Description

The TN75B Series are a set of three-terminal low power high voltage regulators implemented in CMOS technology. They allow input voltages as high as 36V.

The TN75B Series are designed specifically for portable battery-powered applications which require ultra-low quiescent current. The very-low consumption of type 2.5uA ensures long battery life and dynamic transient boost feature improves device transient response for wireless communication applications.

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

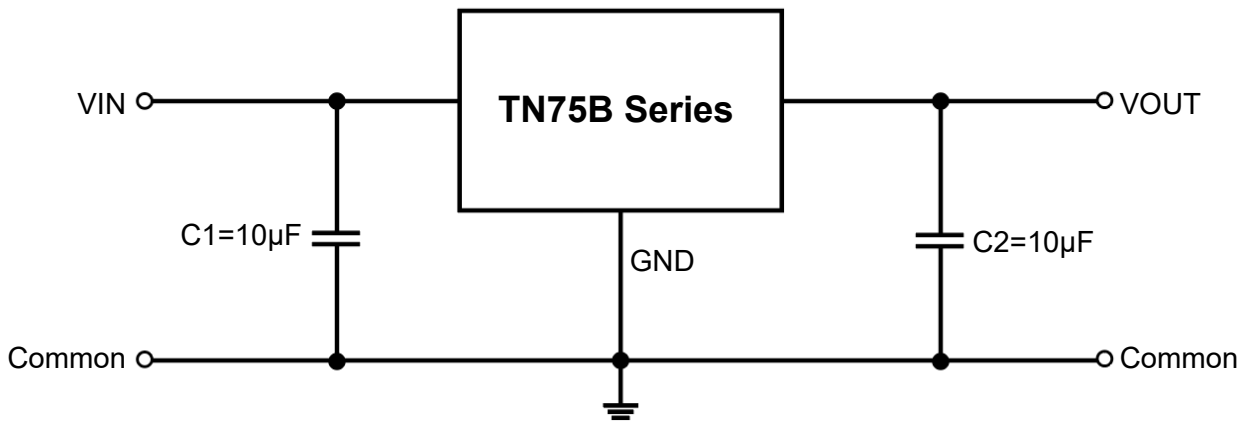
Features

- Wide Input Voltage Range: 3V~36V
- Maximum Output Current: 200mA
- Standard Fixed Output Voltage Options: 1.8V,3.0V,3.3V,3.6V,5.0V
- Low Quiescent Current: 2.5μA
- PSRR=68dB@1KHz
- Low Dropout: 620mV @ 100mA,V_{OUT}=3.3V
- Low Output Voltage Accuracy: ±2%
- Short Circuit Protection
- Thermal Shutdown Protection
- Available Packages: SOT-23, SOT-23-3, SOT-89, SOT-23-5 and DFN2x2C-6L

Applications

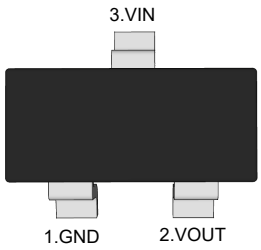
- Battery-Powered Equipment
- Ultra Low Power Microcontrollers
- Security Monitoring Equipment

Typical Application Circuit



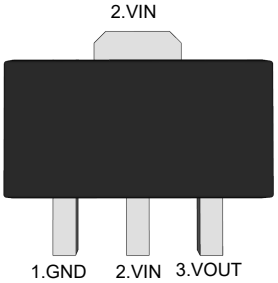
Pin Distribution

SOT-23



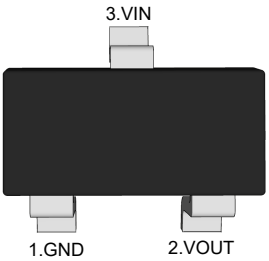
(Top View)

SOT-89



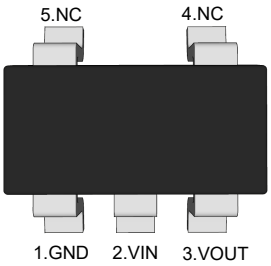
(Top View)

SOT-23-3



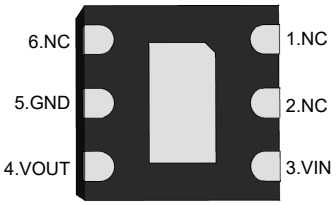
(Top View)

SOT-23-5



(Top View)

DFN2x2C-6L



Bottom View

Functional Pin Description

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

Ordering Information

TN75B□□□□

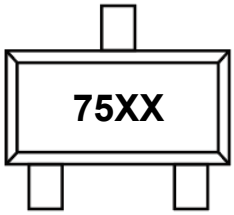
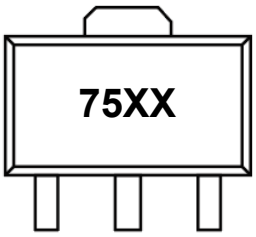
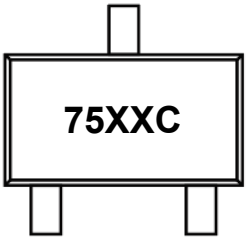
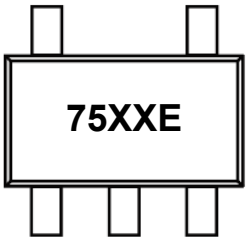
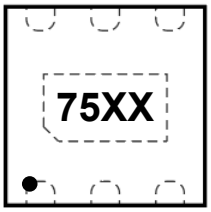
Package Type
SA : SOT-23 SC : SOT-23-3 SQ : SOT-89
SE : SOT-23-5 DFC : DFN2x2C-6L

