

GS324

Low Power Quad Operational Amplifiers

Product Description

The GS324 consists of four independent, high gain, internally frequency compensated operational amplifiers which were designed specifically to operate from a single power supply over a wide range of voltages.

Operation from split power supplies is also possible and the low power supply current drains is independent of the magnitude of the power supply voltage.

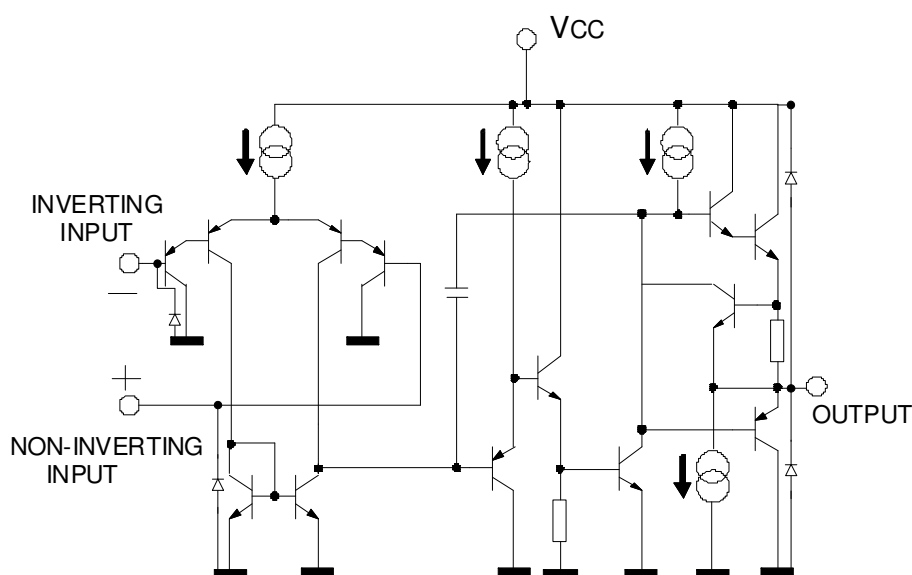
Application areas include transducer amplifiers, DC gain blocks and all the conventional op amp circuits, which now can be more easily implemented in single power supply systems.

For example, the GS324 can be directly operated off of the standard +5V power supply voltage which is used in digital systems and will easily provide the required interface electronics without requiring the additional $\pm 15\text{V}$ power supplies.

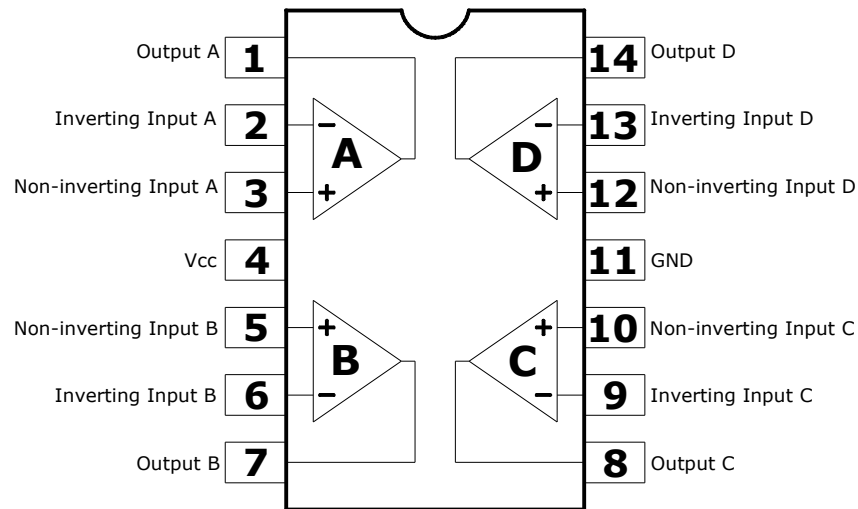
Features

- Wide range of supply voltages 3V to 32V
- Low supply current drain independent of Supply
- Supply Current 0.7mA TYP.
- Low input biasing current
- Low input offset voltage and offset current
- Input common-mode voltage range includes ground
- Differential input voltage range equal to the power supply voltage
- DC voltage gain: 100V/mV TYP.
- Internally frequency compensation
- RoHS Compliant, 100%Pb & Halogen Free
- ESD Protection(2KV) between V+/V- and GND

