LR324

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.



SOP-14



DIP-14

Package

- **Package of LR324 is DIP-14**
- **Package of LR324D is SOP-14**

Features

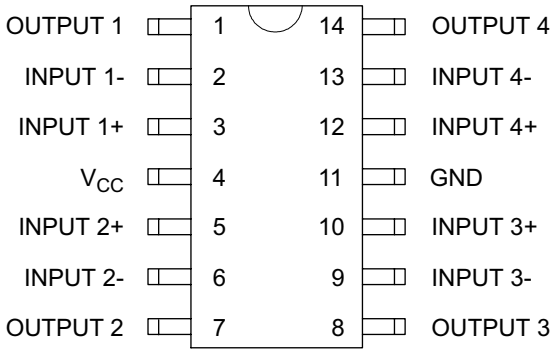
- Internally Frequency Compensated
- Large Voltage Gain
- Low Input Bias Current
- Low Input Offset Voltage
- Large Output Voltage Swing
- Wide Power Supply Voltage Range:
  Single Supply 3V to 30V or
  Dual Supplies ± 1.5V to ± 15V
- Low Supply Current Drain: 600μA

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

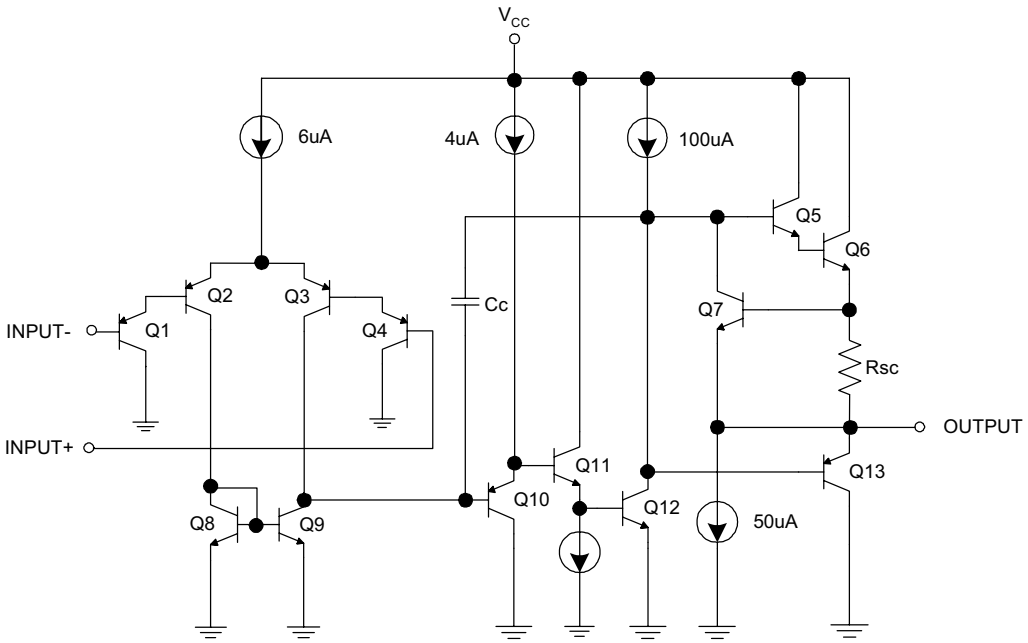


Figure 2. Functional Block Diagram of LR324/LR324D
(Each Amplifier)

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 $T_A = 25°C$		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 °C unless otherwise specified.

