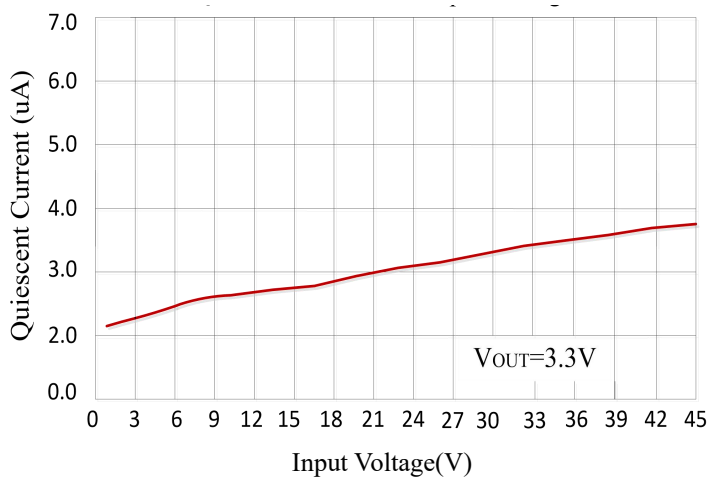
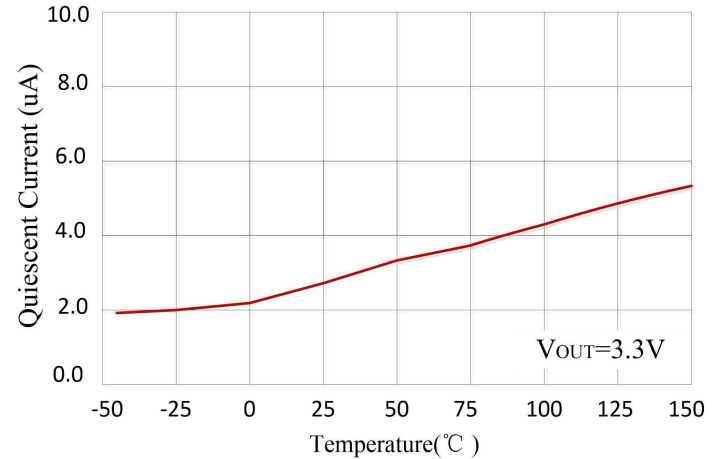
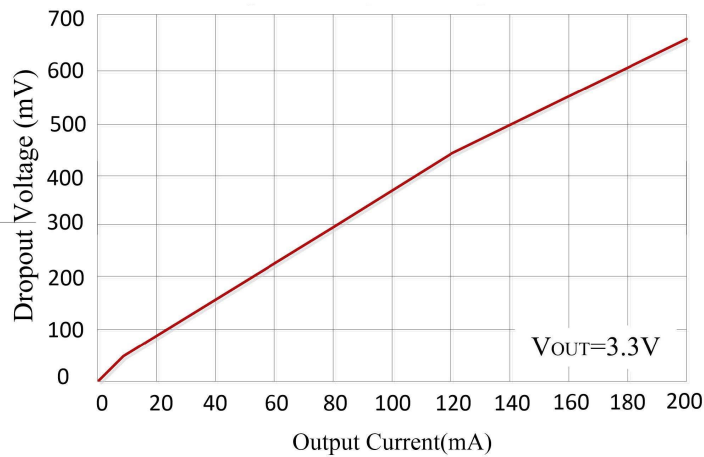
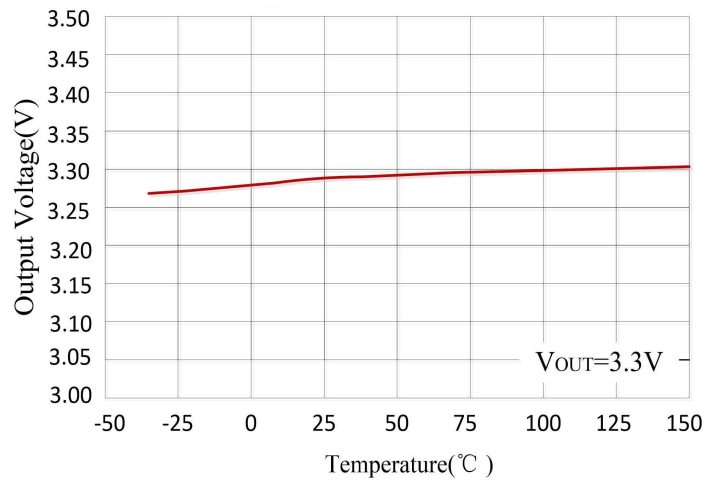
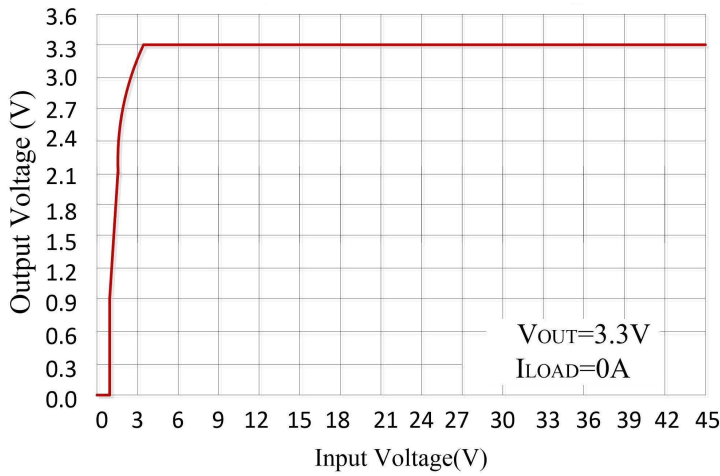
Electrical Characteristics