Output Voltage
18 : 1.8V 30 : 3.0V 33 : 3.3V
36 : 3.6V 50 : 5.0V

Output current tap
L: 150mA

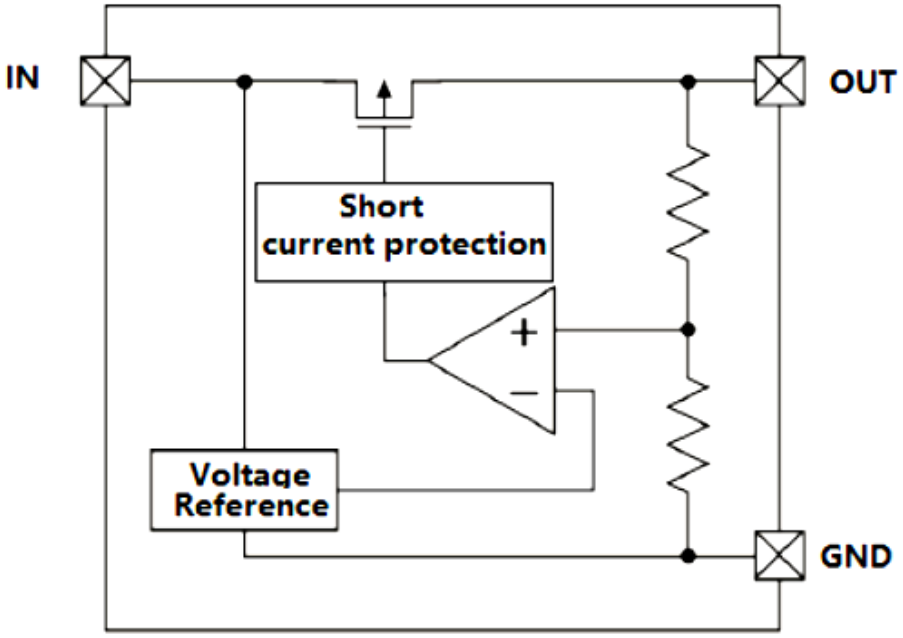
Revision:B

Ordering Information Continue

Orderable Device	Package	Reel (inch)	Package Qty (PCS)	Eco Plan Note	MSL Level	Marking Code
TN75BL18SA	SOT-23	7	3000	RoHS & Green	MSL1	 XX:Output Voltage e.g. 30:3.0V
TN75BL30SA						
TN75BL33SA						
TN75BL36SA						
TN75BL50SA						
TN75BL18SQ	SOT-89	7/13	1000/3000	RoHS & Green	MSL1	 XX:Output Voltage e.g. 30:3.0V
TN75BL30SQ						
TN75BL33SQ						
TN75BL36SQ						
TN75BL50SQ						
TN75BL18SC	SOT-23-3	7	3000	RoHS & Green	MSL3	 XX:Output Voltage e.g. 30:3.0V
TN75BL30SC						
TN75BL33SC						
TN75BL36SC						
TN75BL50SC						
TN75BL18SE	SOT-23-5	7	3000	RoHS & Green	MSL3	 XX:Output Voltage e.g. 30:3.0V
TN75BL30SE						
TN75BL33SE						
TN75BL36SE						
TN75BL50SE						
TN75BL18DFC	DFN2x2C-6L	7	3000	RoHS & Green	MSL1	 XX:Output Voltage e.g. 30:3.0V
TN75BL30DFC						
TN75BL33DFC						
TN75BL36DFC						
TN75BL50DFC						

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 ~ +40	V
Power Dissipation	SOT-23	300	mW
	SOT-23-3	400	mW
	SOT-23-5	400	mW
	SOT-89	600	mW
	DFN2x2C-6L	1000	mW
Thermal Resistance,Junction-to-Ambient	SOT-23	330	°C/W
	SOT-23-3	380	°C/W
	SOT-23-5	380	°C/W
	SOT-89	180	°C/W
	DFN2x2C-6L	100	°C/W
Operating Junction Temperature		-40 ~ +125	°C
Storage Temperature Range		-65 ~ +150	°C
Lead Temperature (Soldering, 10 sec)		300	°C
ESD Voltage	HBM	±4000	V

Note1: Exceed these limits to damage to the device. Exposure to absolute maximum rating conditions may affect.

Recommended Operating Conditions

Parameter	Value	Unit
Supply Voltage	3~36	V
Maximum Output Current	200	mA
Operating Ambient Temperature	-40 ~ +125	°C

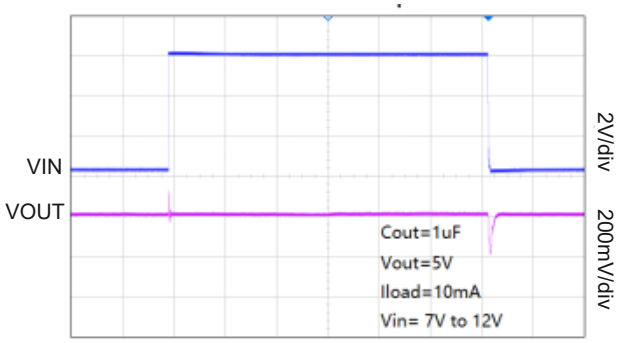
Electrical Characteristics

(V_{IN}=V_{OUT}+2V, C_{IN}=10μF, C_{OUT}=10μF, T_A=25℃ , unless otherwise noted.)

Parameter	Symbol	Test Conditions		Min.	Typ.	Max.	Unit
Input Voltage	V_{IN}			3	--	36	V
Output Voltage Accuracy	ΔV_{OUT}	I_{OUT}=1mA		-2	--	+2	%
Maximum Output Current	$I_{OUT(Max)}$			--	200	--	mA
Quiescent Current	I_Q	I_{OUT}=0mA		--	2.5	4	μA
Dropout Voltage	V_{DROP}	V_{OUT}=2.5V	I_{OUT}=150mA	--	900	1350	mV
			I_{OUT}=100mA	--	600	1000	mV
		V_{OUT}=3.0V	I_{OUT}=150mA	--	910	960	mV
			I_{OUT}=100mA	--	650	700	mV
		V_{OUT}=3.3V	I_{OUT}=150mA	--	895	950	mV
			I_{OUT}=100mA	--	620	680	mV
		V_{OUT}=3.6V	I_{OUT}=150mA	--	755	930	mV
			I_{OUT}=100mA	--	500	660	mV
		V_{OUT}=5.0V	I_{OUT}=150mA	--	810	990	mV
			I_{OUT}=100mA	--	510	600	mV
Line Regulation	ΔV_{LINE}	V_{IN}=V_{OUT}+2V to 30V I_{OUT}=10mA		--	--	0.2	%/V
Load Regulation	ΔV_{LOAD}	V_{IN}=V_{OUT}+2V, 1mA<I_{OUT}<150mA		--	5	20	mV
Short Current Protection	I_{Short}	OUT Short to GND		--	100	--	mA
Output Noise	e_N	10Hz to 100KHz I_{OUT}=30mA		--	120	--	μV_{RMS}
Power Supply Rejection Ratio	PSRR	V_{IN}=12V, I_{OUT}=1mA, f=1KHz		--	68	--	dB

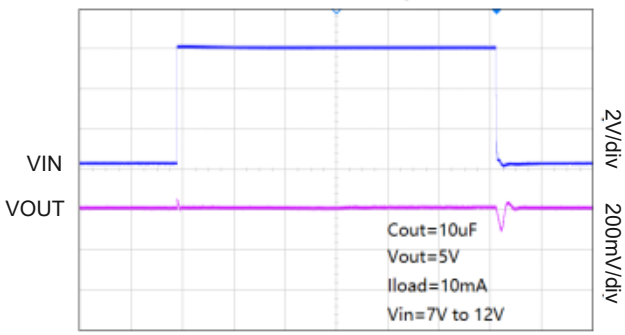
Typical Characteristics Curves

Line-Transient Response



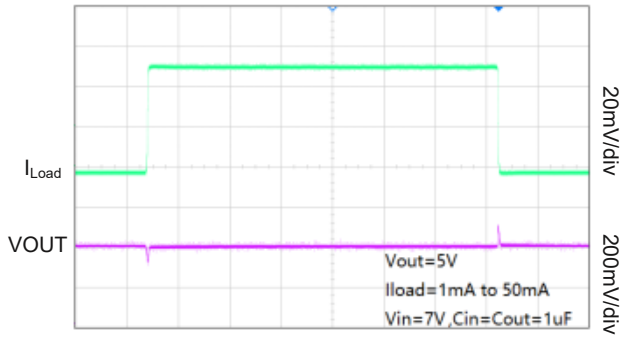
Time(1ms/div)

Line-Transient Response



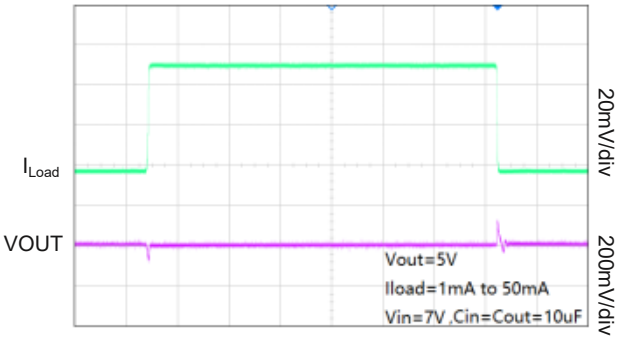
Time(1ms/div)

Load-Transient Response



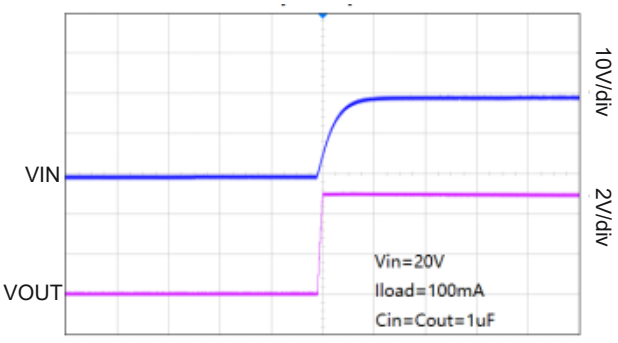
Time(5ms/div)

