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

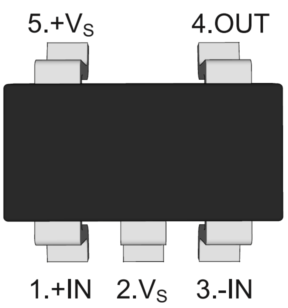
- Rail to rail input and output, typical 0.8mV Vos
- Gain bandwidth product 1.5MHz
- Low input bias current: 10pA Level, <1nA
- Low Power consumption
- 2.1V ~ 5.5V working voltage
- Low operating current: 45uA

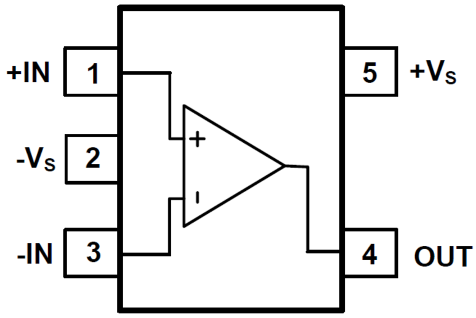
Applications

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

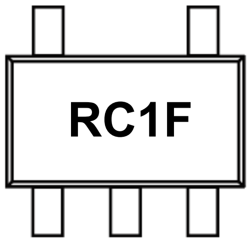
Pin Distribution

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℃) Note1

Parameter	Symbol	Value	Units
Supply Voltage	V_{CC}	7.5	V
Common-mode Input Voltage	V_{ICR}	(-VS)-0.5~(+VS)+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.

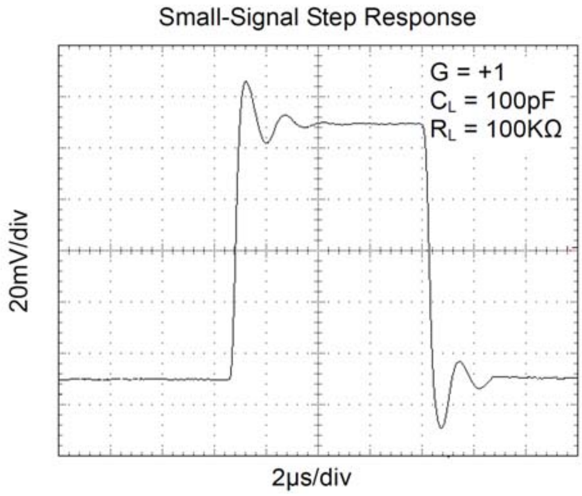
Electrical Characteristics

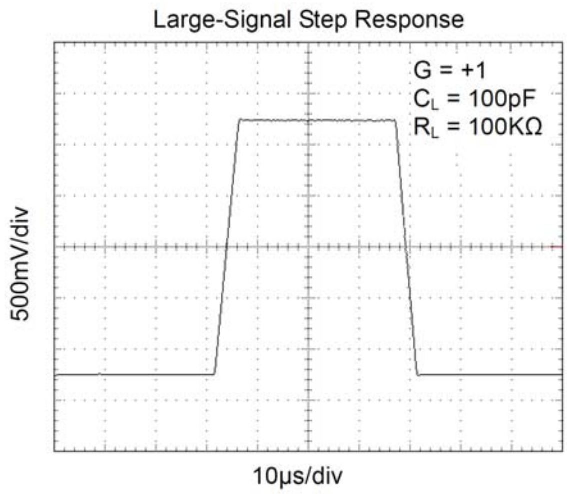
At R_L = 100kΩ connected to Vs/2,and V_{OUT} = Vs/2,Ta=25℃) , unless otherwise noted.

