

Description

The TN72 series is manufactured using CMOS technology with a maximum input voltage of 30V. This series is a high-voltage linear regulator with multiple fixed output voltages.

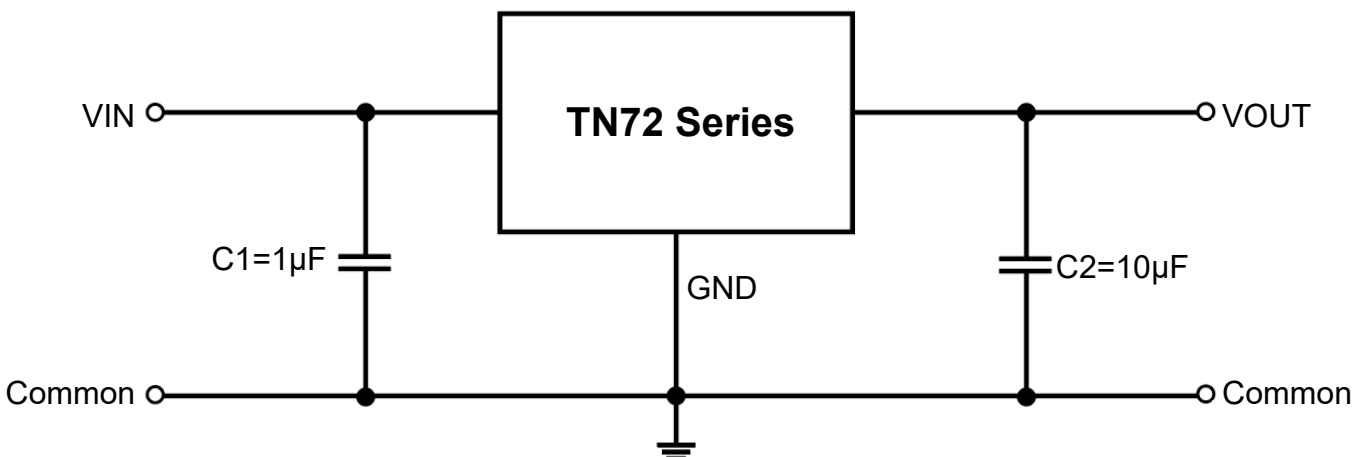
Features

- Wide Input Voltage Range: 3V~ 30V
- Maximum Output Current: 200mA
- Low Dropout: 500mV @ 100mA
- Fixed Output Voltages: 1.8V, 2.5V, 3.0V, 3.3V, 4.0V, 4.2V, 4.4V, 5.0V
- Output Voltage Accuracy: $\pm 2\%$
- Current Limiting Protection
- Short Circuit Protection
- Thermal Shutdown Protection
- Available Packages: SOT-23, SOT-23-3, SOT-89, SOT-23-5 DFN1x1-4L and DFN2x2C-6L

Applications

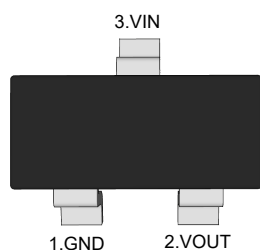
- Battery-Powered Equipment
- Smoke Detectors and Sensors
- Microcontroller Applications
- Household Appliances

Typical Application Circuit



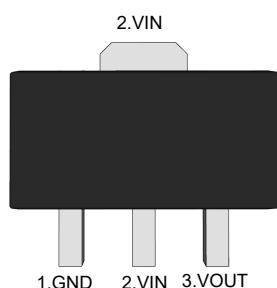
Pin Distribution

SOT-23



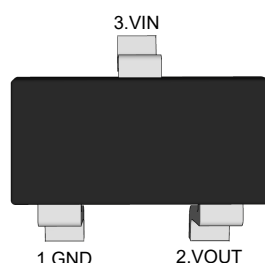
(Top View)

SOT-89



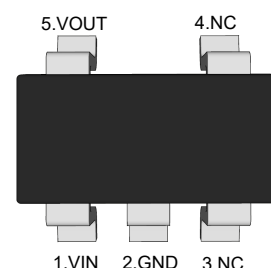
(Top View)

SOT-23-3



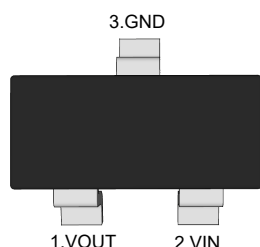
(Top View)

SOT-23-5



(Top View)

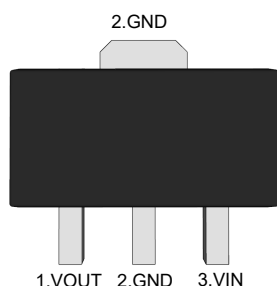
SOT-23



(Top View)

PJ72-A Series

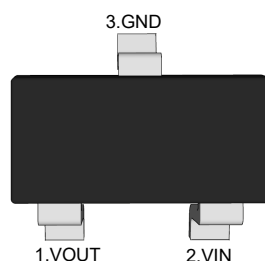
SOT-89



(Top View)

PJ72-A Series

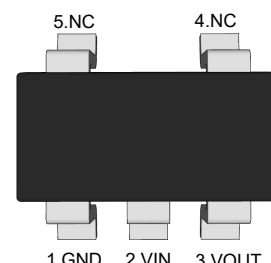
SOT-23-3



(Top View)

PJ72-A Series

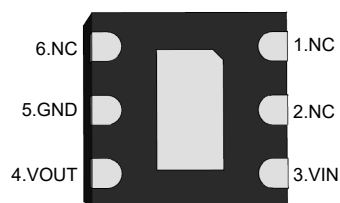
SOT-23-5



(Top View)

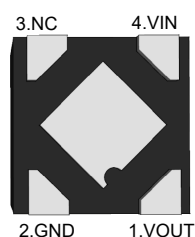
PJ72-A Series

DFN2x2C-6L



Bottom View

DFN1x1-4L



(Bottom View)

Functional Pin Description

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

Ordering Information

TN72□□□□□

Pin arrangement version number
 □(Blank): Normal pin arrangement version
 -A: A version pin arrangement

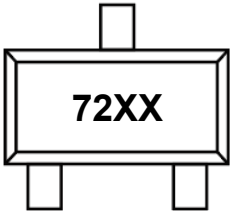
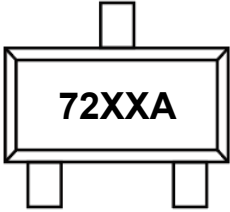
Package Type
 SA:SOT-23 SC:SOT-23-3 SQ:SOT-89
 SE:SOT-23-5 DFC : DFN2x2C-6L DE:DFN1x1-4L

Output Voltage
 18 : 1.8V 25 : 2.5V 30 : 3.0V 33 : 3.3V
 40 : 4.0V 42 : 4.2V 44 : 4.4V 50 : 5.0V

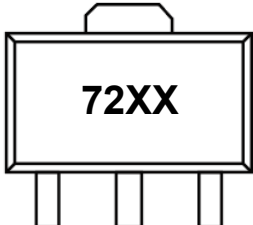
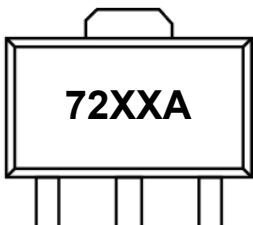
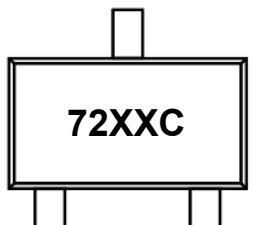
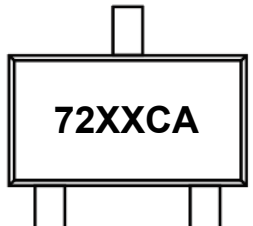
Output current tap
 L : 200mA

A:Revision NO.

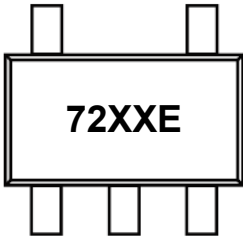
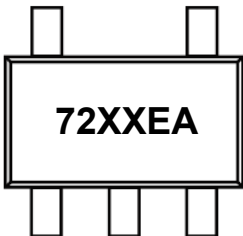
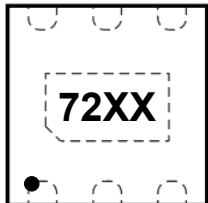
Series NO.

Orderable Device	Package	Reel (inch)	Package Qty (PCS)	Eco Plan ^{Note}	MSL Level	Marking Code
TN72AL18SA	SOT-23	7	3000	RoHS & Green	MSL1	 XX:Output Voltage e.g. 30:3.0V
TN72AL25SA						
TN72AL30SA						
TN72AL33SA						
TN72AL40SA						
TN72AL42SA						
TN72AL44SA						
TN72AL50SA						
TN72AL18SA-A						 XX:Output Voltage e.g. 30:3.0V
TN72AL25SA-A						
TN72AL30SA-A						
TN72AL33SA-A						
TN72AL40SA-A						
TN72AL42SA-A						
TN72AL44SA-A						
TN72AL50SA-A						

Ordering Information Continue

Orderable Device	Package	Reel (inch)	Package Qty (PCS)	Eco Plan ^{Note}	MSL Level	Marking Code
TN72AL18SQ	SOT-89	7/13	1000/3000	RoHS & Green	MSL1	 XX:Output Voltage e.g. 30:3.0V
TN72AL25SQ						
TN72AL30SQ						
TN72AL33SQ						
TN72AL40SQ						
TN72AL42SQ						
TN72AL44SQ						
TN72AL50SQ						
TN72AL18SQ-A						 XX:Output Voltage e.g. 30:3.0V
TN72AL25SQ-A						
TN72AL30SQ-A						
TN72AL33SQ-A						
TN72AL40SQ-A						
TN72AL42SQ-A						
TN72AL44SQ-A						
TN72AL50SQ-A						
TN72AL18SC	SOT-23-3	7	3000	RoHS & Green	MSL3	 XX:Output Voltage e.g. 30:3.0V
TN72AL25SC						
TN72AL30SC						
TN72AL33SC						
TN72AL40SC						
TN72AL42SC						
TN72AL44SC						
TN72AL50SC						
TN72AL18SC-A						 XX:Output Voltage e.g. 30:3.0V
TN72AL25SC-A						
TN72AL30SC-A						
TN72AL33SC-A						
TN72AL40SC-A						
TN72AL42SC-A						
TN72AL44SC-A						
TN72AL50SC-A						

