



概述

LMV321（单路）是一款低功耗、输入/输出轨到轨、电压反馈的通用运算放大器。其具有较宽的输入共模电压和输出摆幅；最低工作电压可达 2.1V，最大推荐工作电压可达 5.5V。

LMV321 在 45uA 功耗的情况下具有 1.1MHz 增益带宽积；其具有极低的输入偏置电流（10pA 级），可用于积分器、光电二极管放大器和压电传感器等；其具有输入/输出轨到轨，使其可作为缓冲器用于单电源系统中。

该系列运算放大器的应用包括安全监测，便携式设备，电池和电源，供应的控制，低的电力传感器系统中的信号处理和接口。

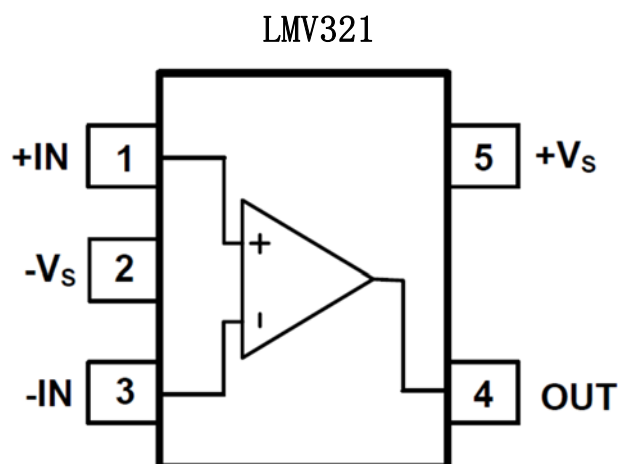
特点

- 低功耗：45uA
- 轨到轨输入/输出
- 低输出失调电压：典型 0.8mV
- 单位增益稳定
- 增益带宽积 1.1MHz
- 低输入偏置电流：10pA 级
- 2.1V~5.5V 的工作电压
- 宽输入电压范围：-0.1V~5.6V(V_S=5.5V)

主要应用

- ASIC 输入和输出运放
- 传感器接口、压电传感放大器
- 医疗器械
- 音频输出
- 移动通信、DSP 接口
- 便携式系统、电池供电设备
- 烟雾探测器、笔记本电脑、PCMCIA 卡

管脚排列图





极限条件

供电电压 (V+ to V-)	7.5 V
输入共模电压	(-VS) - 0.5 V to (+VS)+0.5V
贮存温度	-50°C to +150°C
结温	+150°C
工作温度	-40°C to +85°C
Lead Temperature Range (Soldering 10 sec)	250°C

注意：超过以上极限值有可能造成芯片的永久性损坏；长时间工作在极限值条件下，亦会影响器件的可靠性。精密的 LMV321 器件，在微小的静电情况下也可能受损，很小的参数变化就可能使整个电路性能不达标，故建议对电路做一定的预防措施。同时正确的安装上整机，也会减少损坏。

电气性能参数：VS = +5V

(无特殊说明 在 RL=100kΩ 连接 Vs/2 , 且 Vout = Vs/2, Ta=25°C)

