

MSKSEMI 美森科

SEMICONDUCTOR



ESD



TVS



TSS



MOV



GDT



PLED

LM321

产品手册

产品简介

LM321 是一款单路输出的低功耗差分式运算放大器，可以单电源或双电源供电。具有较高的开环增益、内部补偿、高共模范围和良好的温度稳定性，以及具有输出短路保护的特点。可应用于传感器的放大电路、直流放大模块，音频放大电路和传统的运算放大电路中

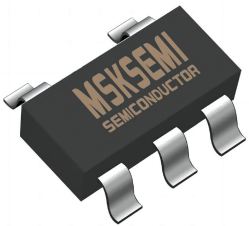
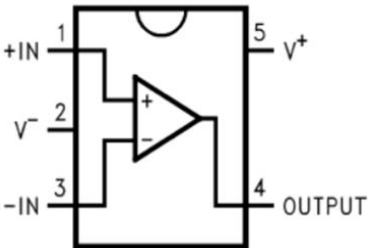

产品特点

- 单电源电压范围：3V~36V
- 双电源电压范围：±18V
- 单位增益带宽：可达 1.2MHz
- 输出短路保护
- 低功耗：0.5mA @ V+=5V
- 封装形式：SOT-23-5

产品用途

- 传感器信号放大器
- 直流增益
- 音频放大器
- 其它应用领域

封装形式和管脚

封装形式	管脚定义	丝印
 <p>SOT-23-5</p>		

SOT23-5 管脚序号	管脚定义	功能说明
1	IN+	正相输入
2	V-	电源负
3	IN-	反相输入
4	OUTPUT	输出
5	V+	电源正

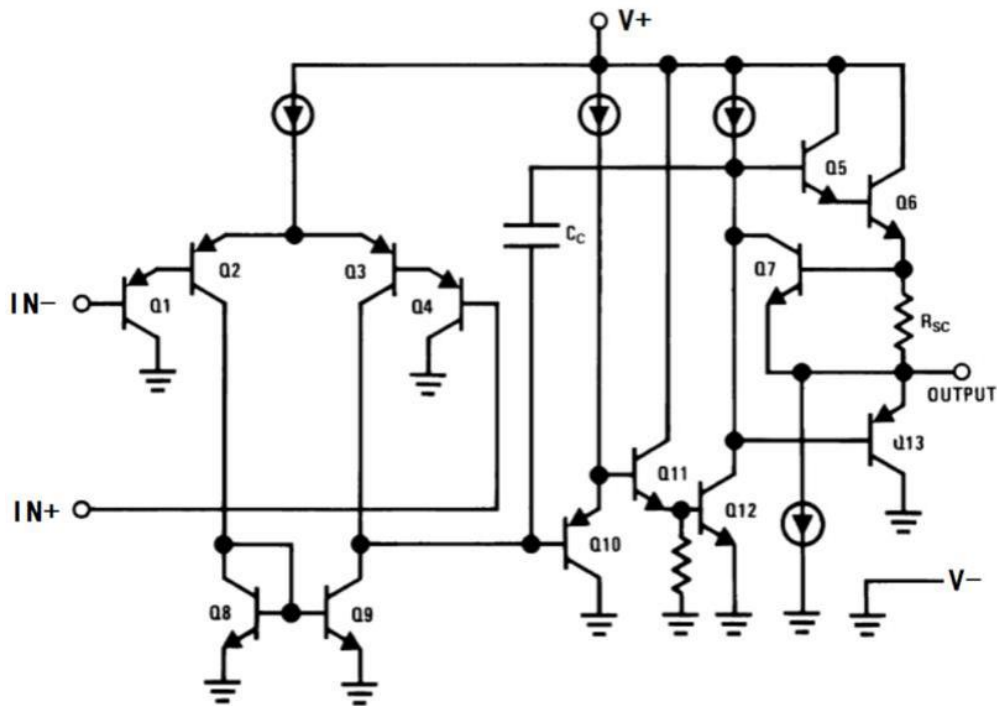
极限参数

项目	符号	极限值 ⁽¹⁾	单位
单电源供电电压	V+	40	V
双电源供电电压	V _S	±20	V
差分输入电压 ⁽²⁾	V _{IDR}	±40	V
共模输入电压	V _{ICR}	-0.3~40V	V
输出短路时间	t _{sc}	连续	
耗散功率	P _D	300	mW
工作温度	T _A	0~70	°C
储存温度	T _S	-65~150	°C
焊接温度	T _W	260, 10s	°C