Ordering Information Continue

Orderable Device	Package	Reel (inch)	Package Qty (PCS)	Eco Plan ^{Note}	MSL Level	Marking Code
TN72AL18SE	SOT-23-5	7	3000	RoHS & Green	MSL3	 XX:Output Voltage e.g. 30:3.0V
TN72AL25SE						
TN72AL30SE						
TN72AL33SE						
TN72AL40SE						
TN72AL42SE						
TN72AL44SE						
TN72AL50SE						
TN72AL18SE-A						 XX:Output Voltage e.g. 30:3.0V
TN72AL25SE-A						
TN72AL30SE-A						
TN72AL33SE-A						
TN72AL40SE-A						
TN72AL42SE-A						
TN72AL44SE-A						
TN72AL50SE-A						
TN72AL18DFC	DFN2x2C-6L	7	3000	RoHS & Green	MSL1	 XX:Output Voltage e.g. 30:3.0V
TN72AL25DFC						
TN72AL30DFC						
TN72AL33DFC						
TN72AL40DFC						
TN72AL42DFC						
TN72AL44DFC						
TN72AL50DFC						

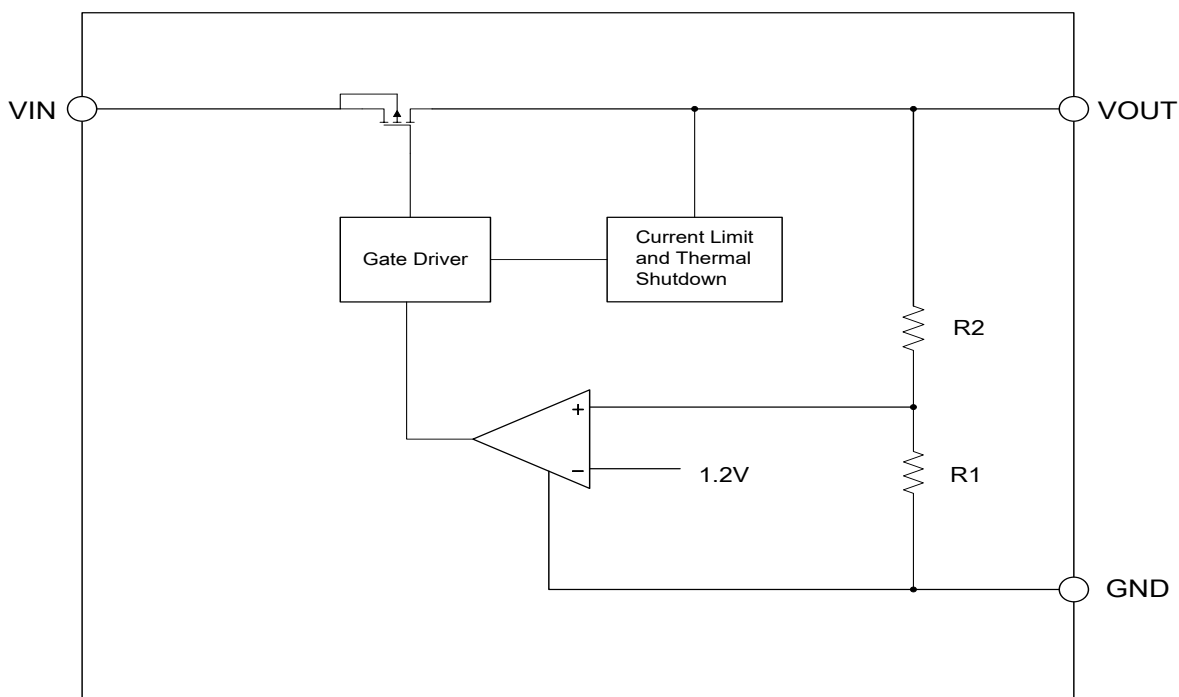
Orderable Device	Package	Reel (inch)	Package Qty (PCS)	Eco Plan ^{Note}	MSL Level	Marking Code
TN72AL18DE	DFN1x1-4L	7	10000	RoHS & Green	MSL1	 XX: Output Voltage e.g. 18:1.8V
TN72AL25DE						
TN72AL30DE						
TN72AL33DE						
TN72AL40DE						
TN72AL42DE						
TN72AL44DE						
TN72AL50DE						

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 ^{Note1}

Ratings at 25°C ambient temperature unless otherwise specified.

Parameter		Value	Unit
VIN to GND Voltage		-0.3~36	V
VOUT to GND Voltage		-0.3~7	V
VIN to GND Voltage		-0.3~31	V
Output Current		Internally limited	--
Power Dissipation	SOT-23	300	mW
	SOT-23-3	400	mW
	SOT-23-5	400	mW
	SOT-89	740	mW
	DFN1x1-4L	400	mW
	DFN2x2C-6L	1370	mW
Thermal Resistance,Junction-to-Ambient	SOT-23	333	°C/W
	SOT-23-3	250	°C/W
	SOT-23-5	250	°C/W
	SOT-89	135	°C/W
	DFN1x1-4L	250	°C/W
	DFN2x2C-6L	73	°C/W
Operating Junction Temperature		-40 ~ +125	°C
Storage Temperature Range		-40 ~ +150	°C
Human Body Model ESD Level (HBM)		4	KV
Charge Device Model ESD Level (CDM)		200	V

Note1: 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	3~30	V
Maximum Output Current	200	mA
Operating Ambient Temperature	-40 ~ +125	°C

Electrical Characteristics

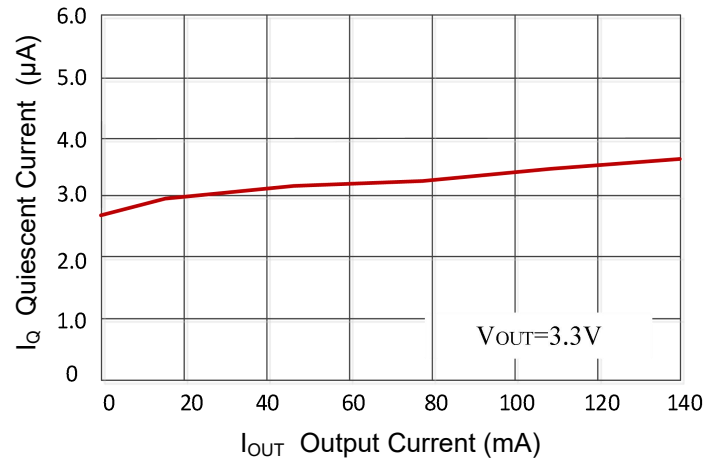
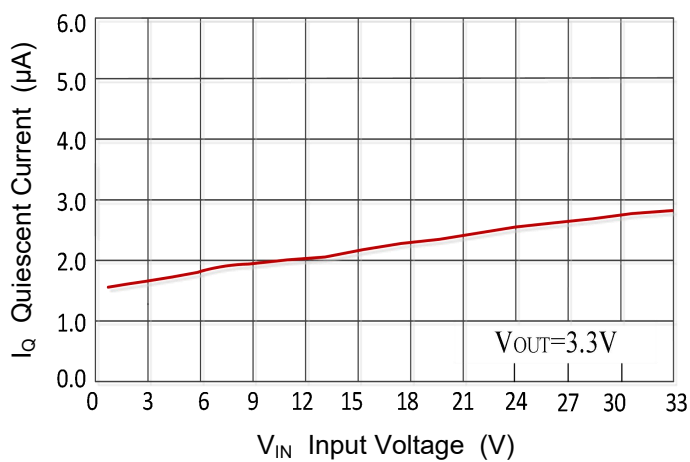
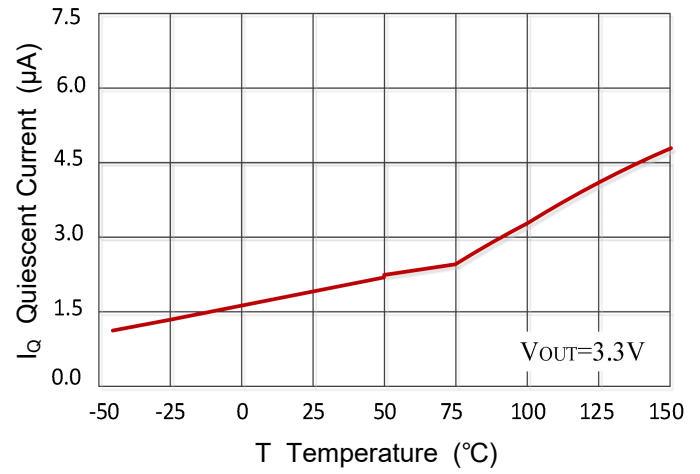
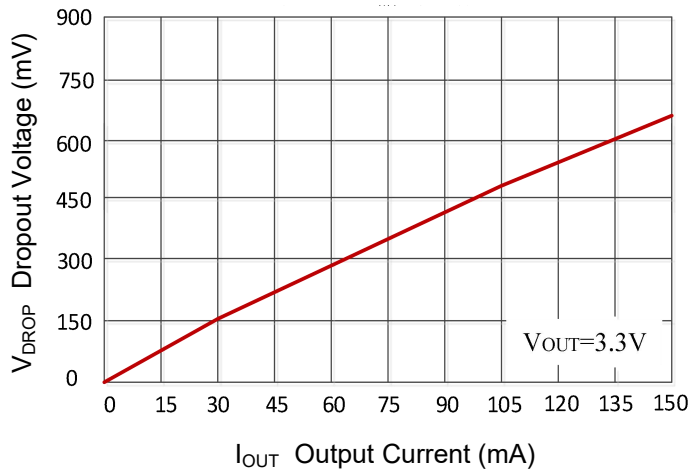
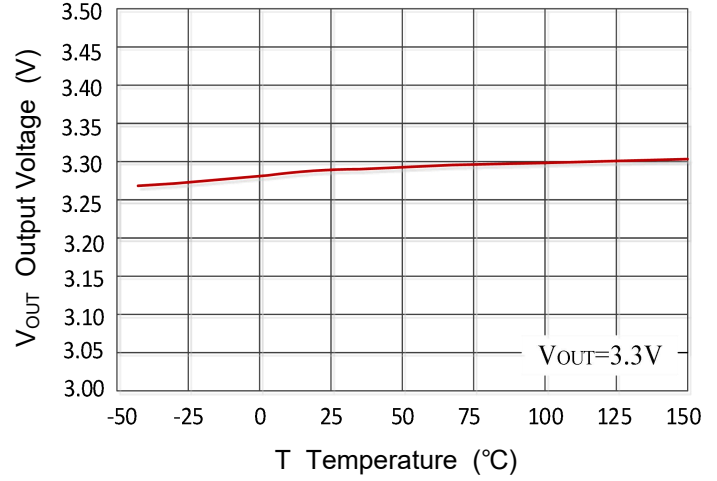
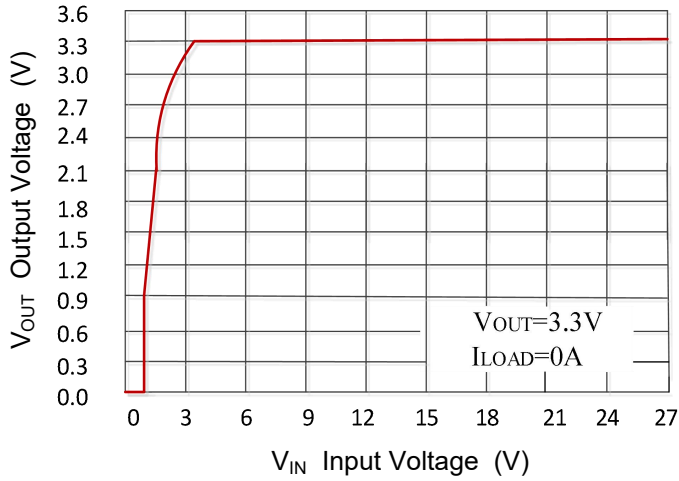
($V_{IN}=V_{OUT}+1V$, $C_{IN}=1\mu F$, $C_{OUT}=10\mu F$, $T_A=25^{\circ}C$, unless otherwise noted.)