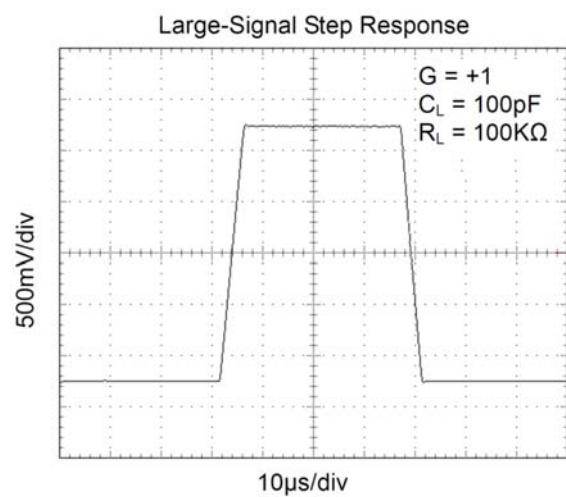
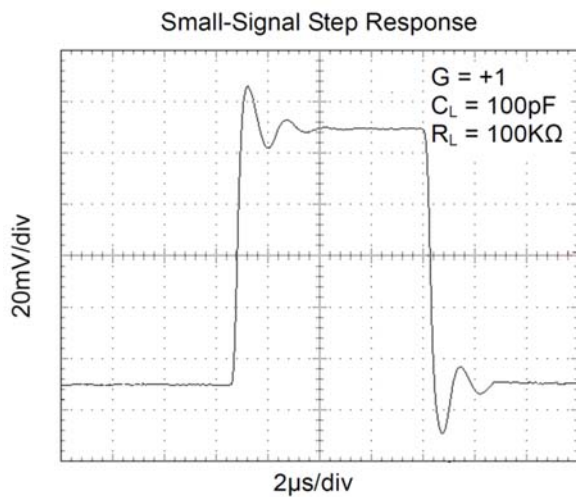
参数	测试条件	LMV321			
		25°C			
		典型值	Max/Min	单位	MIN/MAX
输入参数					
输入失调电压 (VOS)		±0.8	±5	mV	MAX
输入偏置电流 (IB)		10		pA	TYP
输入失调电流		10		pA	TYP
输入共模电压(Vcm)	VS = 5.5V	-0.1 to +5.6		V	TYP
共模抑制比(CMRR)	VS = 5.5V, VCM = -0.1V to 4V	70	62	dB	MIN
	VS = 5.5V, VCM=-0.1V to 5.6V	68	56	dB	MIN
开环增益(AOL)	RL = 5KΩ, Vo = 0.1V to 4.9V	80	70	dB	MIN
	RL = 100KΩ, Vo = 0.035V to 4.96V	84	80	dB	MIN
输入失调电压漂移 (ΔVOS/ΔT)	4.96V	2.7		μV/°C	TYP
输出参数					
输入电压摆幅	RL = 100KΩ	0.008		V	TYP
	RL = 10KΩ	0.08		V	TYP
输出电流 (IOUT)		30	20	mA	MIN