Load-Transient Response



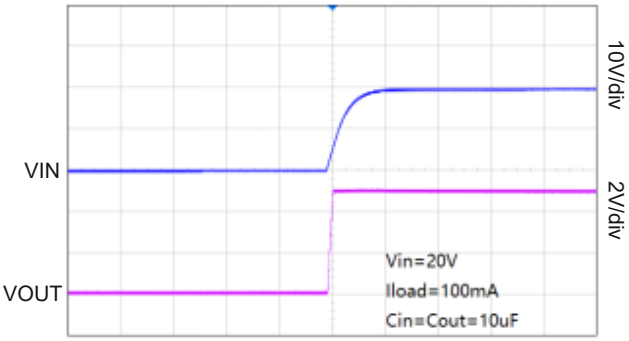
Time(5ms/div)

Start uo Response

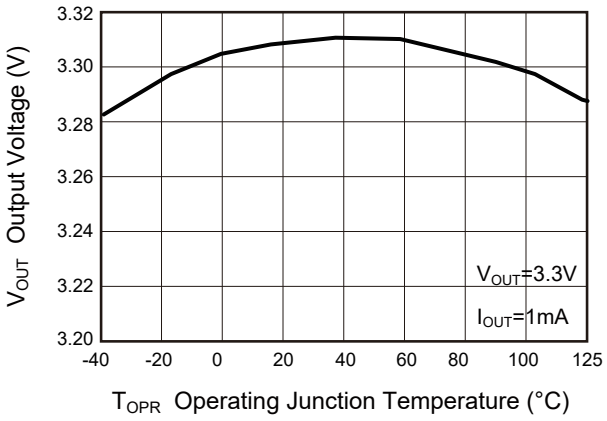


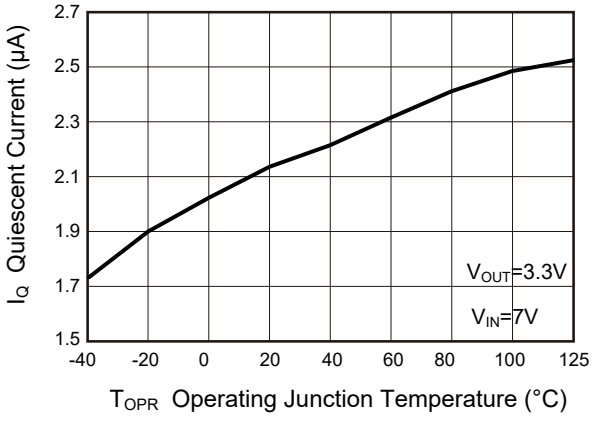
Time(10ms/div)

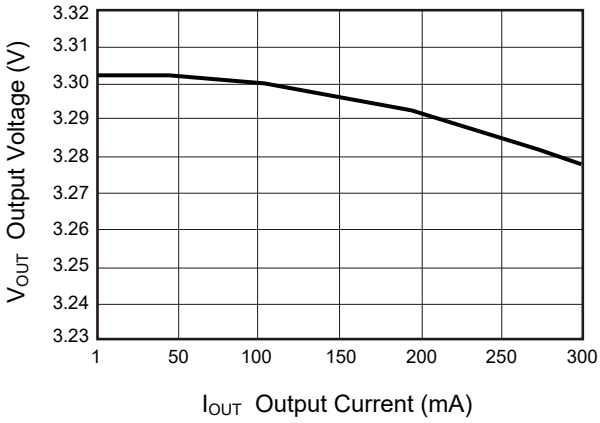
Start uo Response

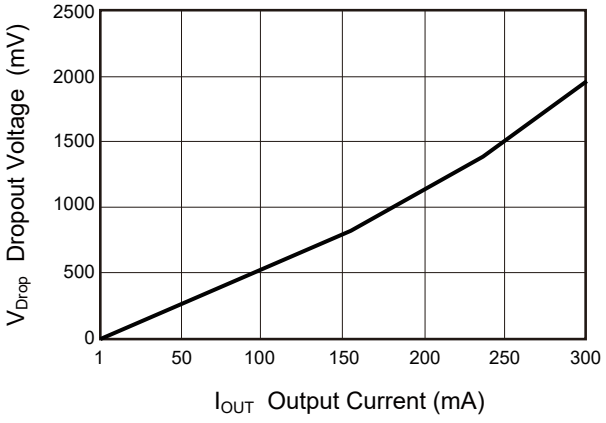


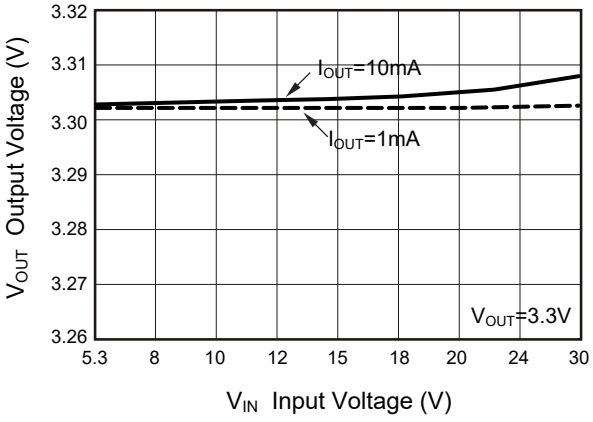
Time(10ms/div)

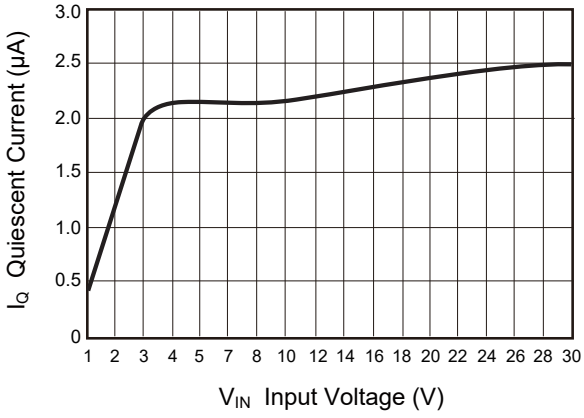












Functional Description

Input Capacitor

A 1μF~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 output capacitance is from 1μF to 10μF, Equivalent Series Resistance (ESR) is from 5mΩ to 100mΩ, 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 OUT and GND pins.

Low Quiescent Current

The TN75B Series consuming only around 2.5μA for all input range and output loading, provides great power saving in portable and low power applications.