Parameter	Symbol	Test Conditions		Min.	Typ.	Max.	Unit
Input Voltage	V _{IN}			3	--	30	V
Output Voltage Accuracy	ΔV _{OUT}	V _{IN} =12V, I _{OUT} =10mA		-2	--	+2	%
Max. Output Current	I _{OUT_MAX}			--	200	--	mA
Quiescent Current	I _Q	V _{IN} =12V, I _{OUT} =0mA		--	--	3	μA
Dropout Voltage ^{Note2}	V _{DROP}	1.8V≤V _{OUT} ≤3V	I _{OUT} =100mA	--	500	750	mV
			I _{OUT} =150mA	--	700	1100	
		3.3V≤V _{OUT} ≤3.6V	I _{OUT} =100mA	--	500	700	
			I _{OUT} =150mA	--	800	990	
		4V≤V _{OUT} ≤5V	I _{OUT} =100mA	--	500	700	
			I _{OUT} =150mA	--	700	990	
Line Regulation	ΔV _{LINE}	V _{IN} =V _{OUT} +2 to24V, I _{OUT} =1mA		--	0.1	--	mV/V
Load Regulation	ΔV _{LOAD}	1mA<I _{OUT} <150mA, V _{IN} =7V		--	0.1	--	mV/mA
Limit Current	I _{LIMIT}	V _{IN} =V _{OUT} + 2V		--	350	--	mA
Short Current	I _{SHORT}	The Output Short-Circuit Current to The Ground		--	120	--	mA
Power Supply Rejection Ratio	PSRR	V _{IN} =12V,I _{OUT} =1mA, f=1KHz		--	60	--	dB
Thermal Shutdown Temperature	T _{SHDN}	Shutdown, Temp increasing		--	154	--	°C
Thermal Reset Temperature	T _{SHDN}	Reset, Temp increasing		--	125	--	°C

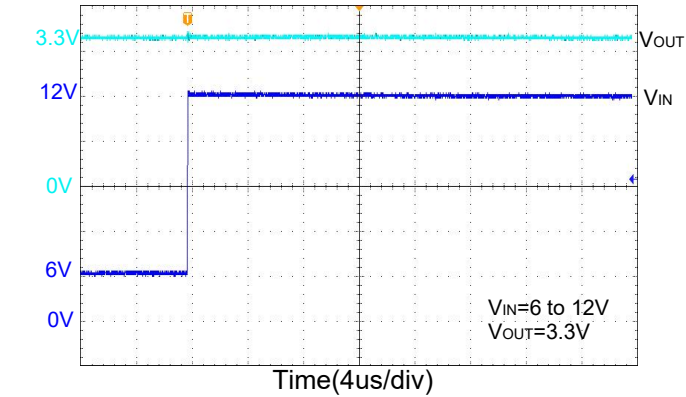
Note2: The dropout voltage is defined as $V_{IN} - V_{OUT}$, when V_{OUT} is 98% of the normal value of V_{OUT} .

Typical Electrical Curves

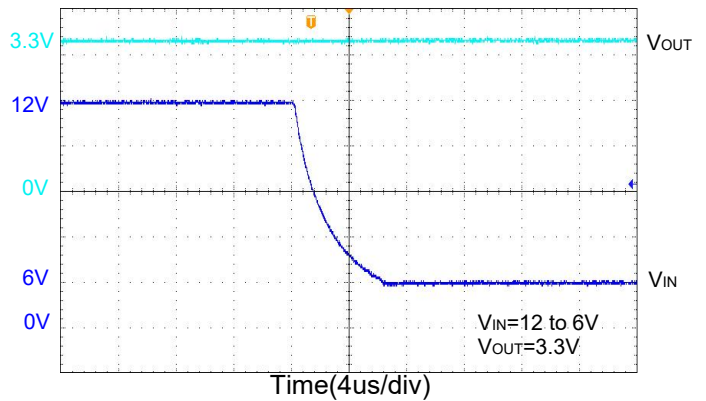
($V_{IN}=V_{OUT}+1V$, $C_{IN}=1\mu F$, $C_{OUT}=10\mu F$, $T_A=25^\circ C$, unless otherwise noted.)



