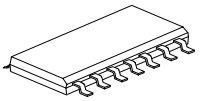
概述：

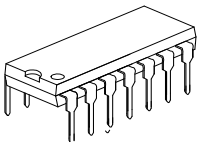
HLM2902DR为高性能、具有四个独立的运算放大器，内含相位补偿电路，适用于收录机和音调系统作音调均衡网络，也用于其他场合。

采用 14 引线双列直插式塑料封装 DIP14，

功耗 720mW,以及贴片 SOP14 封装,功耗 400mW。



SOP14



DIP14

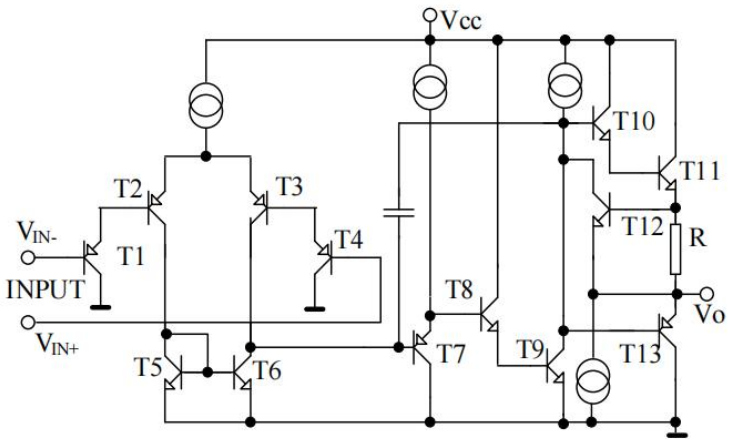
主要特点：

- 无需外接相位补偿电路
- 电源电压范围宽：单电源时，Vcc=3~32V，
  双电源时， Vcc=±1.5V~16V
- 功耗电流小:Icc=0.6mA（典型）（RL=∞）
- 输入电压范围可接近地电平

原理简介

LM2902由四个完全相同的运算放大器组成， 单元电路如图所示,其工作原理简要 说明如下： 输入信号加到T1、T4基极， 经差分放大后；T8 、T9于复合放大构成中间级； 输出级由T10~T13组成。其中T12为保护管， 当输出电流过大时， R上压降增大使T12饱和导 通， T12集电极电位下降， 接近1/2Vcc，使得推挽管T10 、T11和T13截止，从而起到保护作用。电容C为相位补偿电容。

内部电路图



引出端功能符号

引出端序号	功 能	符 号	引出端序号	功 能	符 号
1	输出 1	OUT1	8	输出 3	OUT3
2	反向输入 1	IN- (1)	9	反向输入 3	IN- (3)
3	正向输入 1	IN+(1)	10	正向输入 3	IN+(3)
4	电源	Vcc	11	地	GND
5	正向输入 2	IN+(2)	12	正向输入 4	IN+(4)
6	反向输入 2	IN- (2)	13	反向输入 4	IN- (4)
7	输出 2	OUT2	14	输出 4	OUT4

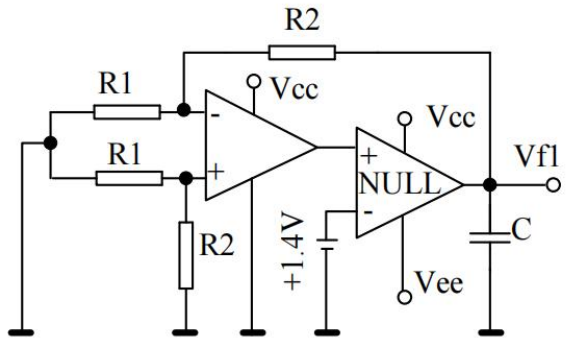
极限值（绝对最大额定值，若无其它规定，Tamb=25℃）

参 数	符 号	测 试 条 件	额 定 值	单 位
电源电压	Vcc		32	V
差动输入电压	V_{ID}		32	V
最大输入电压	V_{IN}		-0.3~32	V
允许功耗	P_D	DIP-14 SOP-14	720 400	mW
工作温度	Topr		0~+70	℃
贮存温度	Tstg		-55~+125	℃