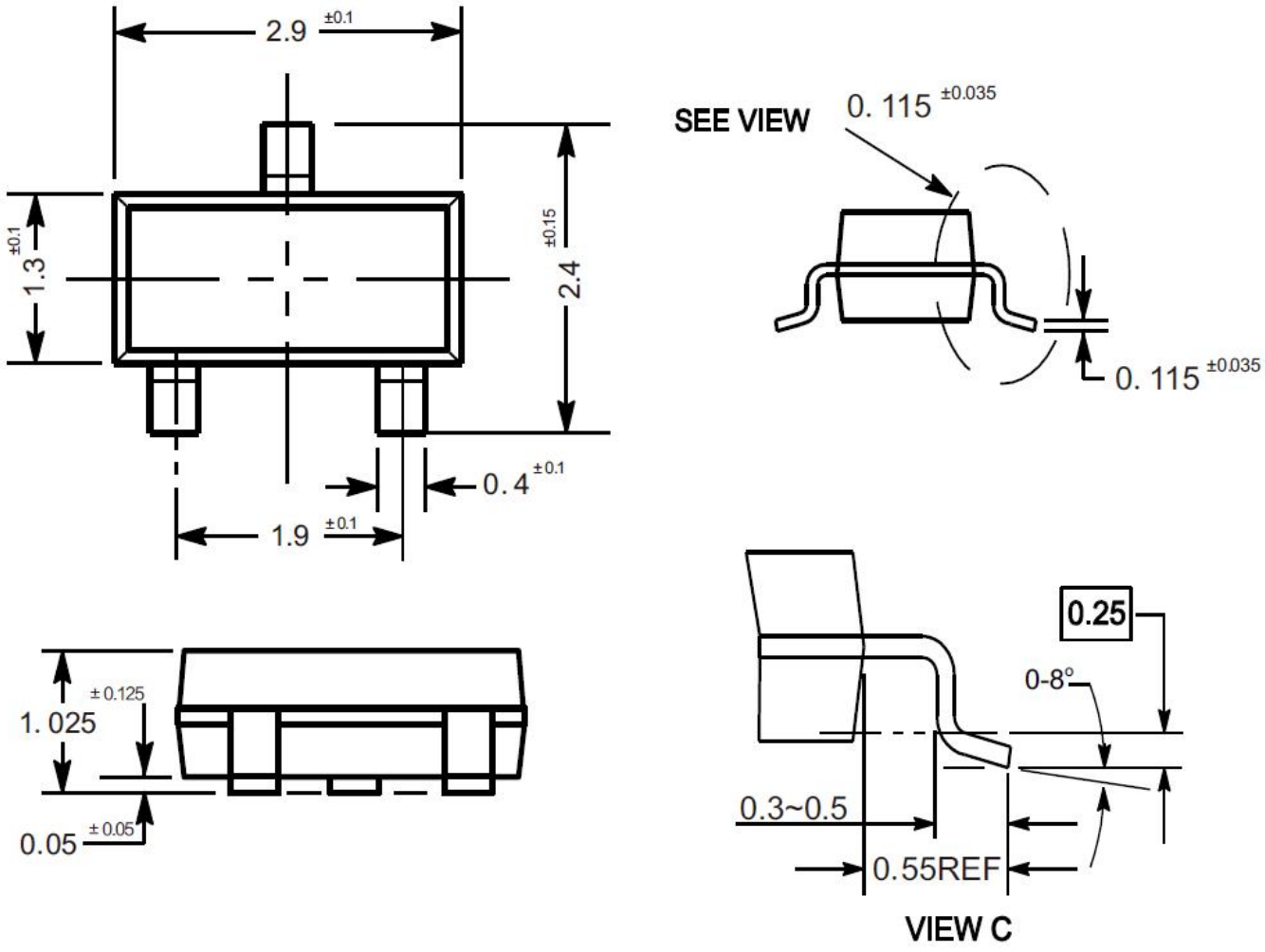
Short Current Limit Protection

When output current at the OUT pin is higher than current limit threshold or the OUT pin is short-circuit to GND, the short current limit protection will be triggered and clamp the output current to approximately 80mA to prevent over-current and to protect the regulator from damage due to overheating.

