

## 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.

## Package

- Package of LR324 is DIP-14
- Package of LR324D is SOP-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:  $600\mu A$

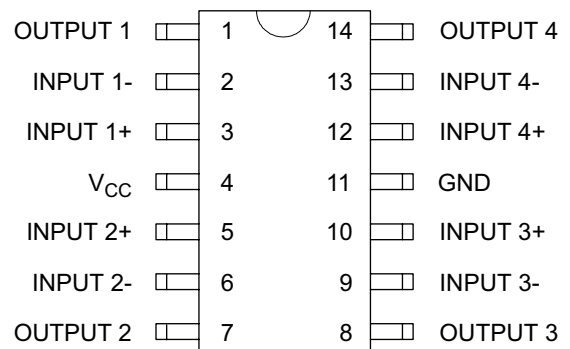
## Applications

- Battery Charger
- Cordless Telephone
- Switching Power Supply



## Pin Configuration

Package/Package  
(DIP-14/SOP-14)



Top View

Figure 1. Pin Configuration of LR324/LR324D

# LR324

## Functional Block Diagram

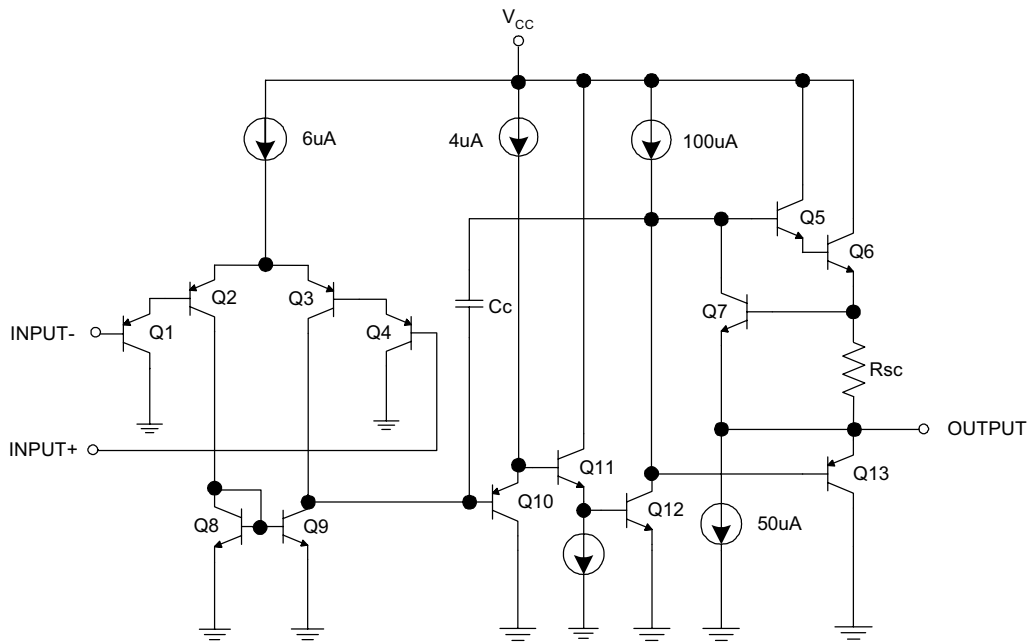


Figure 2. Functional Block Diagram of LR324/LR324D  
(Each Amplifier)

# LR324

## Ordering Information

Package	Temperature Range	Part Number	Packing Type
DIP-14	-40 to 85°C	LR324	Tube
SOP-14		LR324D	Tube

