Description

The TN71B series is a set of three-terminal low power high voltage regulators implemented in CMOS technology. They allow input voltages as high as 30V. They are available with several fixed output voltages ranging from 2.8V to 9.0V. Because of the low power dissipation, TN71B series are widely used in a variety of equipment such as audio device, video device, communication device and so on.

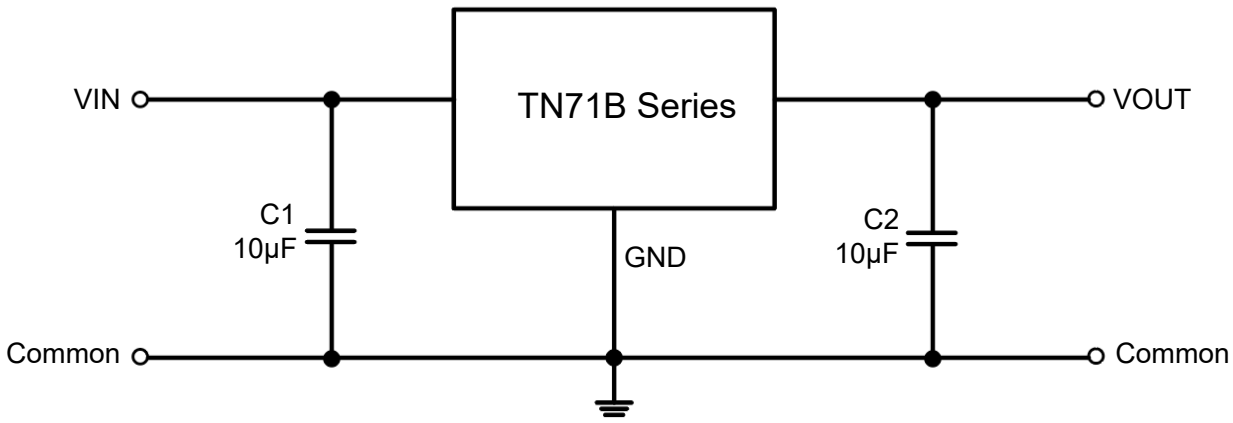
Features

- High Input Voltage Rating: Up to 30V
- Maximum Output Current: 100mA
- Standard Fixed Output Voltage Options: 2.8V,3V,3.3V,3.6V,4V,4.4V,5V and 9V
- Low Quiescent Current: 1.5uA
- PSRR=dB@1KHz
- Low Dropout : 100mV(Max.) @ 1mA
- Low Output Voltage Accuracy: ±2%
- Low Power Consumption
- Low Temperature Coefficient
- Available Packages: SOT-23, SOT-23-3 and SOT-89

Applications

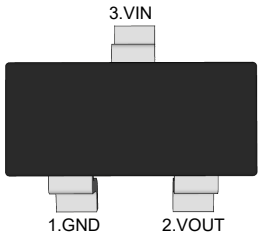
- Battery-Powered Equipment
- Communication Equipment
- Audio/Video Equipment

Typical Application Circuit



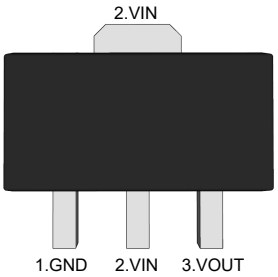
Pin Distribution

SOT-23



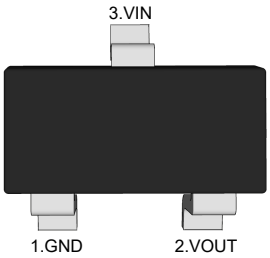
(Top View)

SOT-89



(Top View)

SOT-23-3



(Top View)

Functional Pin Description

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

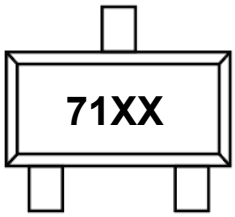
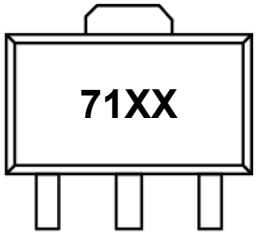
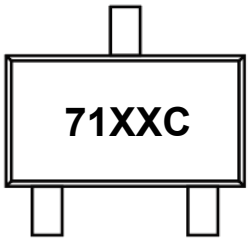
Ordering Information