Package Outline

SOT-23

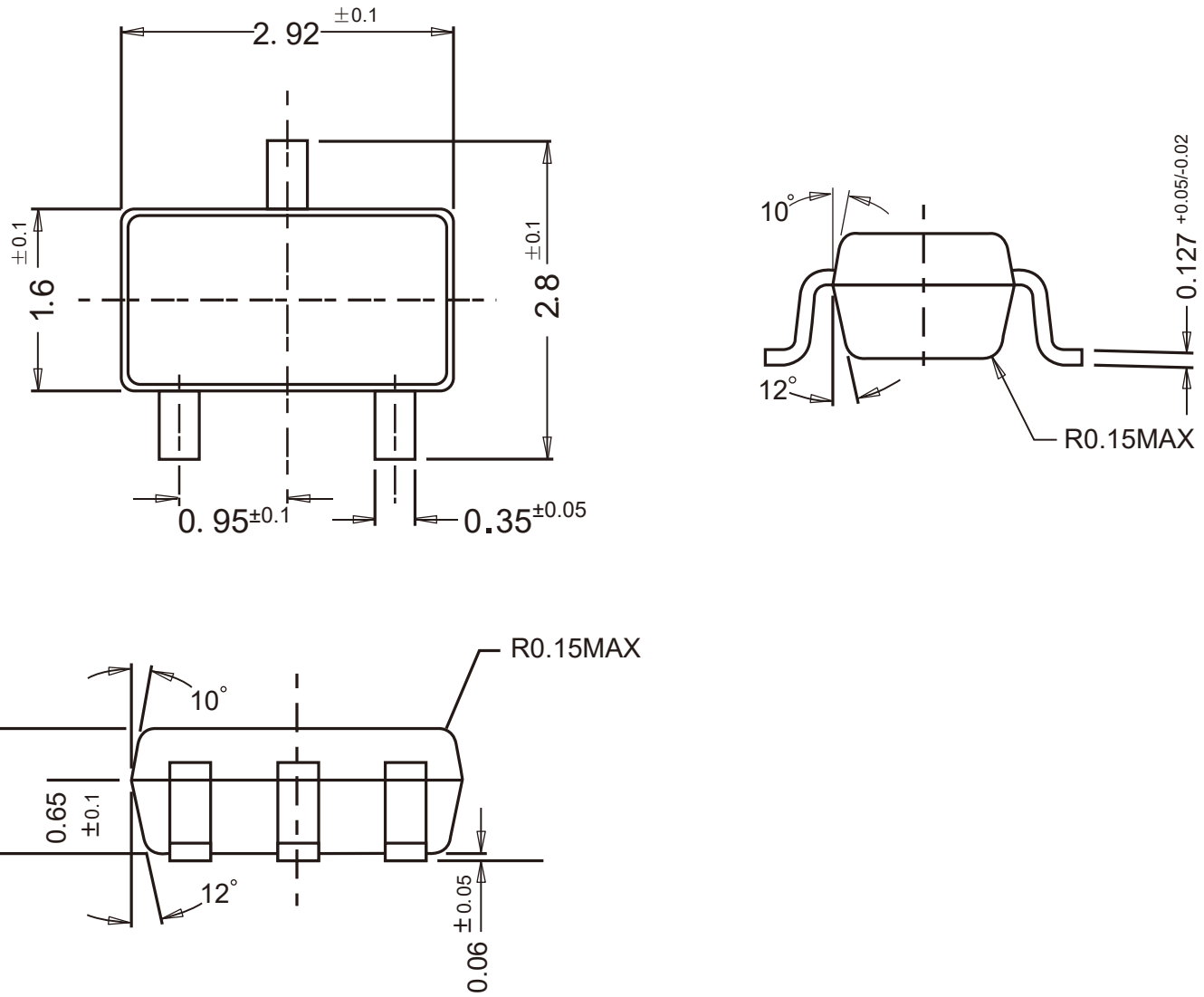
Dimensions in mm



Package Outline

SOT-23-3

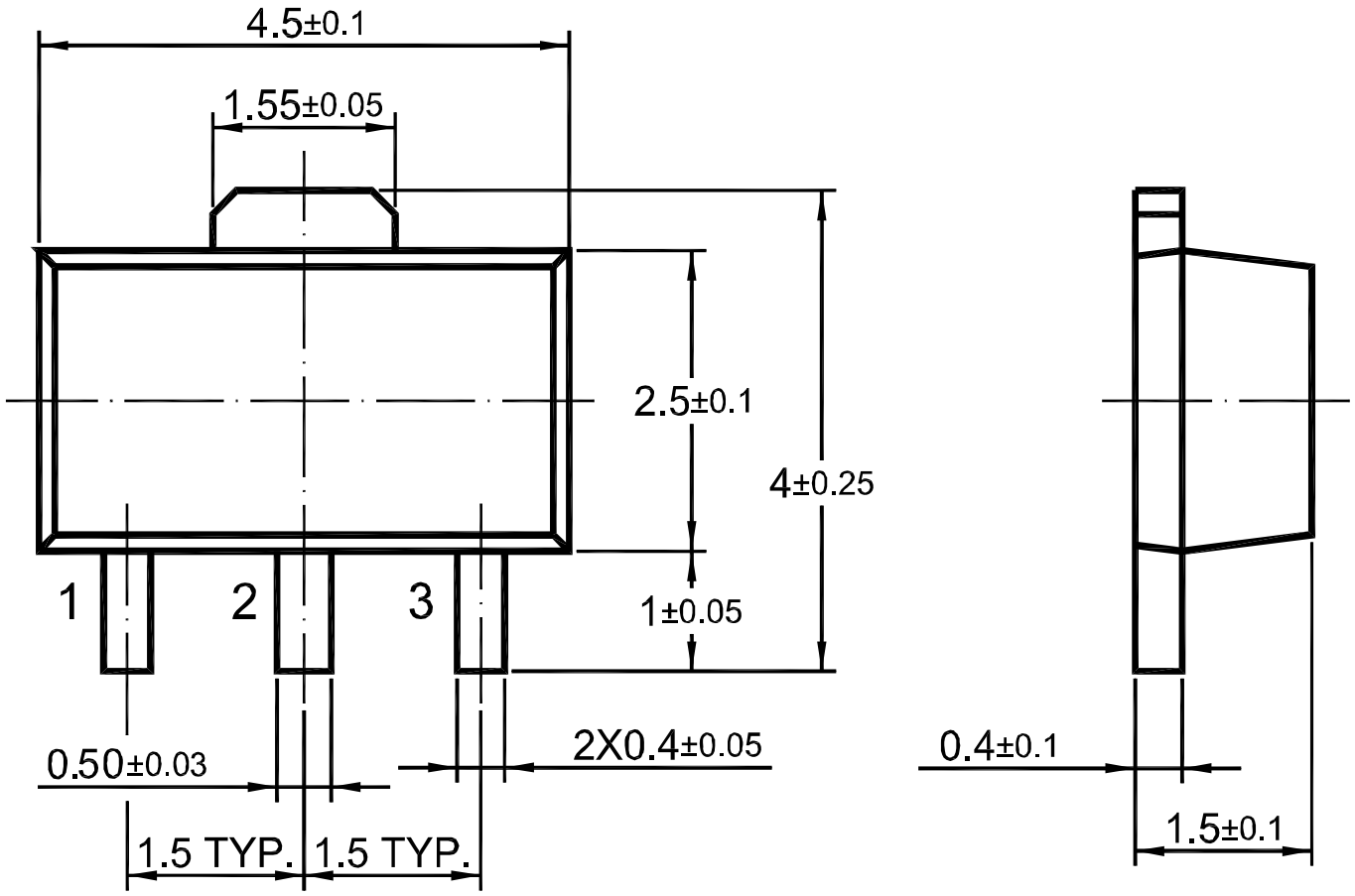
Dimensions in mm



Package Outline

SOT-89

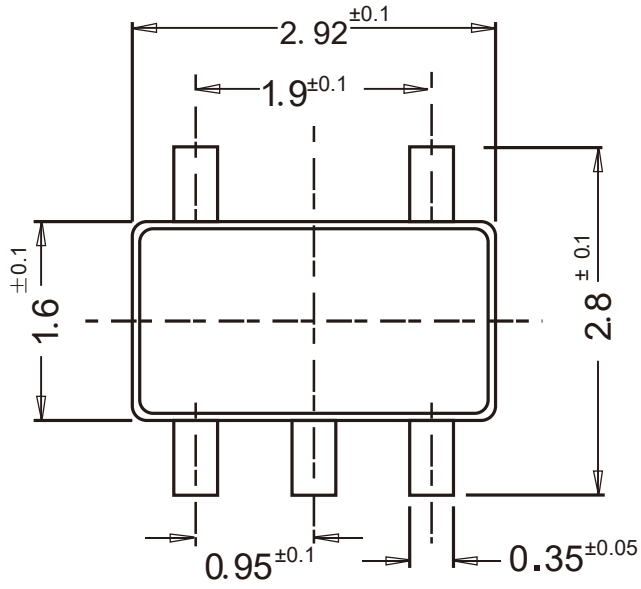
Dimensions in mm

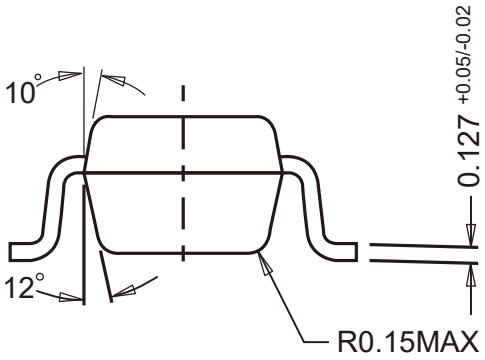


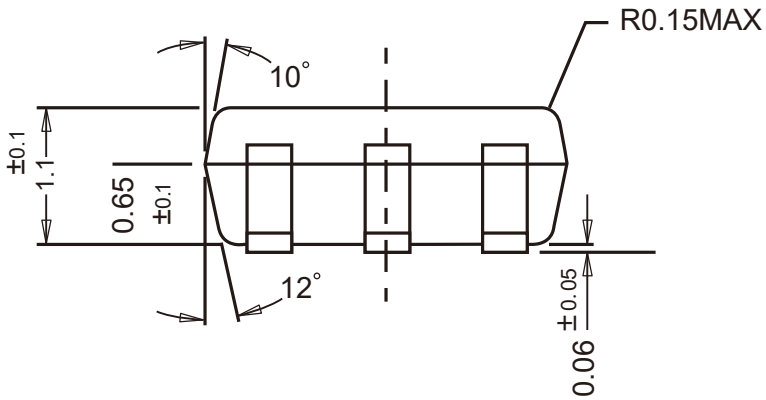
Package Outline

SOT-23-5

Dimensions in mm

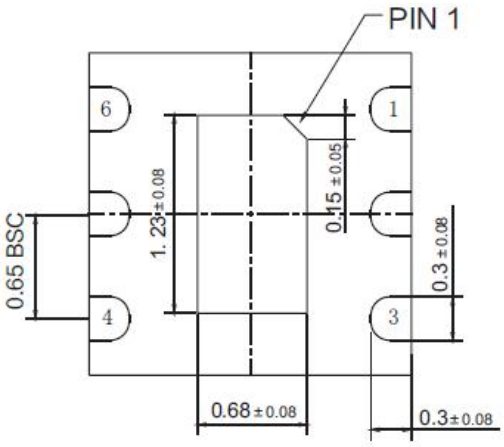




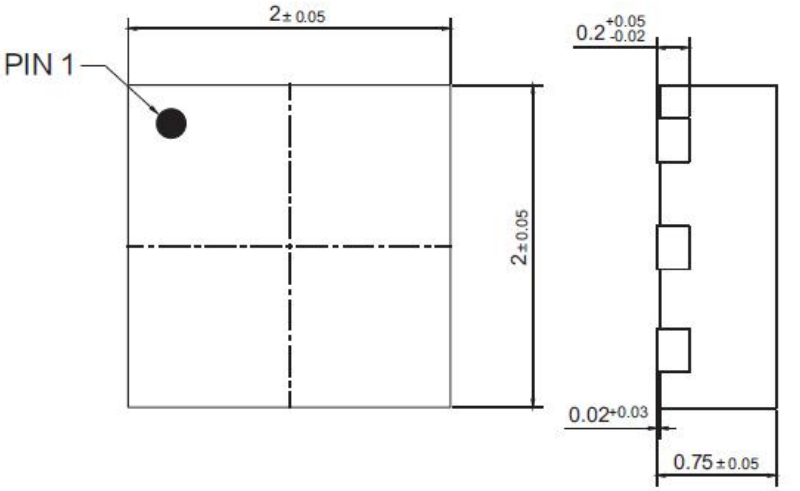


Package Outline