## 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

# LR324

## 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

# LR324

## Typical Performance Characteristics

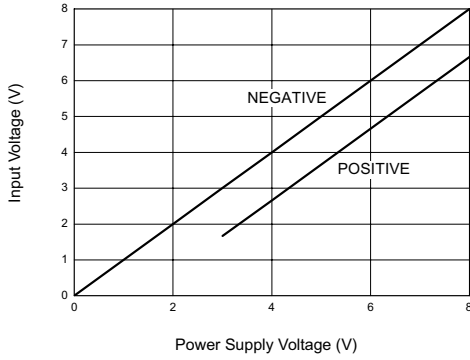


Figure 3. Input Voltage Range

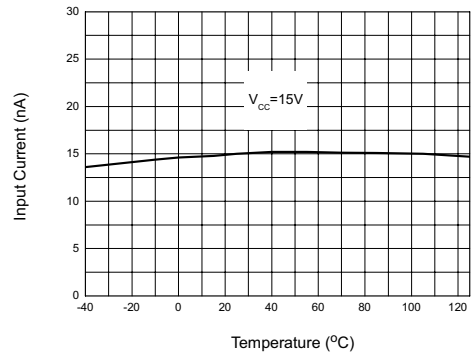


Figure 4. Input Current

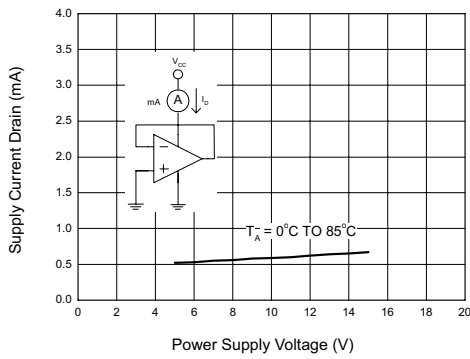


Figure 5. Supply Current

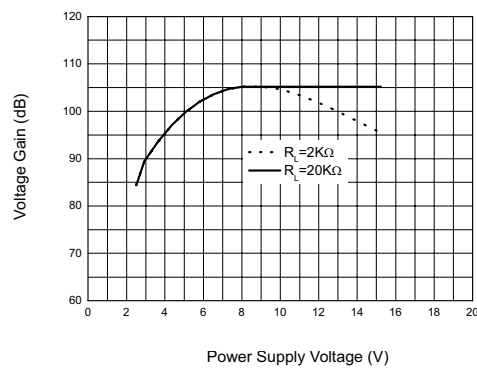


Figure 6. Voltage Gain

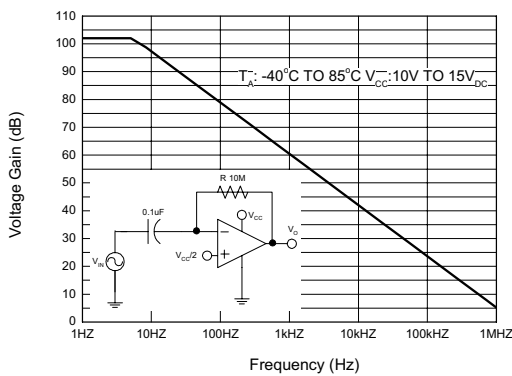


Figure 7. Open Loop Frequency Response

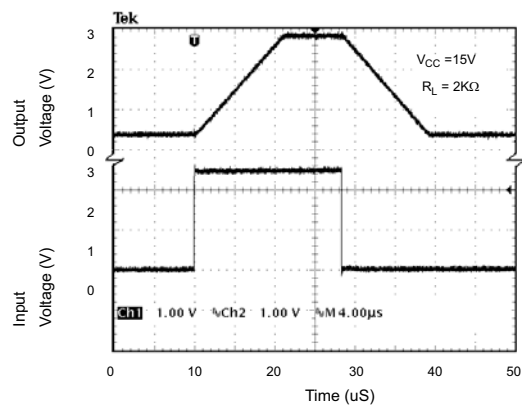


Figure 8. Voltage Follower Pulse Response

# LR324

## Typical Performance Characteristics (Continued)

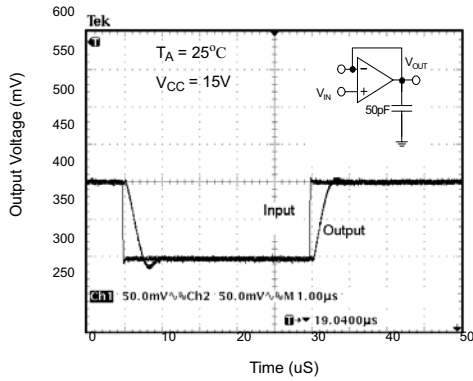


Figure 9. Voltage Follower Pulse Response (Small Signal)