Parameter		Symbol	Test Conditions		Min	Typ	Max	Unit
Input Offset Voltage		V_{IO}	V_O: 1.4V, RS: 0Ω, 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= ∞, 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≥ 2KΩ, 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

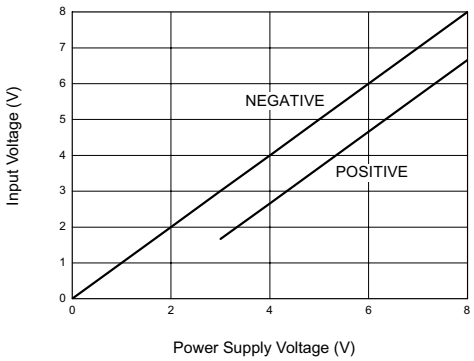


Figure 3. Input Voltage Range

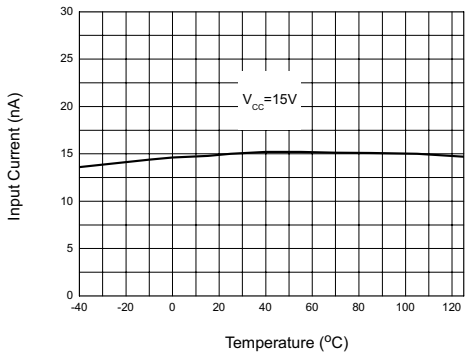


Figure 4. Input Current

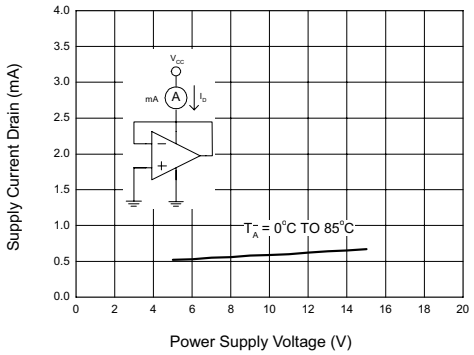


Figure 5. Supply Current

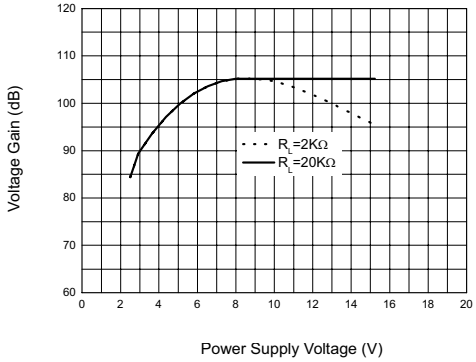


Figure 6. Voltage Gain

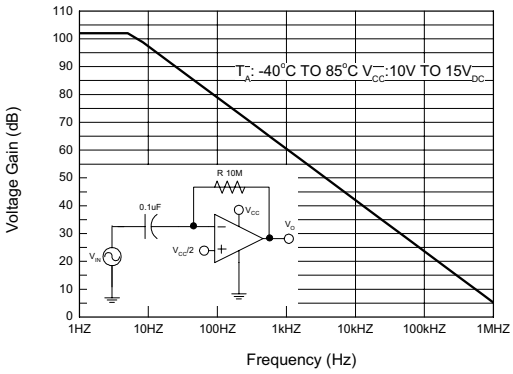


Figure 7. Open Loop Frequency Response

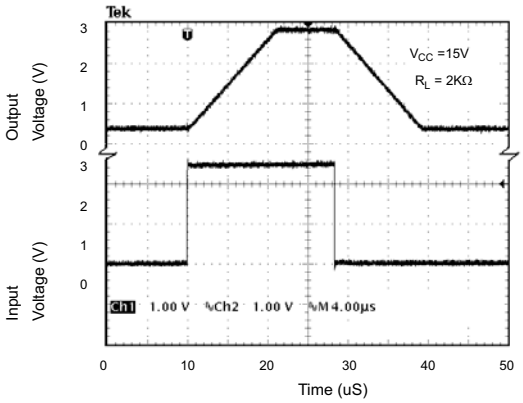


Figure 8. Voltage Follower Pulse Response

Typical Performance Characteristics (Continued)

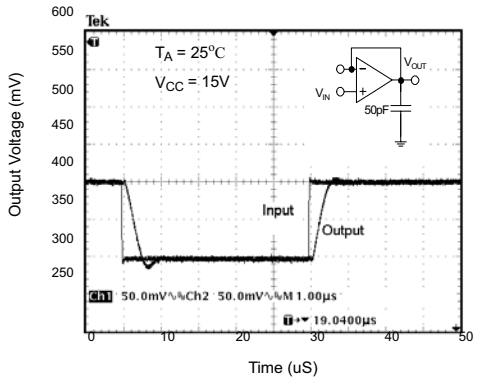


Figure 9. Voltage Follower Pulse Response (Small Signal)

