Features

- Single-Supply Operation from +3V ~ +36V
- Low Offset Voltage: 5mV (Max)
- Gain-Bandwidth Product: 1MHz (Typ)
- Quiescent Current: 700μA per Amplifier (Typ)
- Dual-Supply Operation from ±1.5V ~ ±18V
- Low Input Bias Current: 20nA (Typ)
- Large Output Voltage Swing:0V to Vcc-1.5V
- Operating Temperature: -40°C ~ +125°C
- Small Package: BL324 Available in SOP-14 Package

General Description

BL324 operates from a single 3V to 36V supply or dual ±1.5V to ±18V supplies ,The BL324 have a high gain-bandwidth product of 1MHz, a slew rate of 0.2V/μs, and a quiescent current of 700μA/amplifier at 5V. The BL324 is designed to provide optimal performance in low voltage and low noise systems. The maximum input offset voltage is 5mV for BL324. BL324 Quad is available in Green SOP-14 package.

Applications

- Motor Control
- Battery Management Solution
- Temperature Sensors or Controllers
- Digital Multimeter
- Blu-ray Players and Home Theaters

Package/Ordering Information

MODEL	CHANNEL	ORDER NUMBER	PACKAGE DESCRIPTION	PACKAGE OPTION
BL324	Quad	BL324	SOP-14	Tape and Reel,2500

Pin Configuration

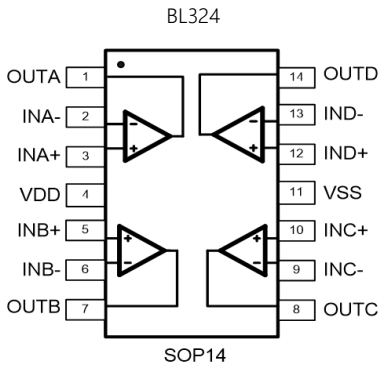


Figure 1. Pin Assignment Diagram

Absolute Maximum Ratings

Condition	Symbol	Max
Power Supply Voltage	Vcc	±20V or 36V
Differential input voltage	$V_{I(DIFF)}$	36V
Input Voltage	V_I	-0.3V~36V
Operating Temperature Range	Topr	-40°C ~+125°C
Storage Temperature Range	Tstg	-65°C ~+150°C

Note: Stress greater than those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions outside those indicated in the operational sections of this specification are not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

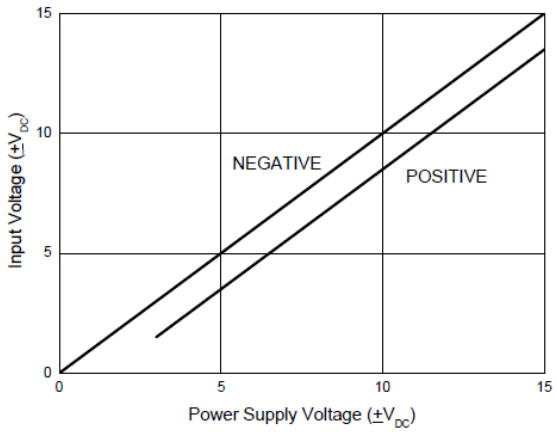
Electrical Characteristics

(At V_S = +15V, T_A=25°C, unless otherwise noted.)