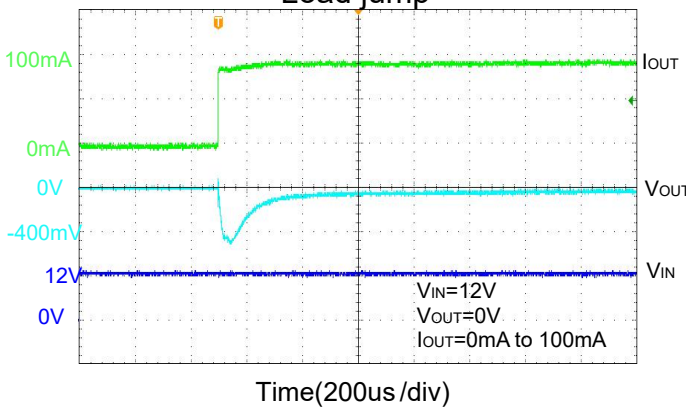
Input jump



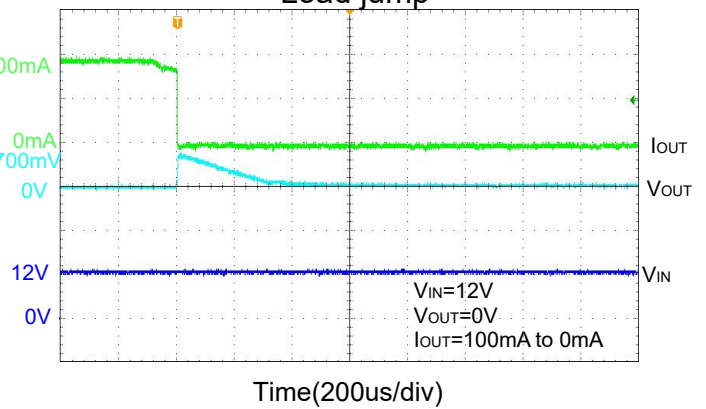
Input jump



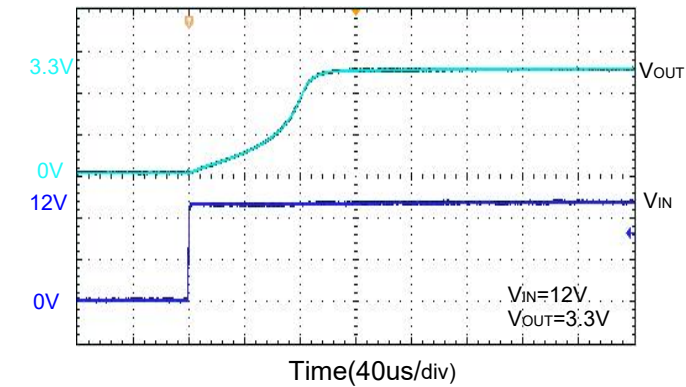
Load jump



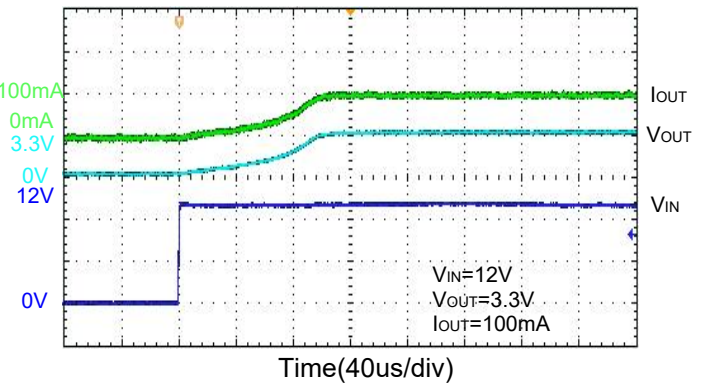
Load jump



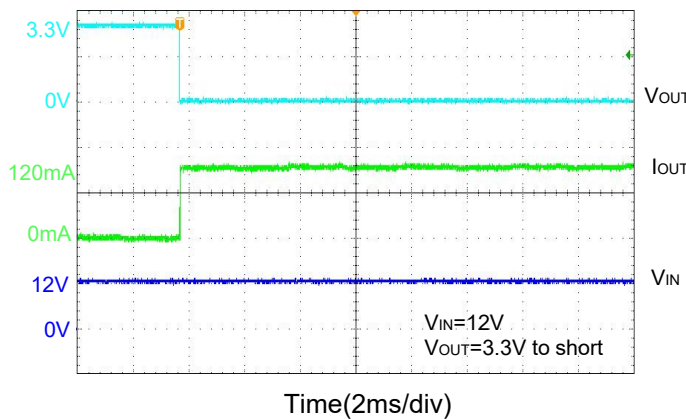
No-load start



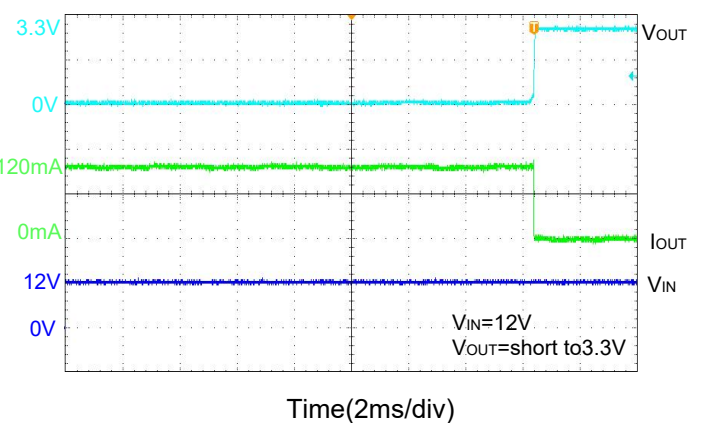
Start with load



Short-circuit Protection



Short-circuit Protection



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 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 °C, T_A is the ambient temperature and the $R_{\theta JA}$ is the junction to ambient thermal resistance.

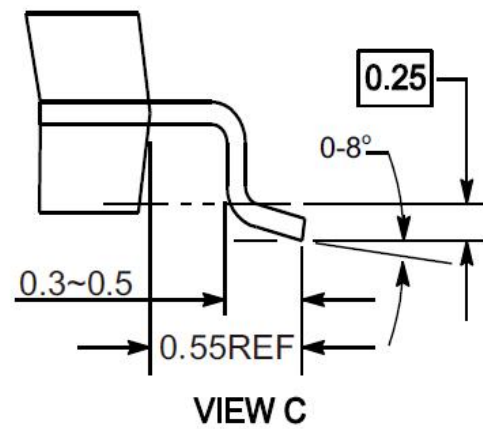
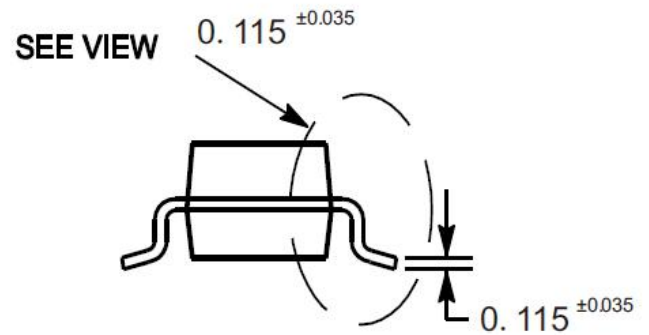
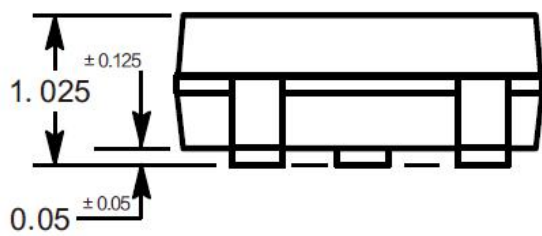
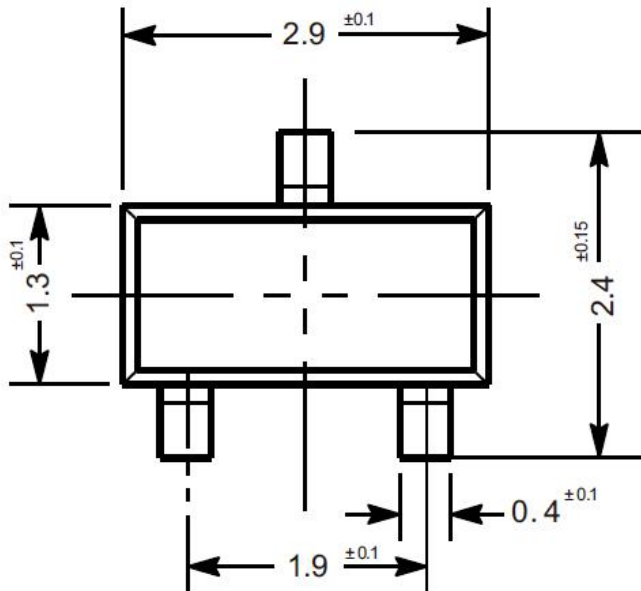
The power dissipation definition in device is :

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

Package Outline

SOT-23

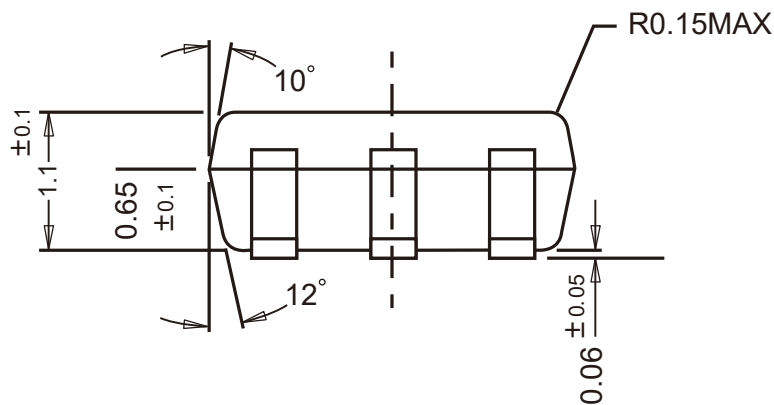
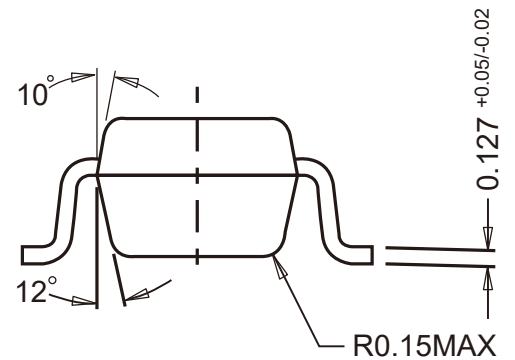
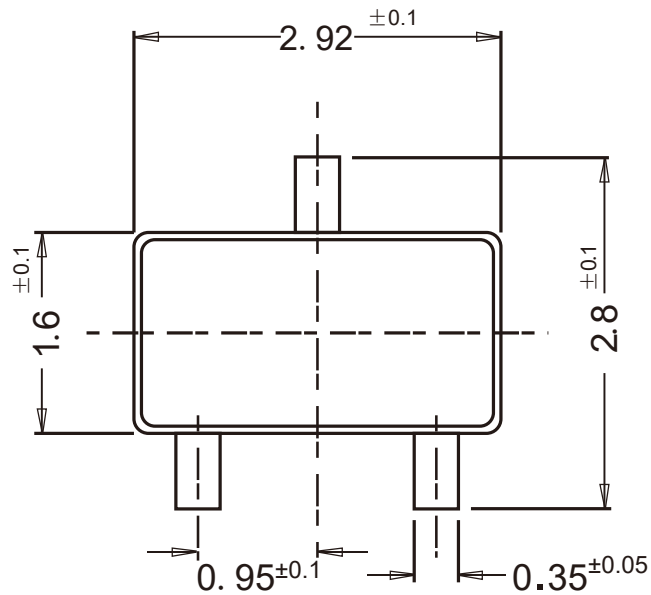
Dimensions in mm