TN71B□□□□

Package Type
SA : SOT-23 SC : SOT-23-3
SQ : SOT-89

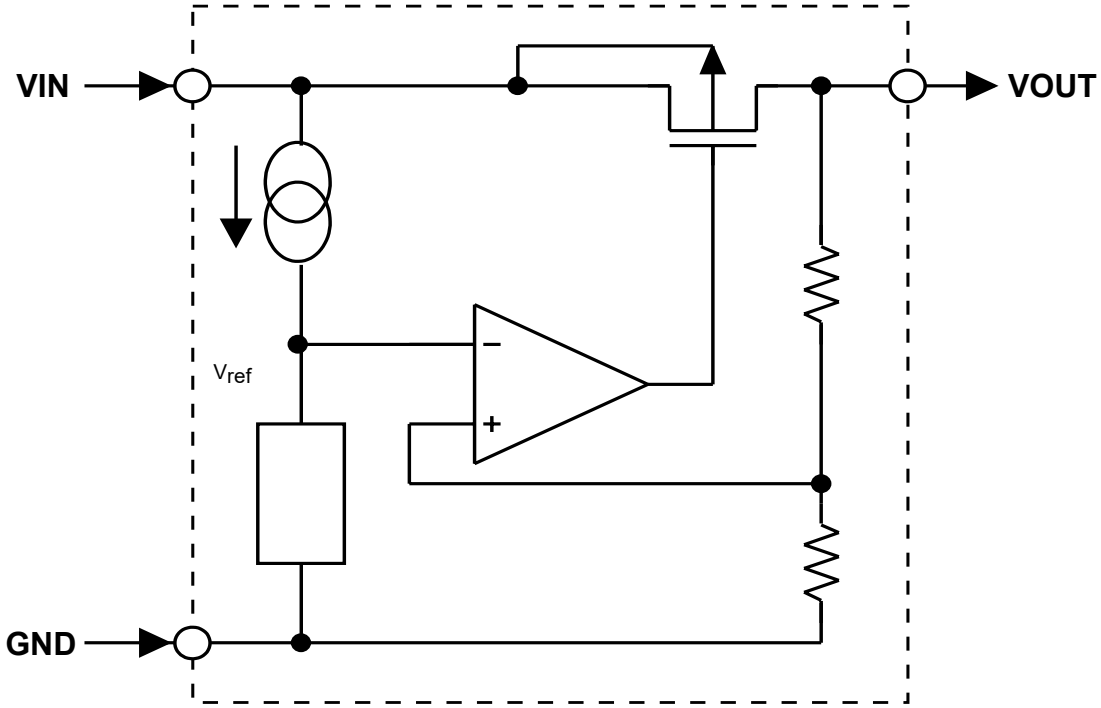
Output Voltage
28 : 2.8V 30 : 3.0V 33 : 3.3V
36 : 3.6V 40 : 4.0V 44 : 4.4V
50 : 5.0V 90 : 9.0V

Output current tap
K: 100mA

Orderable Device	Package	Reel (inch)	Package Qty (PCS)	Eco Plan Note	MSL Level	Marking Code
TN71BK28SA	SOT-23	7	3000	RoHS & Green	MSL1	 XX:Output Voltage e.g. 30:3.0V
TN71BK30SA						
TN71BK33SA						
TN71BK36SA						
TN71BK40SA						
TN71BK44SA						
TN71BK50SA						
TN71BK90SA						
TN71BK28SQ	SOT-89	7/13	1000/3000	RoHS & Green	MSL1	 XX:Output Voltage e.g. 30:3.0V
TN71BK30SQ						
TN71BK33SQ						
TN71BK36SQ						
TN71BK40SQ						
TN71BK44SQ						
TN71BK50SQ						
TN71BK90SQ						
TN71BK28SC	SOT-23-3	7	3000	RoHS & Green	MSL3	 XX:Output Voltage e.g. 30:3.0V
TN71BK30SC						
TN71BK33SC						
TN71BK36SC						
TN71BK40SC						
TN71BK44SC						
TN71BK50SC						
TN71BK90SC						

Note:
RoHS：PJ 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：PJ 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 ~ +30	V
Power Dissipation	SOT-23	200	mW
	SOT-23-3	400	mW
	SOT-89	600	mW
Thermal Resistance,Junction-to-Ambient	SOT-23	330	°C/W
	SOT-23-3	380	°C/W
	SOT-89	180	°C/W
Operating Ambient Temperature		-40 ~ +85	°C
Storage temperature range		-40 ~ +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	24	V
Maximum Output Current	100	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}		--	--	24	V
Output Voltage Accuracy	ΔV_{OUT}		-2	--	+2	%
Output Current	I_{OUT}	V_{IN}=V_{OUT}+2V	50	--	--	mA
Quiescent Current	I_Q	I_{OUT}=0mA	--	1.5	3.0	μA
Dropout Voltage Note1	V_{DROP}	2.8V≤V_{OUT}≤3.0V, ΔV_{OUT}=2%, I_{OUT}=1mA	--	30	100	mV
		3.0V<V_{OUT}≤9.0V, ΔV_{OUT}=2%, I_{OUT}=1mA	--	25	55	mV
Line Regulation	ΔV_{LINE}	V_{IN}=V_{OUT}+1V to 24V,I_{OUT}=1mA	--	--	0.2	%/V
Load Regulation	ΔV_{LOAD}	V_{IN}=V_{OUT}+2V,1mA≤I_{OUT}≤50mA	--	25	60	mV
Short Current	I_{SHORT}	V_{OUT}=0V	--	130	--	mA
Limit Current	I_{LIMIT}	V_{IN}=V_{OUT} + 2V	--	--	360	mA
Power Supply Rejection Ratio	PSRR	V_{OUT}=3.3V,I_{OUT}=50mA, f=1KHz	--	55	--	dB
Temperature Coefficient	$\frac{\Delta V_{OUT}}{\Delta T_A \times \Delta V_{OUT}}$	V_{IN}=V_{OUT}+2V,I_{OUT}=1mA, -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 10μF 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 :