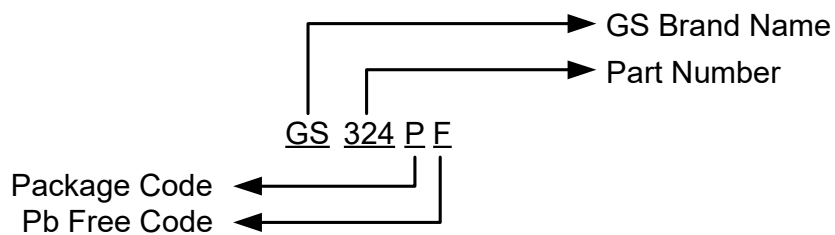
Block Diagram



Pin Assignments

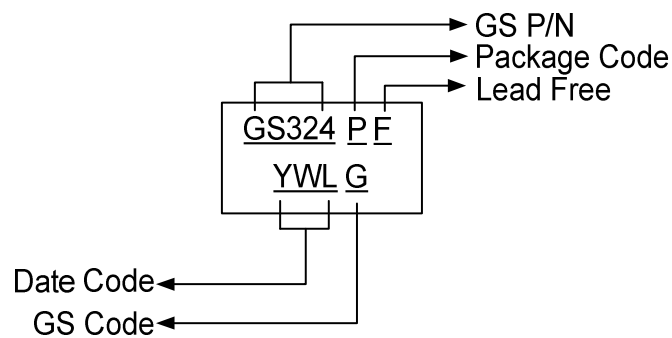


Ordering Information



Device	Package	Quantity Reel
GS324SF	SOP-14	4000 PCS

Marking Information



Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V_{CC}	Single Supply	32	V
V_{CC}, V_{EE}	Split Supply	± 16	V
V_{IDR}	Input Differential Voltage Range	± 32	V
I_{OS}	Output Short-circuit to GND	Continuous	
T_J	Junction Temperature	150	$^{\circ}\text{C}$
T_{STG}	Storage Temperature Range	-65 to +150	$^{\circ}\text{C}$
T_A	Operating Ambient Temperature Range	-40 to 85	$^{\circ}\text{C}$
θ_{JA}	Junction to Ambient Thermal Resistance	SOP-14	150 $^{\circ}\text{C}/\text{W}$
θ_{JC}	Junction to Case Thermal Resistance	SOP-14	23 $^{\circ}\text{C}/\text{W}$
ESD	ESD Rating (HBM)	2K	V

Electrical Characteristics

at specified free-air temperature, $V_{CC}=5\text{V}$ (Unless Otherwise Noted)

Symbol	Parameter	Test Conditions*		Min	Typ	Max	Unit
V _{IO}	Input offset voltage	V _{CC} =5V to Max. V _{IC} =V _{ICR} min, V _O =1.4V	25°C		2	3	mV
			Full range			5	
αV _{IO}	Average temperature coefficient of input offset voltage		Full range		7		μV/°C
I _{IO}	Input offset current	V _O =1.4V	25°C		2	50	nA
			Full range			150	
αI _{IO}	Average temperature coefficient of input offset current		Full range		10		pA/°C
I _{IB}	Input bias current	V _O =1.4V	25°C		20	250	nA
			Full range			500	
V _{ICR}	Common-mode input voltage range	V _{CC} =5V to MAX	25°C	0 to V _{CC} -1.5			V
			Full range	0 to V _{CC} -2			
V _{OH}	High-level output voltage	R _L ≥2kΩ	25°C	V _{CC} -1.5			V
		V _{CC} =MAX, R _L =2kΩ	Full range	26			
		V _{CC} =MAX, R _L ≥10kΩ	Full range	27	28		
V _{OL}	Low-level output voltage	R _L ≥10kΩ	Full range		5	20	mV

