

Low-Power rail-to-rail Operational Amplifier**Description**

LMV321 (single channel) is a rail-to-rail input, output voltage feedback, low power consumption operational amplifier. It has wide input common mode voltage and output swing. The minimum working voltage can be up to 2.1V, and the maximum working voltage is recommended to be 5.5V. Used as power amplifier in all kinds of pocket or portable stereo radio recorders.

LMV321 has the following characteristics: Can provide 1.5MHz gain bandwidth product. It has an extremely low input bias current (about 10pA level) and can be used for integration, photo diode amplifiers and piezoelectric sensors. The Rail to Rail input and output buffers are also used for specific IC designs in single power systems.

Applications of this series of amplifiers include safety monitoring, portable devices, batteries and power supplies, supply control, signal processing and interfaces in low power sensor systems.

Features

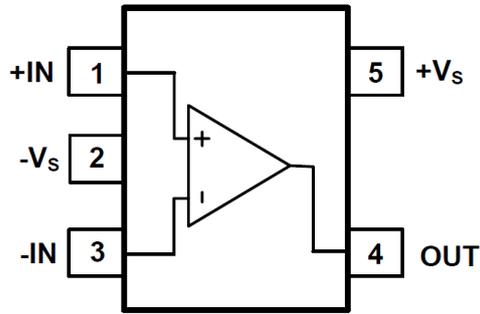
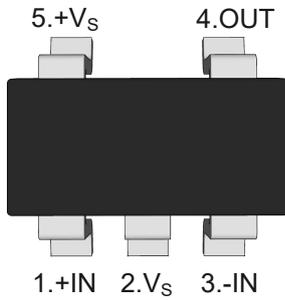
- Rail to rail input and output, typical 0.8mV Vos
- Gain bandwidth product 1.5MHz
- Low input bias current: 10pA Level, <1nA
- Low Power consumption
- 2.1V ~ 5.5V working voltage
- Low operating current: 45uA

Applications

- ASIC input and output amplifier
- Sensor interface
- Piezoelectric sensing amplifier
- Battery-powered equipment
- The mobile communication
- Audio output

Pin Distribution

SOT-23-5



Ordering Information

Orderable Device	Package	Reel (inch)	Package Qty (PCS)	Eco Plan ^{Note}	MSL Level	Marking Code
LMV321	SOT-23-5	7	3000	RoHS & Green	MSL3	

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.

Absolute Maximum Ratings (T_A=25°C) ^{Note1}

Parameter	Symbol	Value	Units
Supply Voltage	V _{CC}	7.5	V
Common-mode Input Voltage	V _{ICR}	(-V _S)-0.5~(+V _S)+0.5	V
Junction Temperature	T _J	150	°C
Operating Temperature Range	T _{OPR}	-40~+85	°C
Lead Temperature (Soldering, 10 sec)	T _L	250	°C
Storage Temperature Range	T _{STG}	-50~150	°C

Note1: Exceeding the above limits may damage to the chip. The reliability of the device will also be affected if the device works under the limit conditions. Electrostatic discharge can also cause damage to chips, so it is suggested to take some preventive measures for integrated circuits. Failure to follow proper handling and installation can also cause damage. Precision LMV321 and other devices are more vulnerable to damage than ordinary devices in the case of tiny electrostatic, and small parameter changes may make the whole circuit performance substandard.

