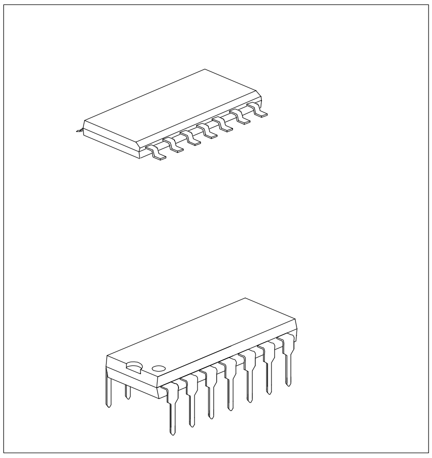
概述：

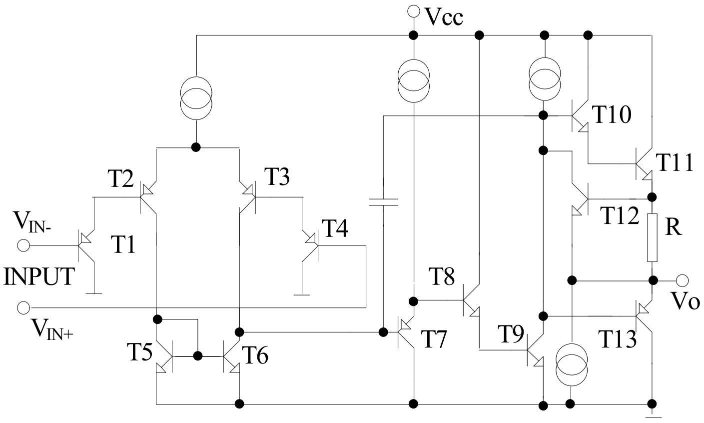
本电路为高性能、具有四个独立的运算放大器，内含相位补偿电路，适用于收录机和音调系统作音调均衡网络，也用于其他场合。采用 SOP14/DIP14塑料封装.



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=3~20V，双电源时，Vcc=±1.5V~10V
- 功耗电流小:Icc=0.7mA（典型）（RL=∞）
- 输入电压范围可接近地电平

内部电路图



原理简介

324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 T_1、T_4 基极，经差分放大后；T_8、T_9 于复合放大构成中间级；输出级由 T_{10}~T_{13} 组成。其中 T_{12} 为保护管，当输出电流过大时，R 上压降增大使 T_{12} 饱和导通，T_{12} 集电极电位下降，接近 1/2Vcc，使得推挽管 T_{10}、T_{11} 和 T_{13} 截止，从而起到保护作用。电容 C 为相位补偿电容。

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	OUT$_1$	8	输出 3	OUT$_3$
2	反向输入 1	IN-（1）	9	反向输入 3	IN-（3）
3	正向输入 2	IN+（2）	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	OUT$_2$	14	输出 4	OUT$_4$

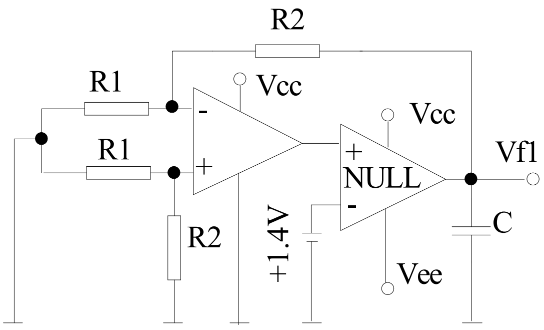
极限值（绝对最大额定值，若无其它规定，Tamb=25℃）

参　　数	符 号	测 试 条 件	额 定 值	单 位
电源电压	Vcc		24	V
差动输入电压	V_{ID}		24	V
最大输入电压	V_{IN}		-0.3~24	V
允许功耗	P_{D}		600	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℃）

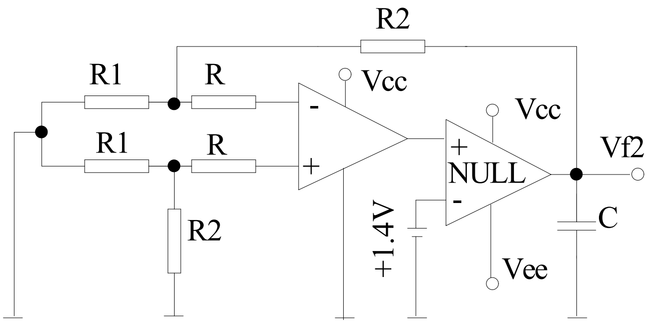
参数	符号	测试条件	最小植	典型值	最大值	单位
失调输入电压	V_{IO}			±2	±7	mV
输入失调电流	I_{IO}	Iin(+)/Iin(-)		±5	±50	nA
输入偏置电流	I_{BA}			45	250	nA
共模输入电压范围	V_{ICM}		0		Vcc-1.5	V
共模抑制比	K_{CMR}		65	80		dB
强信号电压增益	G_{V}	Vcc=15V,R_{L}≥2 kΩ	25	100		V/mV
输出电压范围	Vo		0		Vcc-1.5	V
电源纹波抑制比	PSRR		65	100		dB
通 道 分 离	Cs	f=1kHz~20kHz		120		dB
消耗电流（1）	Icc			0.7	2	mA
消耗电流（2）	Icc	Vcc=20V		1.5	3	mA
输出电流（1）	Io	Vin^{+}=1V,Vin^{-}=0V	20	40		mA
输出电流（2）	Io	Vin^{+}=0V,Vin^{-}=1V	10	20		mA

