

## General Description

The LR324 consists of four independent, high gain and internally frequency compensated operational amplifiers. It is specifically designed to operate from a single power supply. Operation from split power supply is also possible and the low power supply current drain is independent of the magnitude of the power supply voltages.

The LR324 series are Compatible with Industry standard 324.

The LR324 series are available in 2 Packages: DIP-14 and SOIC-14.

## Features

- Internally Frequency Compensated
- Large Voltage Gain
- Low Input Bias Current
- Low Input Offset Voltage
- Large Output Voltage Swing
- Wide Power Supply Voltage Range:  
Single Supply 3V to 30V or  
Dual Supplies  $\pm 1.5V$  to  $\pm 15V$
- Low Supply Current Drain: 600 $\mu A$

## Applications

- Battery Charger
- Cordless Telephone
- Switching Power Supply



Figure 1. Package Types of LR324

### Pin Configuration

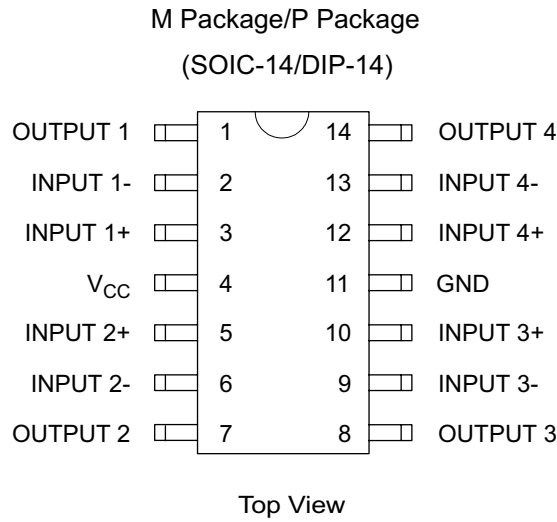


Figure 2. Pin Configuration of LR324

### Functional Block Diagram

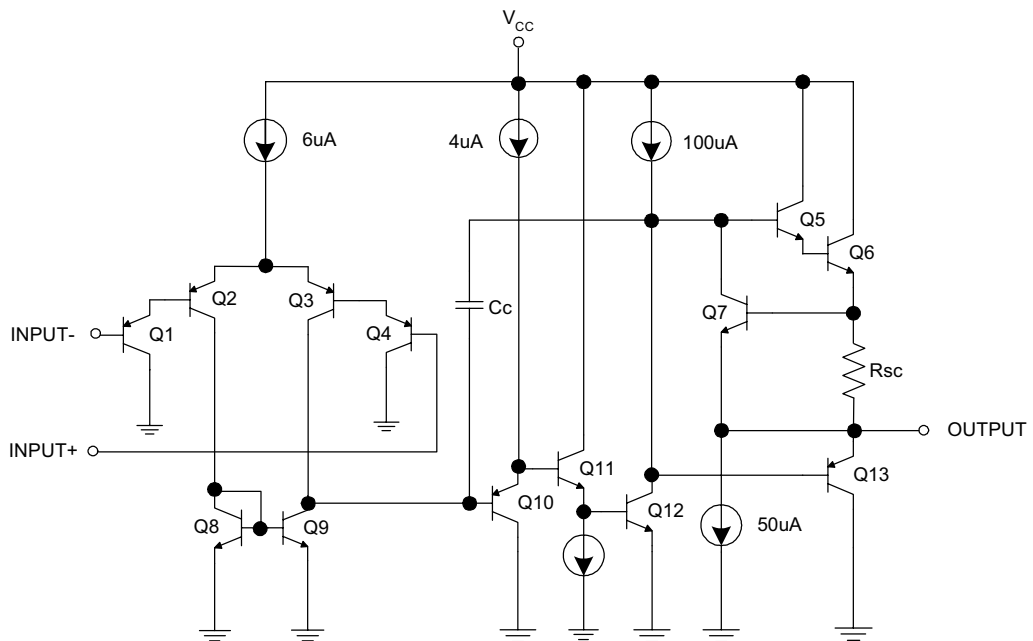


Figure 3. Functional Block Diagram of LR324  
(Each Amplifier)

**Ordering Information**

Package	Temperature Range	Part Number	Packing Type
SOIC-14	-40 to 85°C	LR324M	Tube/Reel
DIP-14		LR324P	Tube

Some of our products are available in Lead Free packages; If buyers need Lead Free product, please add -E1 after the part number in your order. For example, LR358M is a standard tin-lead product, LR358M-E1 means a Lead Free product.