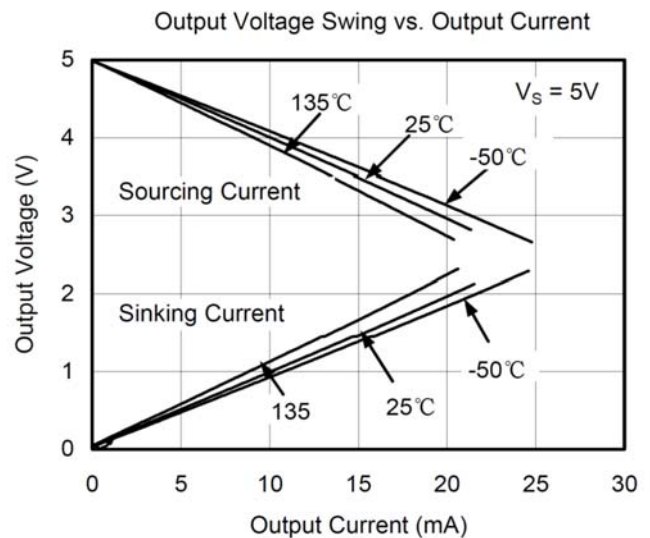
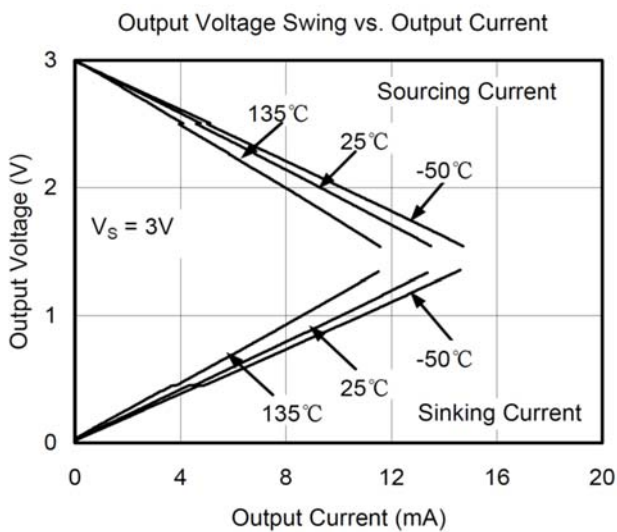
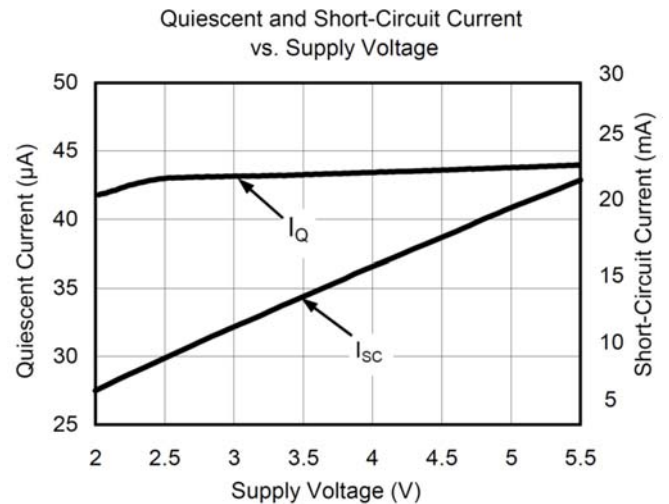
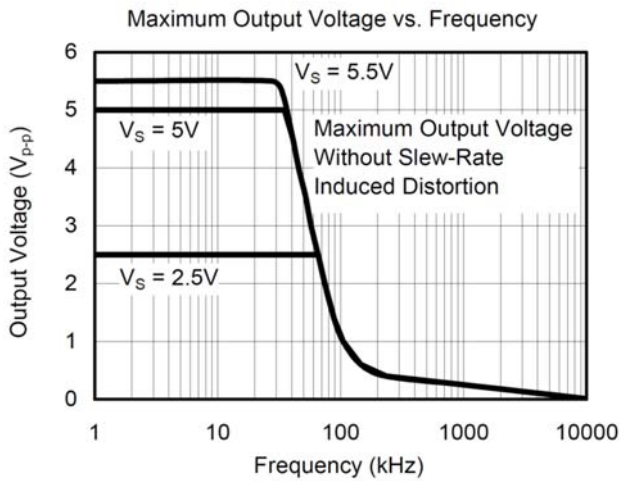
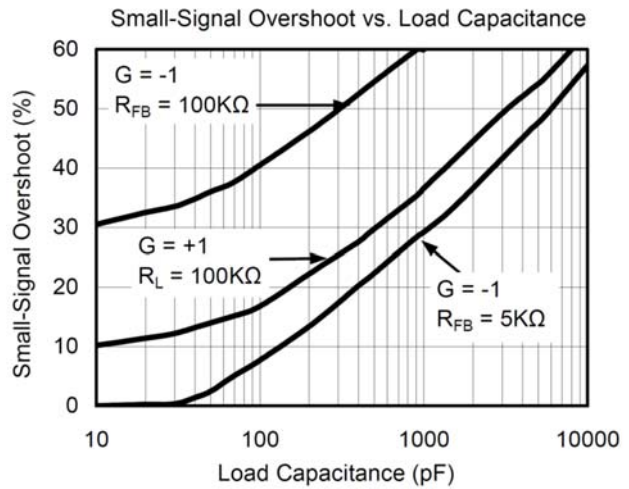
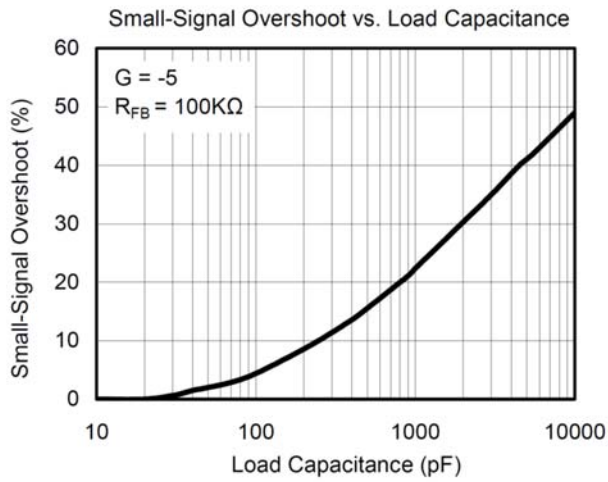


