

Product Specification

XBLW LMV321

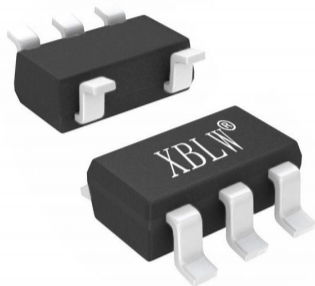
1.1MHz 45uA Rail-to-Rail I/O
CMOS Operational Amplifiers

WEB | www.xinboleic.com



Descriptions

The LMV321(single) are rail-to-rail input and output voltage feedback amplifiers offering low cost. They have a wide input common-mode voltage range and output voltage swing, and take the minimum operating supply voltage down to 2.1V and the maximum recommended supply voltage is 5.5V. temperature range. The LMV321 provide 1.1MHz bandwidth at a low current consumption of 45μA per amplifier. Very low input bias currents of 10pA enable LMV321 to be used for integrators, photodiode amplifiers, and piezoelectric sensors. Rail-to-rail inputs and outputs are useful to designers buffering ASIC in single-supply systems. Applications for the series amplifiers include safety monitoring, portable equipment, battery and power supply control, and signal conditioning and interfacing for transducers in very low power systems. The LMV321 is available in SOT23-5



SOT23-5

Feature

- Low Cost
- Rail-to-Rail Input and Output 0.8mV Typical VOS
- Unity Gain Stable
- Gain Bandwidth Product: 1.1MHz
- Very Low Input Bias Currents:
- Operates on 2.1V to 5.5V Supplies
- Input Voltage Range: -0.1V to +5.6V with $V_S = 5.5V$
- Low Supply Current: <75μA/Amplifier
- Small Packaging: LMV321 Available in SOT23-5

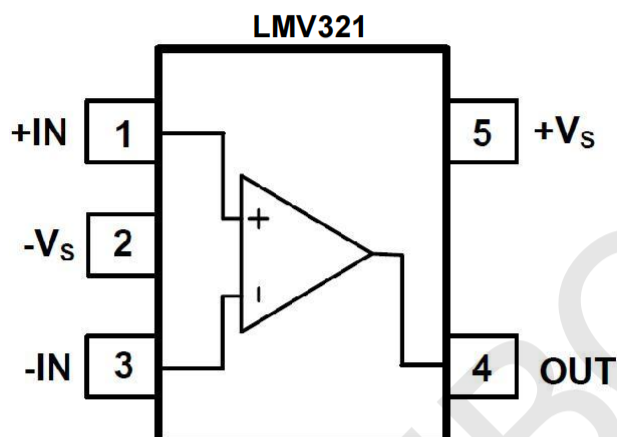
Applications

- ASIC Input Output Amplifier
- Sensor Interface
- Piezo Electric Transducer Amplifier
- Medical Instrumentation
- Mobile Communication
- Audio Output
- Portable Systems
- Smoke Detectors
- Notebook PC
- PCMCIA Cards
- Battery- Powered Equipment
- DSP Interface

Ordering Information

Product Model	Package Type	Marking	Packing	Packing Qty
XBLW LMV321TDTR	SOT23-5	V321	Tape	3000Pcs/Reel

PIN Configurations(Top View)



Absolute Maximum Ratings

Supply Voltage, V+ to V-	7.5V
Common-Mode Input Voltage	$(-V_S) - 0.5V$ to $(+V_S) + 0.5V$
Storage Temperature Range	-50°C to $+150^{\circ}\text{C}$
Junction Temperature	150°C
Operating Temperature Range	-40°C to $+85^{\circ}\text{C}$
Lead Temperature Range (Soldering 10 sec)	250°C

NOTE:

Stresses above those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only; functional operation of the device at these or any other conditions above those indicated in the operational section of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