**Absolute Maximum Ratings**

Parameter	Symbol	Value	Unit
Power Supply Voltage	$V_{CC}$	32	V
Differential Input Voltage	$V_{ID}$	32	V
Input Voltage	$V_{IC}$	-0.3 to 32	V
Output Short Circuit to Ground (One Amplifier) $V_{CC} \leq 12V$ and $T_A = 25^\circ C$		Continuous	
Power Dissipation	$P_D$	720	mW
Operating Temperature Range	$T_{OP}$	-30 to 85	°C
Storage Temperature Range	$T_{STG}$	-55 to 125	°C

### Electrical Characteristics

$V_{CC}=+5V$ ,  $GND=0V$ ,  $T_A=25\text{ }^\circ\text{C}$  unless otherwise specified.

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit	
Input Offset Voltage	$V_{IO}$	$V_O: 1.4V$ , $R_S: 0\Omega$ , $V_{CC}$ : from 5V to 15V		2	7	mV	
Input Bias Current	$I_{BIAS}$	$I_{IN^+}$ or $I_{IN^-}$ , $V_{CM}=0V$		45	250	nA	
Input Offset Current	$I_{IO}$	$I_{IN^+}$ or $I_{IN^-}$ , $V_{CM}=0V$		5	50	nA	
Input Common Mode Voltage Range	$V_{IR}$	$V_{CC}=15V$	0		$V_{CC}-1.5$	V	
Supply Current	$I_{CC}$	$R_L = \infty$ , Over full temperature range on all OP Amps		0.6	2	mA	
		$V_{CC}=30V$		1.5	3		
Large Signal Voltage Gain	$G_V$	$V_{CC}=15V$ , $R_L \geq 2K\Omega$ , $V_O=1V$ to 11V	25	100		dB	
Common Mode Rejection Ratio	CMRR	DC, $V_{CC}=15V$ , $V_{CM}=0V$ to $(V_{CC}-1.5)V$	65	80		dB	
Power Supply Rejection Ratio	PSRR	$V_{CC}=5V$ to 15V	65	100		dB	
Channel Separation (Note 6)	CS	$f=1KHz$ to 20KHz (Input Referred)		120		dB	
Output Current	Source	$I_{SOURCE}$	$V_+=1V$ , $V_-=0V$ , $V_{CC}=15V$ , $V_O=2V$	20	40		mA
	Sink	$I_{SINK}$	$V_-=1V$ , $V_+=0V$ , $V_{CC}=15V$ , $V_O=2V$	10	20		mA