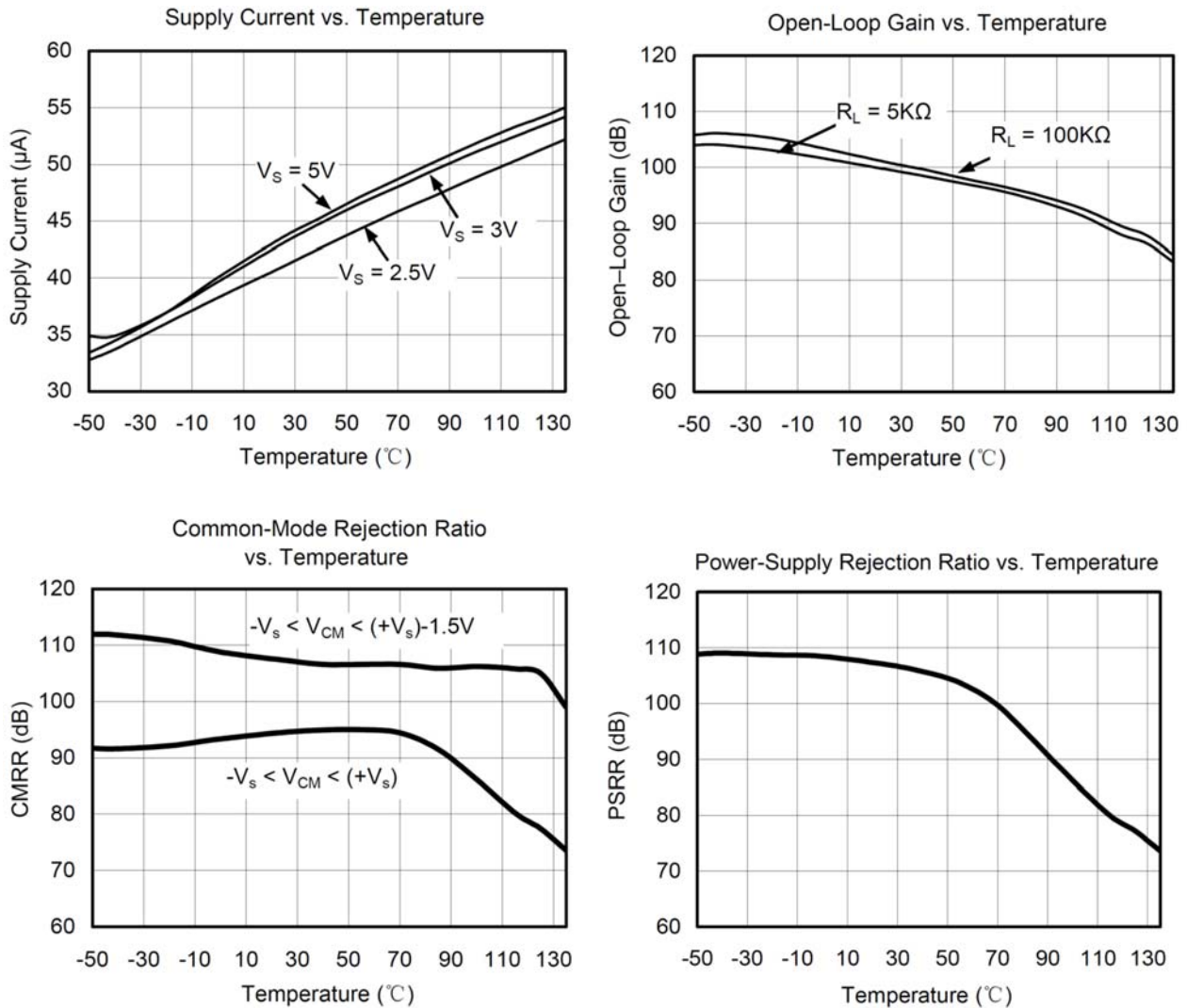
电源部分					
工作电压范围			2.1	V	MIN
			5.5	V	MAX
电源抑制比(PSRR)	$V_s = +2.5\text{ V to } +5.5\text{ V}$ $V_{CM} = (-V_S) + 0.5\text{ V}$	80	60	dB	MIN
静态电流/Amplifier (IQ)	IOUT = 0	45	65	μA	MAX
动态性能					
增益带宽积(GBP)	$C_L = 100\text{ pF}$	1.1		MHz	TYP
转换速率 (SR)	$G = +1, 2\text{ V Output Step}$	0.52		$\text{V}/\mu\text{s}$	TYP
噪声性能					
电压噪声密度 (en)	$f = 1\text{ kHz}$	27		$\text{nV}/\sqrt{\text{Hz}}$	TYP
	$f = 10\text{ kHz}$	20			TYP