Electrical Characteristics

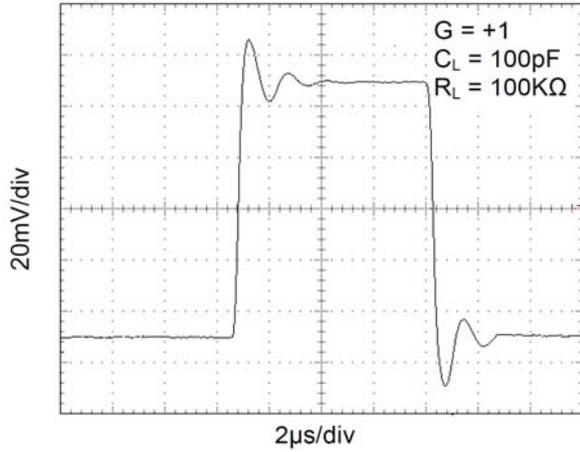
At R_L = 100kΩ connected to V_S/2, and V_{OUT} = V_S/2, T_A=25°C), unless otherwise noted.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Input Offset Voltage	V _{OS}		--	±0.8	±5	mV
Input offset current	I _{OS}		--	10	--	pA
Input bias current	I _B		--	10	--	pA
Common-mode input voltage range	V _{CM}	V _S =5.5V	--	-0.1~5.6	--	V
Open-loop Gain	AOL	V _O =0.1V~4.9 V, R _L =5 kΩ	70	80	--	dB
		V _O =0.035V~4.96V, R _L =100 kΩ	80	84	--	
Common Mode Rejection	CMRR	V _{CM} =-0.1V~4 V, V _S =5.5V	62	70	--	dB
		V _{CM} =-0.1V~5.6 V, V _S =5.5V	56	68	--	
Power Supply Rejection	PSRR	V _{CM} = (-V _S)+0.5 V, V _S =2.5V~5.5V	60	80	--	dB
Input offset voltage drift	ΔV _{OS} /ΔT		--	2.7	--	μV/°C
Input voltage swing	V _I	R _L =100KΩ	--	0.008	--	V
		R _L =10KΩ	--	0.08	--	V
Operating voltage range	V _W		2.1	--	5.5	V
Output Current	I _O		18	30	--	mA
Quiescent Current	I _Q	I _{OUT} =0	--	45	75	μA
Slew Rate	SR	G = +1, 2V Output Step	--	0.7	--	V/μs
Gain Bandwidth Product	GBP	CL = 100pF	--	1.5	--	MHz
Equivalent Input Noise Voltage	e _N	f=1KHz	--	27	--	nV $\sqrt{\text{Hz}}$
		f=10KHz	--	20	--	

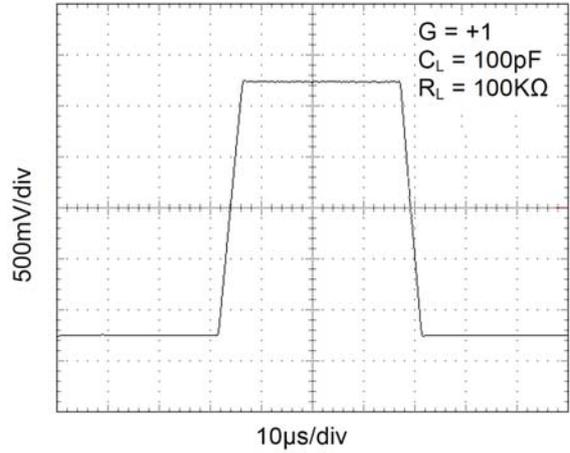
Typical Electrical Curves

($T_A = +25^\circ\text{C}$, $V_S = +5\text{V}$, and $R_L = 100\text{k}\Omega$ connected to $V_S/2$, unless otherwise noted.)