Package Outline

SOT-23-3

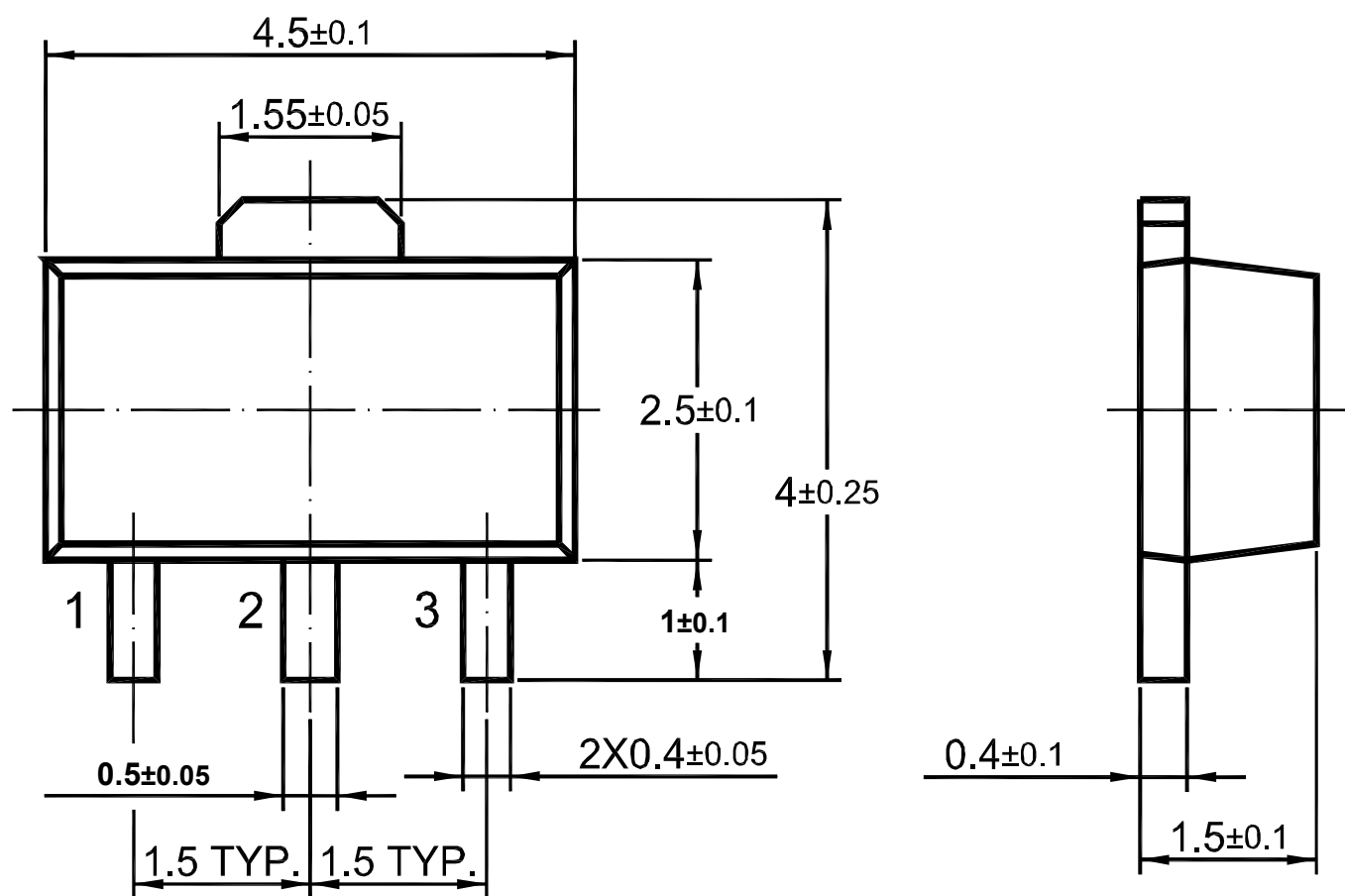
Dimensions in mm



Package Outline

SOT-89

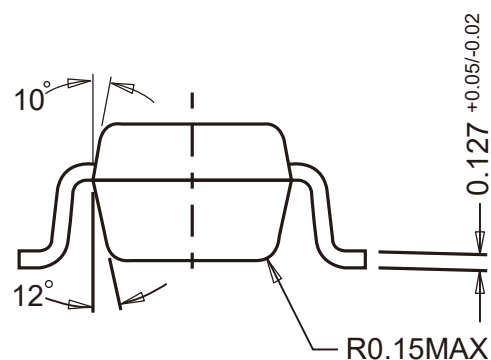
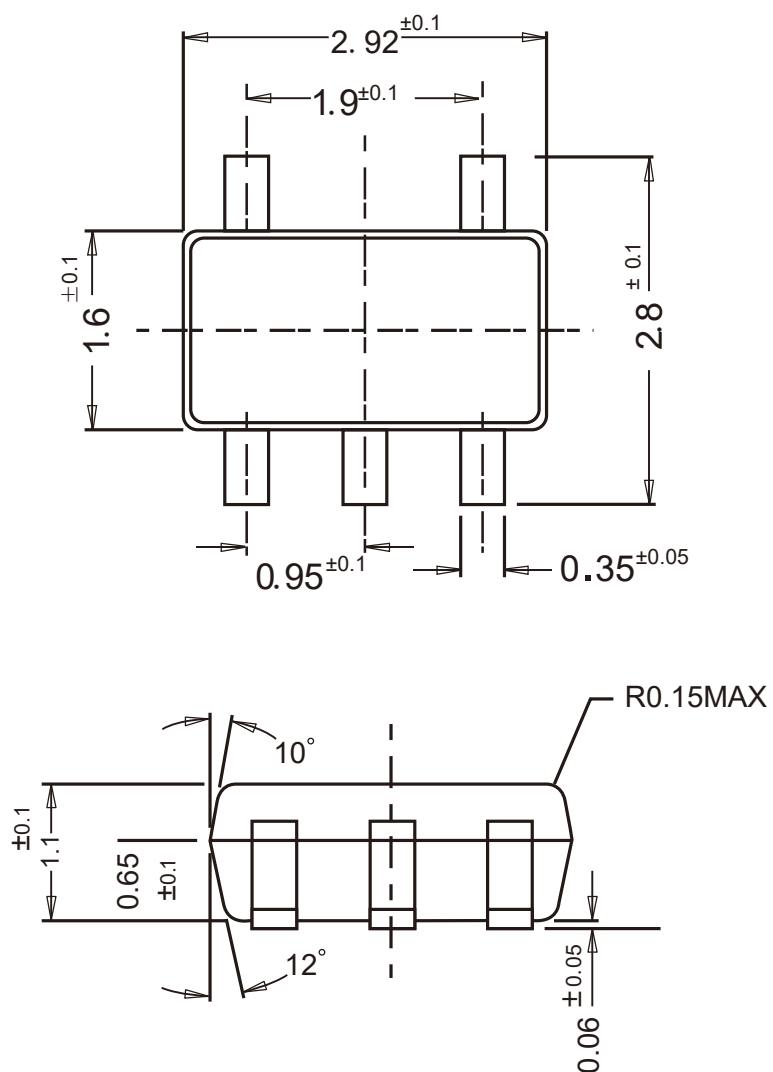
Dimensions in mm