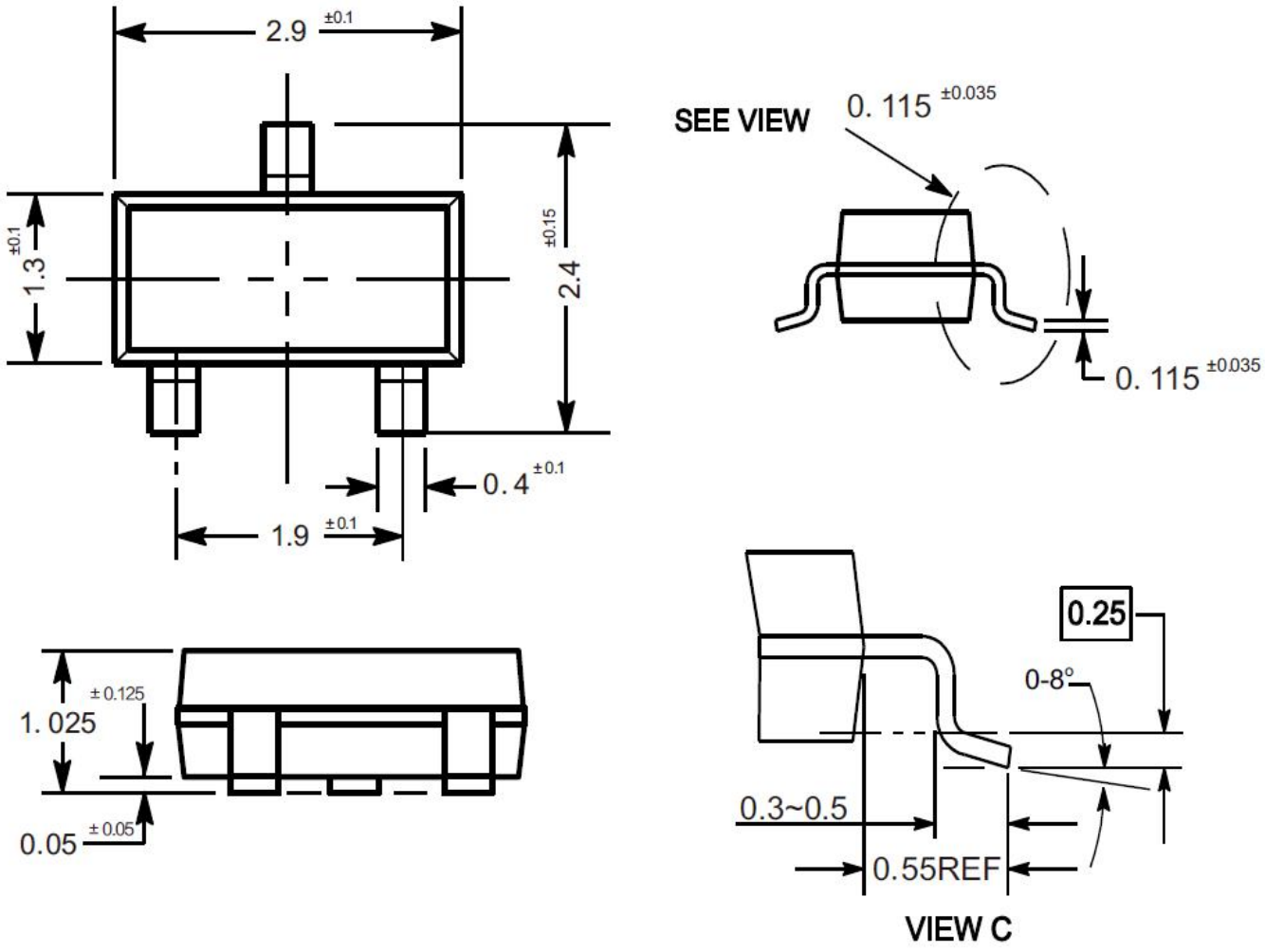
$P_D = (V_{IN} - V_{OUT}) \times I_{OUT} + V_{IN} \times I_Q$

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 TN71B 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.