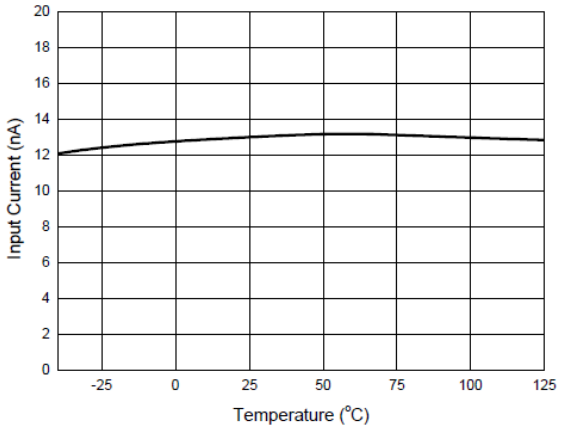
PARAMETER	SYMBOL	CONDITIONS	BL324			
			TYP	MIN/MAX OVER TEMPERATURE		
			+25℃	+25℃	UNITS	MIN/MAX
INPUT CHARACTERISTICS						
Input Offset Voltage	V_{OS}	V_{CM} = V_S/2	0.4	5	mV	MAX
Input Bias Current	I_B		20		nA	TYP
Input Offset Current	I_{OS}		5		nA	TYP
Common-Mode Voltage Range	V_{CM}	V_S = 5.5V	-0.1 to +4		V	TYP
Common-Mode Rejection Ratio	CMRR	V_{CM} = 0V to Vs-1.5V	70	60	dB	MIN
Open-Loop Voltage Gain	A_{OL}	R_L = 5kΩ, V_O = 1V to 11V	100	85	dB	MIN
Input Offset Voltage Drift	$\Delta V_{OS}/\Delta_T$		7		μV/℃	TYP
OUTPUT CHARACTERISTICS						
Output Voltage Swing from Rail	V_{OH}	R_L = 2kΩ	11		V	MIN
	V_{OL}	R_L = 2kΩ	5	20	mV	MAX
	V_{OH}	R_L = 10kΩ	12	13	V	MIN
	V_{OL}	R_L = 10kΩ	5	20	mV	MAX
Output Current	I_{SOURCE}	R_L = 10Ω to V_S/2	40	60	mA	MAX
	I_{SINK}		40	60		
POWER SUPPLY						
Operating Voltage Range				3	V	MIN
				36	V	MAX
Power Supply Rejection Ratio	PSRR	V_S = +5V to +36V, V_{CM} = +0.5V	100	70	dB	MIN
Quiescent Current / Amplifier	I_Q	V_S = 36V, RL=∞	0.7	3	mA	MAX
DYNAMIC PERFORMANCE						
Gain-Bandwidth Product	GBP		1		MHz	TYP
Slew Rate	SR	G = +1, 2V Output Step	0.2		V/μs	TYP