### Typical Performance Characteristics

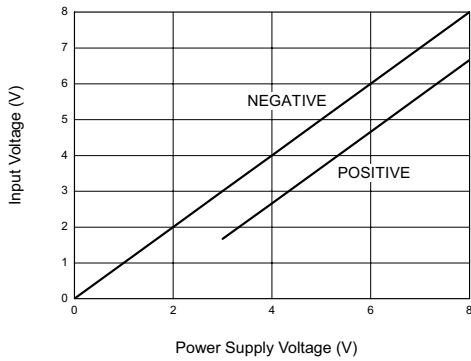


Figure 4. Input Voltage Range

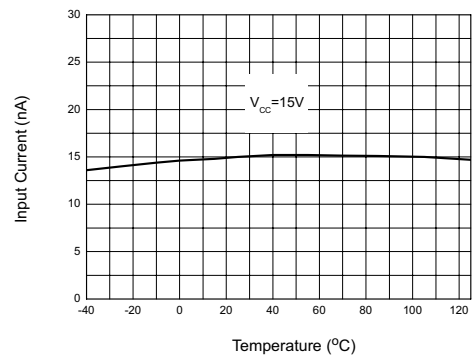


Figure 5. Input Current

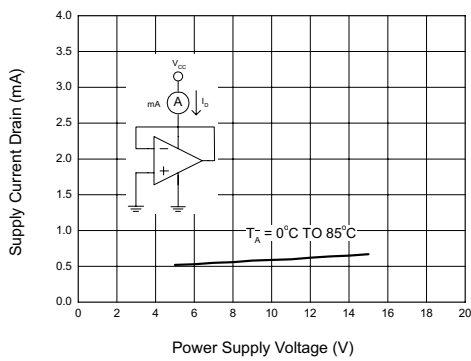


Figure 6. Supply Current

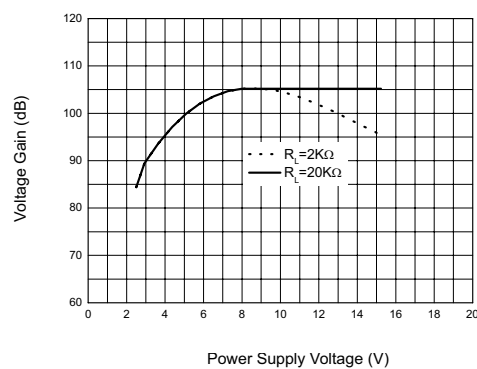


Figure 7. Voltage Gain

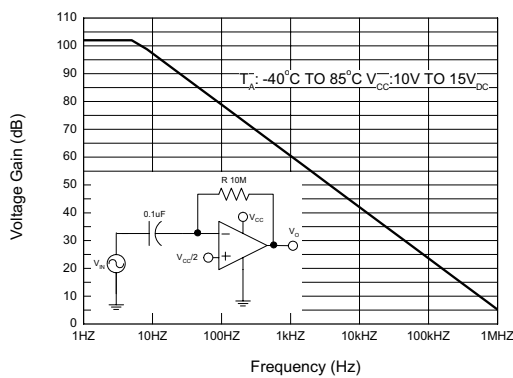


Figure 8. Open Loop Frequency Response

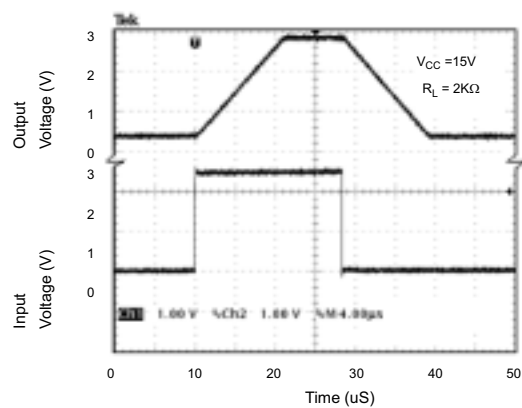


Figure 9. Voltage Follower Pulse Response

### Typical Performance Characteristics (Continued)

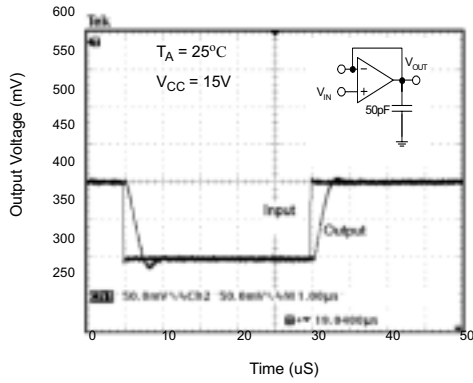


Figure 10. Voltage Follower Pulse Response (Small Signal)