注：（1）极限值是指无论在任何条件下都不能超过的极限值。如果达到此极限值，将有可能造成产品劣化等物理性损伤；同时在接近极限参数下，不能保证芯片可以正常工作。

（2）输入 IN+与 IN-之间的电压差。

等效原理图

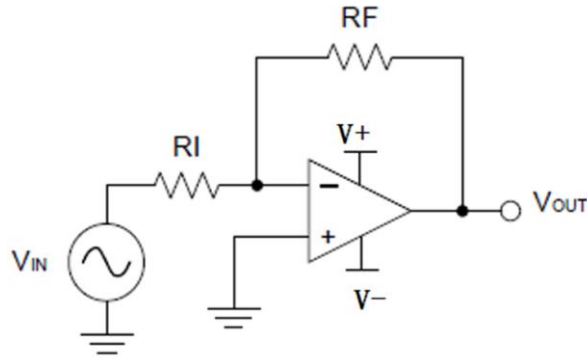


直流电学特性 (T_A=25°C, V₊ =5V, V₋ =GND 除非特别指定)

项目	符号	测试条件	最小值	典型值	最大值	单位	
输入失调电压	V _{IO}	V ₊ =5V to MAX, V _{IC} =V _{ICR} (min), V _O =1.4V	-	5	-	mV	
输入失调电流	I _{IO}	V _O = 1.4 V	-	10	50	nA	
偏置电流	I _{BIAS}	V _O = 1.4 V	-	50	250	nA	
共模输入电压	V _{ICR}	V ₊ =5V to 36V	V ₋	-	V ₊ -1.5V	V	
开环电压增益	AOL	V ₊ =15V, V _O =1V to 11V, R _L ≥2k Ω		100	-	V/mV	
共模抑制比	CMRR	V ₊ =5V to MAX, V _{IC} =V _{ICR} (min)	-	80	-	dB	
单位增益带宽	GBWP		-	1.2	-	MHZ	
电源电压抑制比P _{SSR}	ΔV _{VDD} /ΔV _{IO}	V ₊ =5V to MAX, f=20kHz	-	90	-	dB	
输出高电平电压	V _{OH}	V ₊ =15V, V _{ID} =1V	I _{out} =-50uA	-	13.6	-	V
			I _{out} =-1mA	-	13.5	-	V
			I _{out} =-5mA	-	13.4	-	V
		V ₊ =28V	R _L =2k		26	-	V
输出低电平电压	V _{OL}	V ₊ =15V, V _{ID} =-1V	I _{out} =50uA	-	0.1	-	V
			I _{out} =1mA	-	0.7	-	V
			I _{out} =5mA	-	1.0	-	V
		V ₊ =28V	R _L =2k	-	0.85	-	V
电源工作电流	I _{CC}	V ₊ =5V, V _O =1/2V ₊ , No load	-	0.5	-	mA	
		V ₊ =36, V _O =1/2V ₊ , No load	-	0.8	-	mA	
单电源工作电压	V ₊	V ₋ =0V (GND)	3	-	36	V	
双电源工作电压	V _S	V ₊ , V ₋	-18	-	+18	V	

典型应用

1、线路图



2、设计要求

必须选择大于输入电压范围和输出范围的电源电压。

例如，将信号源 V_{IN} 从 $\pm 0.5\text{ V}$ 放大到 $\pm 1.8\text{ V}$ 。将电源设置为 $\pm 5\text{ V}$ 足以适应此应用要求。