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

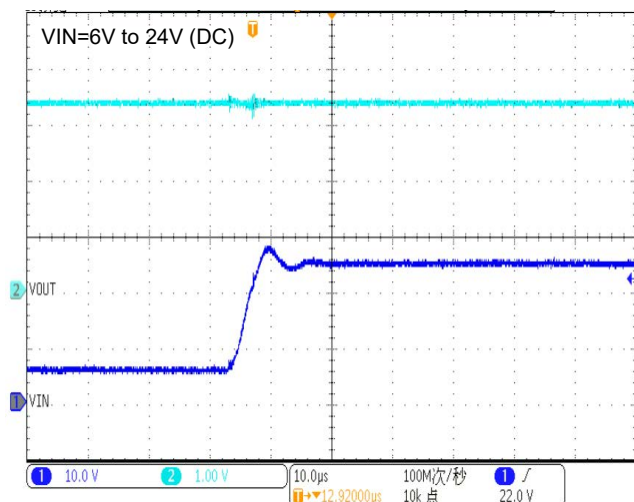
| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|------------------------------|-------------------|--|------|------|------|------------|
| Input Voltage | V_{IN} | | 3 | -- | 45 | V |
| Output Voltage Accuracy | ΔV_{OUT} | $V_{IN}=12V$, $I_{OUT}=10mA$ | -2 | -- | +2 | % |
| Quiescent 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} | $V_{OUTNOM}+0.5V \leq V_{IN} \leq 40V$ $I_{OUT}=1mA$ | -- | 0.01 | -- | %/V |
| Load Regulation | ΔV_{LOAD} | $V_{IN}=12V$, $1mA < I_{OUT} < 100mA$ | -- | 0.02 | -- | %/mA |
| Current Limit | I_{LIM} | | -- | 500 | -- | mA |
| Current Limit | 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 | -- | $^\circ C$ |
| Thermal Reset Temperature | T_{SHDN} | Reset, Temp increasing | -- | 140 | -- | $^\circ C$ |