Package Outline

SOT-23-5

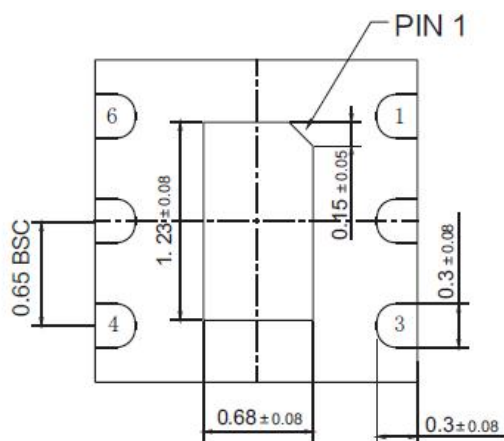
Dimensions in mm



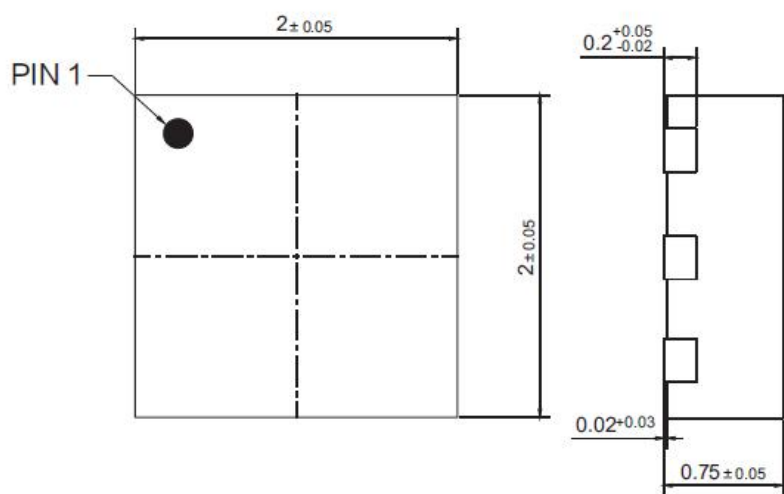
Package Outline

DFN2x2C-6L

Dimensions in mm



BOTTOM VIEW



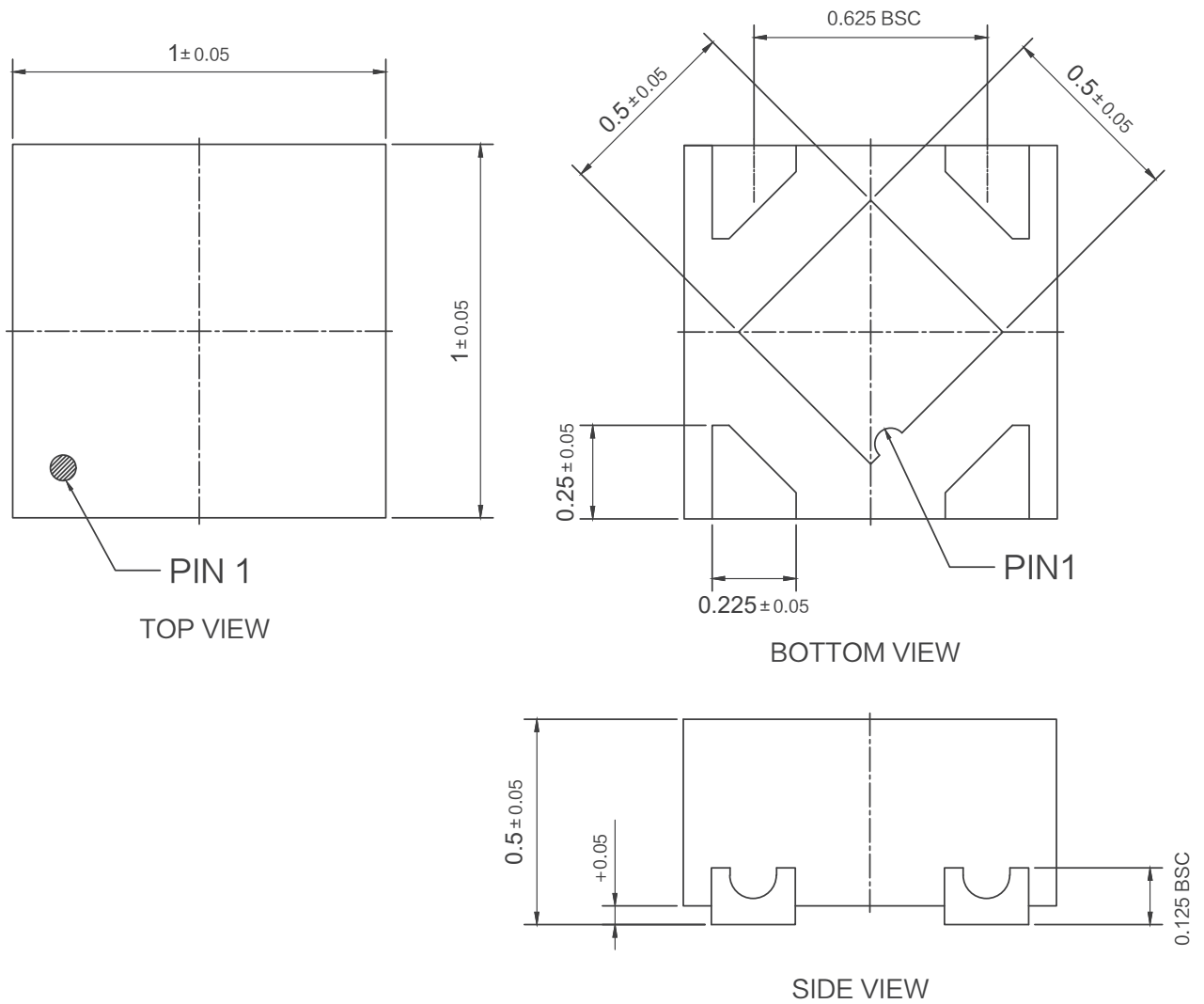
TOP VIEW

SIDE VIEW

Package Outline

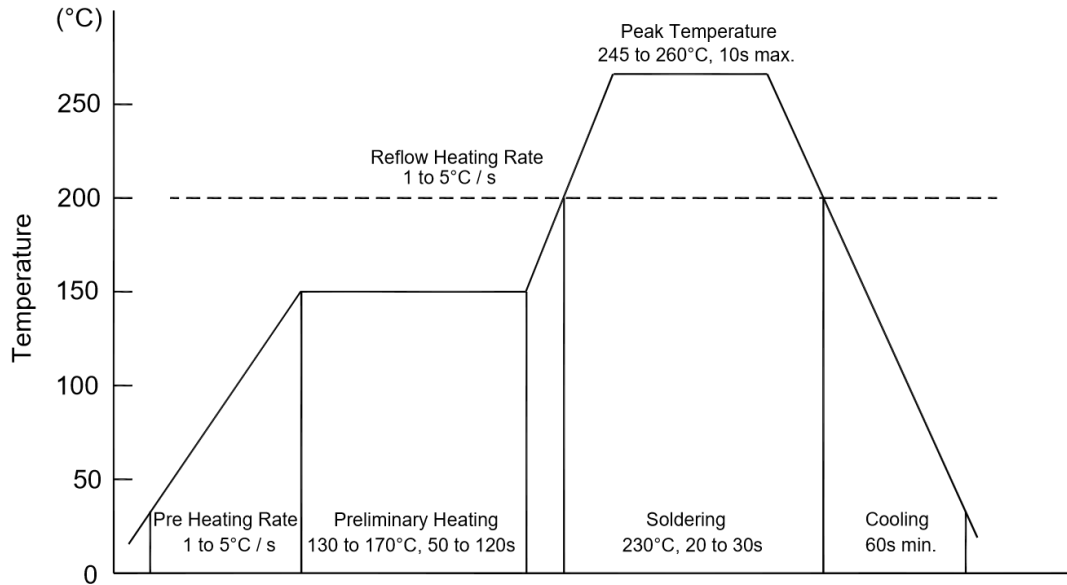
DFN1x1-4L

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

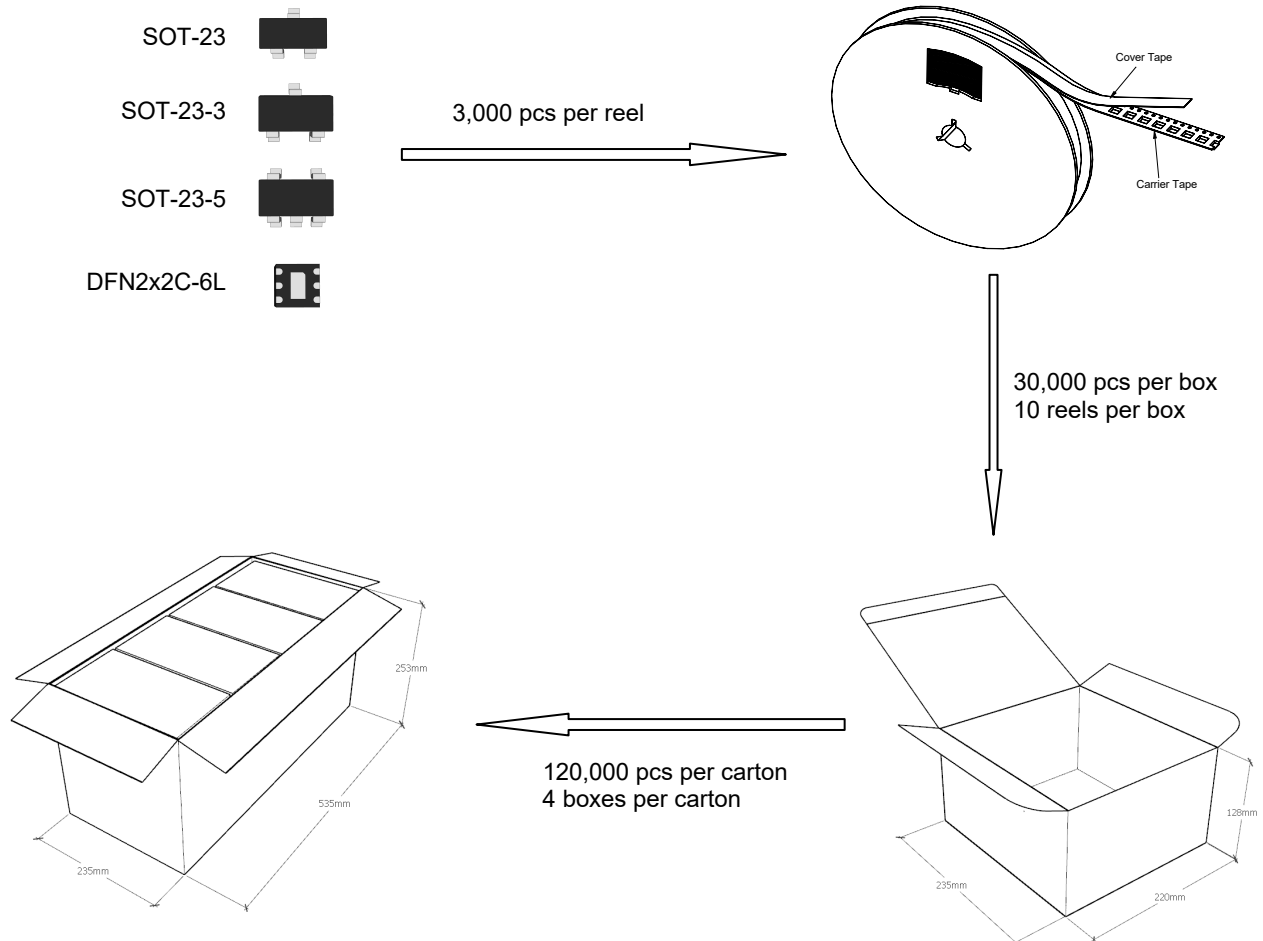
- Temperature: 300°C
- Time: 3s max.
- Times: one time

◆ Storage conditions

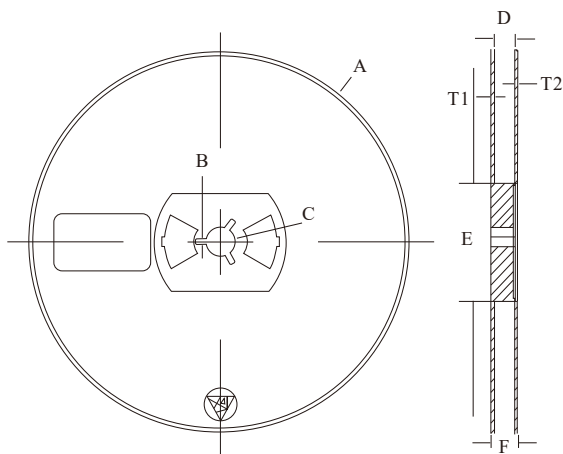
- **Temperature**
5 to 40°C
- **Humidity**
30 to 80% RH
- **Recommended period**
One year after manufacturing

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

- The method of packaging



◆ reel data

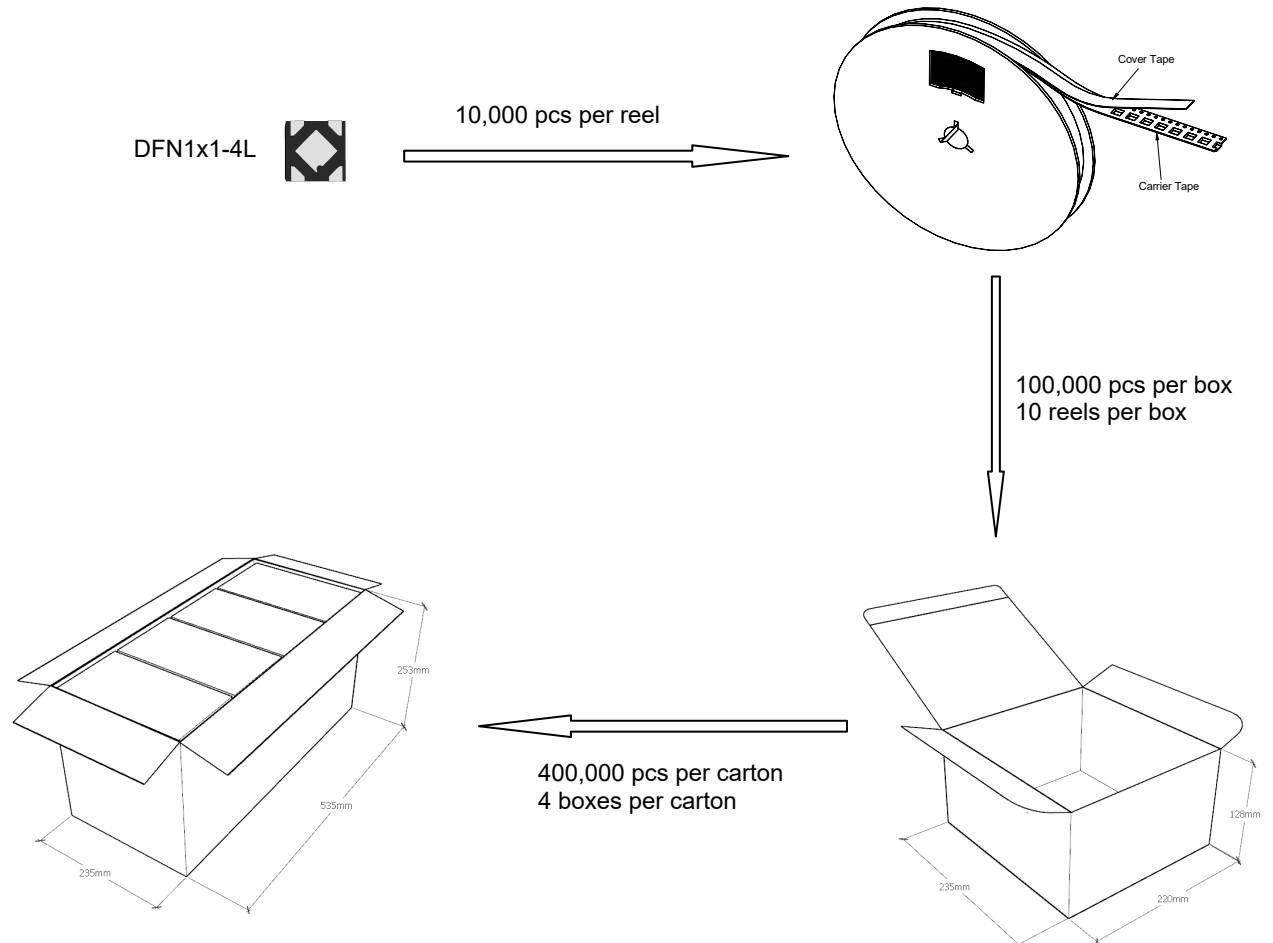


Reel (7")