Typical Performance characteristics

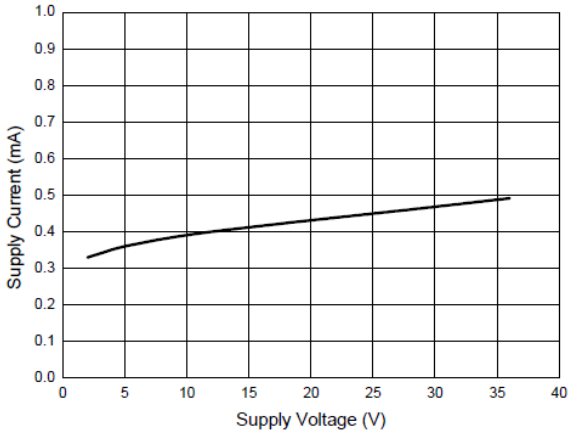
Input Voltage Range



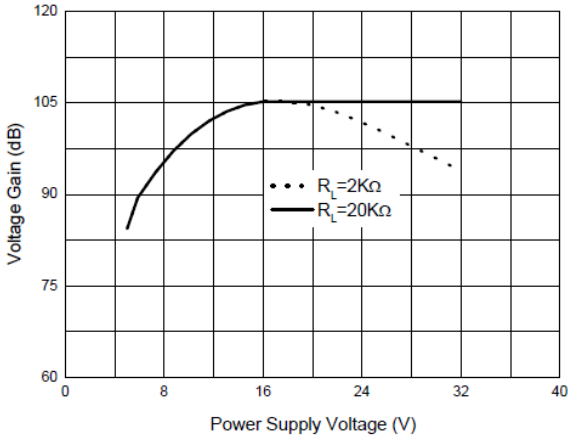
Input Current



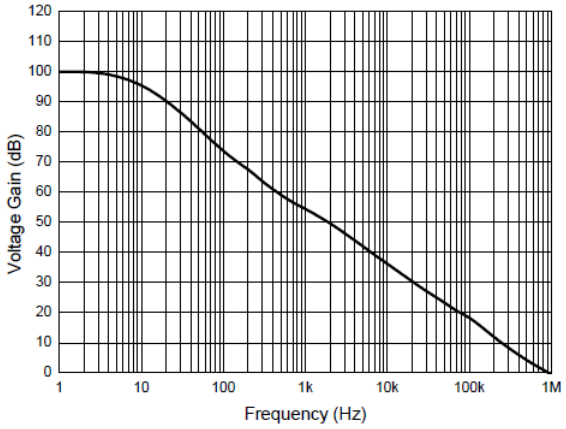
Supply Current



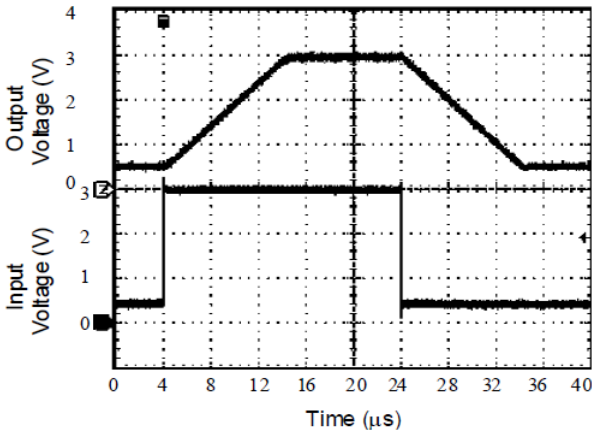
Voltage Gain



Open Loop Frequency Response

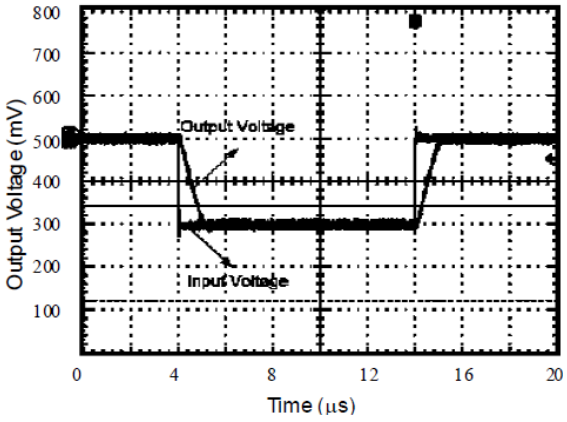


Voltage Follower Pulse Response

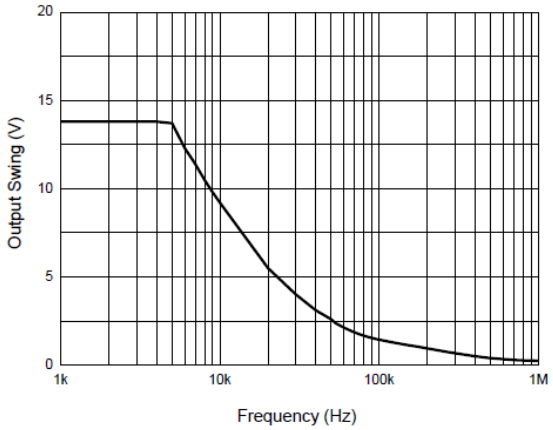


Typical Performance characteristics

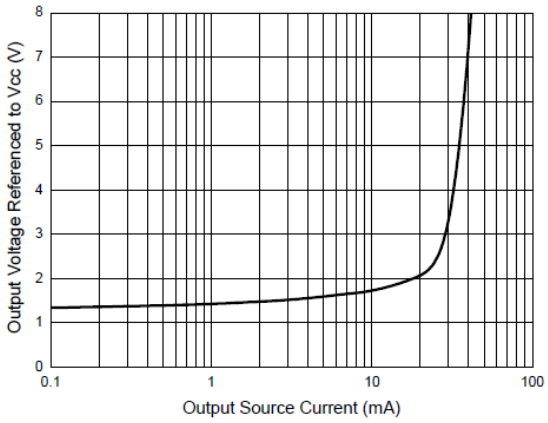
Voltage Follower Pulse Response (Small Signal)