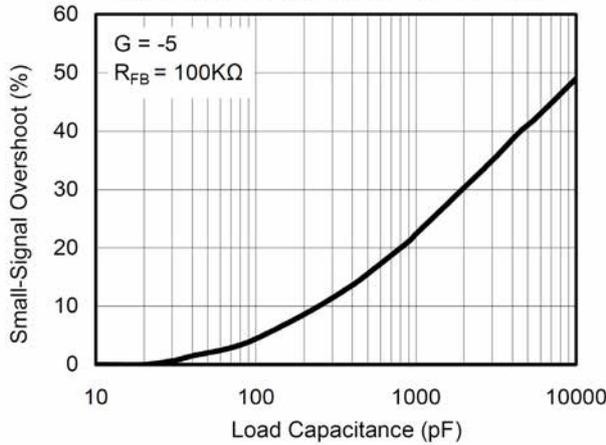
Small-Signal Step Response



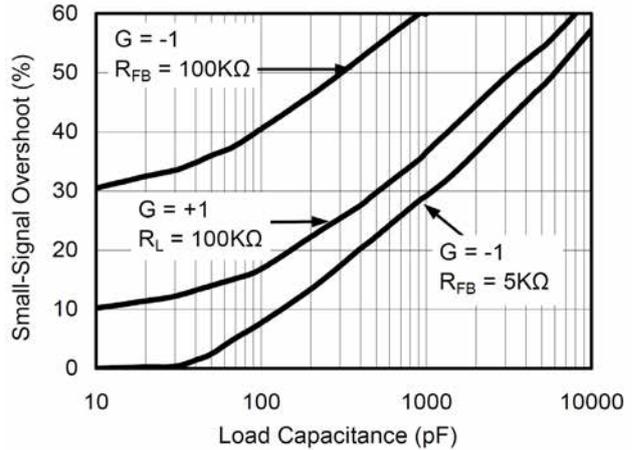
Large-Signal Step Response



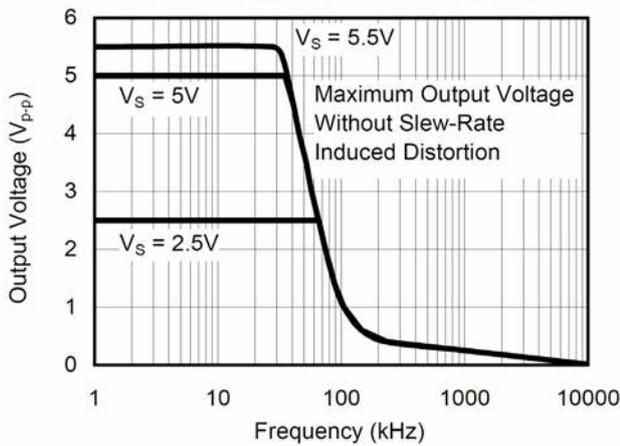
Small-Signal Overshoot vs. Load Capacitance