Typical Characteristic Curves

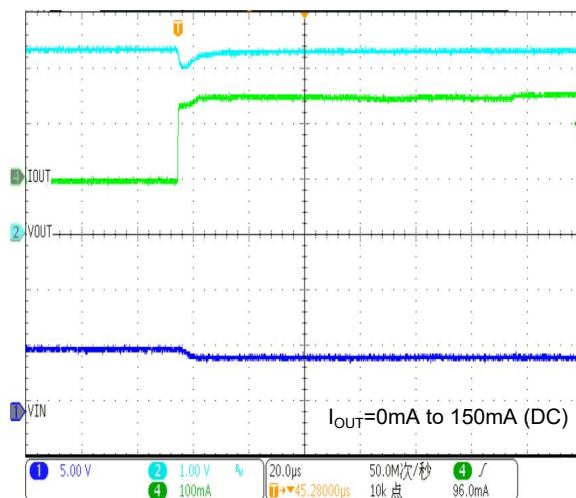
Test Condition: $T_A=25^{\circ}\text{C}$, $I_{\text{out}}=1\text{mA}$, $C_{\text{OUT}}=10\mu\text{F}$, unless otherwise noted



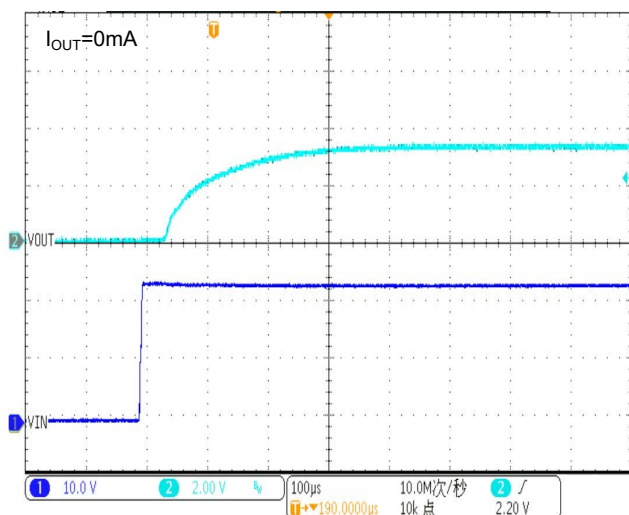
Line transient



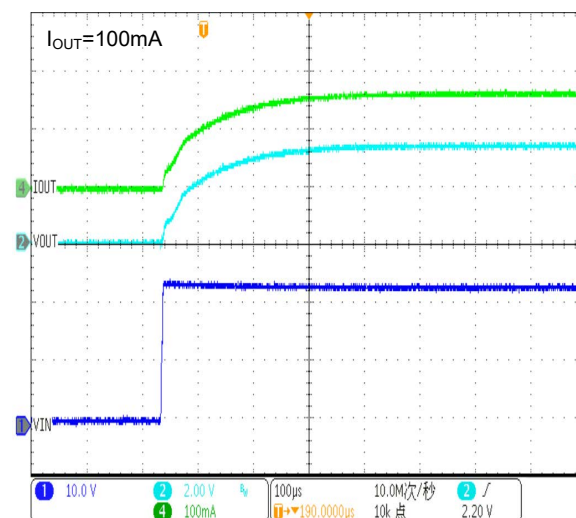
Load transient



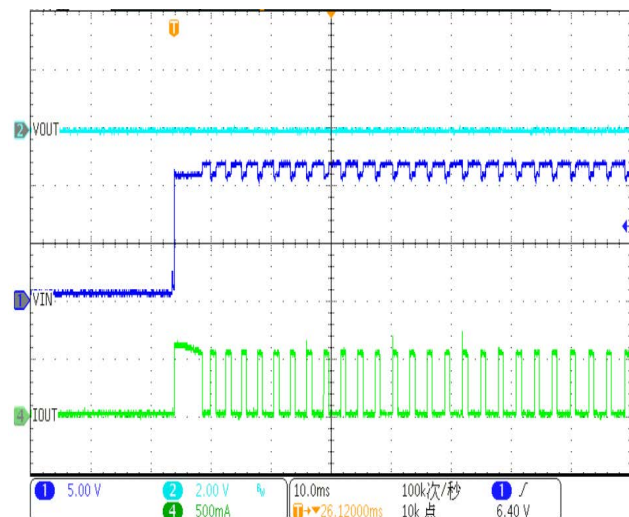
No-load start



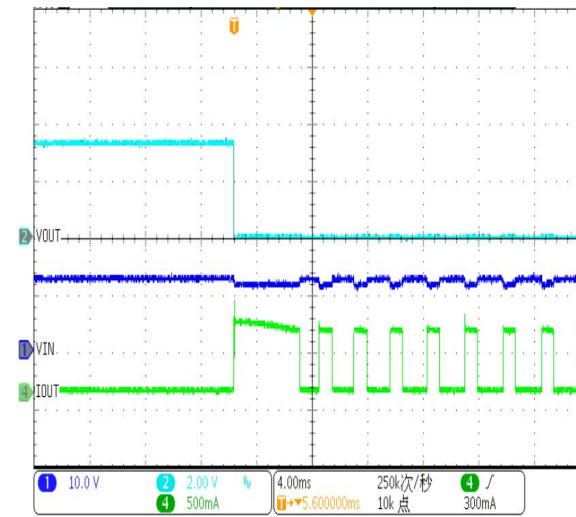
Start with load



Short-circuit Power-on