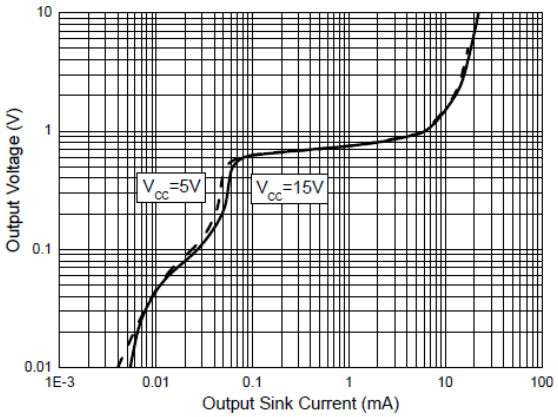
Large Signal Frequency Response



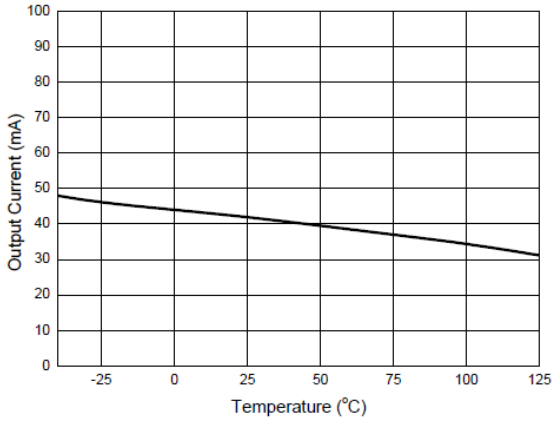
Output Characteristics: Current Sourcing



Output Characteristics: Current Sinking



Current Limiting



Typical Application Circuits

Differential amplifier

The differential amplifier allows the subtraction of two input voltages or cancellation of a signal common the two inputs. It is useful as a computational amplifier in making a differential to single-end conversion or in rejecting a common mode signal. Figure 1. shown the differential amplifier using BL324.

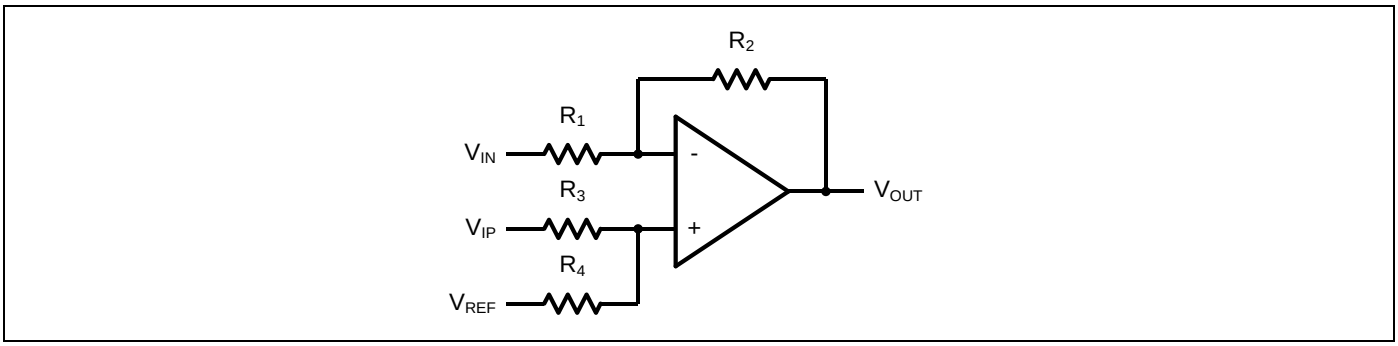


Figure 1. Differential Amplifier

$$V_{OUT} = (\frac{R_1+R_2}{R_3+R_4})\frac{R_4}{R_1}V_{IN} - \frac{R2}{R1}V_{IP} + (\frac{R_1+R_2}{R_3+R_4})\frac{R_3}{R_1}V_{REF}$$

If the resistor ratios are equal (i.e. $R_1=R_3$ and $R_2=R_4$), then

$$V_{OUT} = \frac{R_2}{R_1}(V_{IP} - V_{IN}) + V_{REF}$$

Instrumentation Amplifier

The triple BL324 can be used to build a three-op-amp instrumentation amplifier as shown in Figure 2. The amplifier in Figure 2 is a high input impedance differential amplifier with gain of R2/R1. The two differential voltage followers assure the high input impedance of the amplifier.