典型性能参数

无特殊说明 $T_A = +25^\circ\text{C}$, $V_S = +5\text{V}$, and $R_L = 100\text{k}\Omega$ connected to $V_S/2$







应用说明

1. 驱动容性负载

LMV321单位增益下能直接驱动250pf电容（无振荡），单位增益跟随器（缓冲器）是对容性负载配置最敏感的。直接驱动容性负载，减少了振铃放大器相位正确度，甚至引起振荡。若应用需要驱动更大的电容，则需要在输出和电容之间使用一个隔离电阻，如图1。此隔离电阻 R_{ISO} 和电容负载 C_L 需稳定增加， R_{ISO} 值越大，输出也就越稳定。注意，这种方法损失了最终的增益，因为 R_{ISO} 和负载进行了分压。

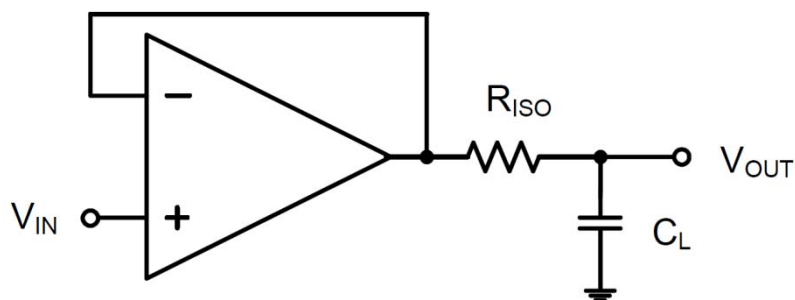


图1，驱动较大电容负载



一种改进的电路方式如图2，他提供的直流DC的精度和交流AC的稳定性，反向输入和输出端之间的反馈电阻 R_f 保证直流的精度， C_f 和 R_{iso} 连接在反向输入端和输出端之间，在高频率信号时，可以抵消一部分相位裕度的损失，从而保证整个反馈回路中的相位裕度。

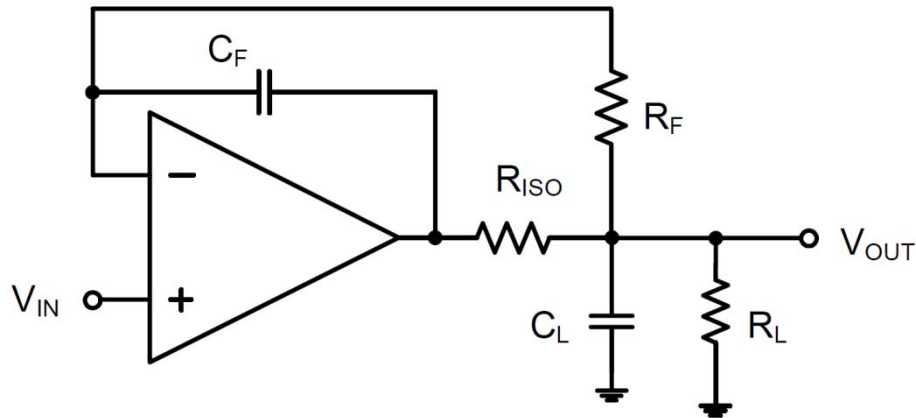


图2，直接驱动高电容，保证DC精度

对于没有缓冲配置的电路，有两种方法增益相位裕度，a) 增加放大器的增益，b) 在反馈电阻间并联一个电容，来抵消寄生电容。

2. 电源旁路和布局

LMV321可工作于单电源 $2.5V \sim 5.5V$ 或双电源 $\pm 1.25V \sim \pm 2.75V$ 。单电源下，旁路电容 $0.1\mu F$ 应靠近电源VDD引脚。双电源的情况下，VDD和VSS引脚都需接 $0.1\mu F$ 的旁路电容。（都为陶瓷电容） $2.2\mu F$ 的钽电容可以增加更好的性能。