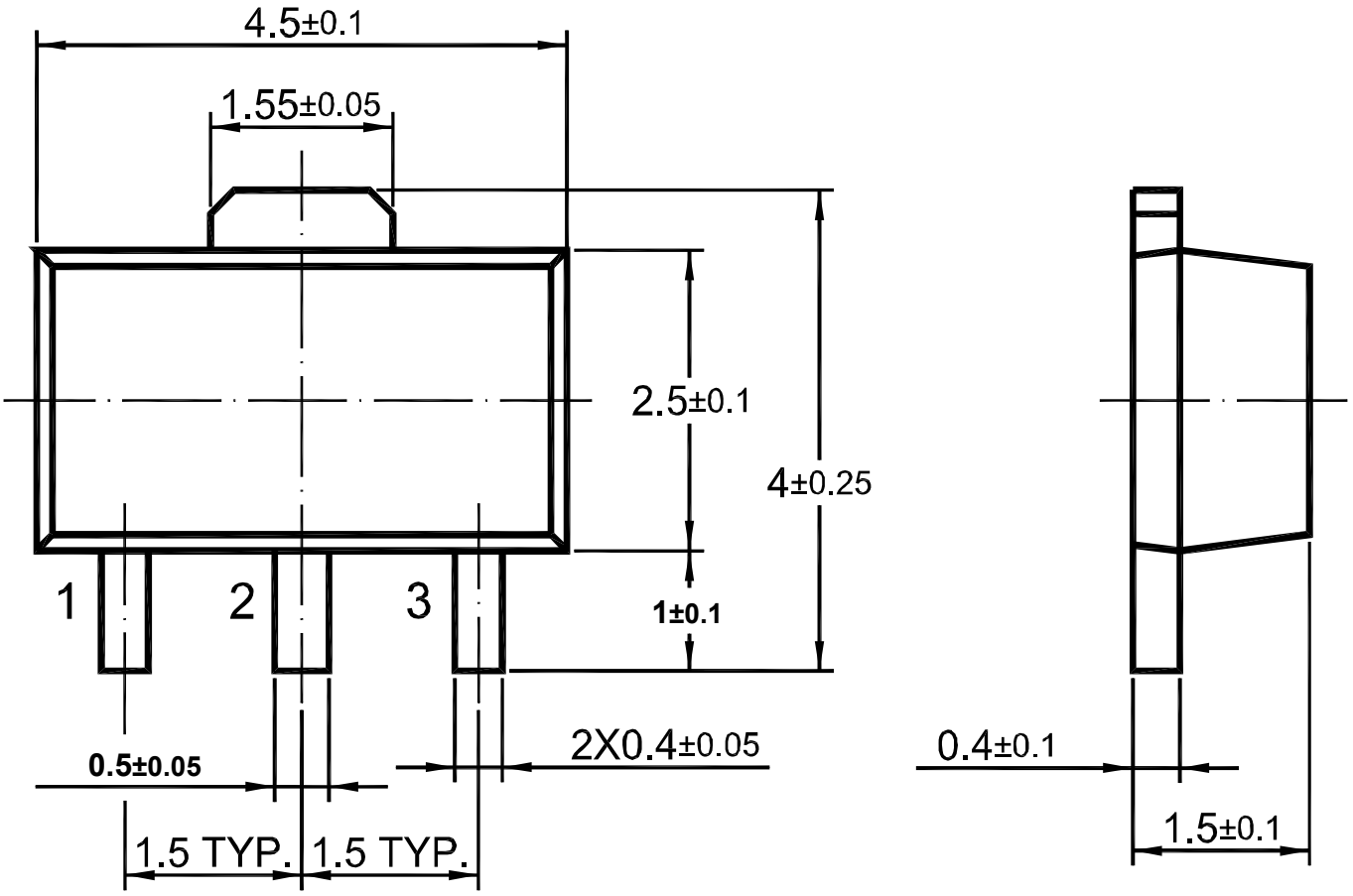
Package Outline

SOT-23
Dimensions in mm



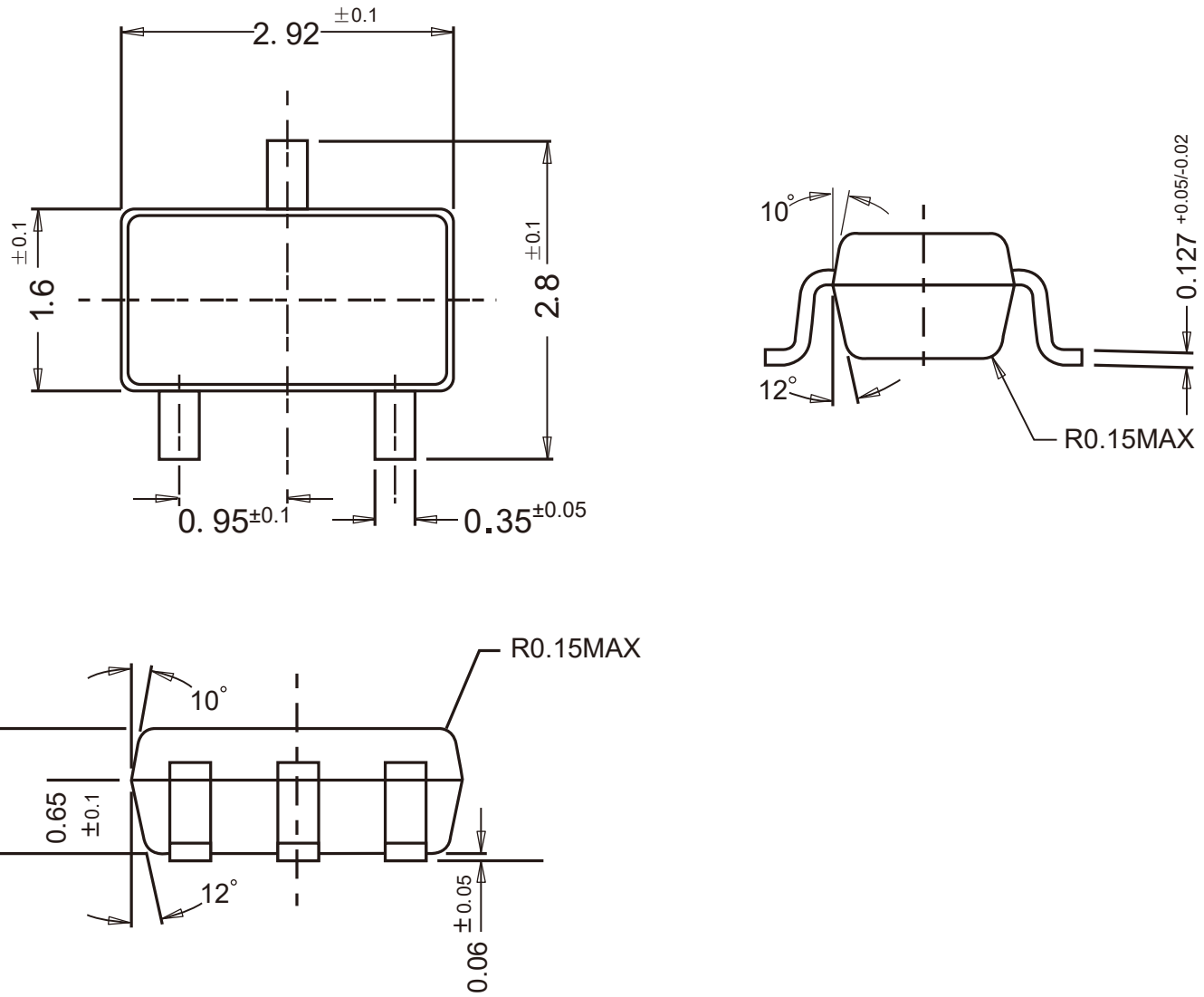
Package Outline

SOT-89
Dimensions in mm



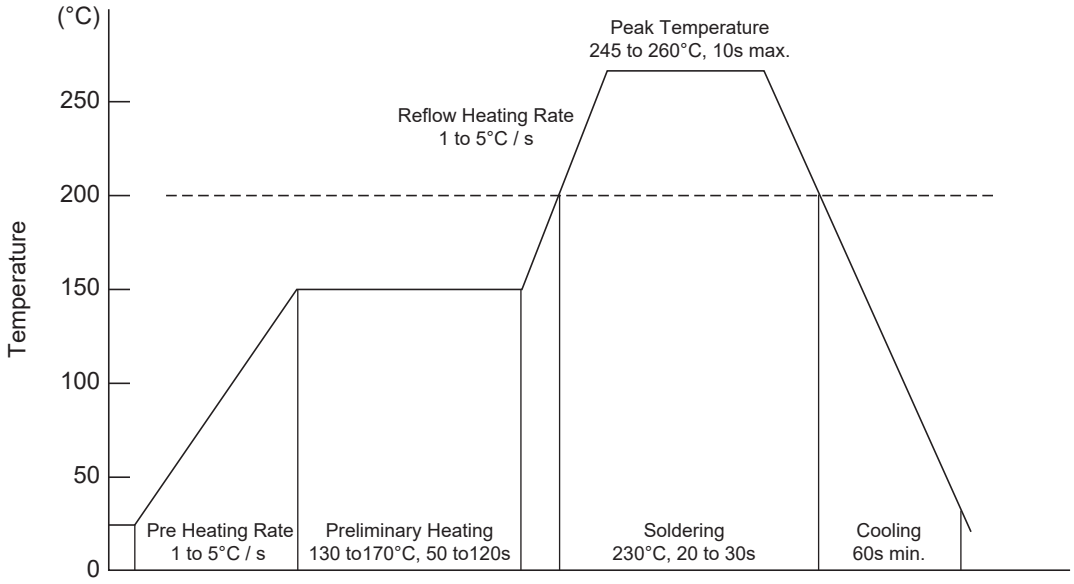
Package Outline

SOT-23-3
Dimensions in mm



Conditions of Soldering and Storage

◆ Recommended condition of reflow soldering