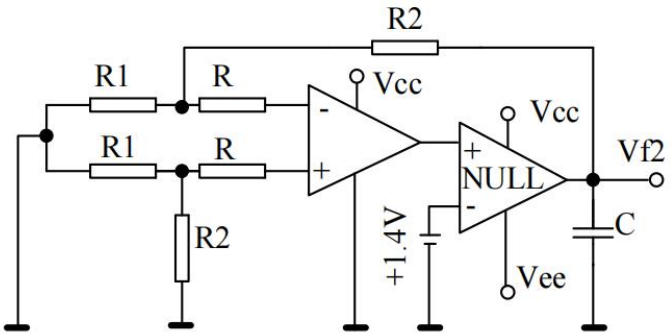
电特性 （若无其它规定，Vcc=5V，Tamb=25℃）

参数	符号	测试条件	最小植	典型值	最大值	单位
失调输入电压	V_{IO}			±2	±5	mV
输入失调电流	I_{IO}	Iin(+)/Iin(-)		±5	±50	nA
输入偏置电流	I_{BA}			45	250	nA
共模输入电压范围	V_{ICM}		0		Vcc-1.5	V
共模抑制比	K_{CMR}		65	80		dB
强信号电压增益	G_V	Vcc=15V,R_L ≥2 kΩ	25	100		V/mV
输出电压范围	Vo		0		Vcc-1.5	V
电源纹波抑制比	PSRR		65	100		dB
通 道 分 离	C_S	f=1kHz~20kHz		120		dB
静态消耗电流(1)	Icc	Vcc=5V		0.6	2	mA
静态消耗电流(2)	Icc	Vcc=30V		1.5	3	mA
输出拉电流	Io	Vin+=1V,Vin⁻=0V	20	35		mA
输出灌电流	Io	Vin+=0V,Vin⁻=1V	10	13		mA