3、设计过程

根据公式(1)计算放大倍数(增益) A_V

$$A_V = -V_O/V_{IN} \quad \text{-----(1)}$$

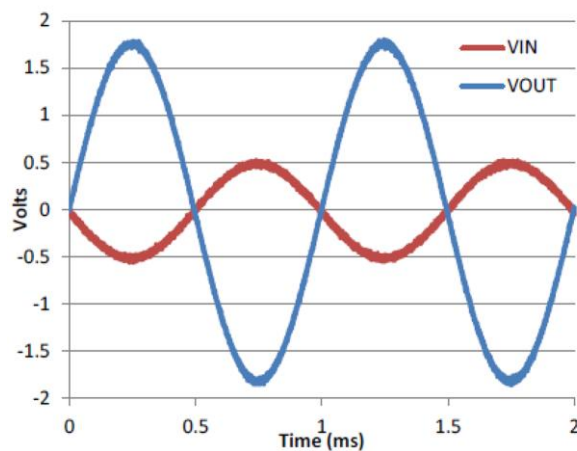
$$A_V = -V_O/V_{IN} = -1.8/0.5 = -3.6$$

一旦确定了所需的增益 A_V ，就要为 R_I 或 R_F 电阻选择一个值。根据运放的电特性及功耗的需要，可选择 $1\text{ k}\Omega$ - $100\text{ k}\Omega$ 范围内的值。本例将选择 $R_I = 10\text{ k}\Omega$ ，则 $R_F = 36\text{ k}\Omega$ 。这由方程式 2 确定。

$$A_V = -R_F/R_I \quad \text{-----(2)}$$

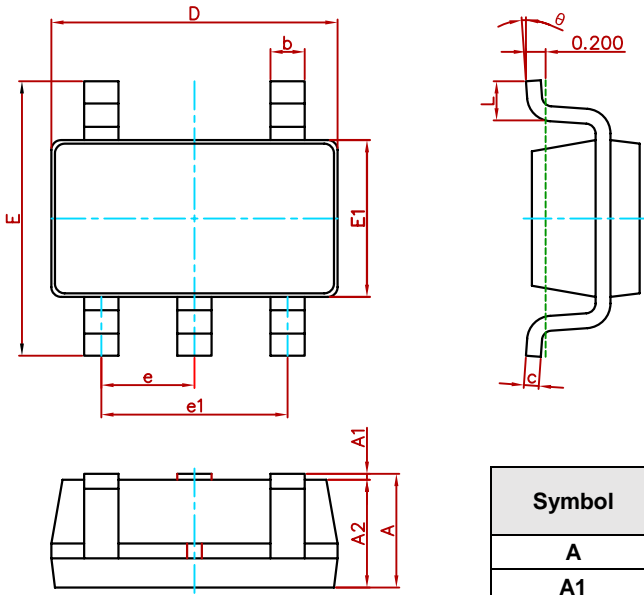
$$R_F = -A_V * R_I = 3.6 * 10 = 36\text{ k}\Omega$$

4、应用曲线图



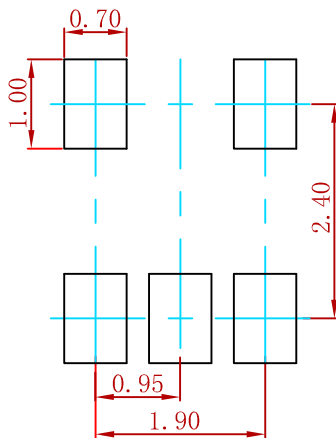
反相放大器的输入电压 VS 输出电压

封装信息



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	2.650	2.950	0.104	0.116
E1	1.500	1.700	0.059	0.067
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

焊盘布局



Note:
 1. Controlling dimension: in millimeters.
 2. General tolerance: ±0.05mm.
 3. The pad layout is for reference purposes only.

订购信息

P/N	PKG	QTY
LM321	SOT-23-5	3000

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