Recommended peak temperature is over 245°C. If peak temperature is below 245°C, you may adjust the following parameters:

- Time length of peak temperature (longer)
- Time length of soldering (longer)
- Thickness of solder paste (thicker)

◆ Conditions of hand soldering

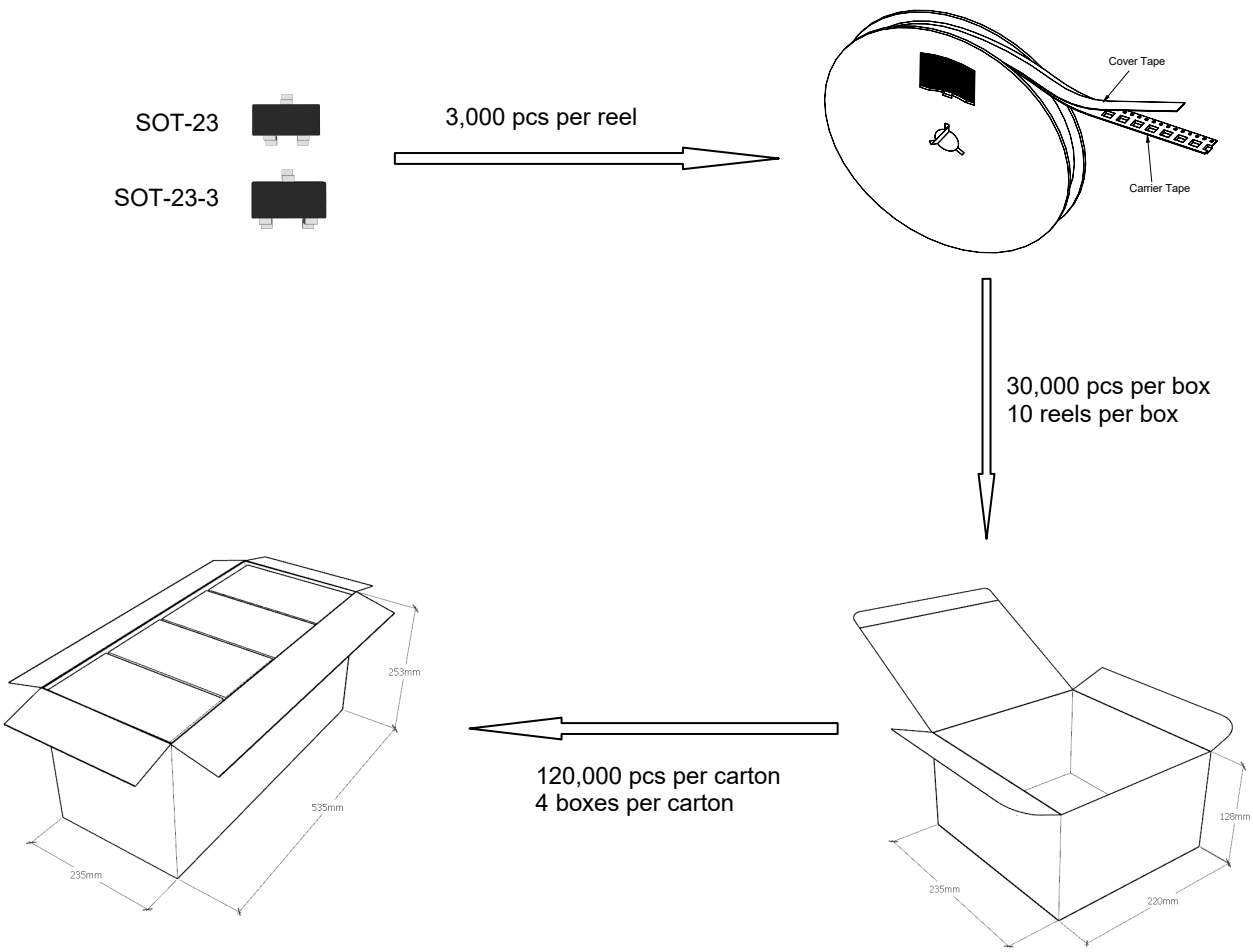
- Temperature: 300°C
- Time: 3s max.
- Times: one time