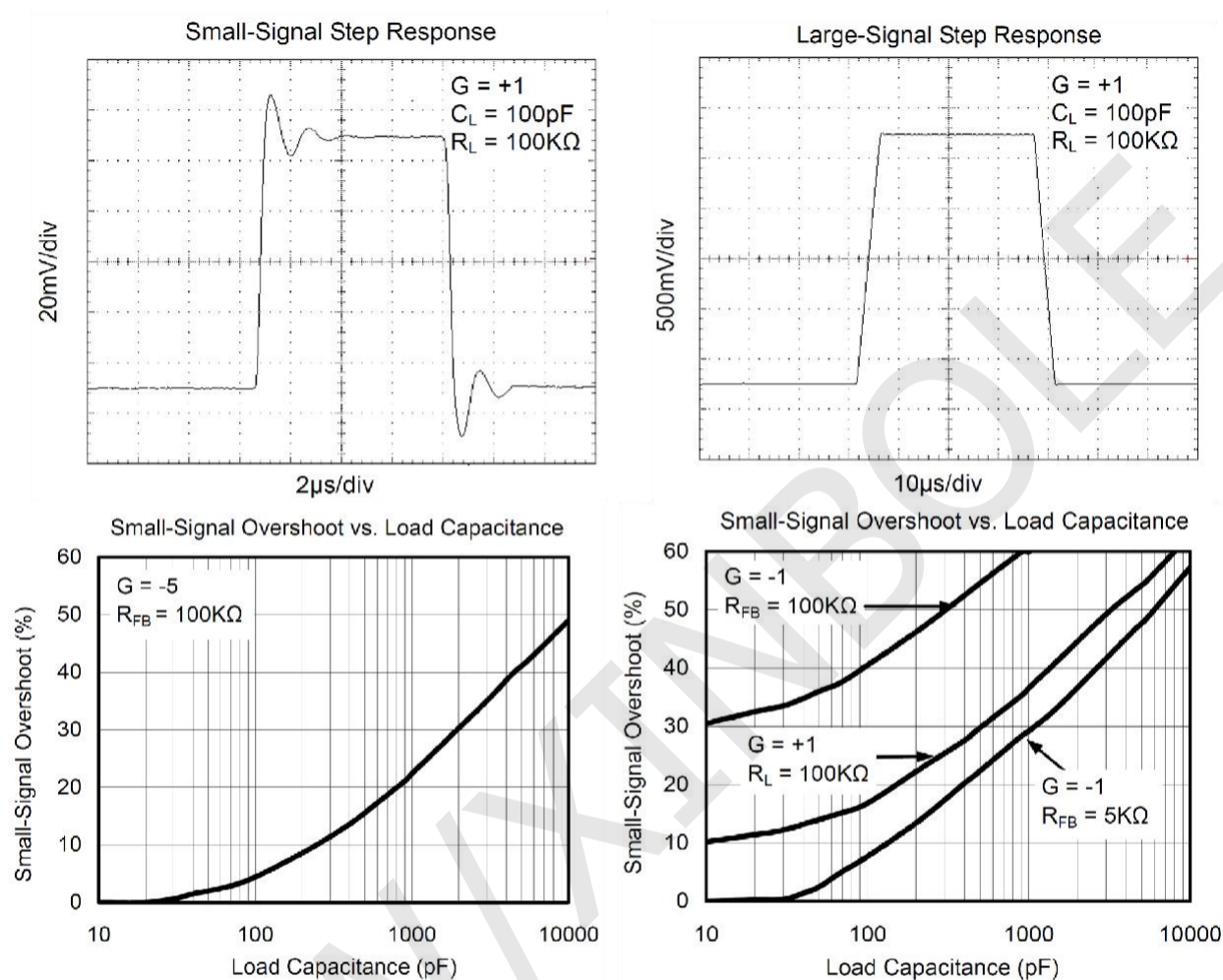
Electrical Characteristics:vs= +5v

(At RL = 100KΩ connected to Vs/2, and VOUT = Vs/2, Ta=25°C,unless otherwise noted.)