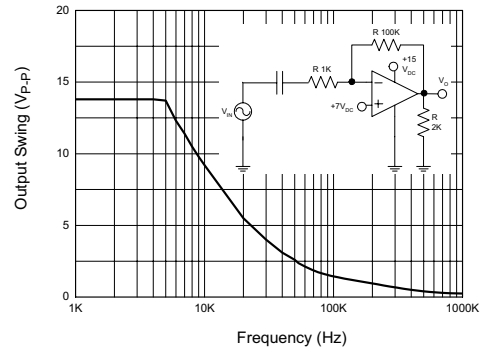


Figure 11. Large Signal Frequency Response

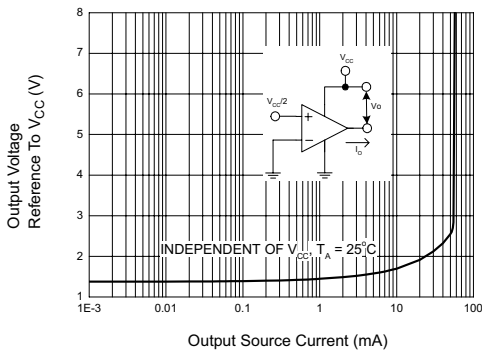


Figure 12. Output Characteristics Current Sourcing

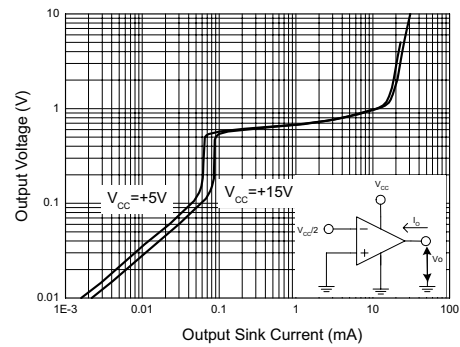


Figure 13. Output Characteristics Current Sinking

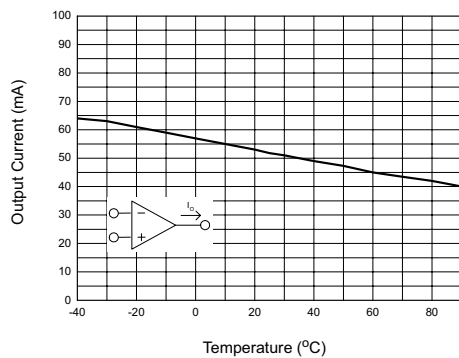


Figure 14. Current Limiting

### Typical Applications

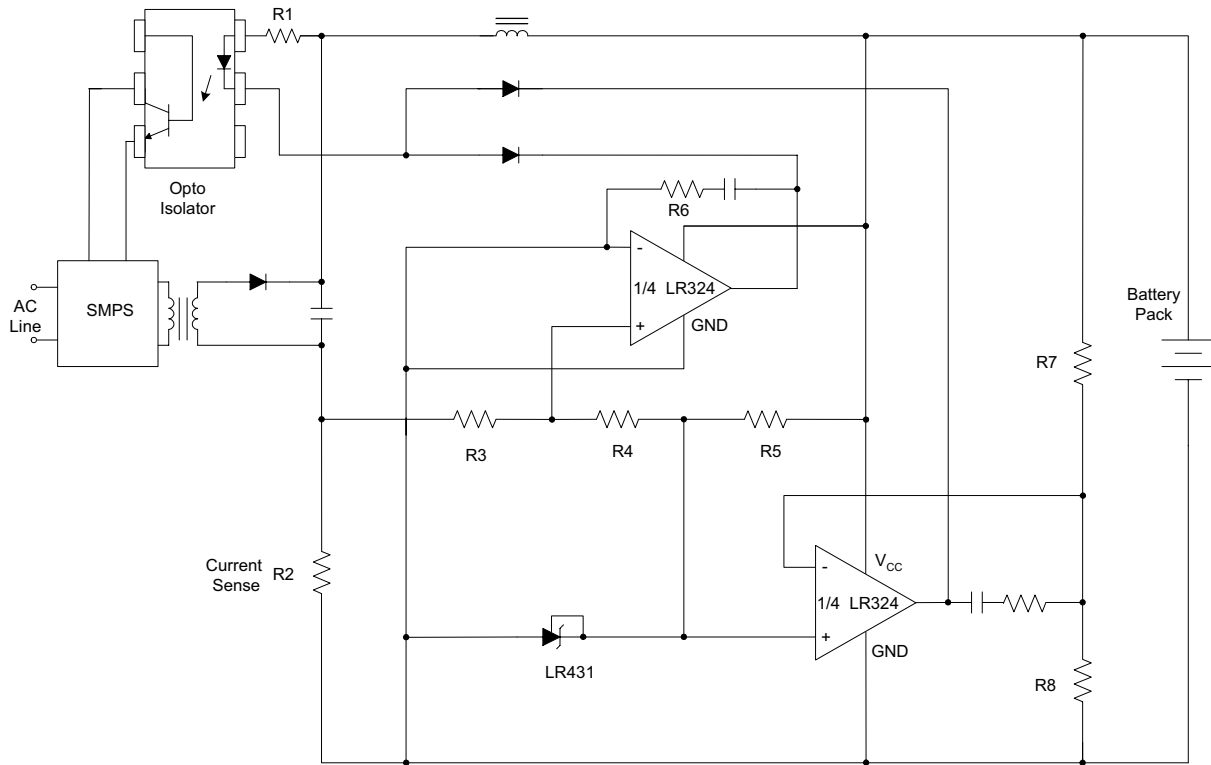


Figure 15. Battery Charger

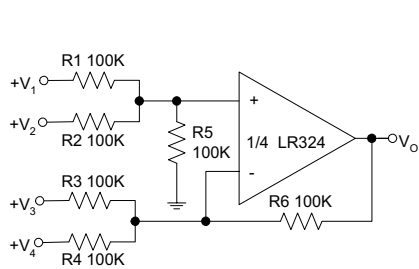


Figure 16. DC Summing Amplifier