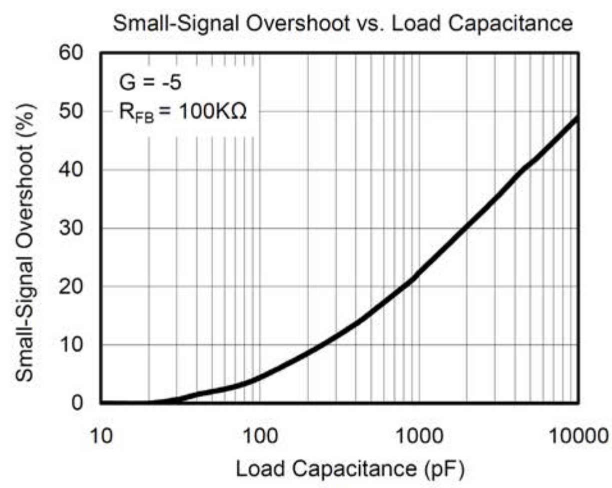
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Input Offset Voltage	V_{OS}		--	±0.8	±5	mV
Input offset current	I_{OS}		--	10	--	pA
Input bias current	I_B		--	10	--	pA
Common-mode input voltage range	V_{CM}	V_S=5.5V	--	-0.1~5.6	--	V
Open-loop Gain	AOL	V_O=0.1V~4.9 V, R_L=5 kΩ	70	80	--	dB
		V_O=0.035V~4.96V, 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	$\Delta V_{OS}/\Delta T$		--	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	IOUT=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	eN	f=1KHz	--	27	--	$nV/\sqrt{Hz}$
		f=10KHz	--	20	--	

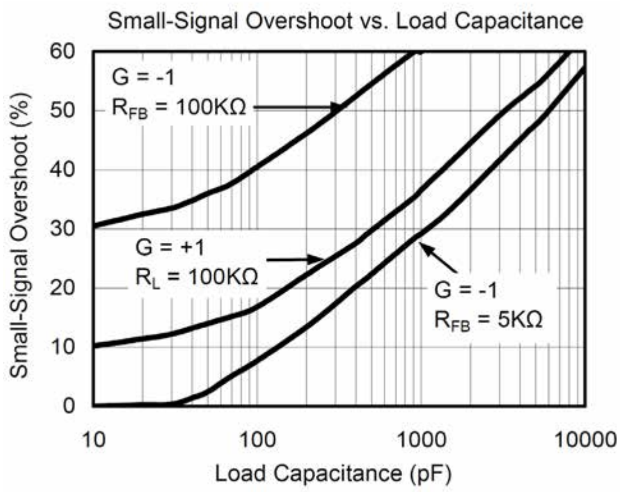
Typical Electrical Curves

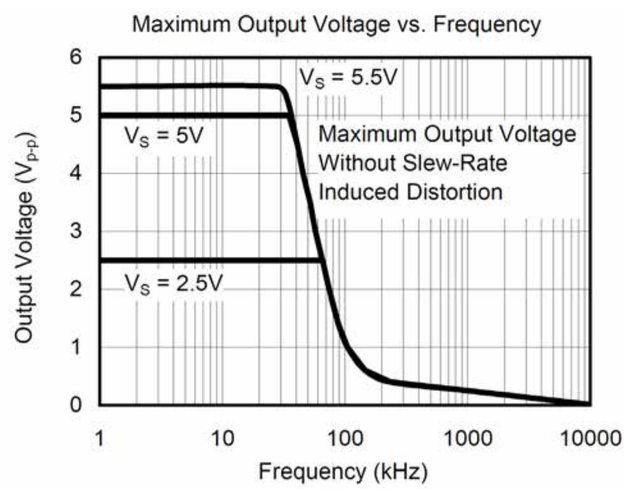
(T_A = +25℃, V_S = +5V, and R_L = 100kΩ connected to V_S/2 , unless otherwise noted.)