PARAMETER	CONDITIONS	LMV321 25°C			
		MIN	TYP	MAX	UNITS
INPUT HARACTERISTICS					
Input Offset Voltage (VOS)		-5	±0.8	5	mV
Input Bias Current (IB)			10		pA
Input Offset Current (IOS)			10		pA
Common-Mode Voltage Range (VCM)	VS=5.5V		-0.1to+5.6		V
Common-Mode Rejection Ratio (CMRR)	VS=5.5V, VCM=-0.1V to 4V	62	70		dB
	VS= 5.5V, VCM=-0.1V to 5.6V	56	68		dB
Open-Loop Voltage Gain (AOL)	RL= 5KΩ ,Vo=0.1V to 4.9V	70	80		dB
	RL=100KΩ,Vo=0.035V to 4.965V	80	84		dB
OUTPUT CHARACTERISTICS					
Output Voltage Swing from Rail	RL = 100KΩ		0.008		V
	RL = 10KΩ		0.08		V
Output Current (IOUT)		18	30		mA
POWER SUPPLY					
Operating Voltage Range		2.1		5.5	V
Power Supply Rejection Ratio (PSRR)	Vs =+2.5V to + 5.5V				V
	VCM= (-VS) + 0.5V	60	82		dB
Quiescent Current / Amplifier (IQ)	IOUT = 0		45	75	μA
DYNAMIC PERFORMANCE					
	CL= 100pF				
Gain-Bandwidth Product (GBP)			1.1		MHz
Slew Rate (SR)	G = +1, 2V Output Step		0.52		V/μs
NOISE PERFORMANCE					
Voltage Noise Density (en)	f = 1kHz f = 10kHz		27		nV/√Hz
			20		

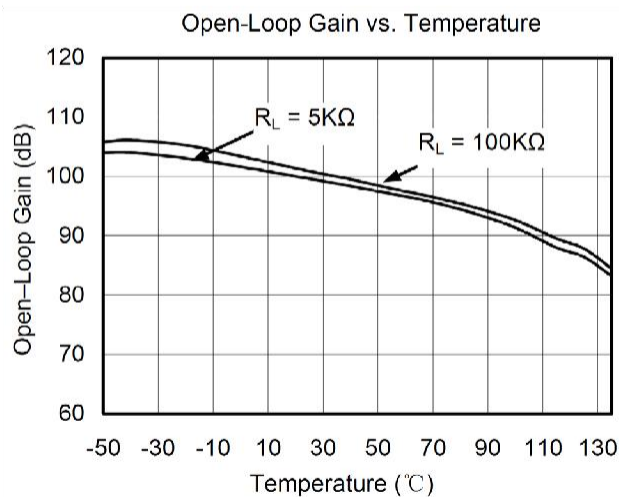
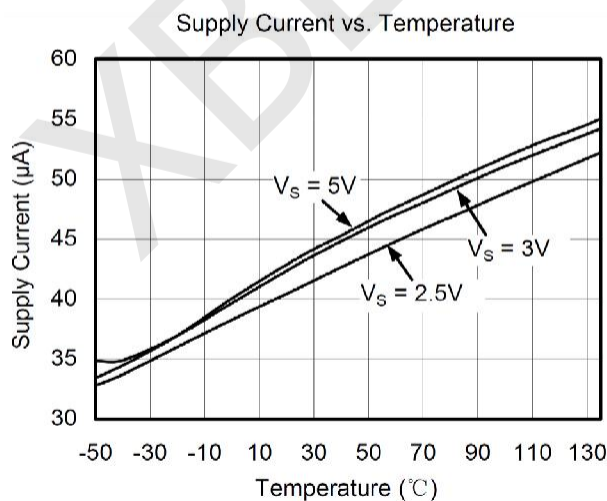
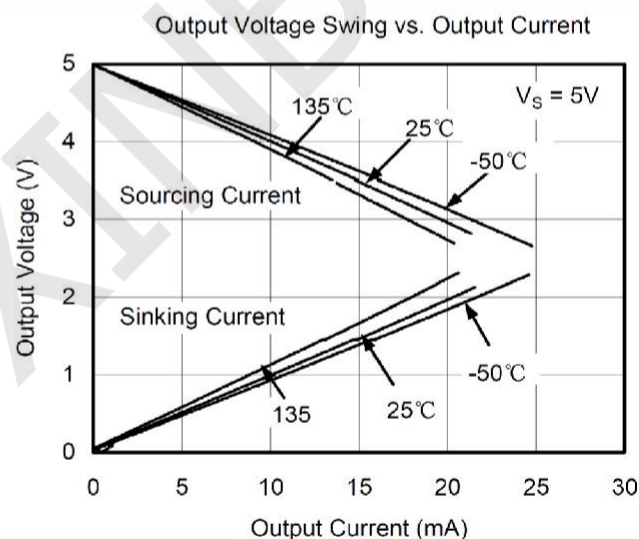
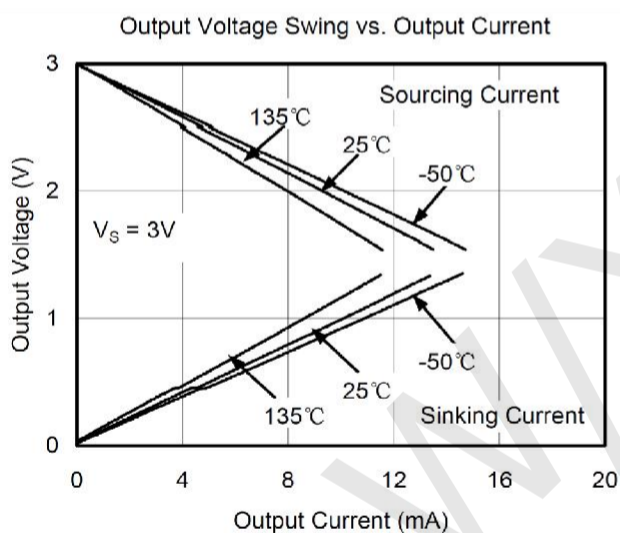
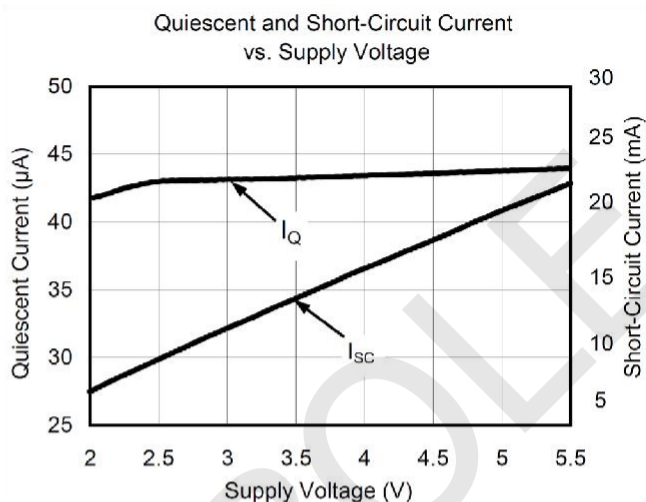
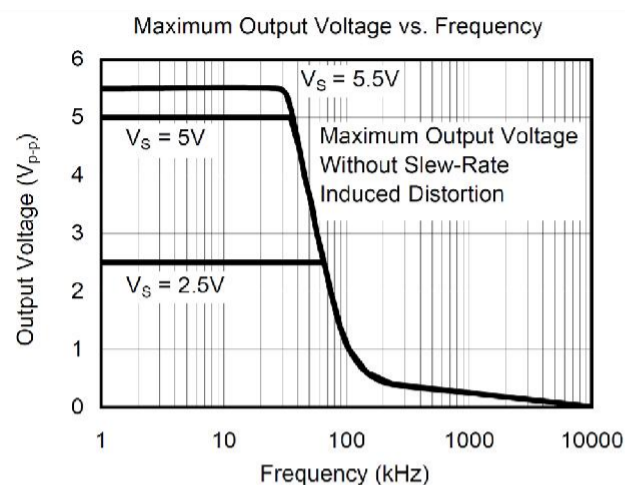
Typical Performance Characteristics