◆ Storage conditions

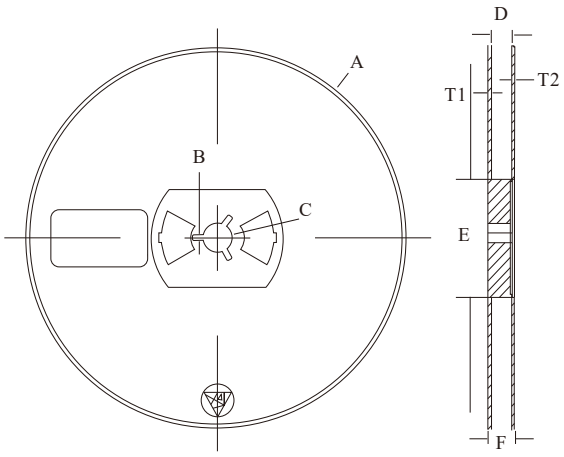
- **Temperature**
  5 to 40°C
- **Humidity**
  30 to 80% RH
- **Recommended period**
  One year after manufacturing

Package Specifications (SOT-23/SOT-23-3)

- The method of packaging



◆ Embossed tape and reel data

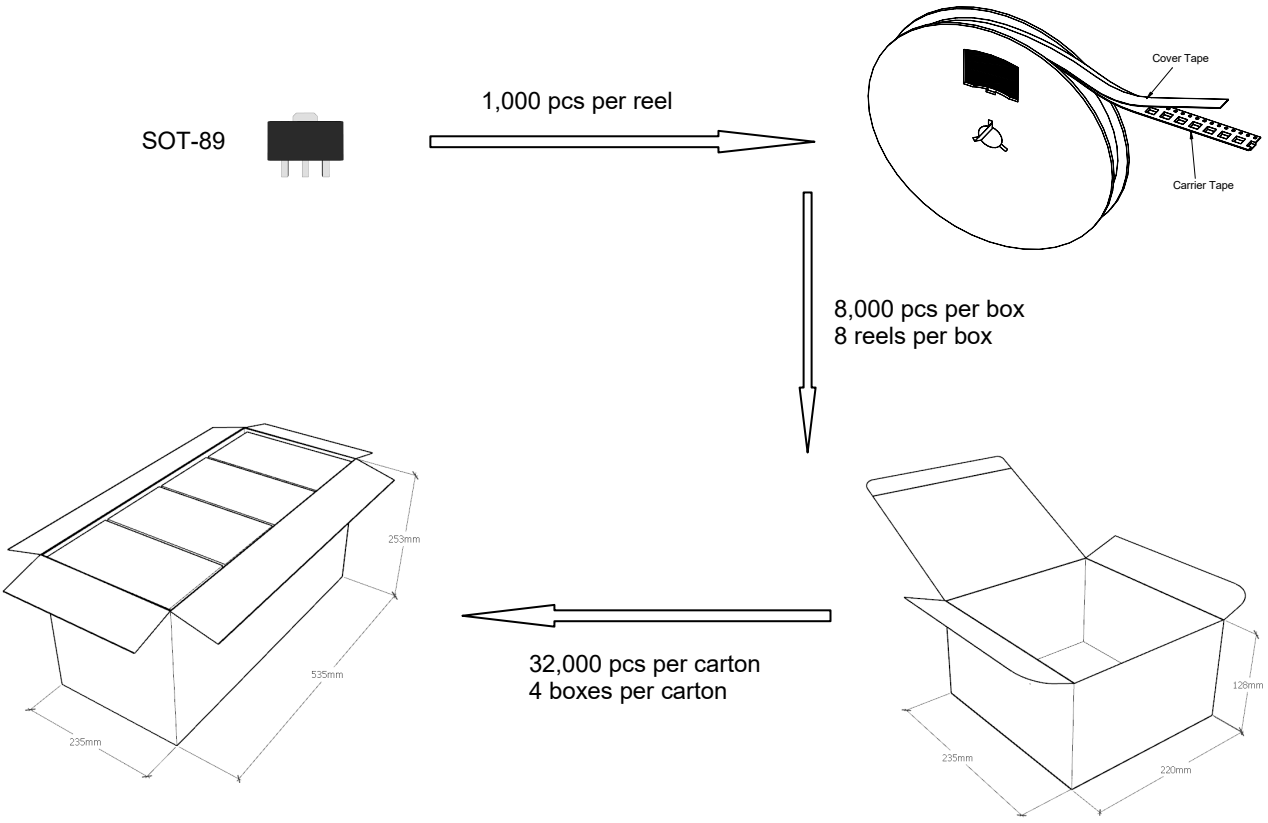


Reel (7")