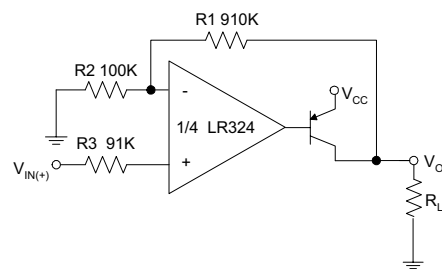


Figure 17. Power Amplifier

Typical Applications (Continued)

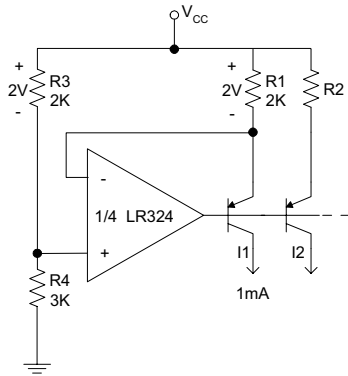


Figure 18. Fixed Current Sources

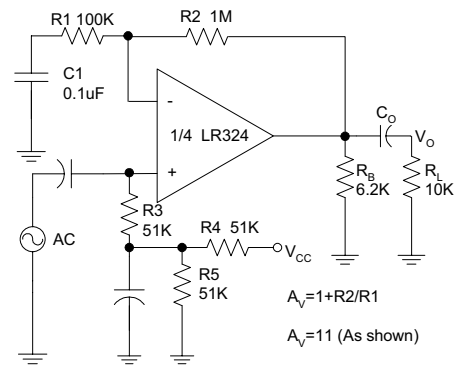


Figure 19. AC Coupled Non-Inverting Amplifier

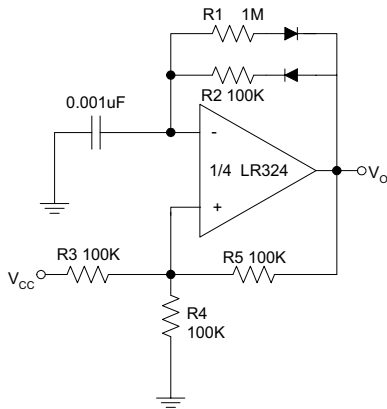


Figure 20. Pulse Generator

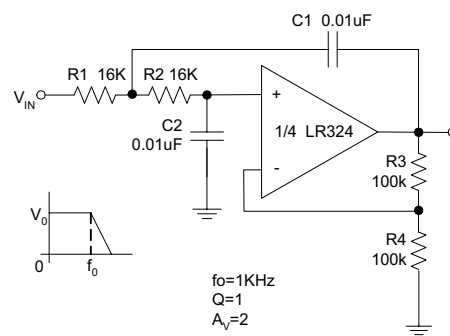


Figure 21. DC Coupled Low-Pass RC Active Filter



**Mechanical Dimensions**

**DIP-14**

**Unit: mm**