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



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APPLICATION NOTES

Driving Capacitive Loads

The LMV321 can directly drive 250pF in unity-gain without oscillation. The unity-gain follower (buffer) is the most sensitive configuration to capacitive loading. Direct capacitive loading reduces the phase margin of amplifiers and this results in ringing or even oscillation. Applications that require greater capacitive drive capability should use an isolation resistor between the output and the capacitive load like the circuit in Figure 1. The isolation resistor R_{ISO} and the load capacitor C_L form a zero to increase stability. The bigger the R_{ISO} resistor value, the more stable V_{OUT} will be. Note that this method results in a loss of gain accuracy because R_{ISO} forms a voltage divider with the R_{LOAD} .

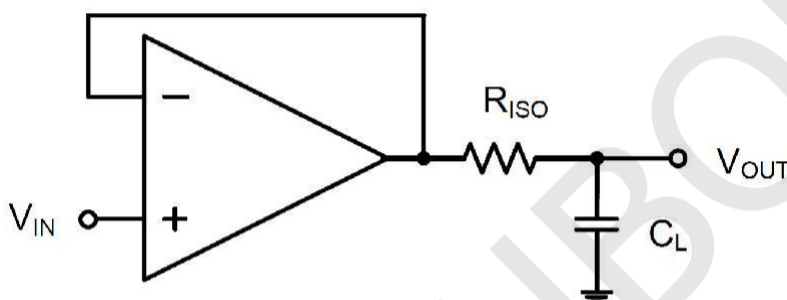


Figure 1. Indirectly Driving Heavy Capacitive Load

An improvement circuit is shown in Figure 2. It provides DC accuracy as well as AC stability. R_F provides the DC accuracy by connecting the inverting signal with the output, C_F and R_{ISO} serve to counteract the loss of phase margin by feeding the high frequency component of the output signal back to the amplifier's inverting input, thereby preserving phase margin in the overall feedback loop.

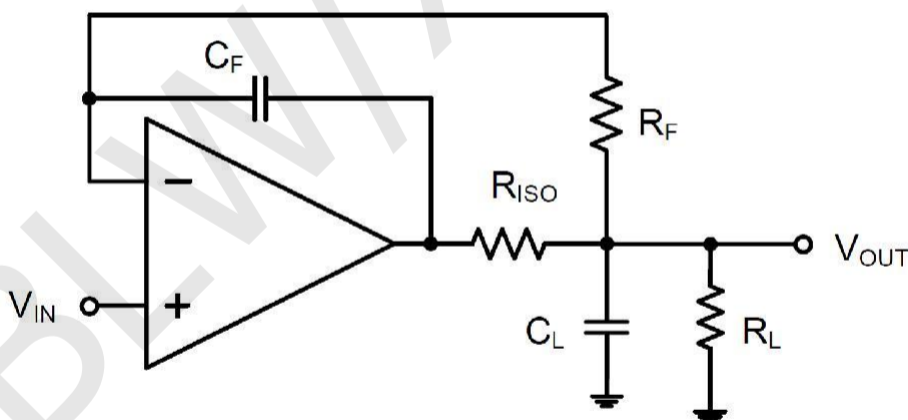


Figure 2. Indirectly Driving Heavy Capacitive Load with DC Accuracy

For no-buffer configuration, there are two others ways to increase the phase margin: (a) by increasing the amplifier's gain or (b) by placing a capacitor in parallel with the feedback resistor to counteract the parasitic capacitance associated with inverting node.

Power-Supply Bypassing and Layout

The LMV321 family operates from either a single +2.5V to +5.5V supply or dual $\pm 1.25\text{V}$ to $\pm 2.75\text{V}$ supplies. For single-supply operation, bypass the power supply VDD with a $0.1\mu\text{F}$ ceramic capacitor which should be placed close to the VDD pin. For dual-supply operation, both the VDD and the VSS supplies should be bypassed to ground with separate $0.1\mu\text{F}$ ceramic capacitors. $2.2\mu\text{F}$ tantalum capacitor can be added for better performance.

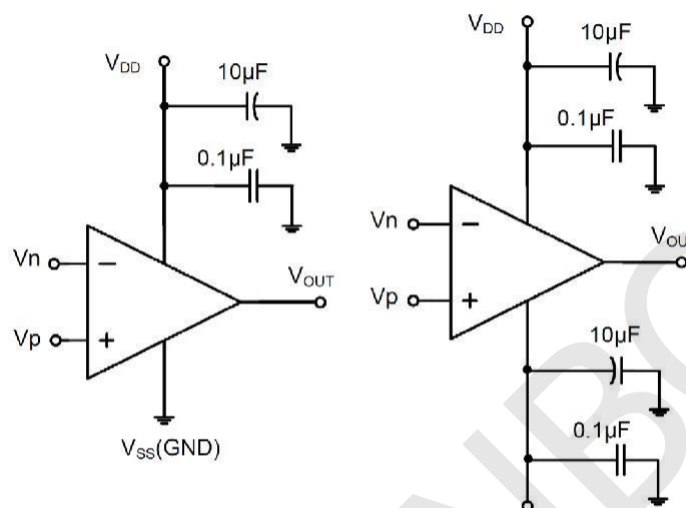


Figure 3. Amplifier with Bypass Capacitors

TYPICAL APPLICATION CIRCUITS

Differential Amplifier

The circuit shown in Figure 4 performs the difference function. If the resistors ratios are equal ($R_4 / R_3 = R_2 / R_1$), then $V_{OUT} = (V_p - V_n) \times R_2 / R_1 + V_{REF}$.