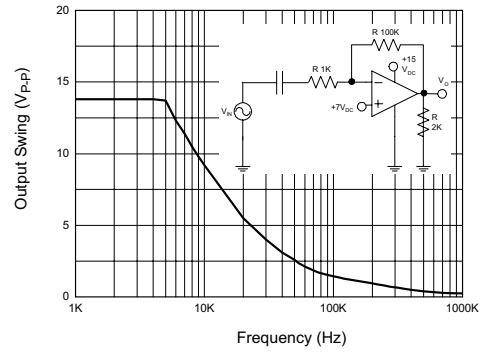


Figure 10. Large Signal Frequency Response

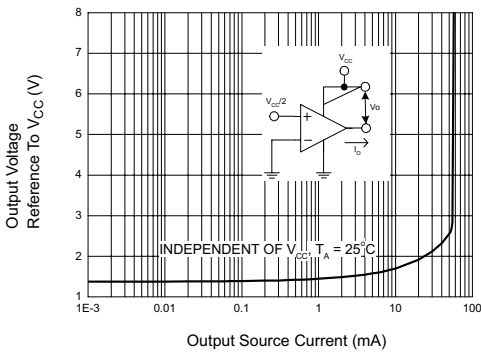


Figure 11. Output Characteristics Current Sourcing

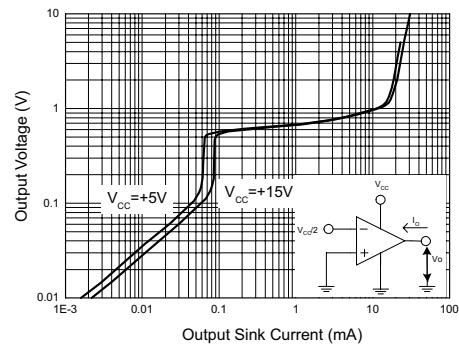


Figure 12. Output Characteristics Current Sinking

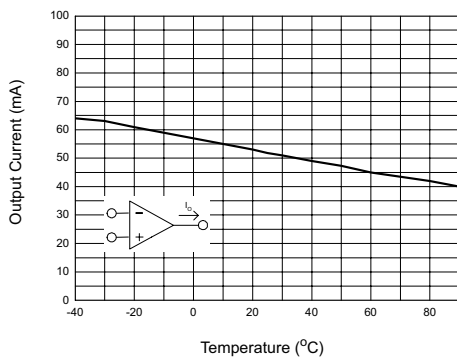


Figure 13. Current Limiting