测试原理图（注：NULL 指零放大器）



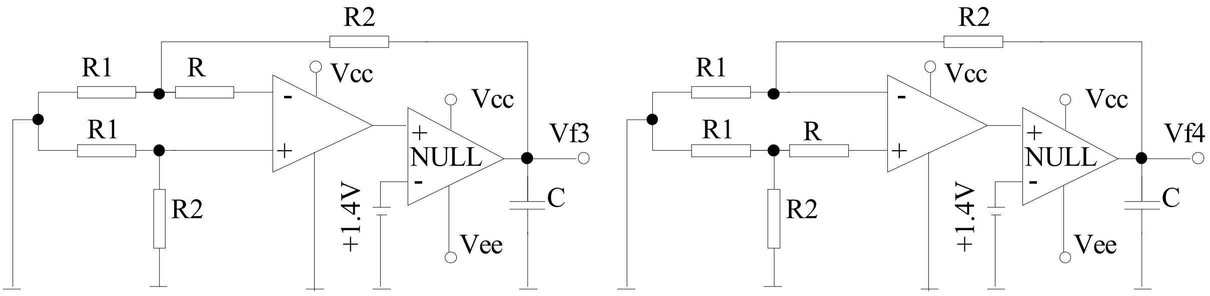
Vio=Vf1/（1+R2/R1）

输入失调电压 Vio 测试图



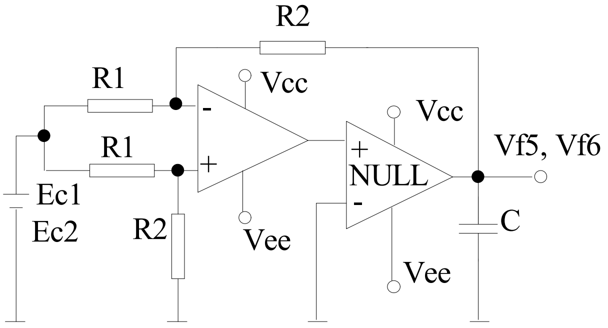
Iio=（Vf2-Vf1）/R（1+R2/R1）

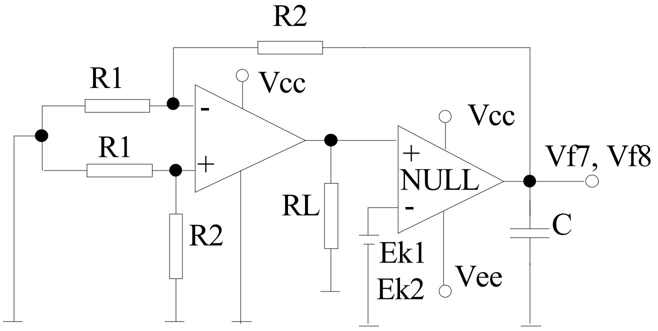
输入失调电流 Iio 测试图



IBA=（Vf4-Vf3）/2R（1+R2/R1）

输入偏置电流 IBA 测试图



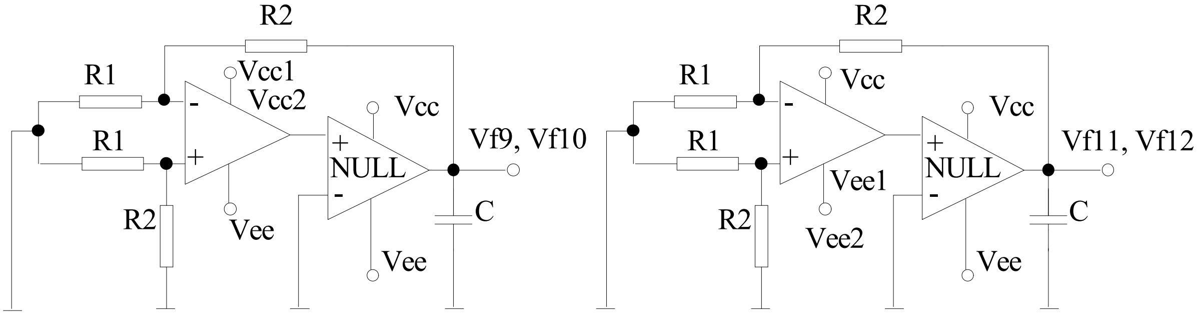