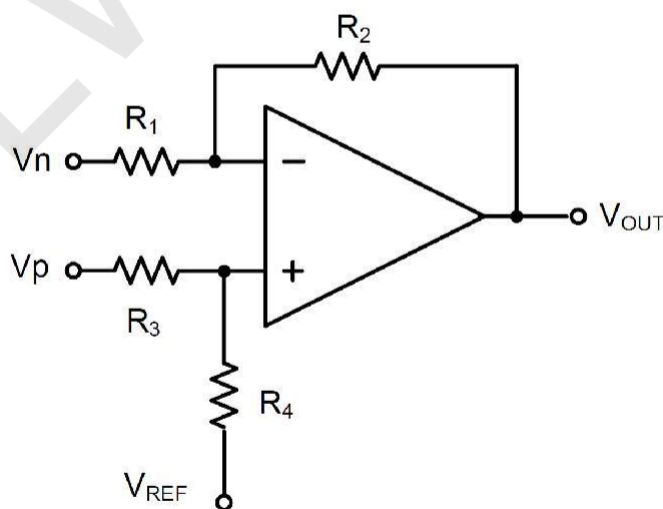


Figure 4. Differential Amplifier

Instrumentation Amplifier

The circuit in Figure 5 performs the same function as that in Figure 4 but with the high input impedance.

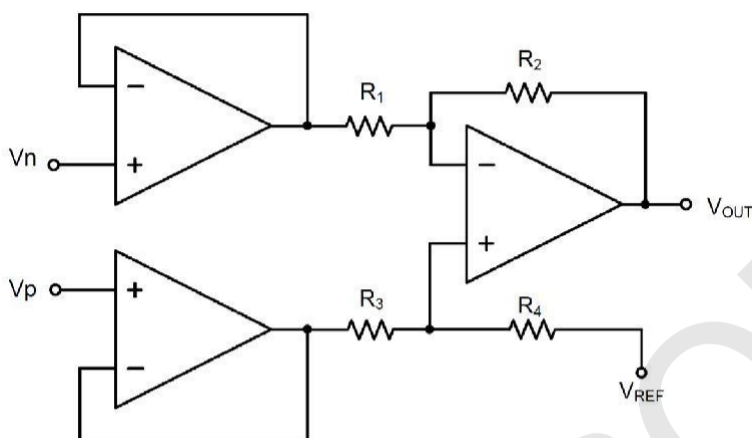


Figure 5. Instrumentation Amplifier

Low Pass Active Filter

The low pass filter shown in Figure 6 has a DC gain of $(-R_2 / R_1)$ and the -3dB corner frequency is $1/2\pi R_2 C$. Make sure the filter is within the bandwidth of the amplifier. The Large values of feedback resistors can couple with parasitic capacitance and cause undesired effects such as ringing or oscillation in high-speed amplifiers. Keep resistors value as low as possible and consistent with output loading consideration.