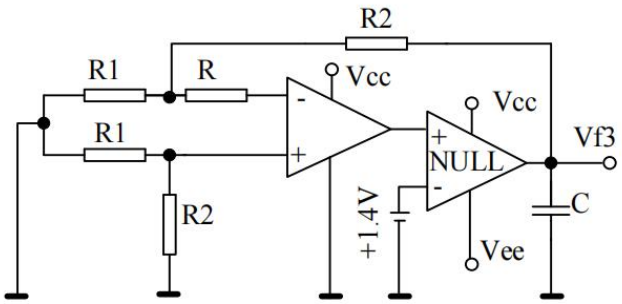
测试原理图（注：NULL 指零放大器）

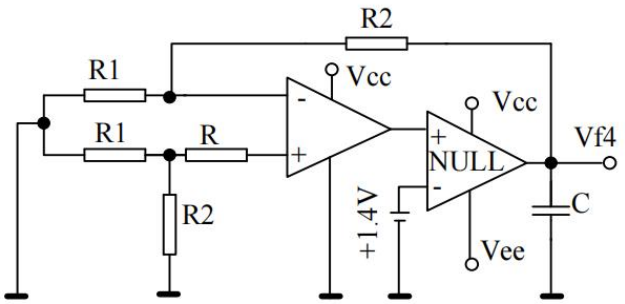


Vio=Vf1/（1+R2/R1）
输入失调电压 Vio 测试图

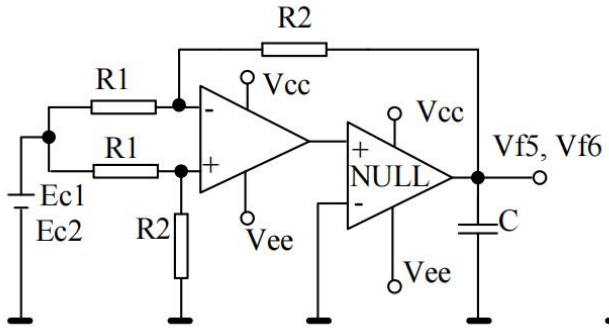


Iio=（Vf2-Vf1）/R（1+R2/R1）
输入失调电流 Iio 测试图

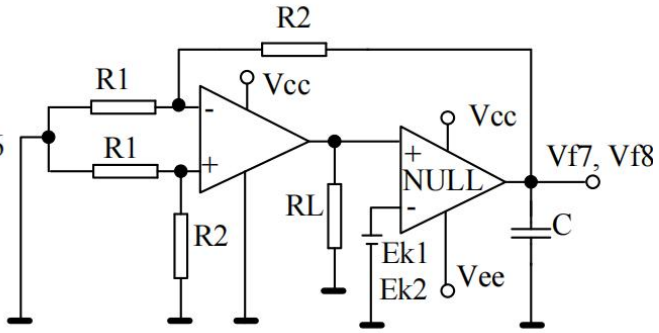




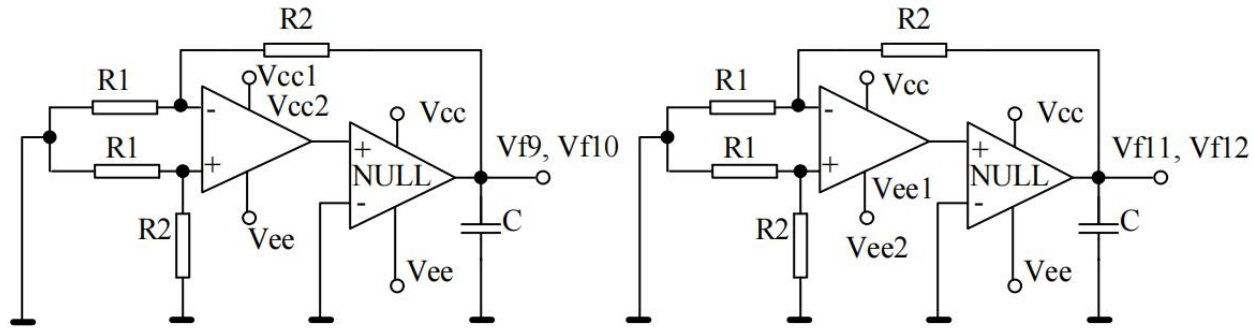
IBA=（Vf4-Vf3）/2R（1+R2/R1）
输入偏置电流 IBA 测试图



CMR=20log|（Ec1-Ec2）(1+R2/R1）/（Vf5-Vf6|
共模抑制比 CMR 及共模输入电压范围 VICM 测试图

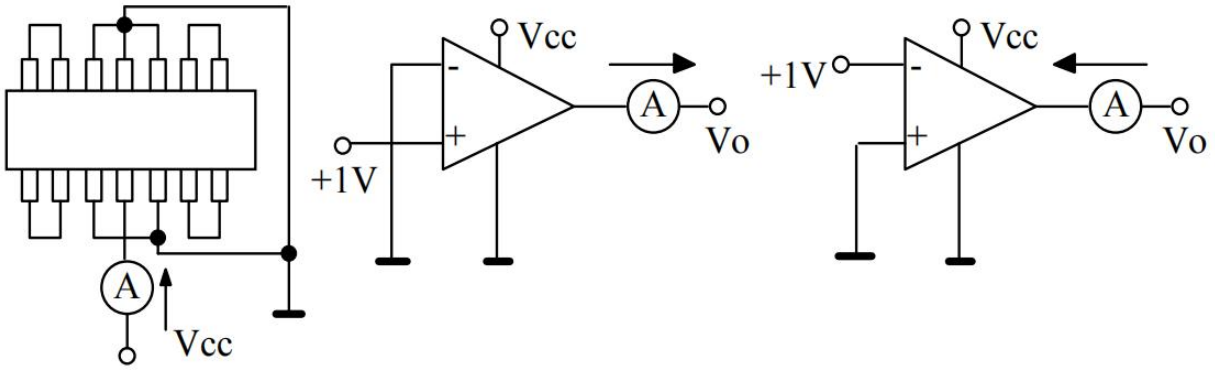


Gv=（Ek1-Ek2）(1+R2/R1）/（Vf8-Vf7）
电压增益 Gv 测试图

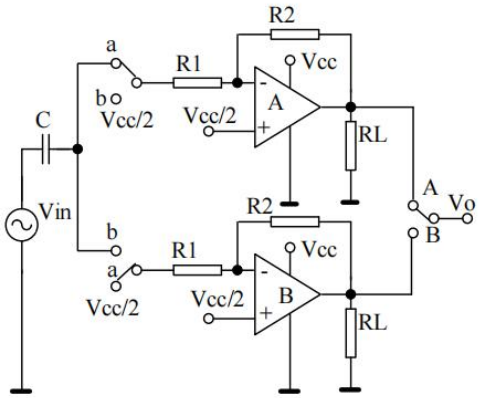


PSRR（+）=20log|（Vcc1-Vcc2）(1+R2/R1)/（Vf9-Vf10）|　PSRR（-）=20log|（Vee1-Vee2）(1+R2/R1)/（Vf11-Vf12|