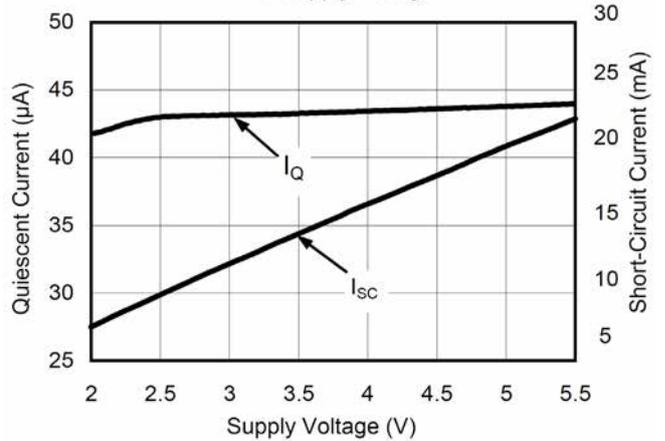
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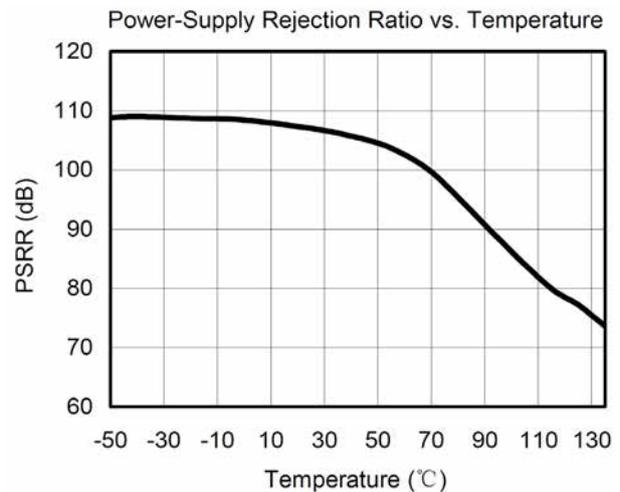
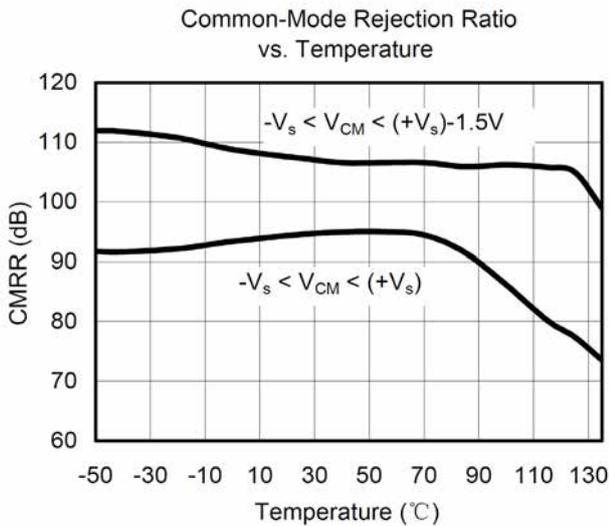
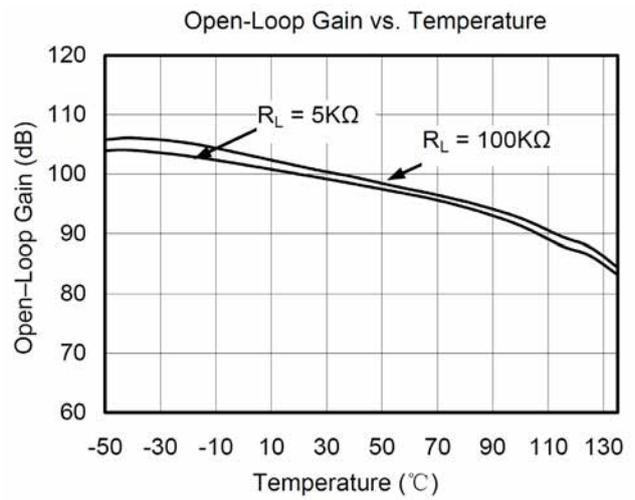
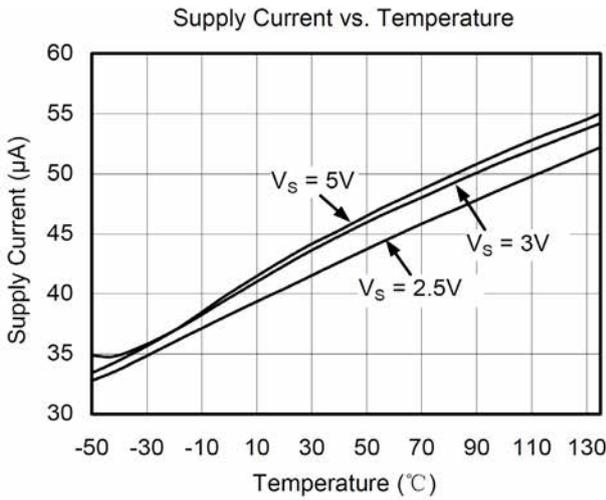
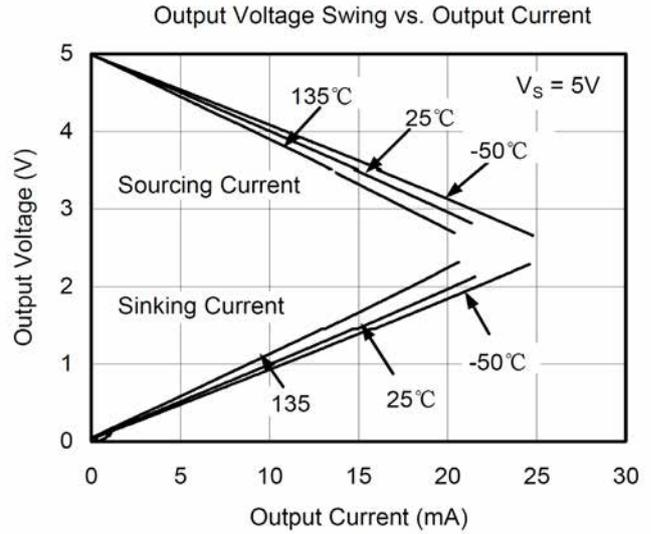
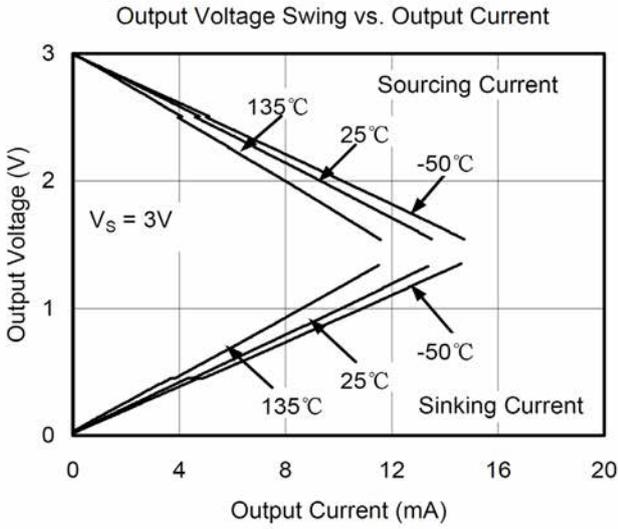