Power-on short



Functional Description

Input Capacitor

A 1 μ F 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 10 μ F, 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

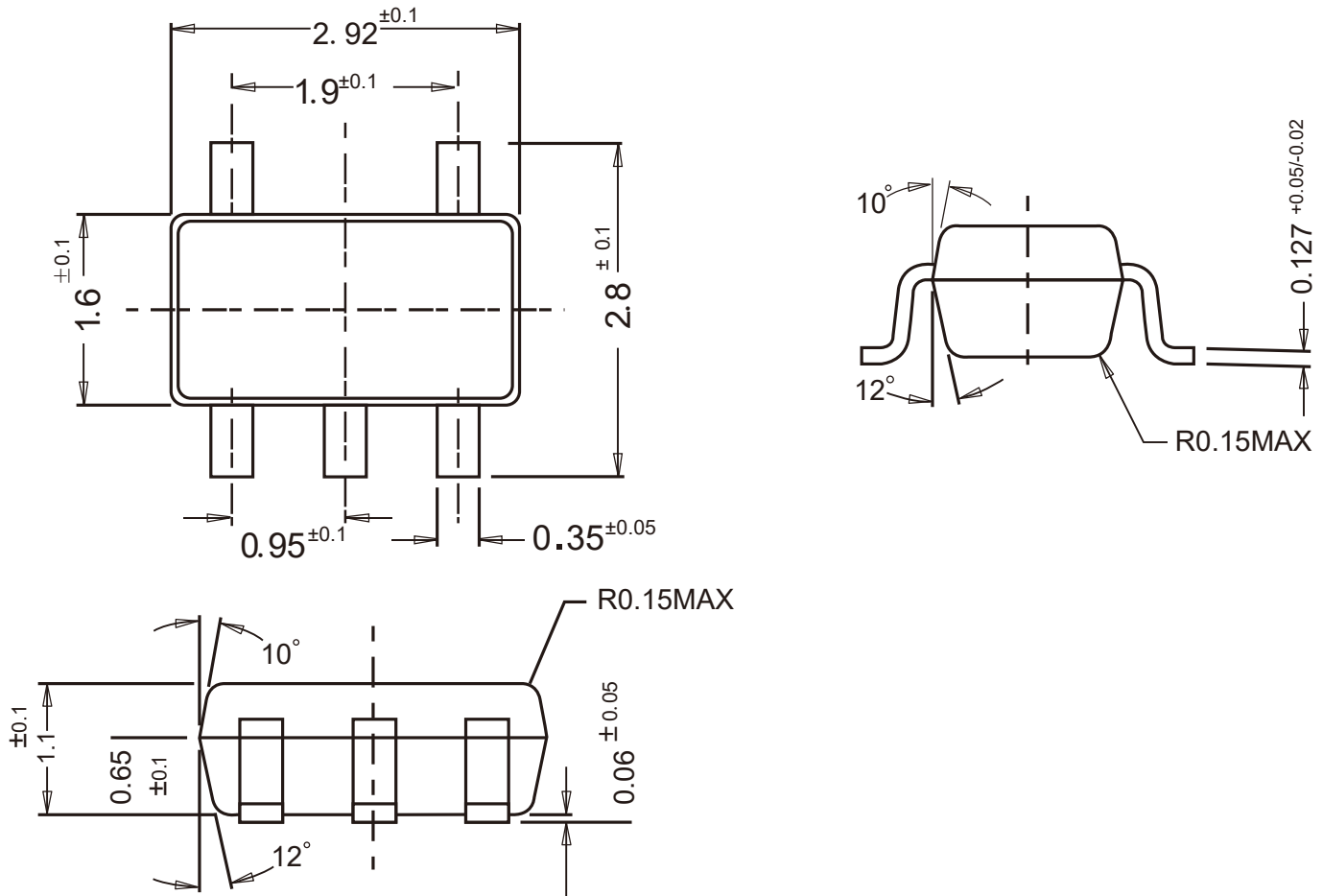
When output current at VOUT pin is higher than current limit threshold or the VOUT pin is direct short to GND, the current limit protection will be triggered and clamp the output current at a pre-designed level to prevent over-current and thermal damage.