CMR=20log│（Ec1-Ec2）（1+R2/R1）/（Vf5-Vf6│

共模抑制比 CMR 及共模输入电压范围 VICM 测试图

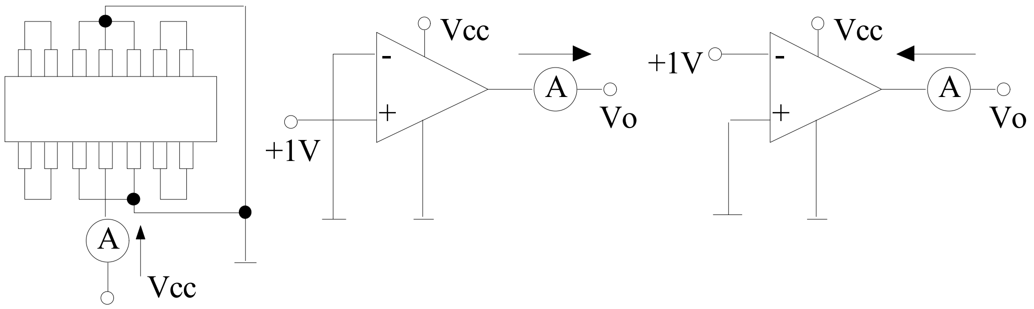
Gv=（Ek1-Ek2）（1+R2/R1）/（Vf8-Vf7）

电压增益 Gv 测试图

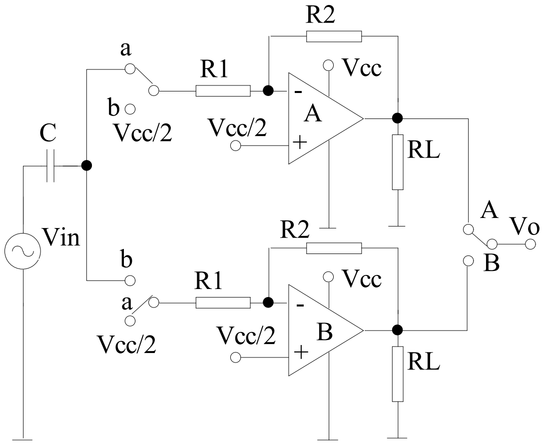


PSRR（+）=20log│（Vcc1-Vcc2）（1+R2/R1）/（Vf9-Vf10）│　　PSRR（-）=20log│（Vee1-Vee2）（1+R2/R1）/（Vf11-Vf12│