Maximum Output Voltage vs. Frequency



Quiescent and Short-Circuit Current vs. Supply Voltage

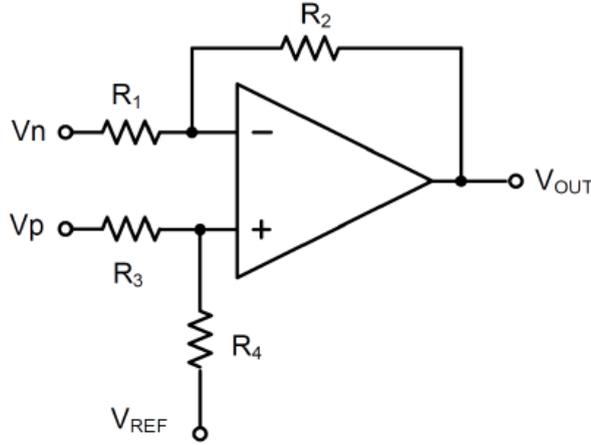




Typical Applications

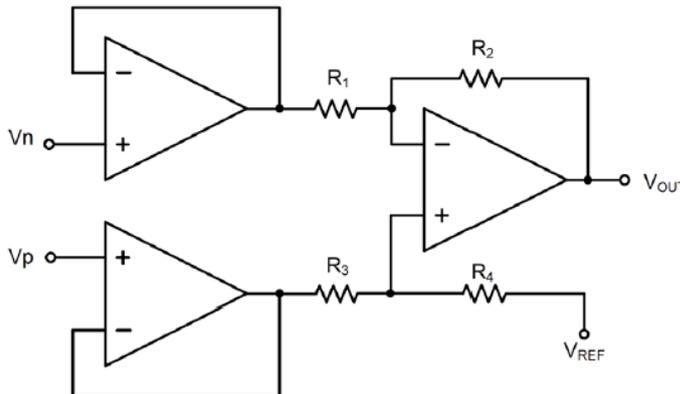
1. differential amplifier

As shown in the figure, if the resistance is equal, ($R_4 / R_3 = R_2 / R_1$), then the output $V_{OUT} = (V_p - V_n) \times R_2 / R_1 + V_{REF}$



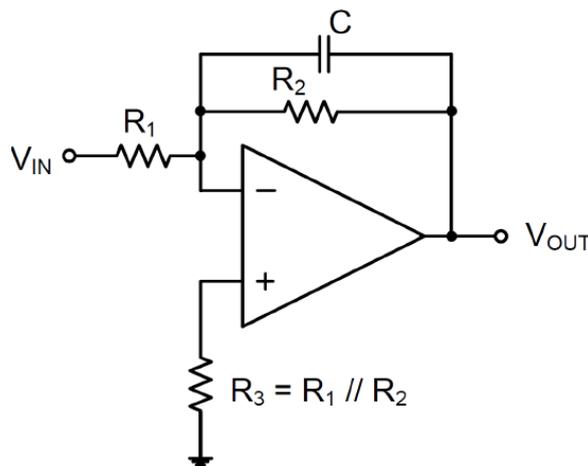
2. instrumentation amplifier

The circuit in the figure above performs the same function, but the input is high impedance.