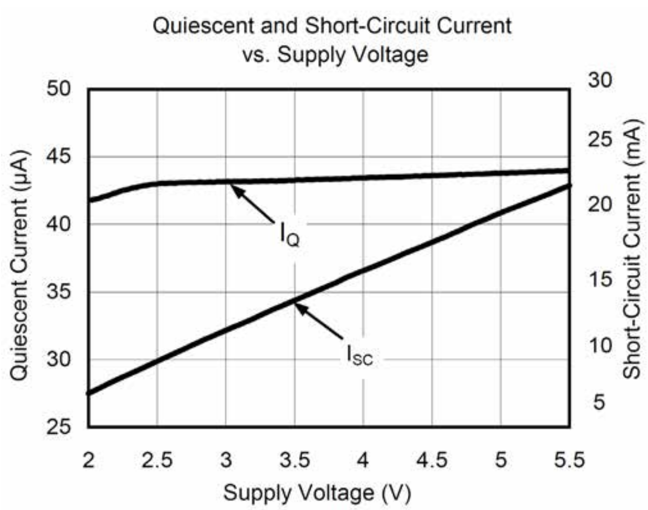


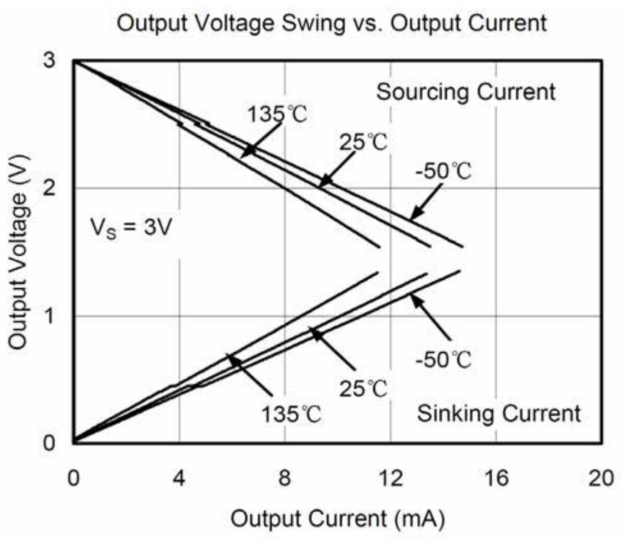


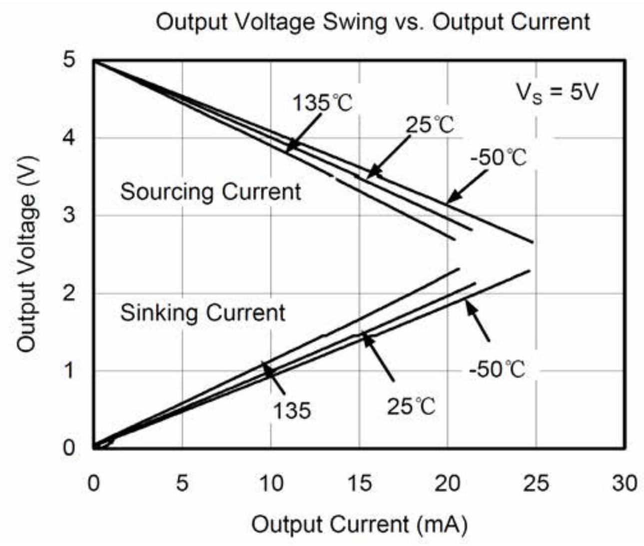


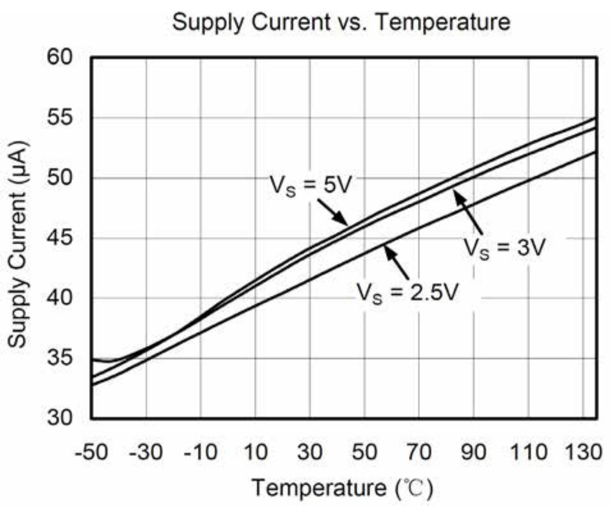


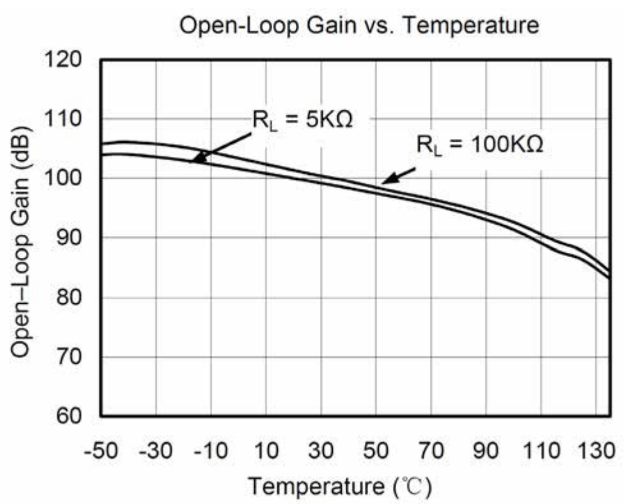


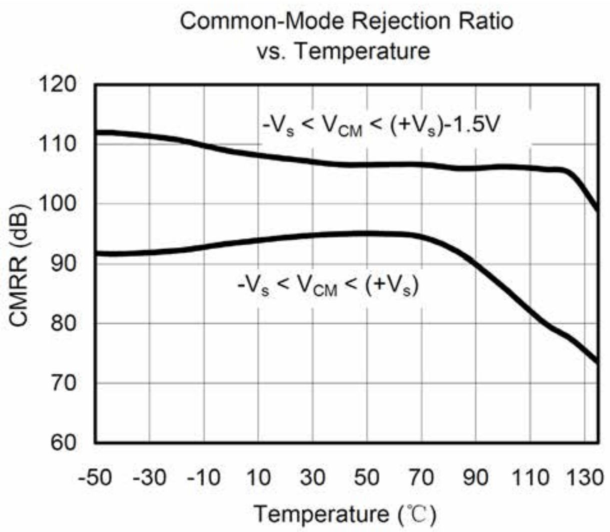


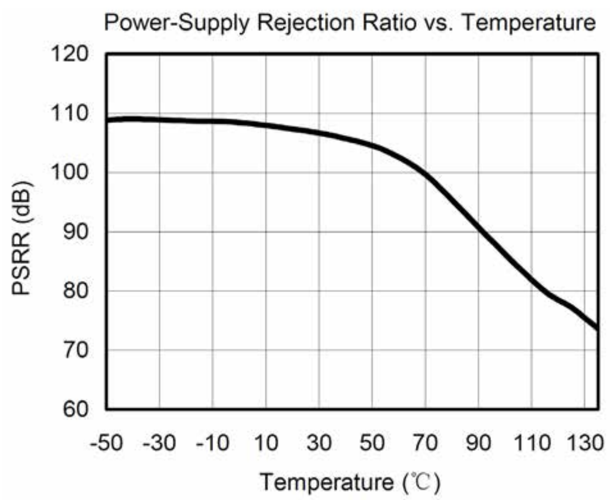

Output Voltage Swing vs. Output Current
Sourcing Current
135℃
25℃
-50℃
VS = 3V
-50℃
25℃
135℃
Sinking Current
Output Voltage (V)
Output Current (mA)
0
4
8
12
16
20
0
1
2
3


Output Voltage Swing vs. Output Current
VS = 5V
135℃
25℃
-50℃
Sourcing Current
Sinking Current
-50℃
135
25℃
Output Voltage (V)
Output Current (mA)
0
5
10
15
20
25
30
0
1
2
3
4
5


Supply Current vs. Temperature
VS = 5V
VS = 3V
VS = 2.5V
Supply Current (μA)
Temperature (℃)
30
35
40
45
50
55
60
-50
-30
-10
10
30
50
70
90
110
130