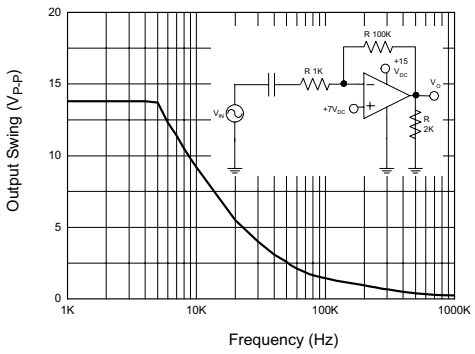


Figure 10. Large Signal Frequency Response

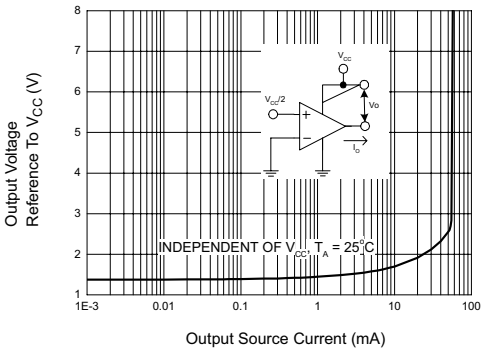


Figure 11. Output Characteristics Current Sourcing

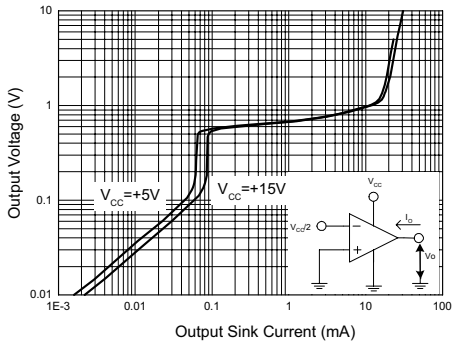


Figure 12. Output Characteristics Current Sinking

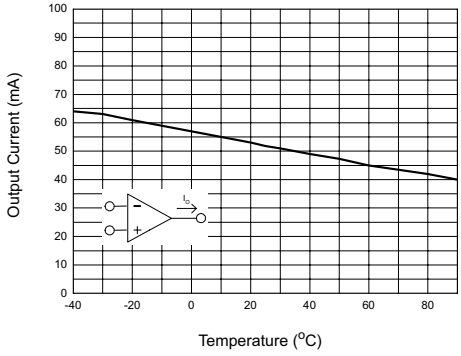