DFN2x2C-6L
Dimensions in mm



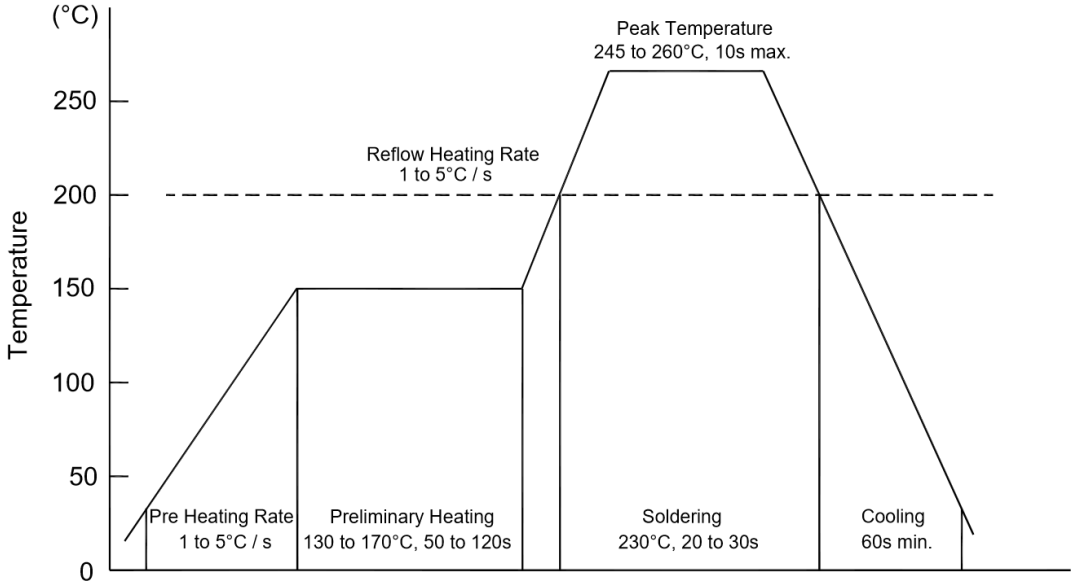
BOTTOM VIEW



TOP VIEW SIDE VIEW

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

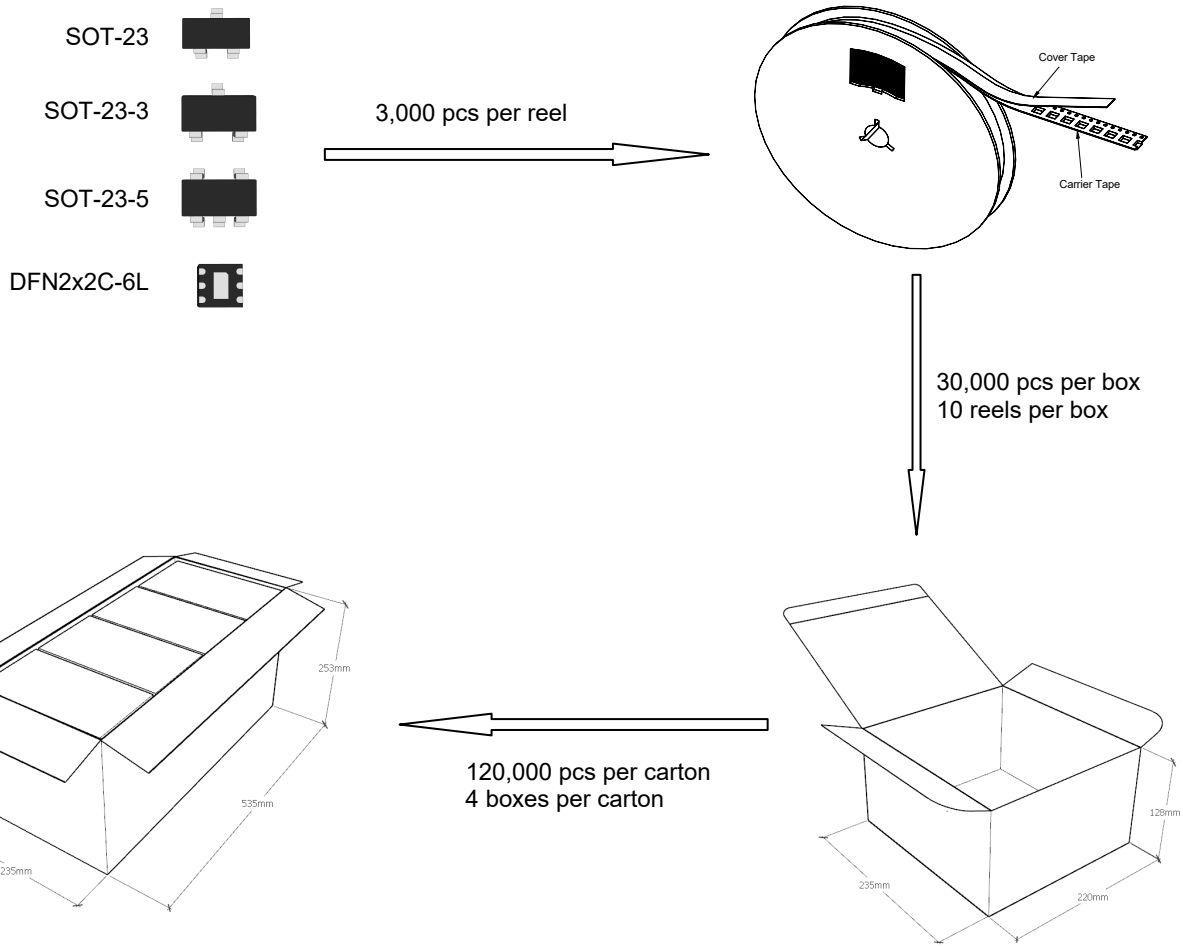
- Temperature: 300°C
- Time: 3s max.
- Times: one time

◆ Storage conditions

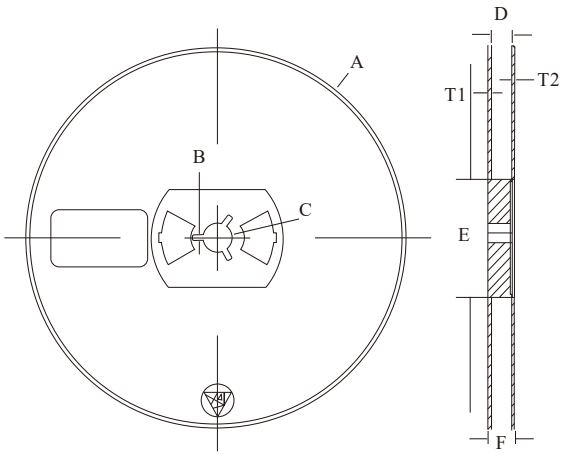
- **Temperature**
  5 to 40°C
- **Humidity**
  30 to 80% RH
- **Recommended period**
  One year after manufacturing

Package Specifications (SOT-23/SOT-23-3/SOT-23-5/DFN2x2C-6L)