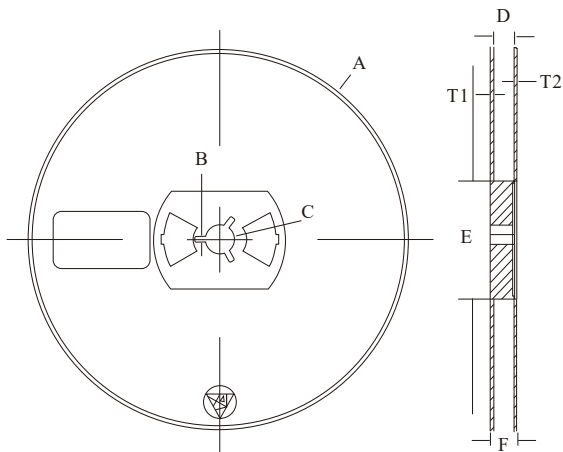
Symbol	Value (unit: mm)
A	Ø 177.8±1
B	2.7±0.2
C	Ø 13.5±0.2
E	Ø 54.5±0.2
F	12.3±0.3
D	9.6+2/-0.3
T1	1.0±0.2
T2	1.2±0.2

Package Specifications (DFN1x1-4L)

- The method of packaging



◆ reel data

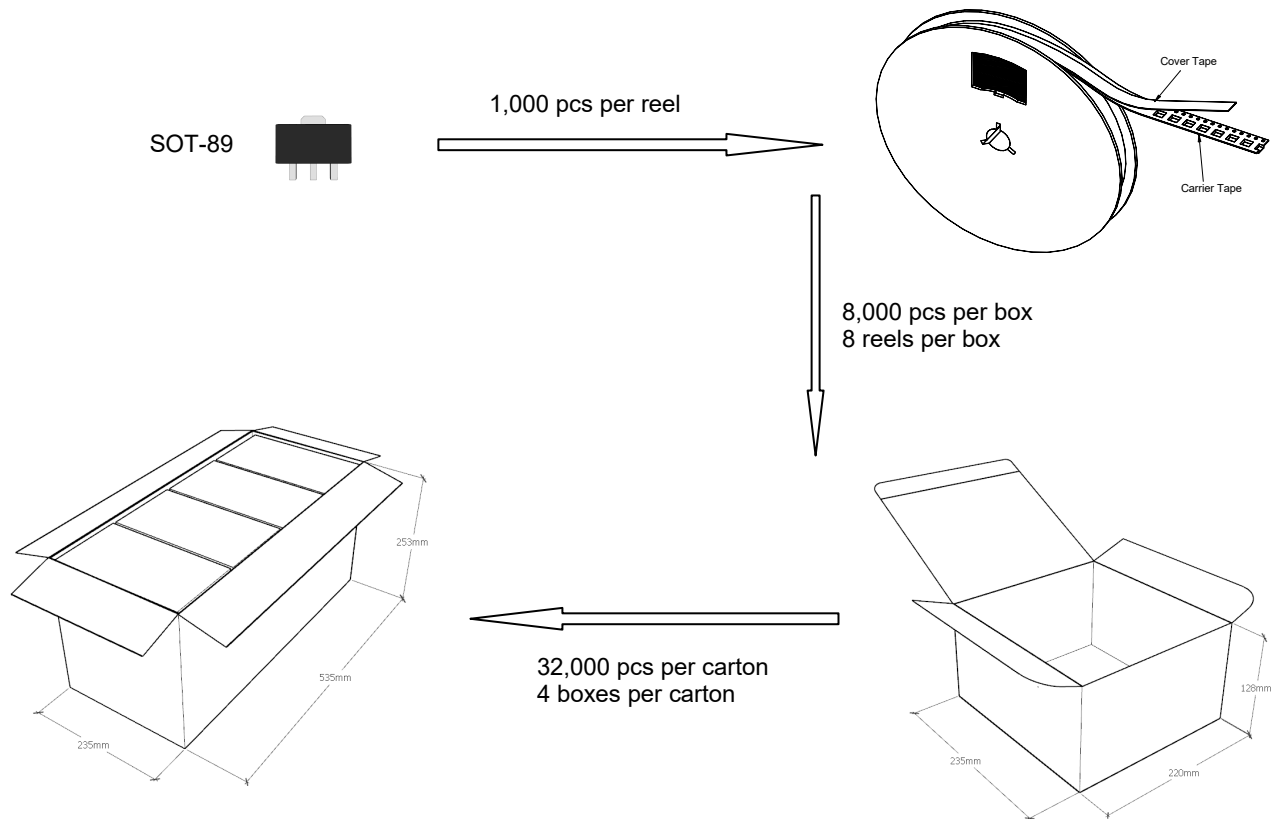


Reel (7")

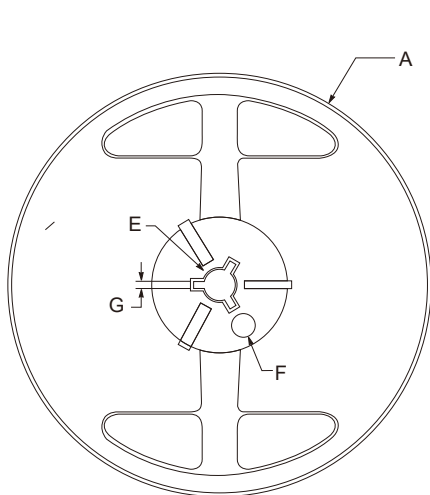
Symbol	Value (unit: mm)
A	$\varnothing 177.8 \pm 1$
B	2.7 ± 0.2
C	$\varnothing 13.5 \pm 0.2$
E	$\varnothing 54.5 \pm 0.2$
F	12.3 ± 0.3
D	$9.6 + 2 / - 0.3$
T1	1.0 ± 0.2
T2	1.2 ± 0.2

Package Specifications (SOT-89)

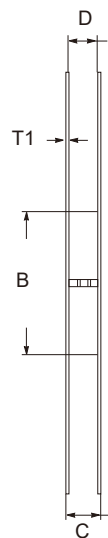
- The method of packaging (1,000PCS/Reel&7inches)



reel data



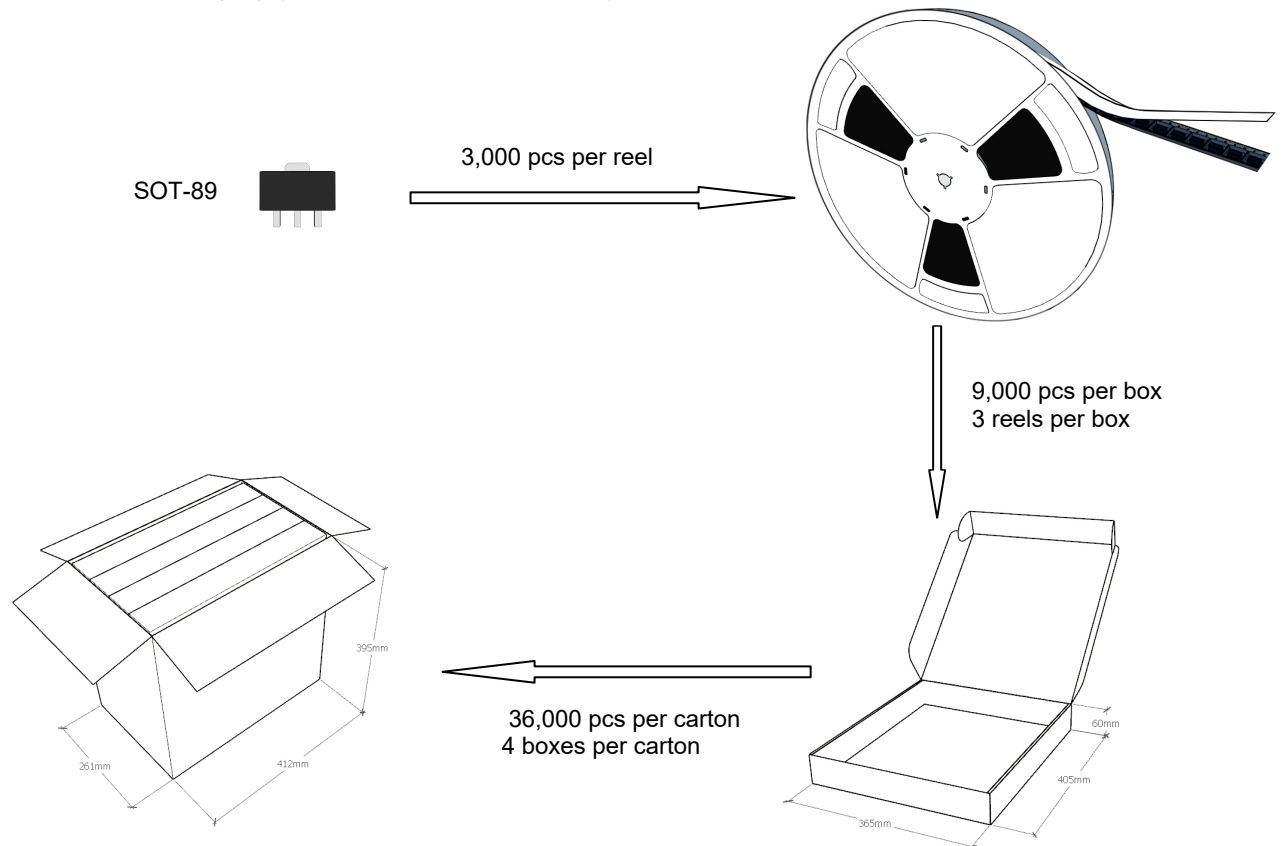
Reel (7")