3. Low pass active filtering

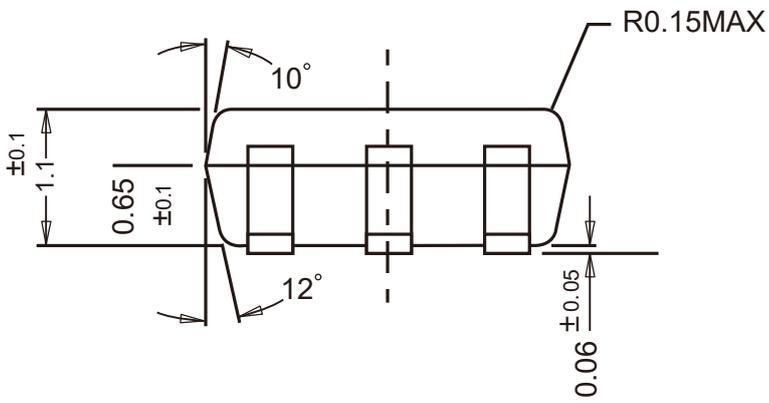
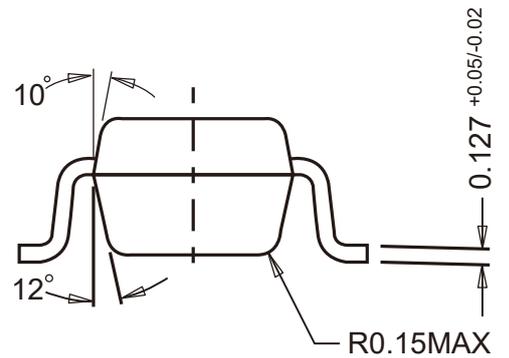
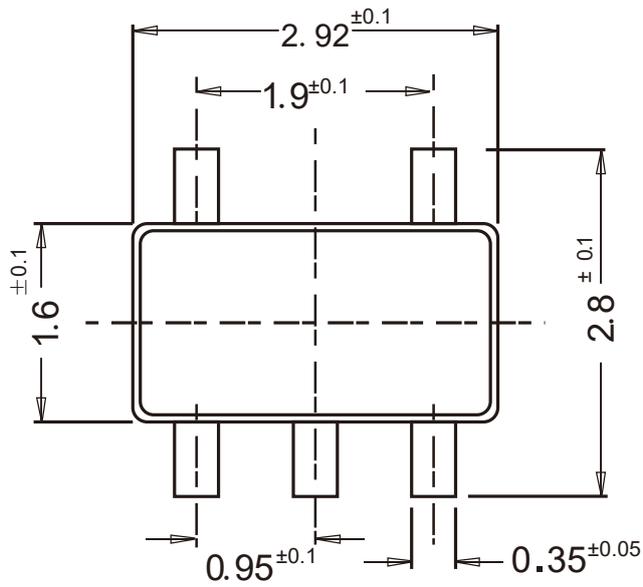
The low-pass filter circuit shown here has a $(-R_2 / R_1)$ DC gain and -3db at a frequency of $1/2 \text{ PI R2C}$ corner. Make sure the filter is within the amplifier's bandwidth. Large feedback resistors are easily accompanied by parasitic capacitance at high speed, resulting in adverse effects such as oscillation. Keep the resistance value as low as possible and consider the appropriate output load.