- The method of packaging



◆ reel data

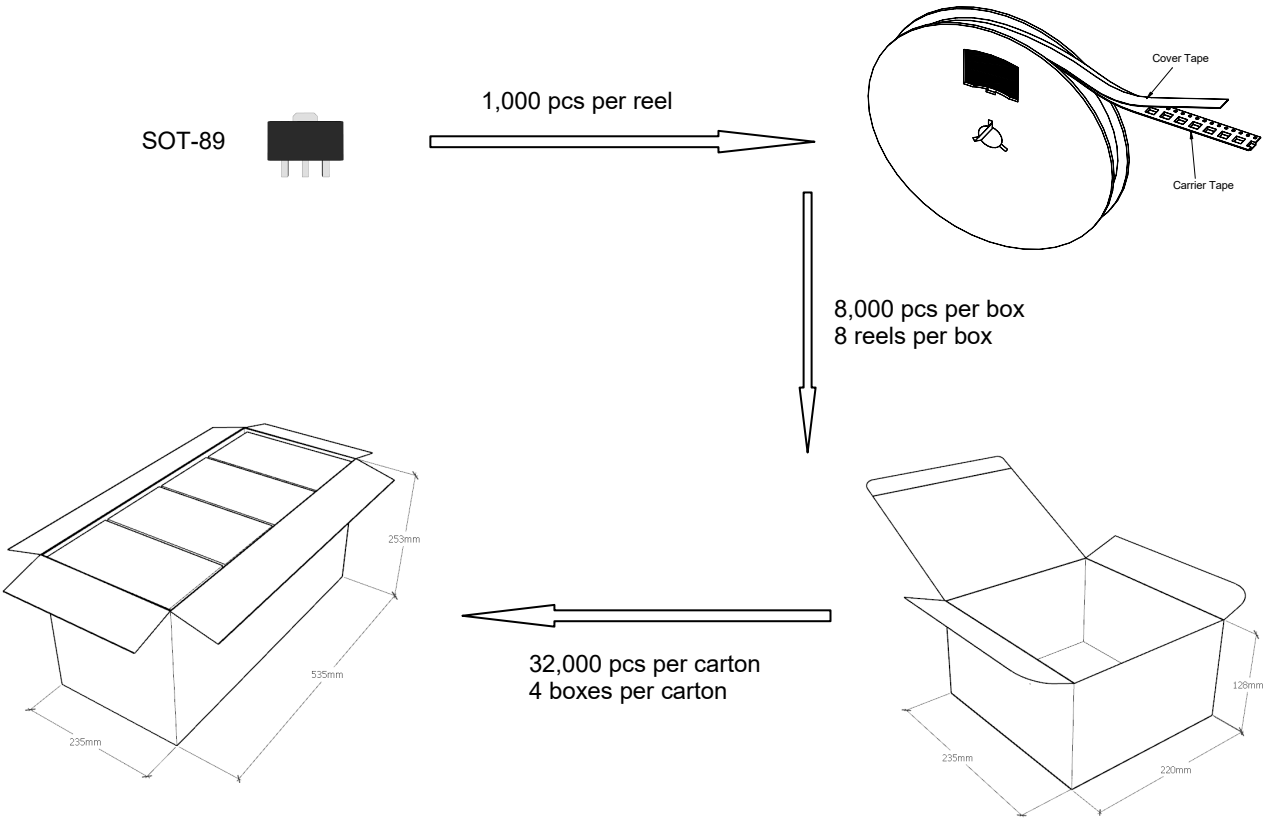


Reel (7")

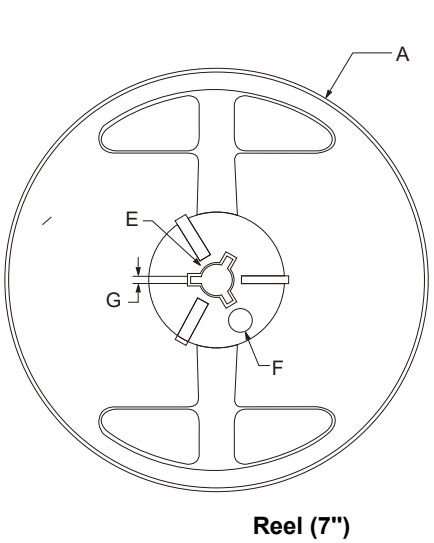
Symbol	Value (unit: mm)
A	Ø 177.8±1
B	2.7±0.2
C	Ø 13.5±0.2
E	Ø 54.5±0.2
F	12.3±0.3
D	9.6+2/-0.3
T1	1.0±0.2
T2	1.2±0.2

Package Specifications (SOT-89)

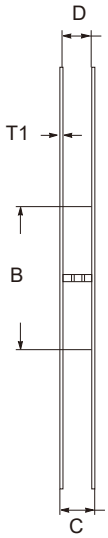
- The method of packaging (1,000PCS/Reel&7inches)



◆ **reel data**



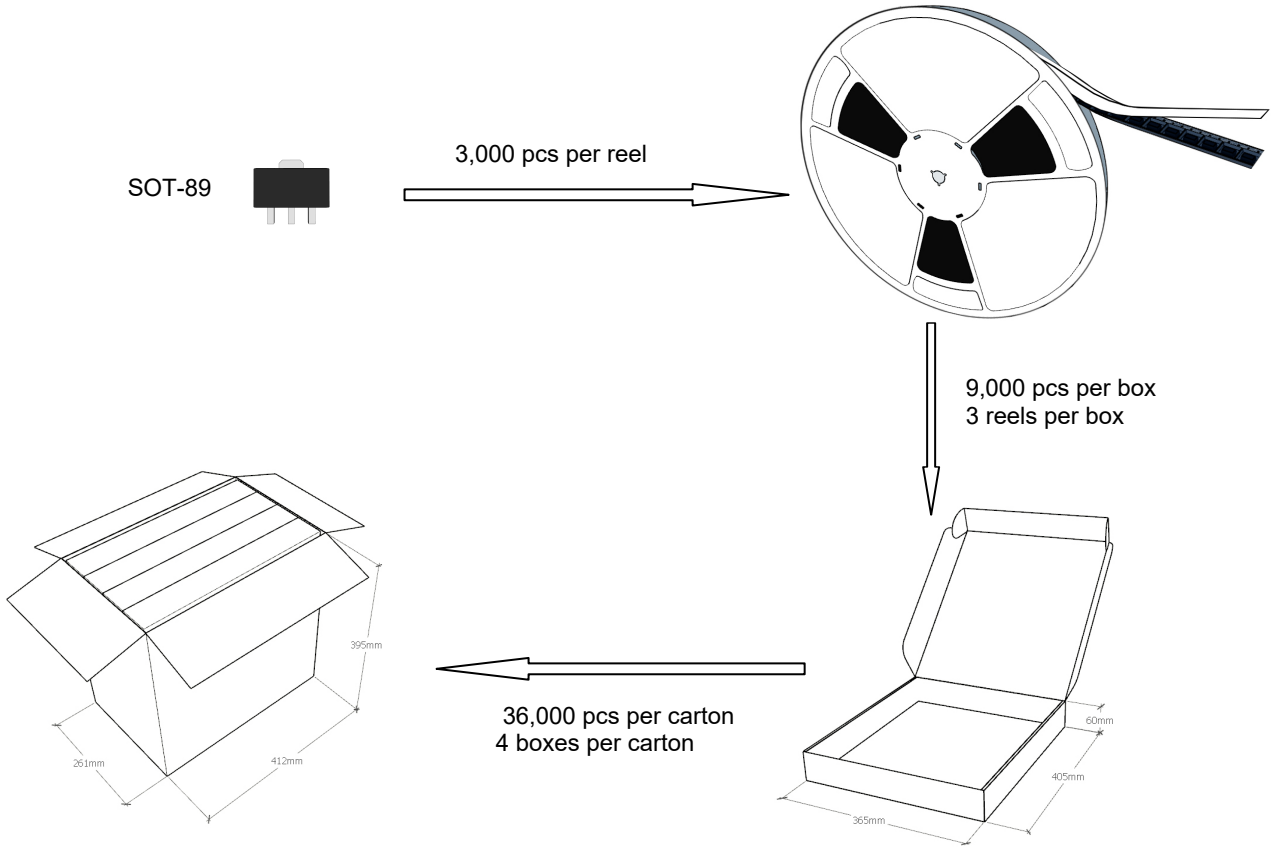
Reel (7")