Figure 13. Current Limiting

Typical Applications

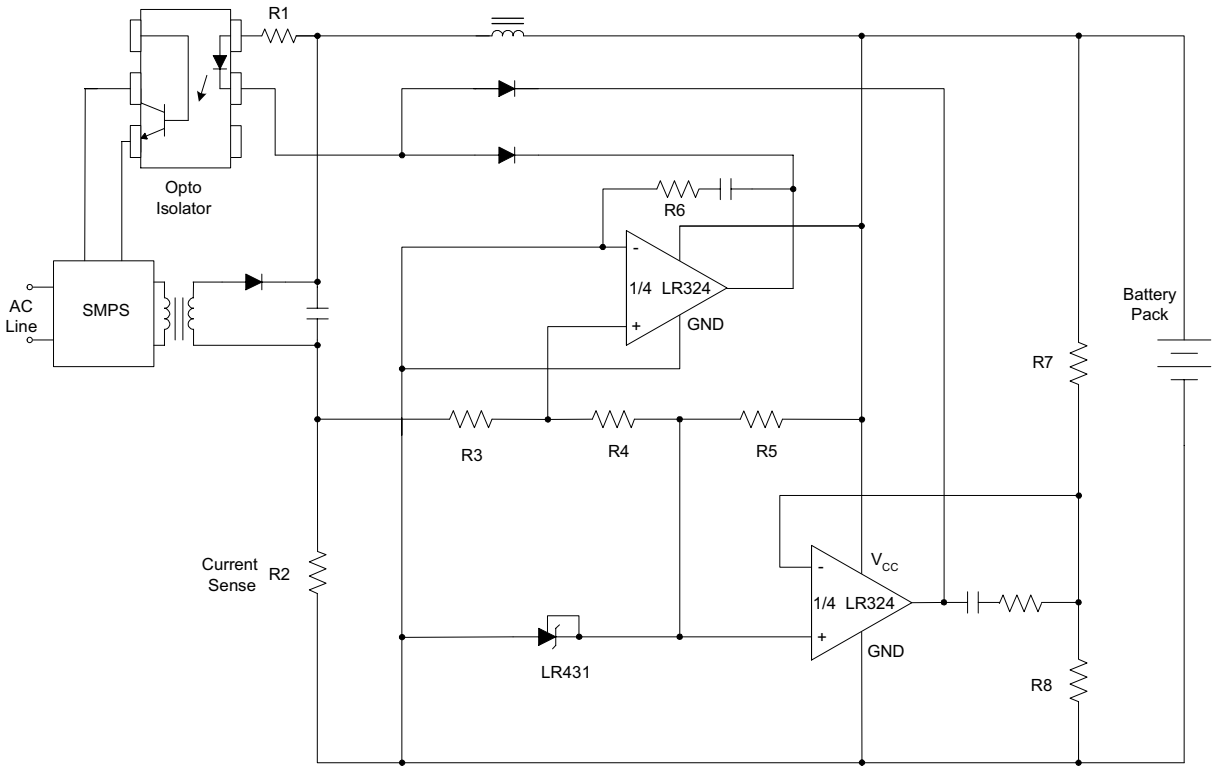


Figure 14. Battery Charger

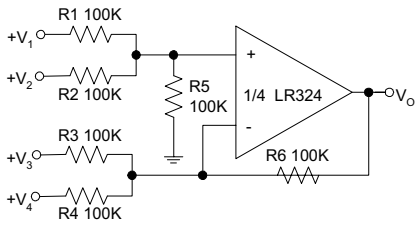


Figure 15. DC Summing Amplifier

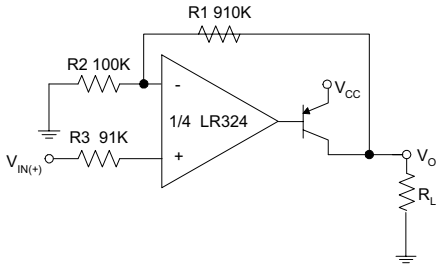


Figure 16. Power Amplifier

LR324

Typical Applications (Continued)