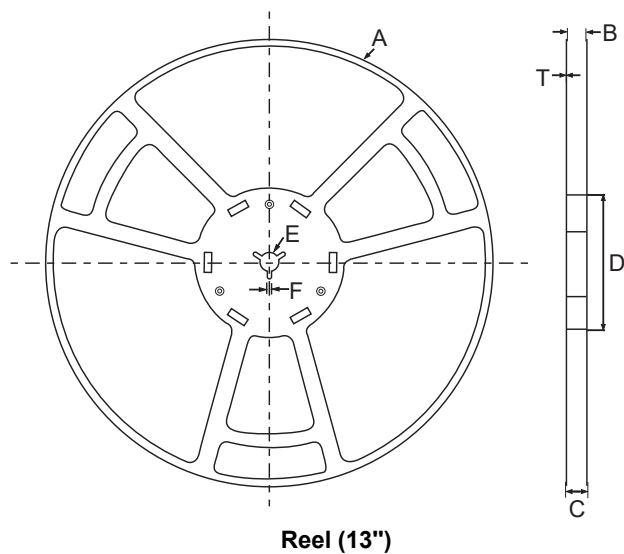
symbol	Value(unit:mm)
A	$\Phi 179 \pm 1$
B	60.5 ± 0.2
C	15.3 ± 0.3
D	$12.5 \sim 13.7$
E	$\Phi 13.5 \pm 0.2$
F	$\Phi 10.0 \pm 0.2$
G	2.7 ± 0.2
T1	1.0 ± 0.2

Package Specifications (SOT-89)

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



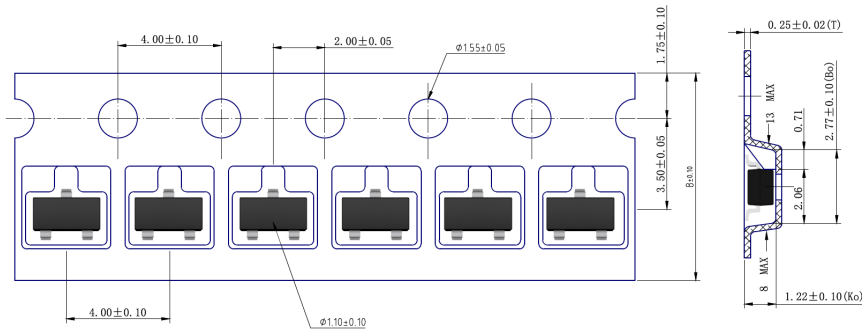
◆ reel data



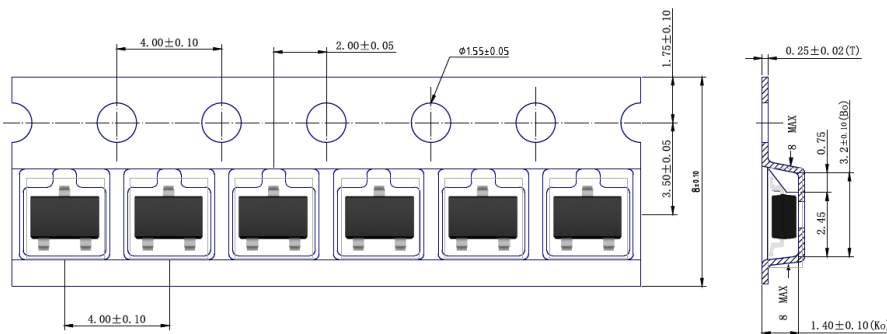
symbol	Value(unit:mm)
A	$\phi 330 \pm 1$
B	12.7 ± 0.5
C	16.5 ± 0.3
D	$\phi 99.5 \pm 0.5$
E	$\phi 13.6 \pm 0.3$
F	2.8 ± 0.3
T	1.9 ± 0.2

◆ Embossed tape data

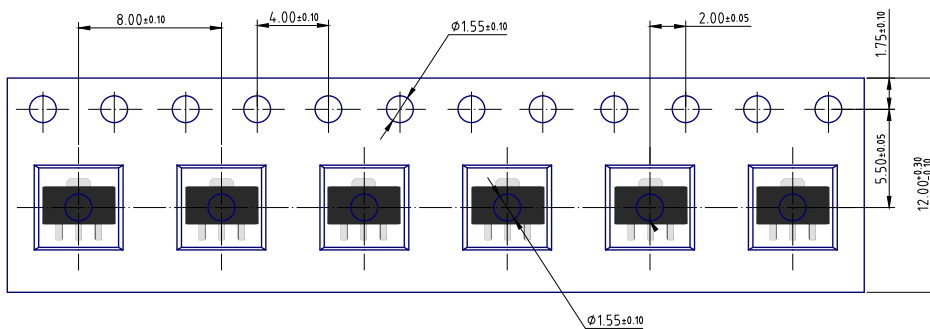
SOT-23



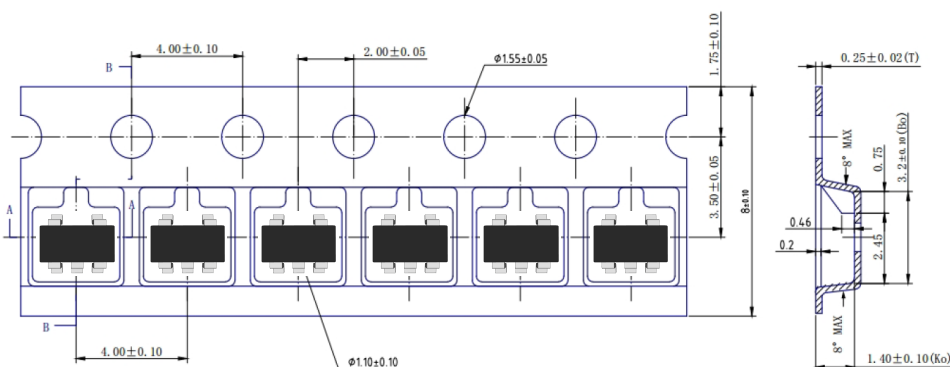
SOT-23-3



SOT-89

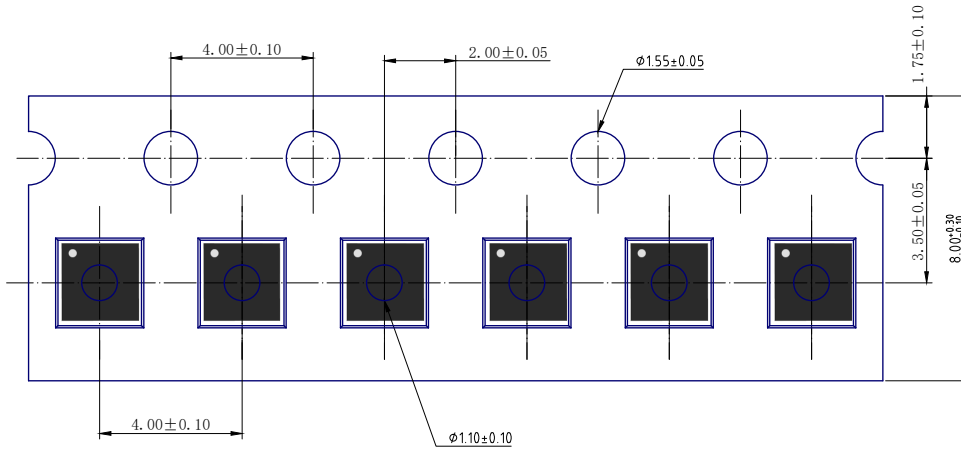


SOT-23-5

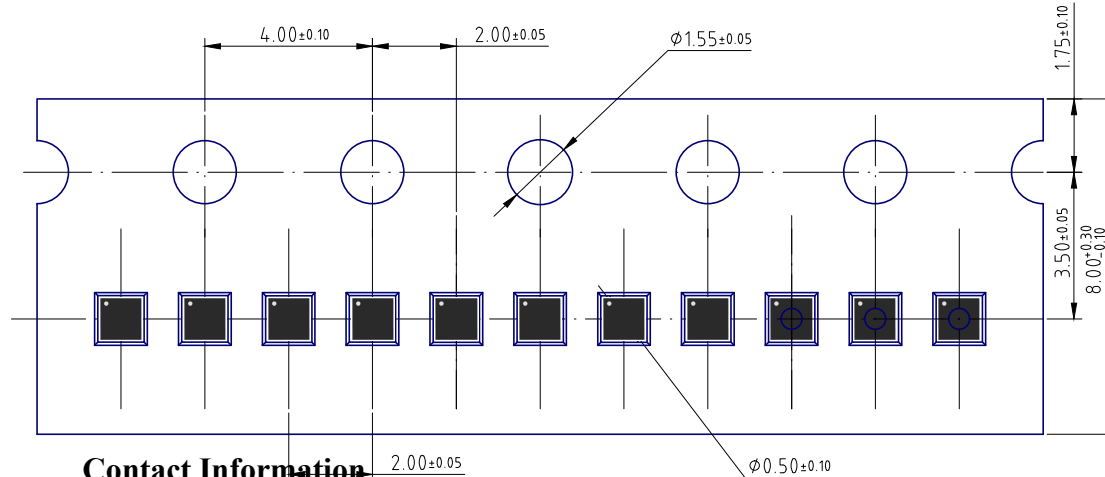


◆ Embossed tape data

DFN2x2C-6L



DFN1x1-4L



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.

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 product 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 controversies arising from the above-mentioned issues in any form.