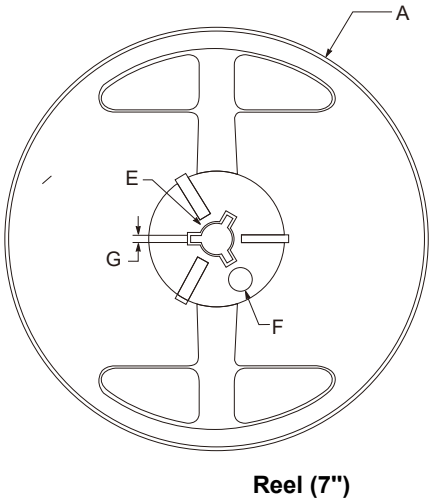
Symbol	Value (unit: mm)
A	Ø 177.8±1
B	2.7±0.2
C	Ø 13.5±0.2
E	Ø 54.5±0.2
F	12.3±0.3
D	9.6+2/-0.3
T1	1.0±0.2
T2	1.2±0.2

Package Specifications (SOT-89)

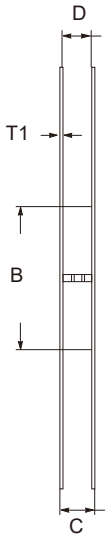
- The method of packaging (1,000PCS/Reel&7inches)



◆ **Embossed tape and reel data**



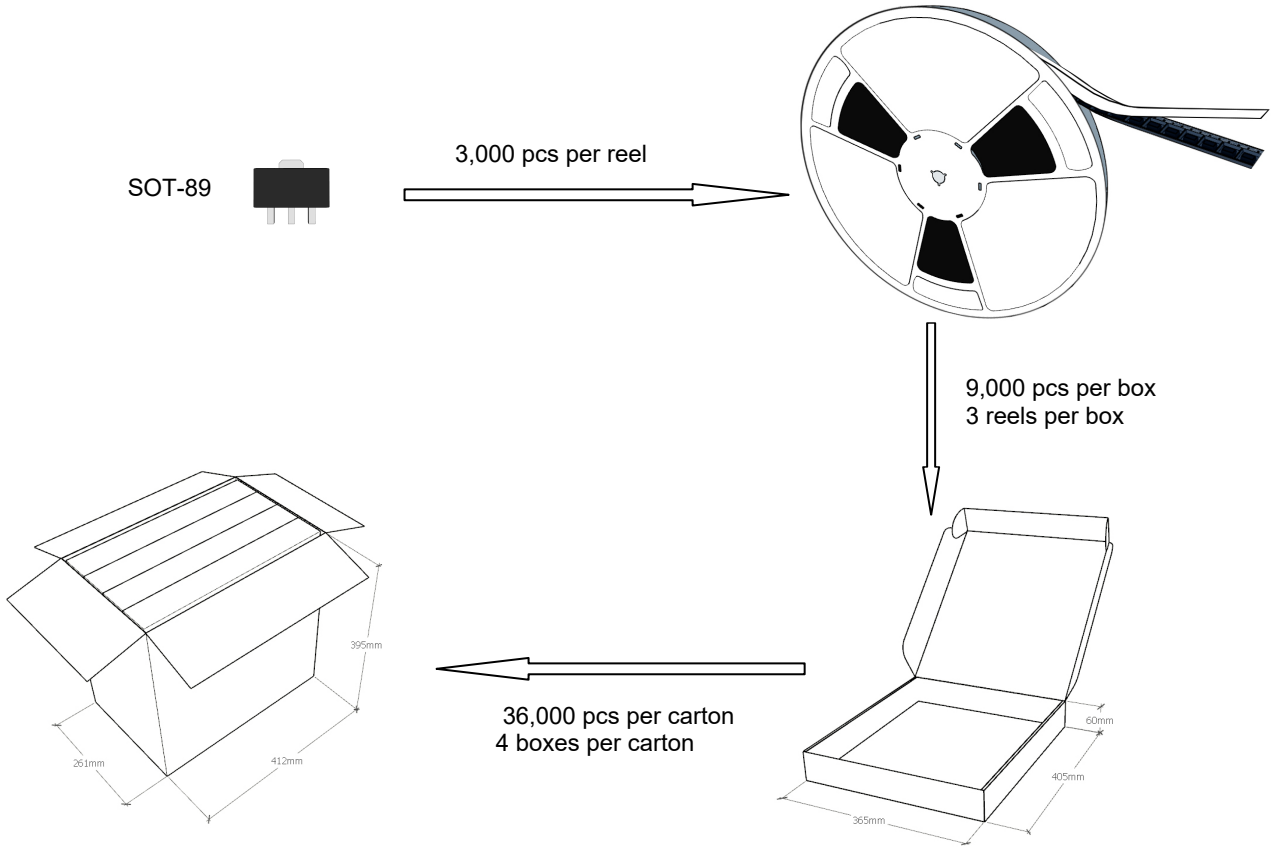
Reel (7")