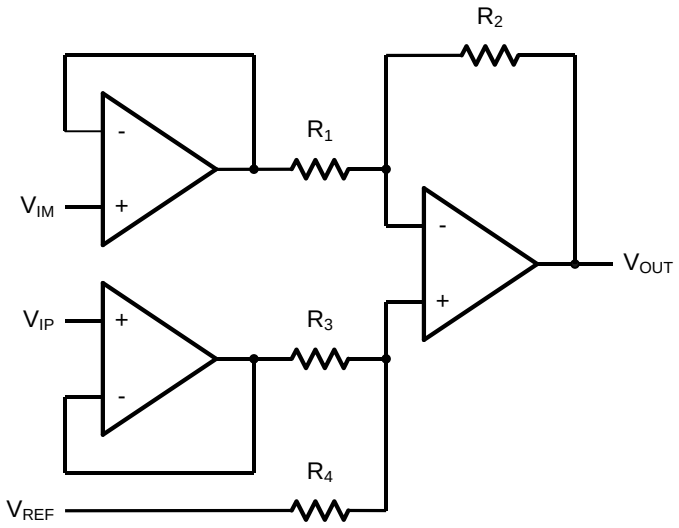


Figure 2. Instrument Amplifier

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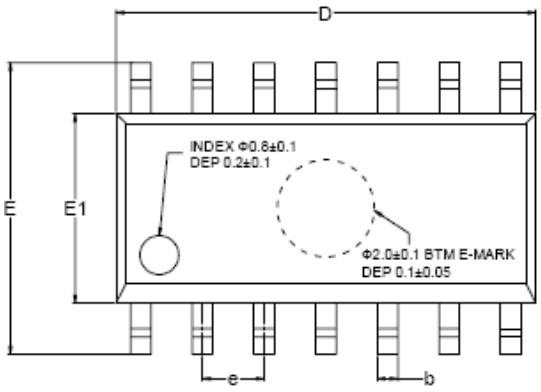
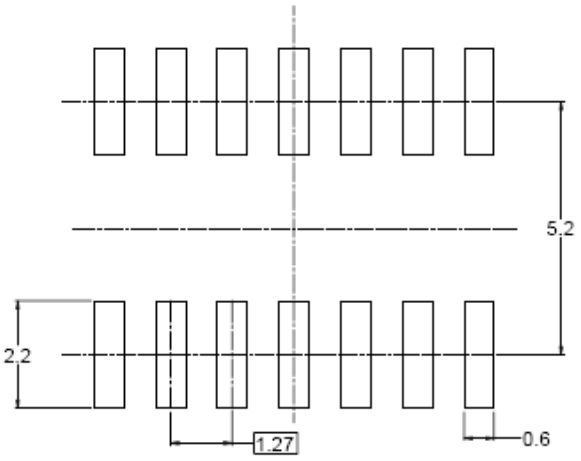
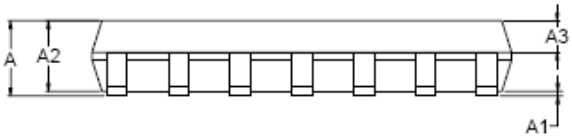
Package Information

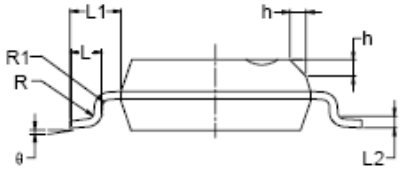
SOP-14





RECOMMENDED LAND PATTERN (Unit: mm)





Symbol	Dimensions In Millimeters			Dimensions In Inches		
	MIN	MOD	MAX	MIN	MOD	MAX
A	1.35		1.75	0.053		0.069
A1	0.10		0.25	0.004		0.010
A2	1.25		1.65	0.049		0.065
A3	0.55		0.75	0.022		0.030
b	0.36		0.49	0.014		0.019
D	8.53		8.73	0.336		0.344
E	5.80		6.20	0.228		0.244
E1	3.80		4.00	0.150		0.157
e	1.27 BSC			0.050 BSC		
L	0.45		0.80	0.018		0.032
L1	1.04 REF			0.040 REF		
L2	0.25 BSC			0.01 BSC		
R	0.07			0.003		
R1	0.07			0.003		
h	0.30		0.50	0.012		0.020
θ	0°		8°	0°		8°