Open-Loop Gain vs. Temperature
RL = 5KΩ
RL = 100KΩ
Open–Loop Gain (dB)
Temperature (℃)
60
70
80
90
100
110
120
-50
-30
-10
10
30
50
70
90
110
130

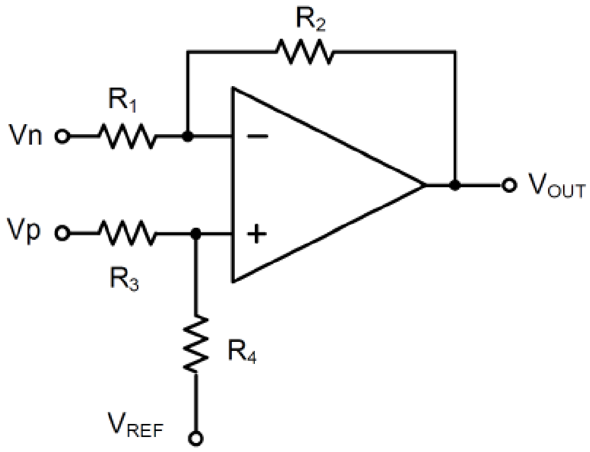

Common-Mode Rejection Ratio
vs. Temperature
-Vs < VCM < (+Vs)-1.5V
-Vs < VCM < (+Vs)
CMRR (dB)
Temperature (℃)
60
70
80
90
100
110
120
-50
-30
-10
10
30
50
70
90
110
130


Power-Supply Rejection Ratio vs. Temperature
PSRR (dB)
Temperature (℃)
60
70
80
90
100
110
120
-50
-30
-10
10
30
50
70
90
110
130

Typical Applications

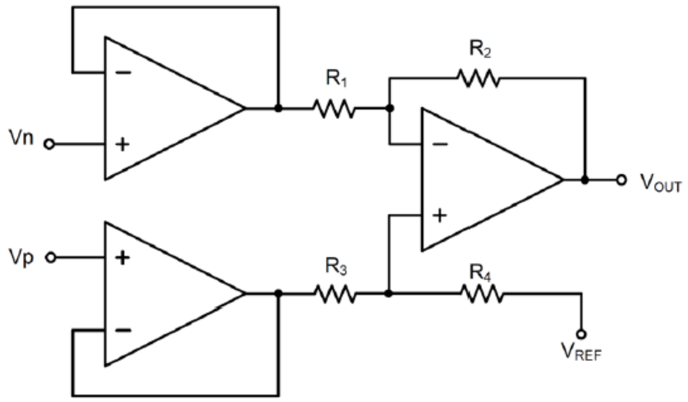
1.differential amplifier

As shown in the figure, if the resistance is equal, (R4 / R3 = R2 / R1), then the output VOUT = (Vp - Vn) × R2 / R1 + VREF