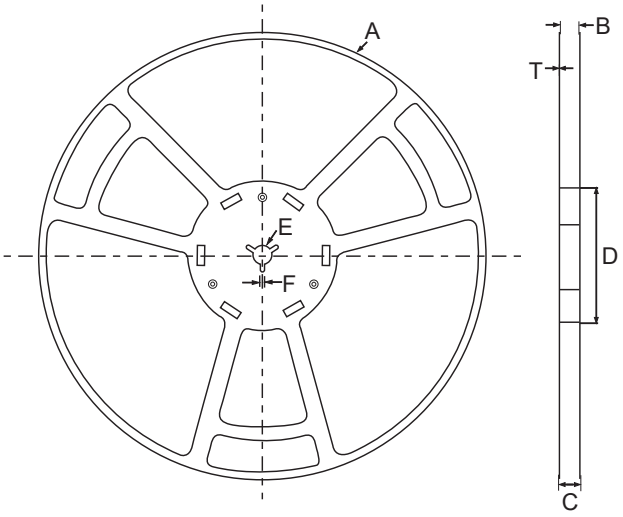
symbol	Value(unit:mm)
A	Φ179±1
B	60.5±0.2
C	15.3±0.3
D	12.5~13.7
E	Φ13.5±0.2
F	Φ10.0±0.2
G	2.7±0.2
T1	1.0±0.2

Package Specifications (SOT-89)

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



◆ **reel data**

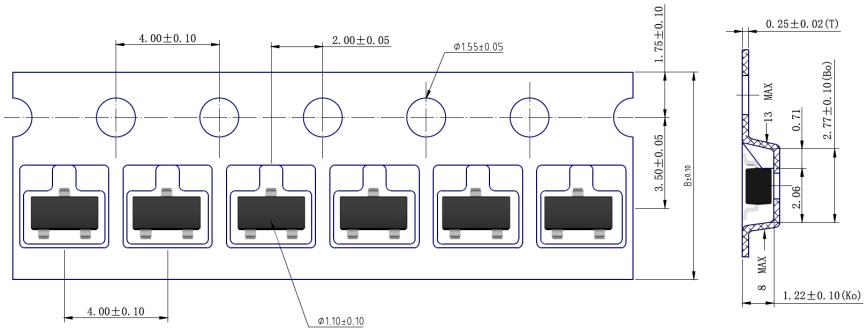


Reel (13")

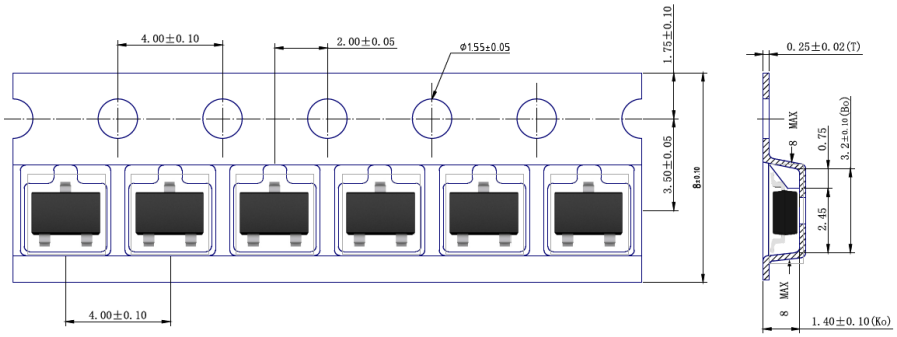
symbol	Value(unit:mm)
A	ϕ330±1
B	12.7±0.5
C	16.5±0.3
D	ϕ99.5±0.5
E	ϕ13.6±0.3
F	2.8±0.3
T	1.9±0.2

◆ Embossed tape data

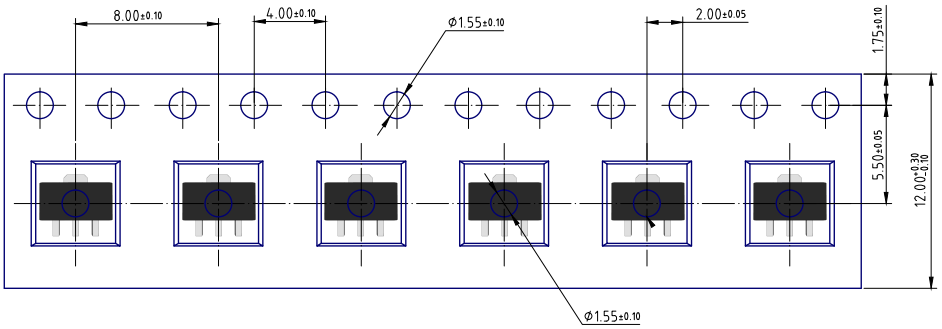
SOT-23



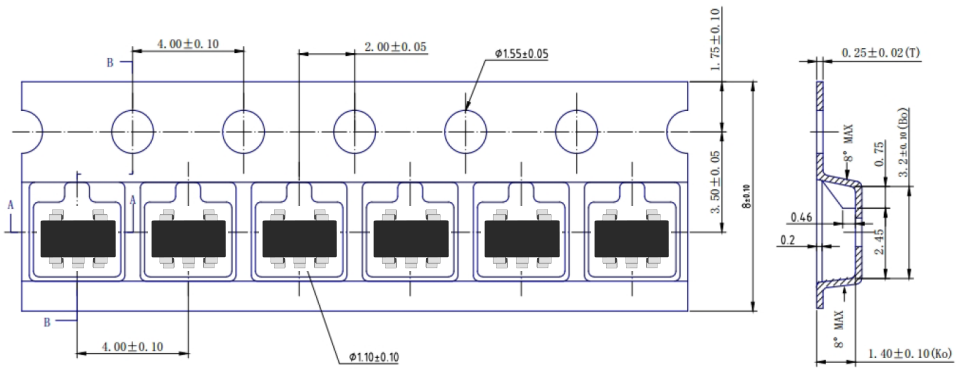
SOT-23-3



SOT-89

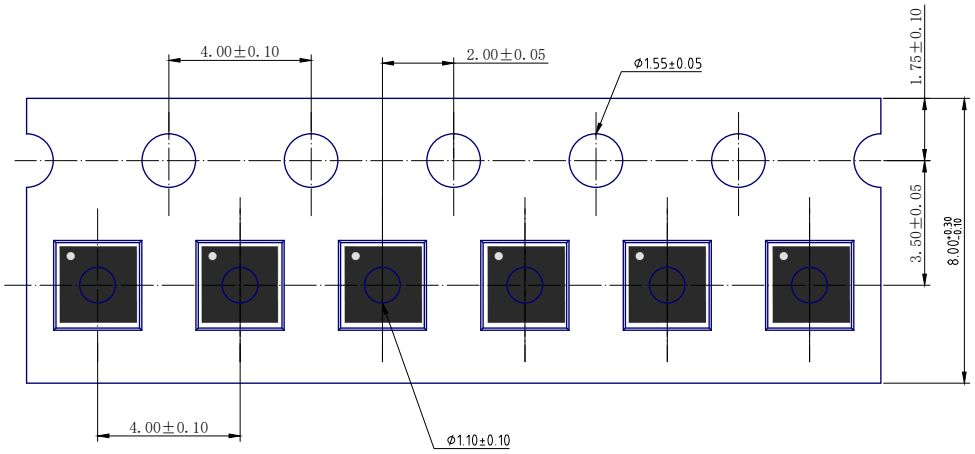


SOT-23-5



◆ Embossed tape data

DFN2x2C-6L



Contact Information

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

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.

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.