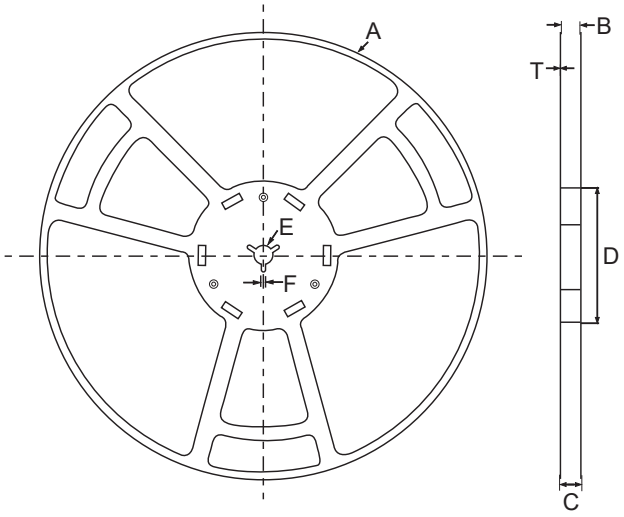
symbol	Value(unit:mm)
A	Φ179±1
B	60.5±0.2
C	15.3±0.3
D	12.5~13.7
E	Φ13.5±0.2
F	Φ10.0±0.2
G	2.7±0.2
T1	1.0±0.2

Package Specifications (SOT-89)

- The method of packaging (3,000PCS/Reel&13inches)



◆ Embossed reel data

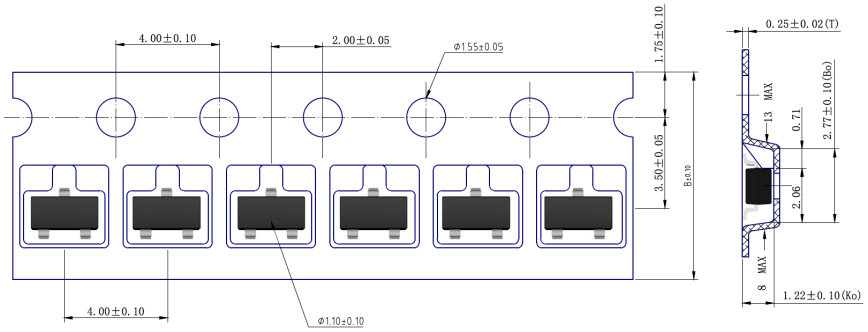


Reel (13")

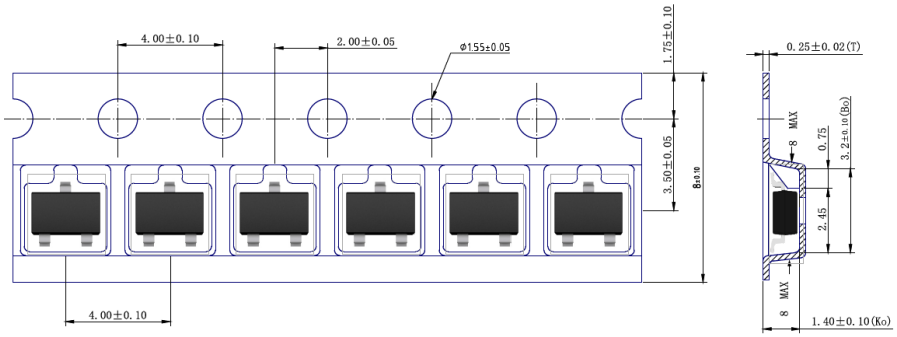
symbol	Value(unit:mm)
A	ϕ330±1
B	12.7±0.5
C	16.5±0.3
D	ϕ99.5±0.5
E	ϕ13.6±0.3
F	2.8±0.3
T	1.9±0.2

◆ Embossed tape data

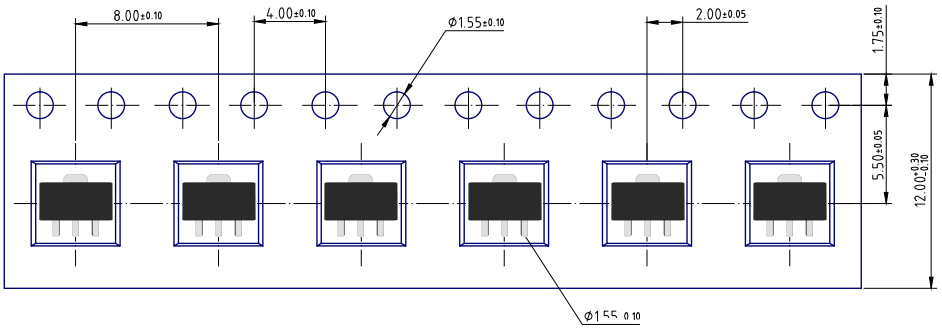
SOT-23



SOT-23-3



SOT-89



Contact Information

TANI website: **http://www.tanisemi.com** Email:tani@tanisemi.com

For additional information, please contact your local Sales Representative.

® is registered trademarks of TANI Corporation.

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.

TANI reserves the right to revise or update the product specification and the products at any time without prior notice, and the user's continued use of the product specification is considered an acceptance of these revisions and updates. Prior to purchasing and using the product, users should verify the above information with TANI to ensure that the prod uct specification is the most current, effective, and complete. If users are particularly concerned about product parameters, please consult TANI in detail or request relevant product test reports. Any data not explicitly mentioned in the product specification shall be subject to separate agreement.

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.

Users should also comply with relevant laws, regulations, policies, and standards when using the product specification. Users are responsible for the risks and liabilities arising from the use of the product specification and must ensure that it is not used for illegal purposes. Additionally, users should respect the intellectual property rights related to the product specification and refrain from infringing upon any third- party legal rights. TANI shall assume no responsibility for any disputes or controv ersies arising from the above-mentioned issues in any form.