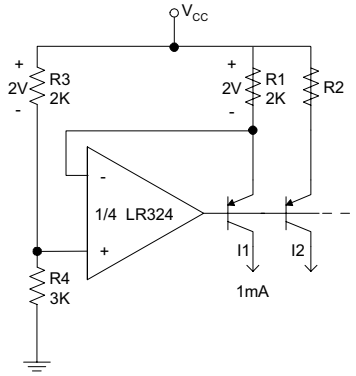


Figure 17. Fixed Current Sources

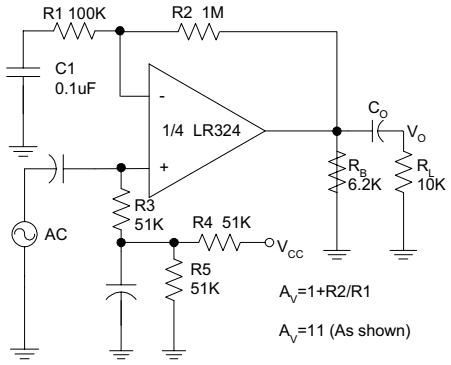


Figure 18. AC Coupled Non-Inverting Amplifier

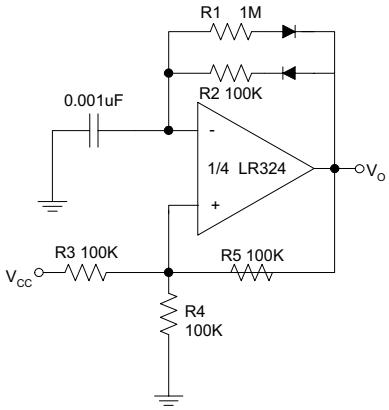


Figure 19. Pulse Generator

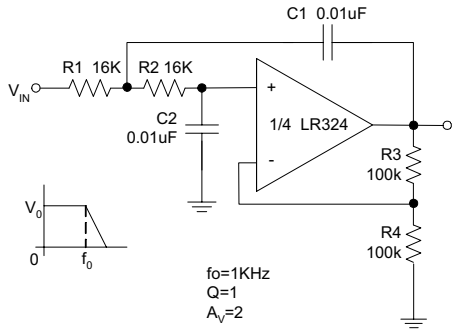
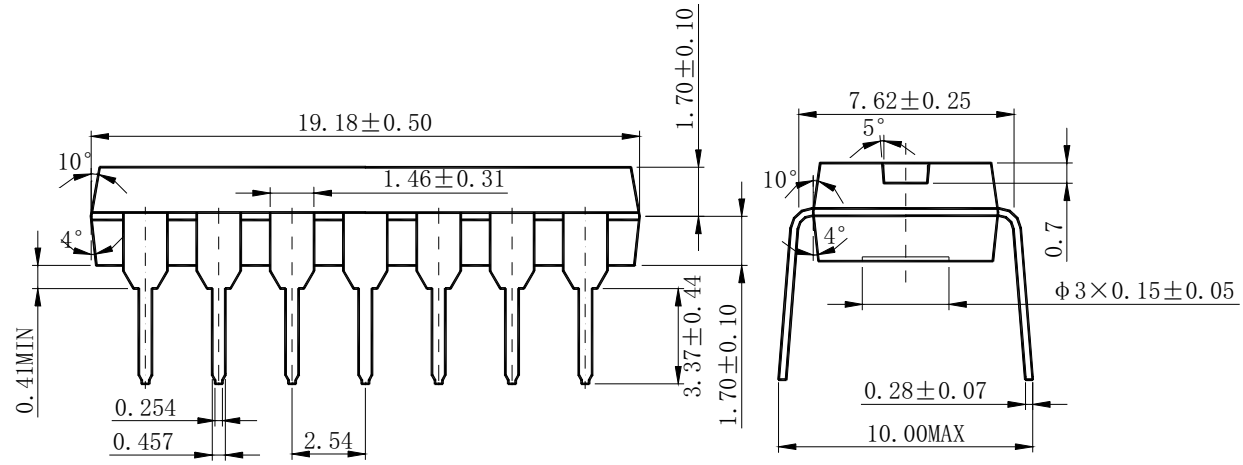


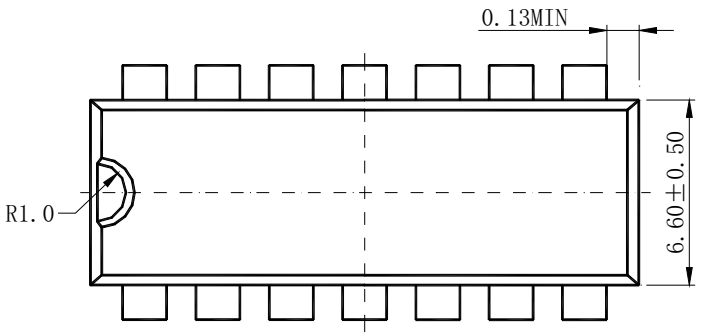
Figure 20. DC Coupled Low-Pass RC Active Filter

LR324

Mechanical Dimensions

DIP-14 **Unit: mm**





LR324

Mechanical Dimensions (Continued)

SOP-14 **Unit: mm**