Package Outline

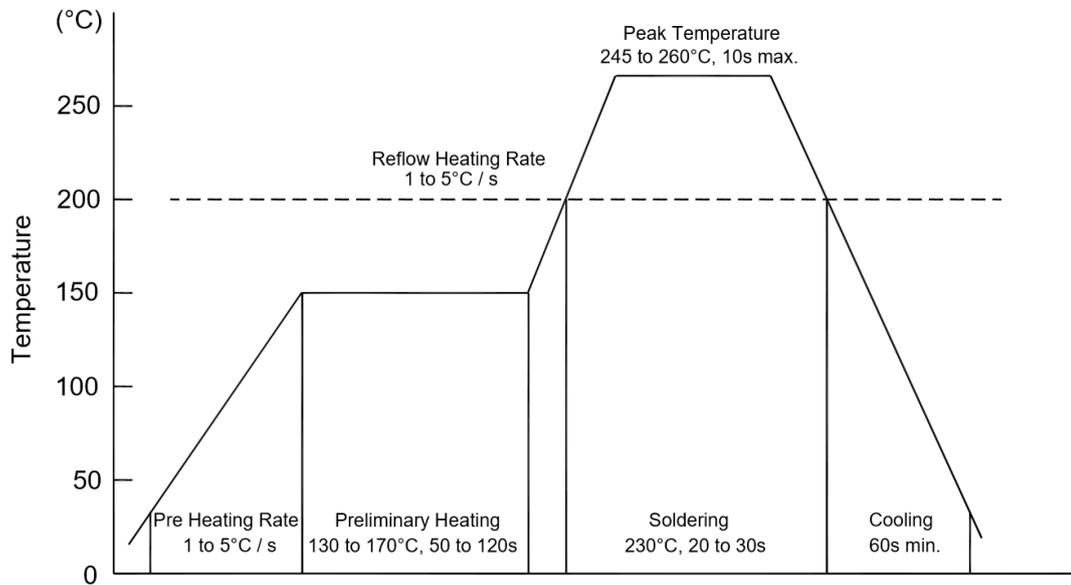
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Dimensions in mm



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

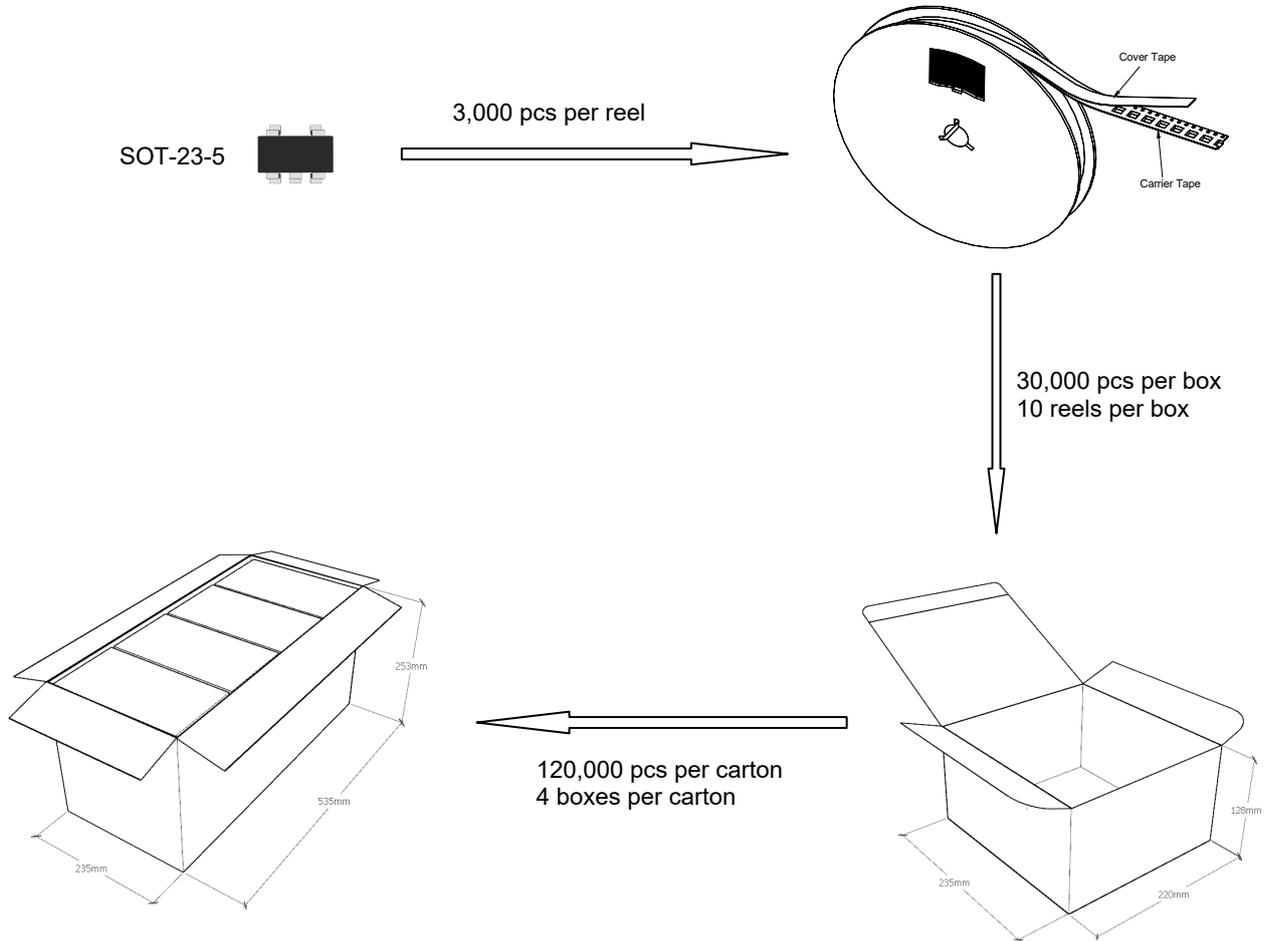
- Temperature: 300°C
- Time: 3s max.
- Times: one time