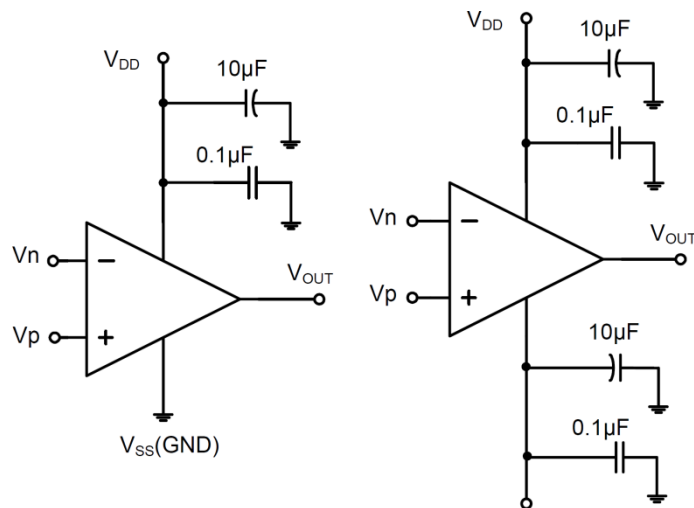


图3，带有旁路电容的运放

典型应用

1. 差分放大器

如图4所示电路，若电阻相等， $(R_4 / R_3 = R_2 / R_1)$ ，那输出 $V_{OUT} = (V_p - V_n) \times R_2 / R_1 + V_{REF}$ 。

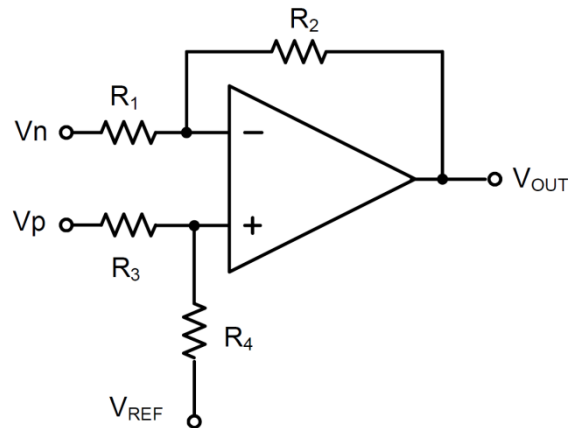


图4, 差分放大器

2. 仪表放大器

如图5电路和图4功能相同, 但是输入为高阻抗。

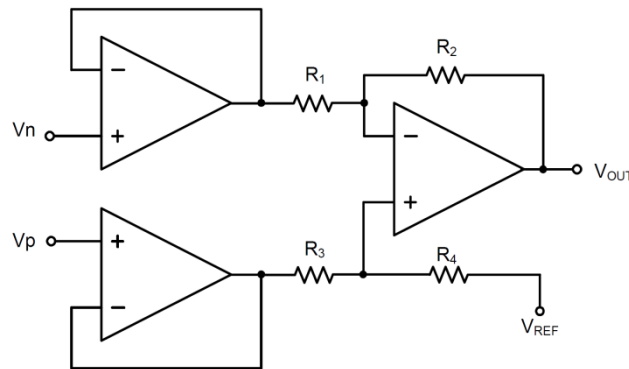


图5, 精密放大电路

3. 低通有源滤波

如图6的低通滤波电路, 拥有一个 $(-R_2 / R_1)$ 直流增益, 和在频率为 $1/2 \pi R_2 C$ 拐角 -3dB 。需确保滤波器在放大器的带宽内。大反馈的电阻在高速时易伴随寄生电容, 从而造成振荡等不良影响。保持尽可能低的电阻值, 并考虑合适的输出的负载。