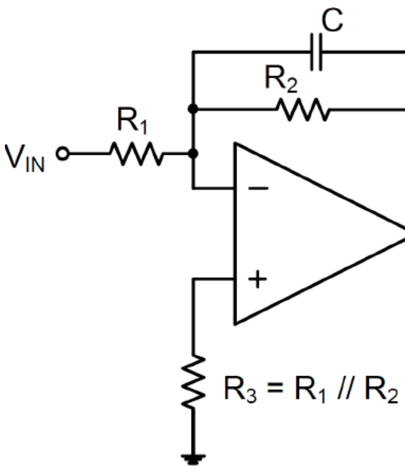
2.instrumentation amplifier

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



3.Low pass active filtering

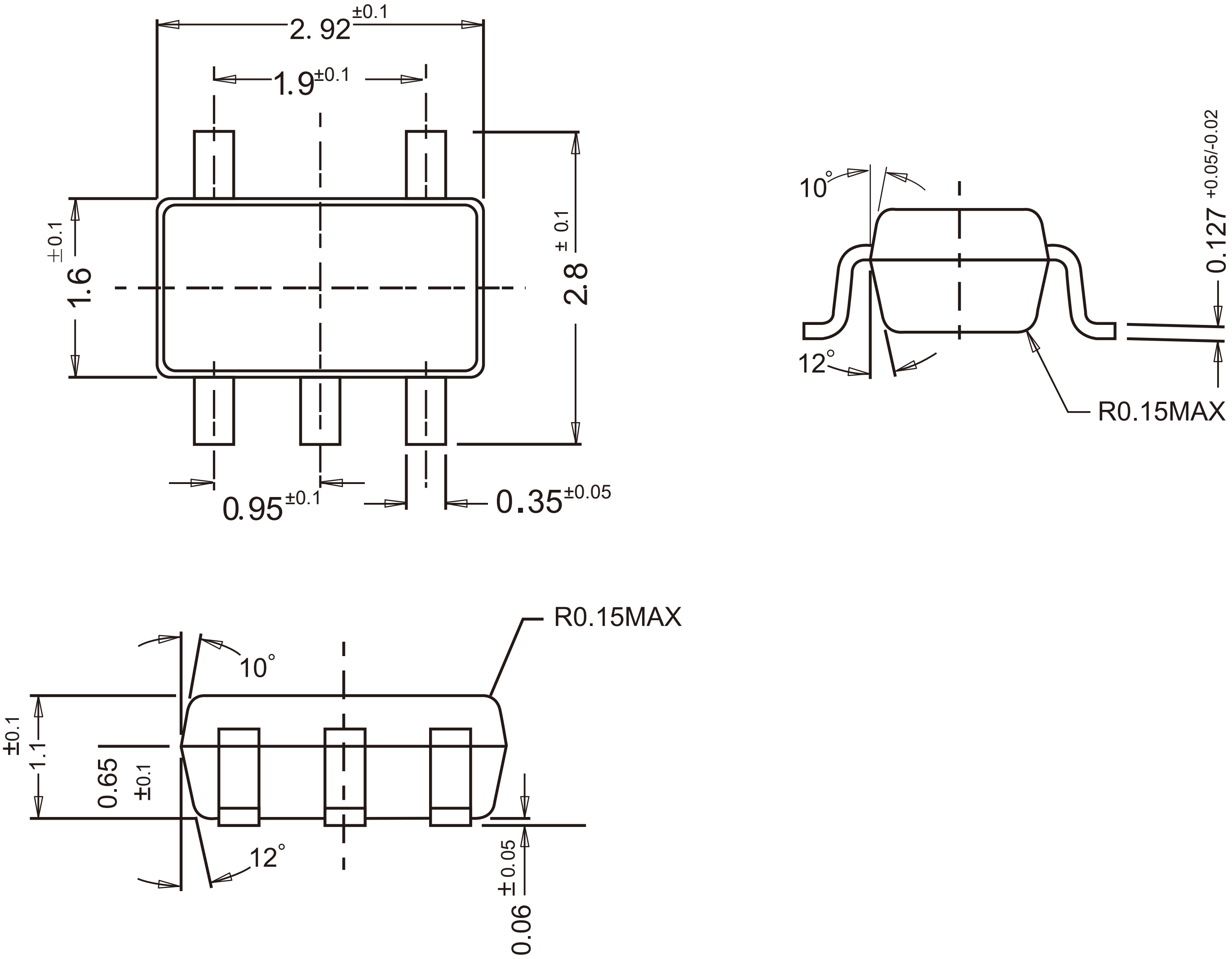
The low-pass filter circuit shown here has a (-R2 / R1) DC gain and -3db at a frequency of 1/2 PI R2C corner. Make sure the filter is within the amplifier's bandwidth. Large feedback resistors are easily accompanied by parasitic capacitance at high speed, resulting in adverse effects such as oscillation. Keep the resistance value as low as possible and consider the appropriate output load.