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

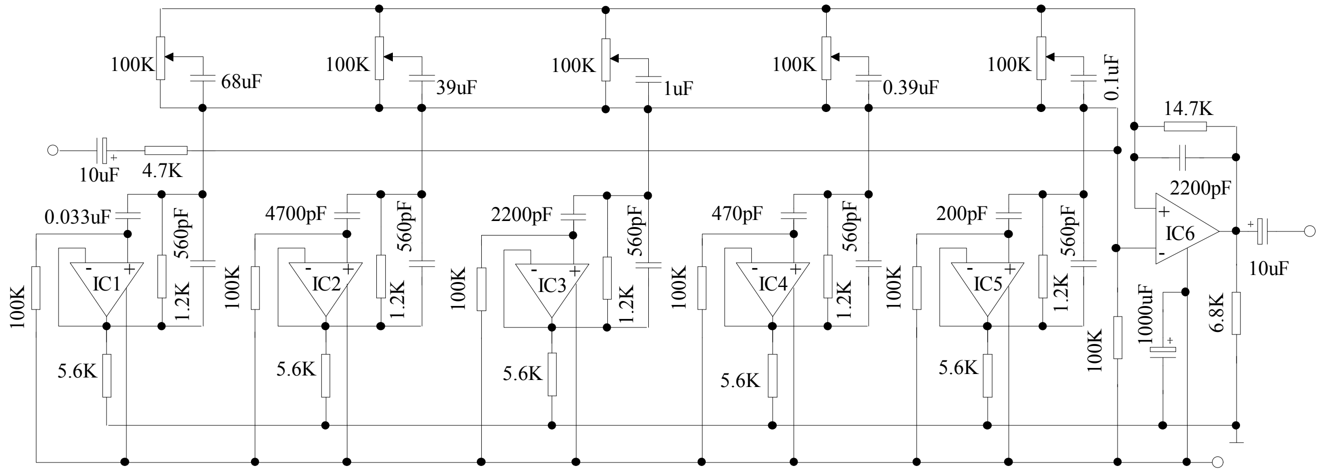
SW：A

Cs（A→B）=20log（R2*V_{OA}）/（R1*V_{OB}）

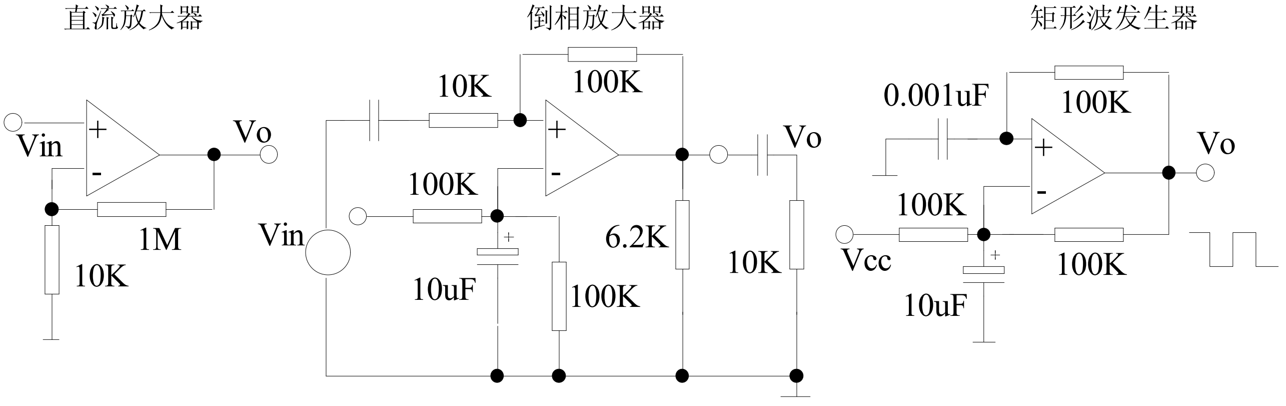
SW：B

Cs（B→A）=20log（R2*V_{OB}）/（R1*V_{OA}）

应用图



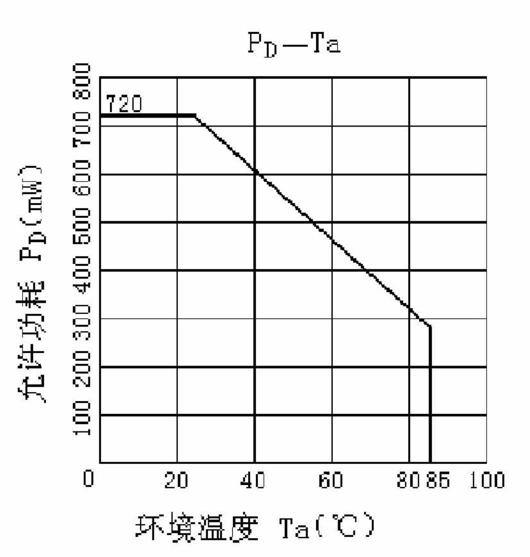
324用于五频率音调控制电路



直流放大器　倒相放大器　矩形波发生器

324的其它应用

特性曲线


PD—Ta
720
允许功耗 PD(mW)
100 200 300 400 500 600 700 800
0
20
40
60
80
85
100
环境温度 Ta(℃)

Attention

■ Any and all HUA XUAN YANG ELECTRONICS products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your HUA XUAN YANG ELECTRONICS representative nearest you before using any HUA XUAN YANG ELECTRONICS products described or contained herein in such applications.

■ HUA XUAN YANG ELECTRONICS assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all HUA XUAN YANG ELECTRONICS products described or contained herein.

■ Specifications of any and all HUA XUAN YANG ELECTRONICS products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer’s products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer’s products or equipment.

■ HUA XUAN YANG ELECTRONICS CO.,LTD. strives to supply high-quality high-reliability products. However, any and all semiconductor products fail with some probability. It is possible that these probabilistic failures could give rise to accidents or events that could endanger human lives, that could give rise to smoke or fire, or that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.

■ In the event that any or all HUA XUAN YANG ELECTRONICS products(including technical data, services) described or contained herein are controlled under any of applicable local export control laws and regulations, such products must not be exported without obtaining the export license from the authorities concerned in accordance with the above law.

■ No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or any information storage or retrieval system, or otherwise, without the prior written permission of HUA XUAN YANG ELECTRONICS CO.,LTD.

■ Information (including circuit diagrams and circuit parameters) herein is for example only ; it is not guaranteed for volume production. HUA XUAN YANG ELECTRONICS believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.

■ Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. When designing equipment, refer to the "Delivery Specification" for the HUA XUAN YANG ELECTRONICS product that you intend to use.