Thermal Protection

The TN54B 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-23-5 Dimensions in mm



Contact Information

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For additional information, please contact your local Sales Representative.

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Product Specification Statement

The product specification aims to provide users with a reference regarding various product parameters, performance, and usage. It presents certain aspects of the product's performance in graphical form and is intended solely for users to select product and make product comparisons, enabling users to better understand and evaluate the characteristics and advantages of the product. It does not constitute any commitment, warranty, or guarantee.

The product parameters described in the product specification are numerical values, characteristics, and functions obtained through actual testing or theoretical calculations of the product in an independent or ideal state. Due to the complexity of product applications and variations in test conditions and equipment, there may be slight fluctuations in parameter test values. TANI shall not guarantee that the actual performance of the product when installed in the customer's system or equipment will be entirely consistent with the product specification, especially concerning dynamic parameters. It is recommended that users consult with professionals for product selection and system design. Users should also thoroughly validate and assess whether the actual parameters and performance when installed in their respective systems or equipment meet their requirements or expectations. Additionally, users should exercise caution in verifying product compatibility issues, and TANI assumes no responsibility for the application of the product. TANI strives to provide accurate and up-to-date information to the best of our ability. However, due to technical, human, or other reasons, TANI cannot guarantee that the information provided in the product specification is entirely accurate and error-free. TANI shall not be held responsible for any losses or damages resulting from the use or reliance on any information in these product specifications.

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Users are advised to pay attention to the parameter limit values specified in the product specification and maintain a certain margin in design or application to ensure that the product does not exceed the parameter limit values defined in the product specification. This precaution should be taken to avoid exceeding one or more of the limit values, which may result in permanent irreversible damage to the product, ultimately affecting the quality and reliability of the system or equipment.

The design of the product is intended to meet civilian needs and is not guaranteed for use in harsh environments or precision equipment. It is not recommended for use in systems or equipment such as medical devices, aircraft, nuclear power, and similar systems, where failures in these systems or equipment could reasonably be expected to result in personal injury. TANI shall assume no responsibility for any consequences resulting from such usage.

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