Package Outline

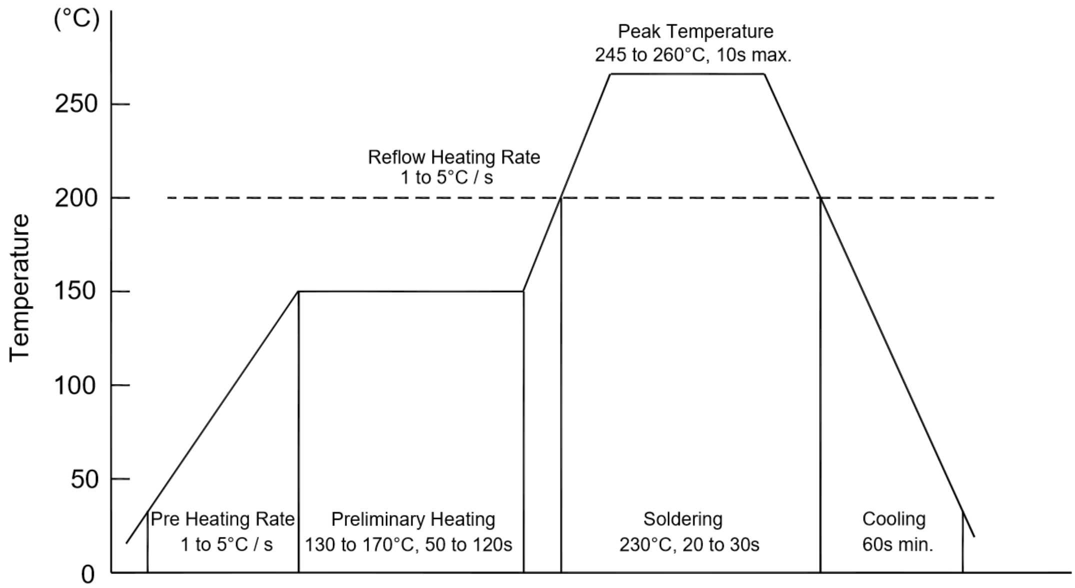
SOT-23-5

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**

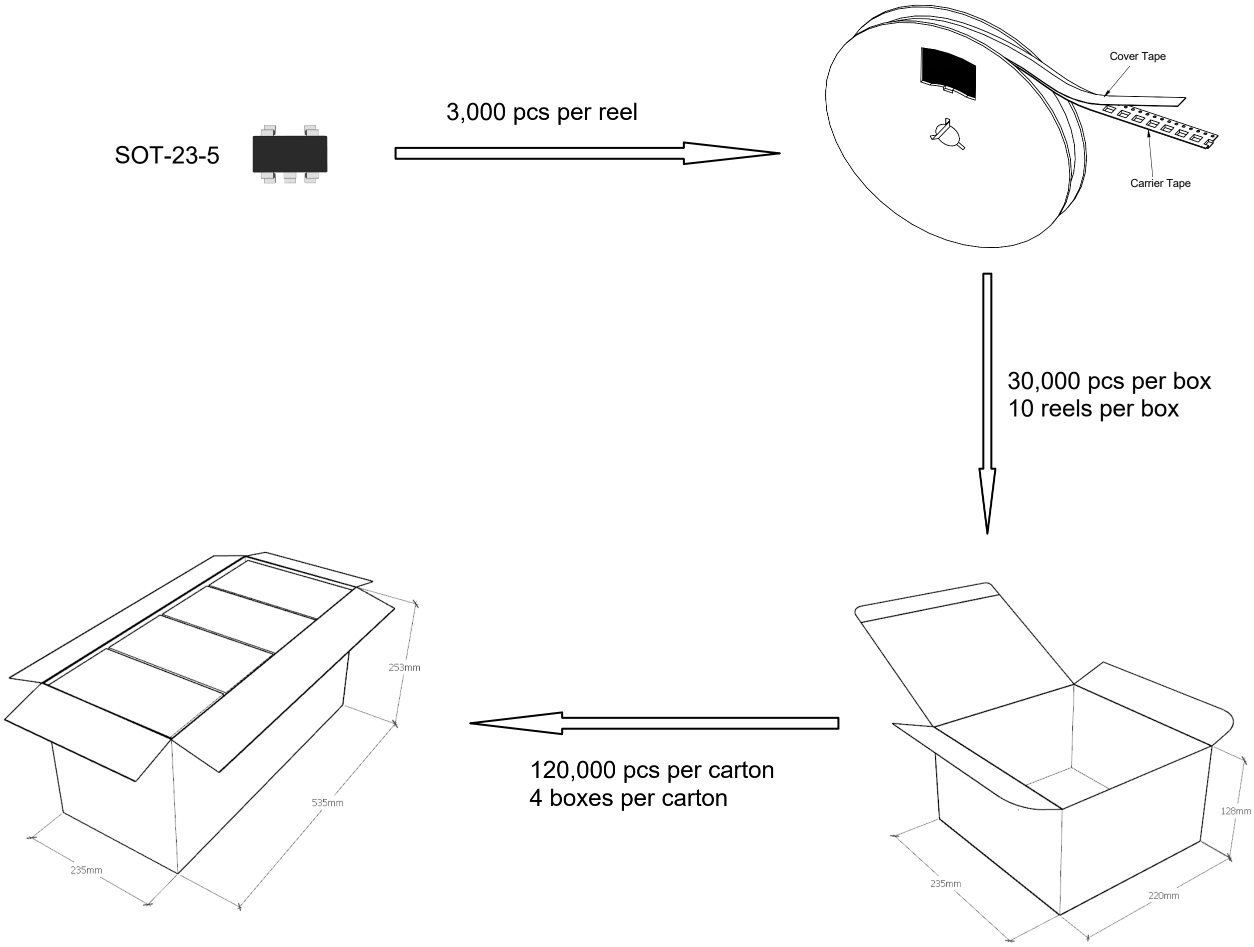
- Temperature: 300°C
- Time: 3s max.
- Times: one time