电源纹波抑制比 PSRR 测试图



消耗电流 Icc 及输出电流 Io 测试图



通道分离度 Cs 测试图

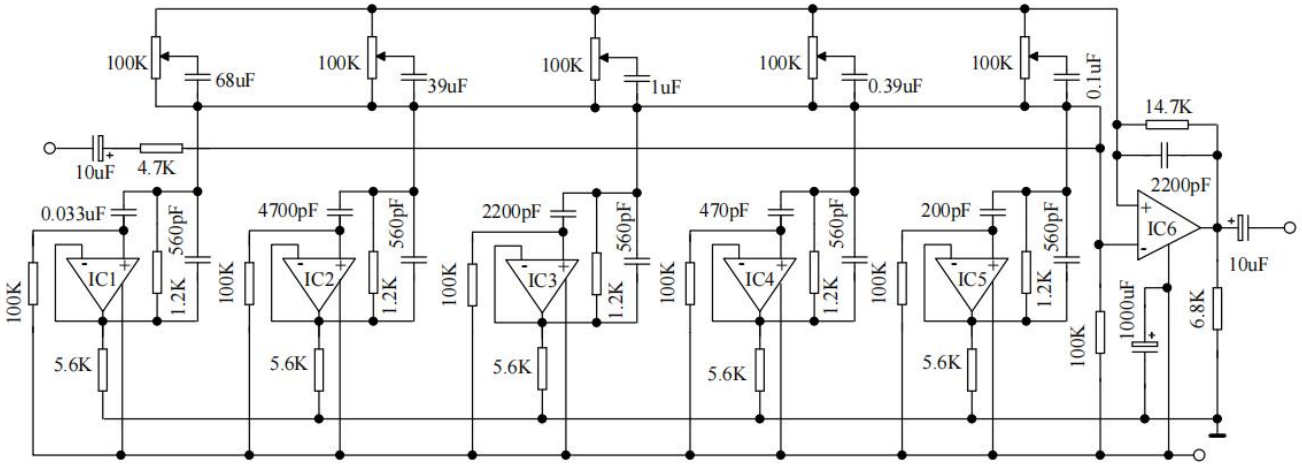
SW：A

Cs（A　B）=20log（R2*VOA）/（R1*VOB）

SW：B

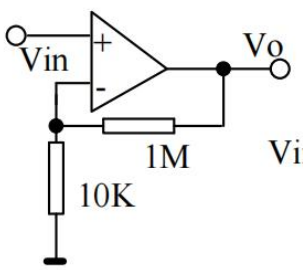
Cs（B　A）=20log（R2*VOB）/（R1*VOA）

应用图

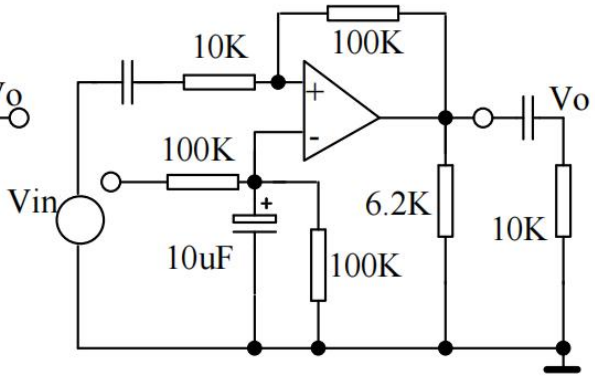


LM2902 用于五频率音调控制电路

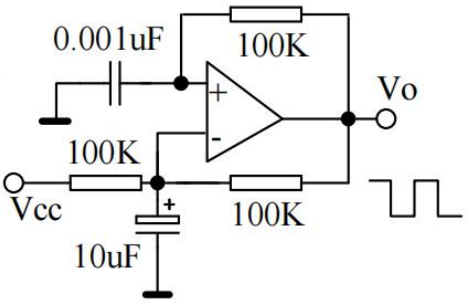
直流放大器



倒相放大器

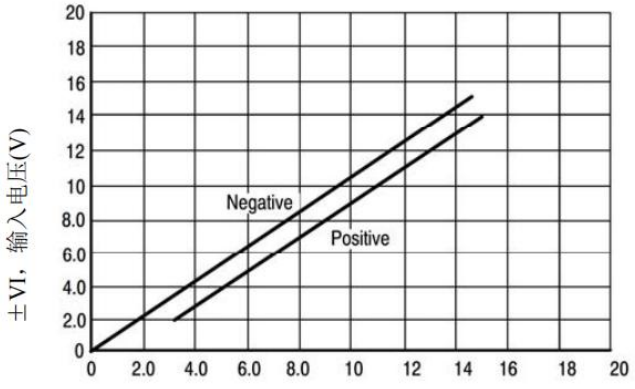


矩形波发生器

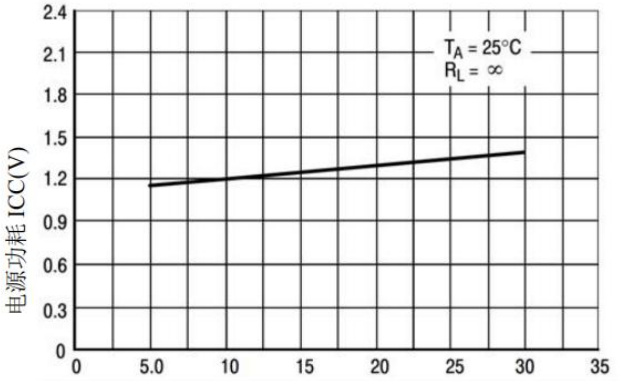


HLM2902DR 的其它应用

特性曲线



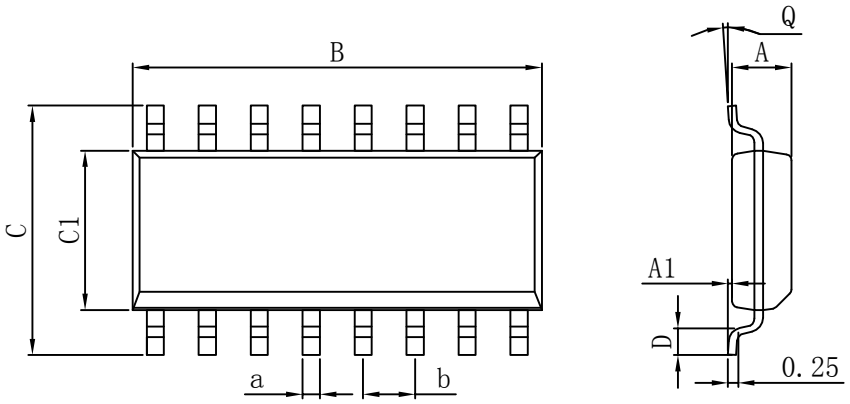
输入电压范围



电源功耗

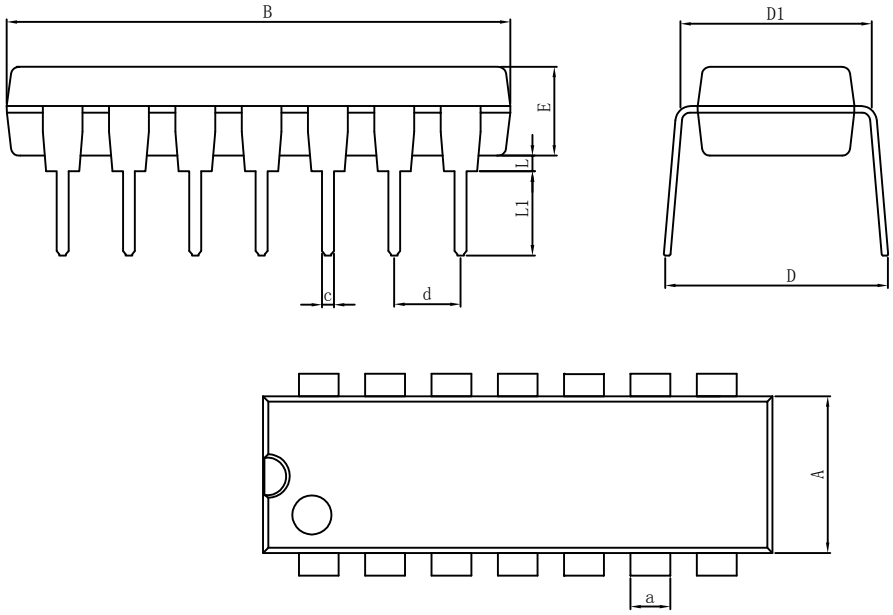
应用

SOP-14



UNIT: mm							
DIM.	MIN	TYP	MAX	DIM.	MIN	TYP	MAX
A	4.520	4.570	4.620	a	0.400	0.420	0.440
A1	0.100	–	0.250	b	1.260	1.270	1.280
B	8.500	8.750	9.000	Q	0°	–	8°
C	5.800	6.100	6.250				
C1	3.800	3.900	4.000				
D	0.400	–	0.950				

DIP-14



UNIT: mm							
DIM.	MIN	TYP	MAX	DIM.	MIN	TYP	MAX
A	6.100	6.300	6.680	a	1.504	1.524	1.544
B	18.940	19.200	19.560	c	0.437	0.457	0.477
D	8.200	8.700	9.200	d	2.530	2.540	2.550
D1	7.42	7.62	7.82	L	0.500	–	0.800
E	3.100	3.300	3.550	L1	3.000	3.200	3.600

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