# LR324

## Typical Applications

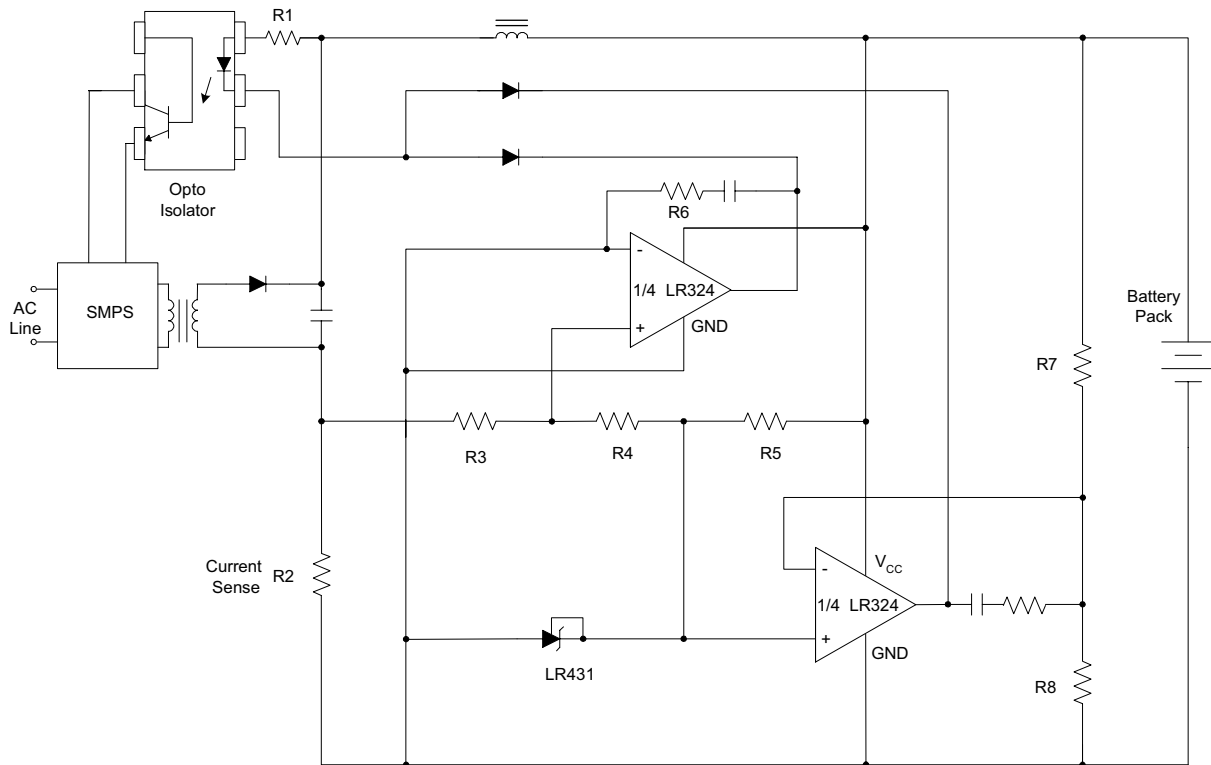


Figure 14. Battery Charger

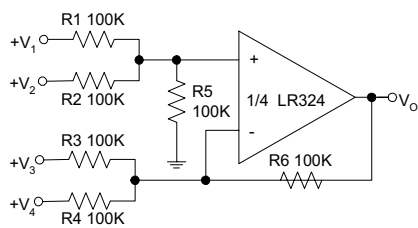


Figure 15. DC Summing Amplifier

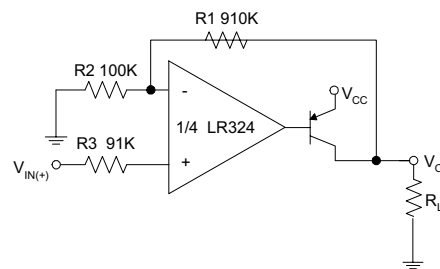


Figure 16. Power Amplifier

# LR324

## Typical Applications (Continued)

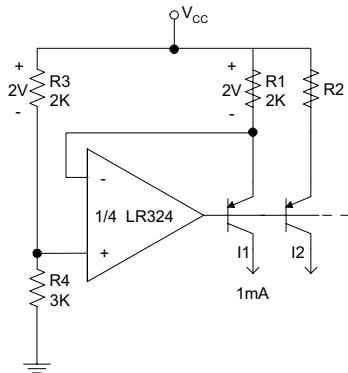


Figure 17. Fixed Current Sources

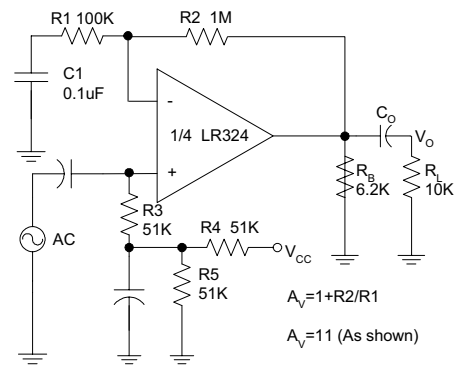