◆ **Storage conditions**

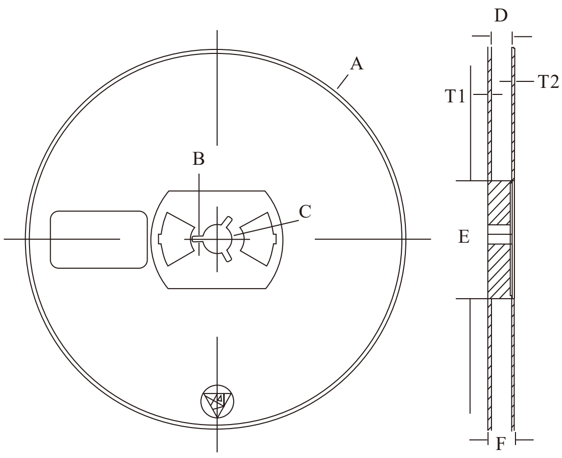
- **Temperature**
  5 to 40°C
- **Humidity**
  30 to 80% RH
- **Recommended period**
  One year after manufacturing

Package Specifications

- The method of packaging



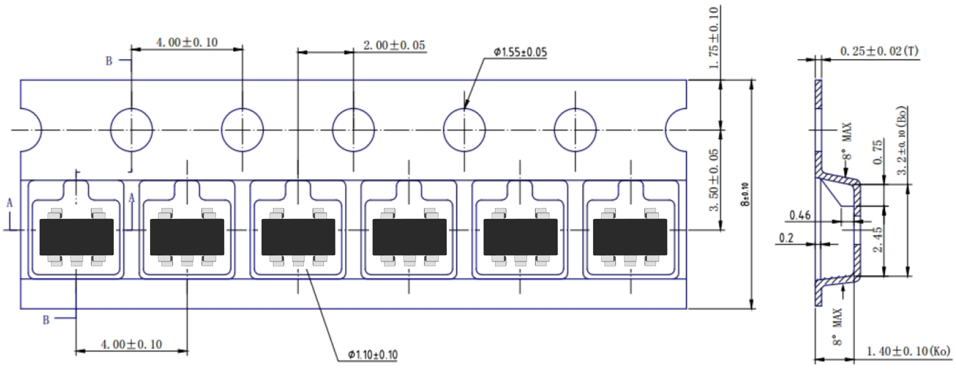
◆ **reel data**



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**



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