◆ Storage conditions

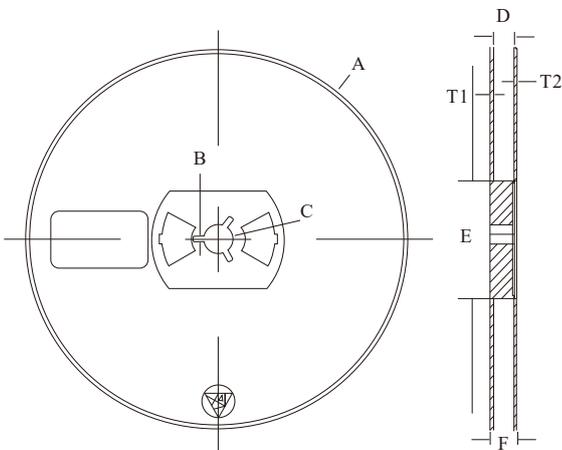
- **Temperature**
5 to 40°C
- **Humidity**
30 to 80% RH
- **Recommended period**
One year after manufacturing

Package Specifications

- The method of packaging



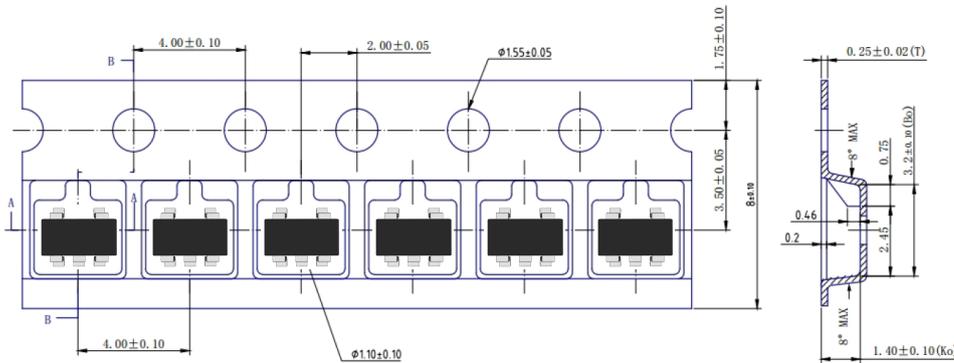
◆ reel data



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

◆ Embossed tape data



Contact Information

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For additional information, please contact your local Sales Representative.

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Product Specification Statement

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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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