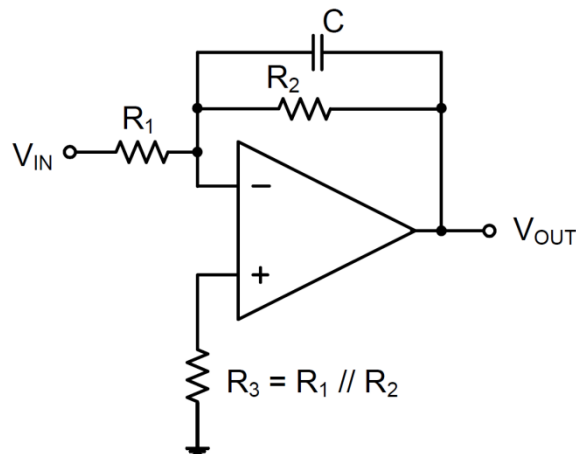
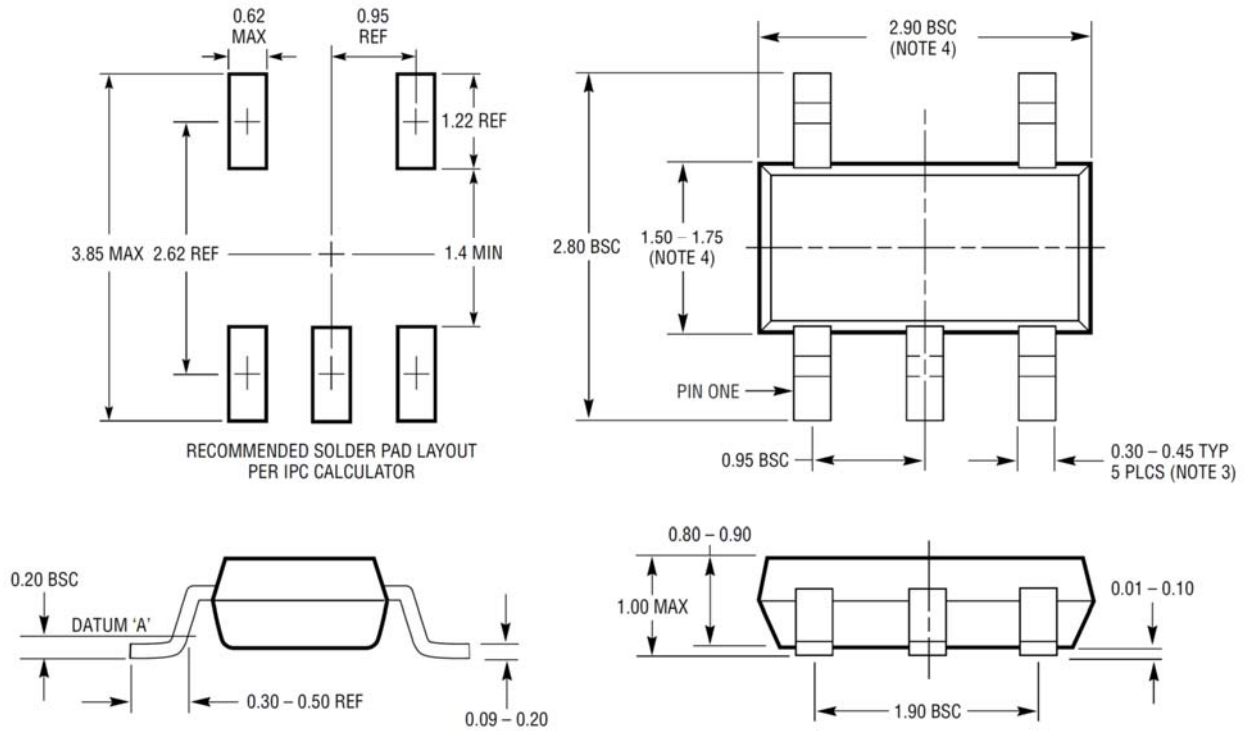


图6, 低通滤波器



封装信息 (SOT23-5)



NOTE

1. 尺寸以毫米为单位;
2. 未按比例尺绘图
3. 该尺寸包含电镀
4. 该尺寸只含塑料模具的光边。



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