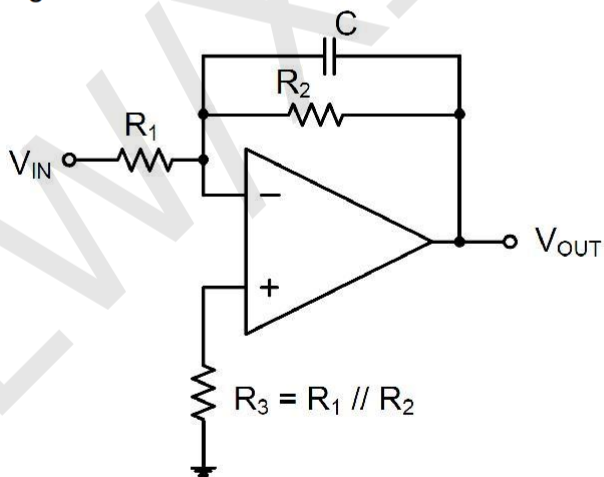
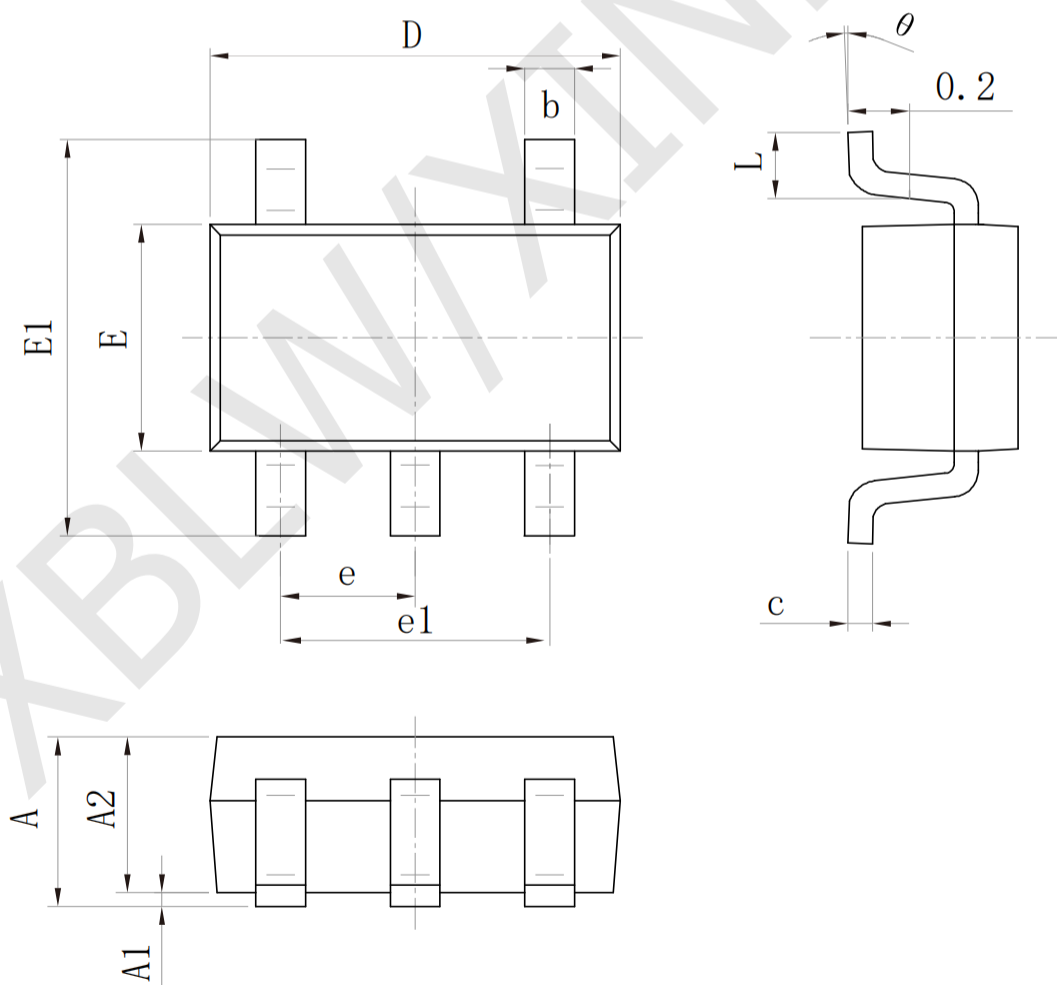


Figure 6. Low Pass Active Filter

Package Information

- SOT23-5

SIZE SYMBOL	Dimensions In Millimeters		SIZE SYMBOL	Dimensions In Inches	
	MIN (mm)	MAX (mm)		MIN (in)	MAX (in)
A	1.050	1.250	A	0.041	0.049
A1	0.000	0.100	A1	0.000	0.004
A2	1.050	1.150	A2	0.041	0.045
b	0.300	0.500	b	0.012	0.020
c	0.100	0.200	c	0.004	0.008
D	2.820	3.020	D	0.111	0.119
E	1.500	1.700	E	0.059	0.067
E1	2.650	2.950	E1	0.104	0.116
e	0.95 (BSC)		e	0.037 (BSC)	
e1	1.800	2.000	e1	0.071	0.079
L	0.300	0.600	L	0.012	0.024
θ	0°	8°	θ	0°	8°



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