Figure 18. AC Coupled Non-Inverting Amplifier

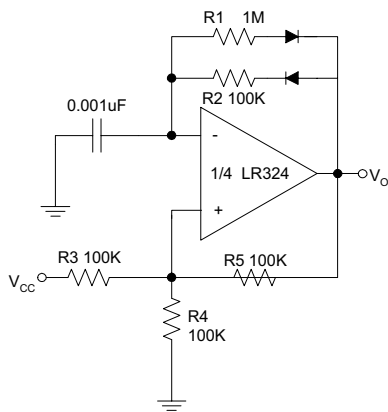


Figure 19. Pulse Generator

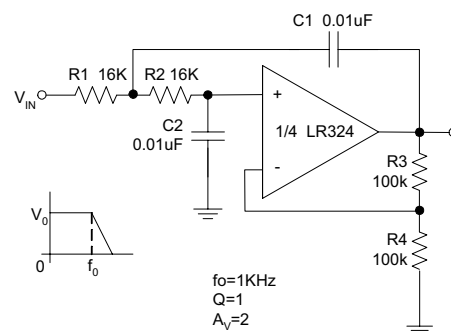


Figure 20. DC Coupled Low-Pass RC Active Filter

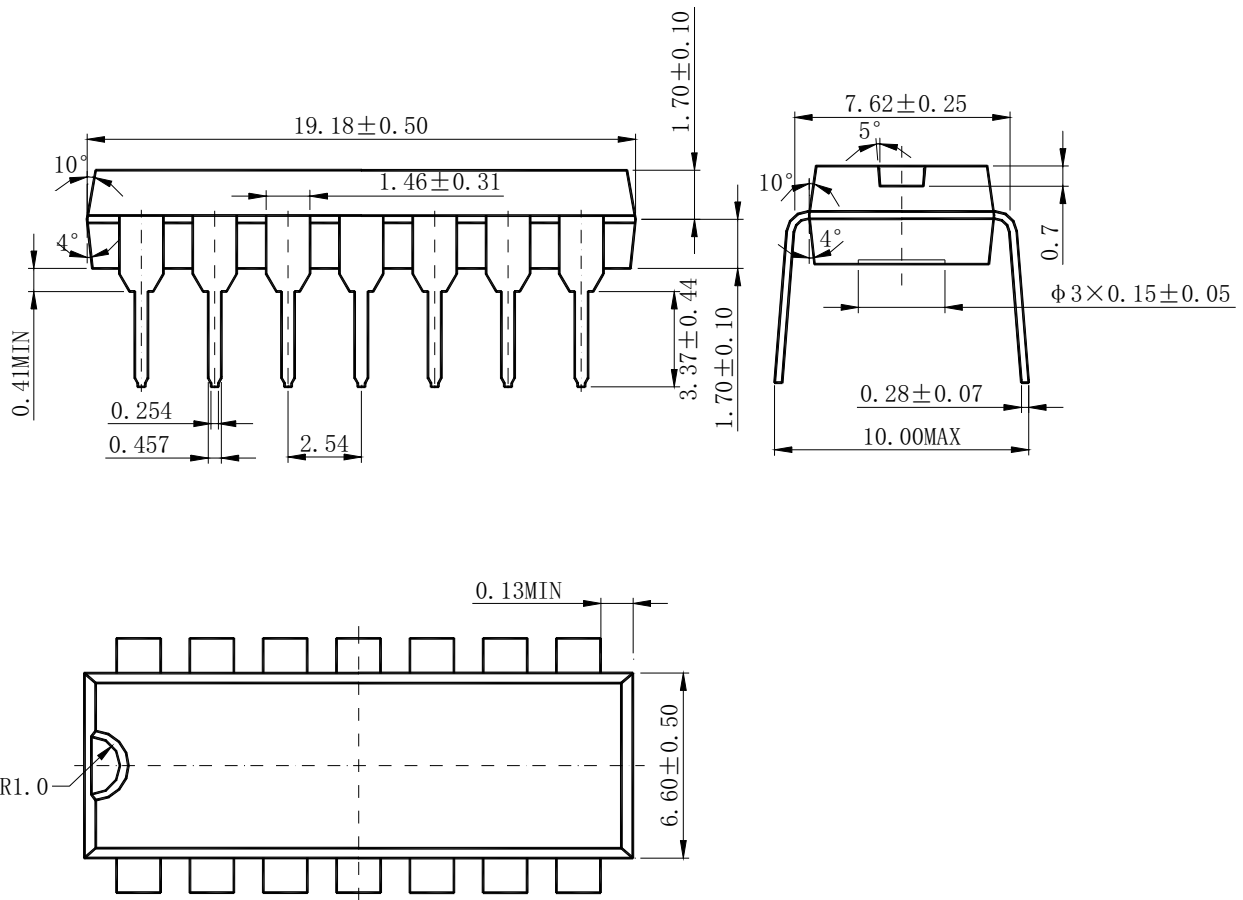


# LR324

## Mechanical Dimensions

DIP-14

Unit: mm



# LR324

## Mechanical Dimensions (Continued)

SOP-14

Unit: mm