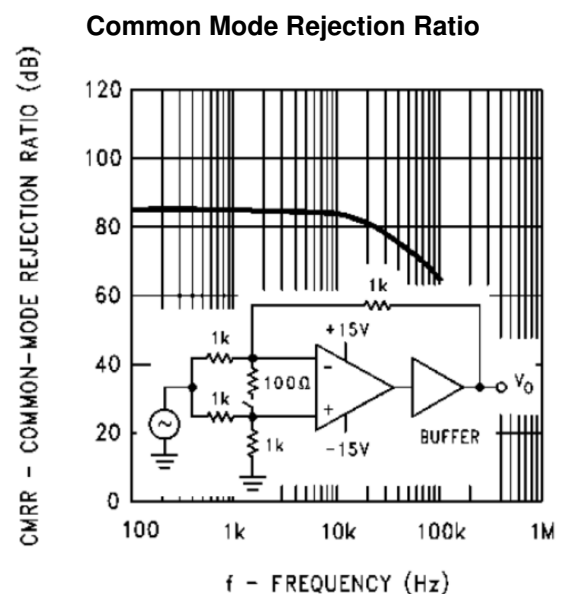
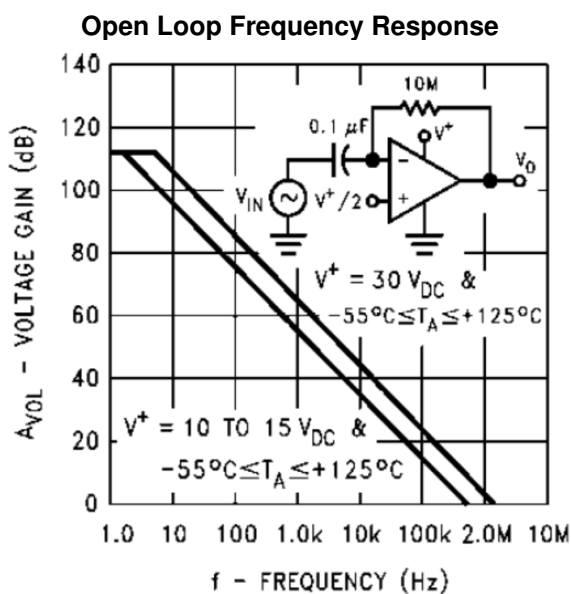
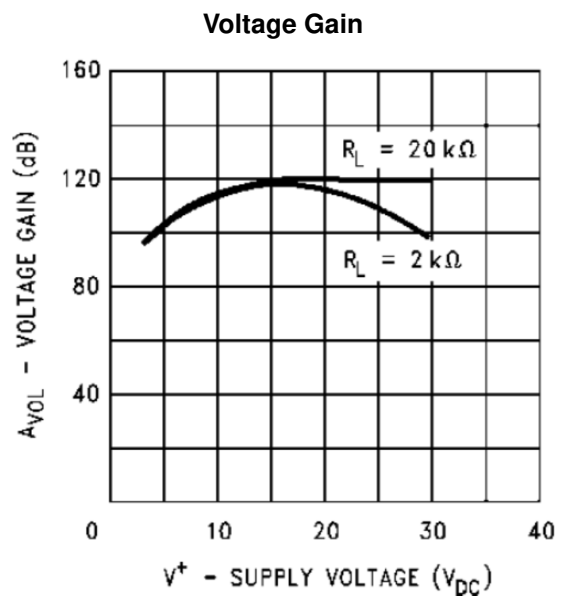
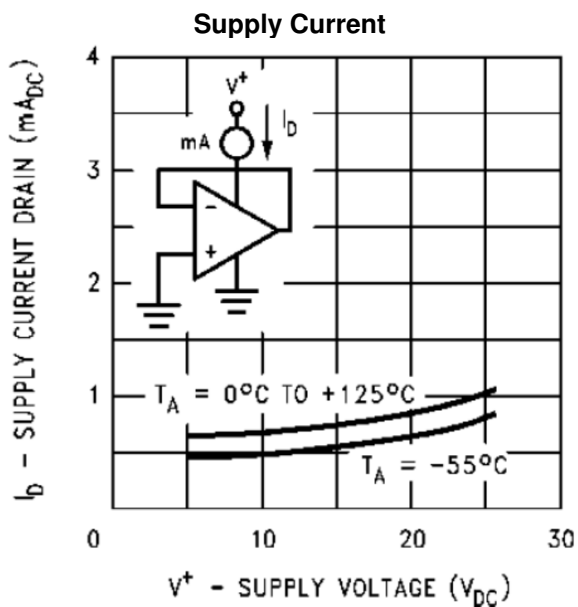
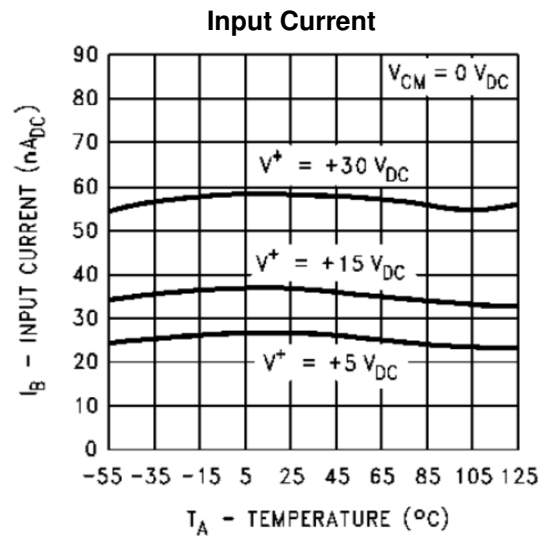
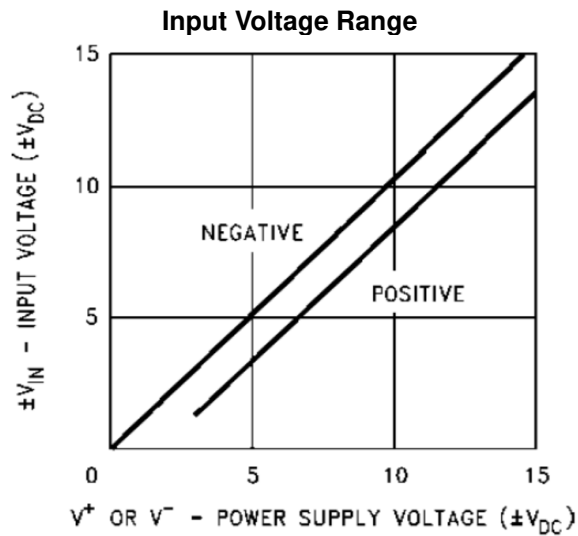
Symbol	Parameter	Test Conditions*		Min	Typ	Max	Unit
A_{VD}	Large-signal differential voltage amplification	$V_{CC}=15V$ $V_O=1V$ to $11V$ $R_L \geq 2k\Omega$	25°C	25	100		V/mV
			Full range	15			
CMRR	Common-mode rejection ratio	$V_{CC}=5V$ to MAX $V_{IC}=V_{ICR}$ min	25°C	65	80		dB
K_{SVR}	Supply voltage rejection ratio ($\Delta V_{CC}/\Delta V_{IO}$)	$V_{CC}=5V$ to MAX	25°C	65	100		dB
V_{O1}/V_{O2}	Crosstalk attenuation	$f=1kHz$ to $20kHz$	25°C		120		dB
I_O	Output current	$V_{CC}=15V$, $V_{ID}=1V$, $V_O=0V$	25°C	-20	-30		mA
			Full range	-10			
		$V_{CC}=15V$ $V_{ID}=-1V$, $V_O=15V$	25°C	10	20		
			Full range	5			
		$V_{ID}=-1V$, $V_O=200mV$	25°C	12	30		μA

Electrical Characteristics (Continue)

Symbol	Parameter	Test Conditions*		Min	Typ	Max	Unit
I_{OS}	Short-circuit output current	V_{CC} at 5V, GND at -5V, $V_O=0V$	25°C		± 40	± 60	mA
I_{CC}	Supply current (two amplifiers)	$V_O=2.5V$, No load	Full range		1.5	3	mA
		$V_{CC}=MAX$, $V_O=0.5V_{CC}$, No load	Full range		0.7	1.2	

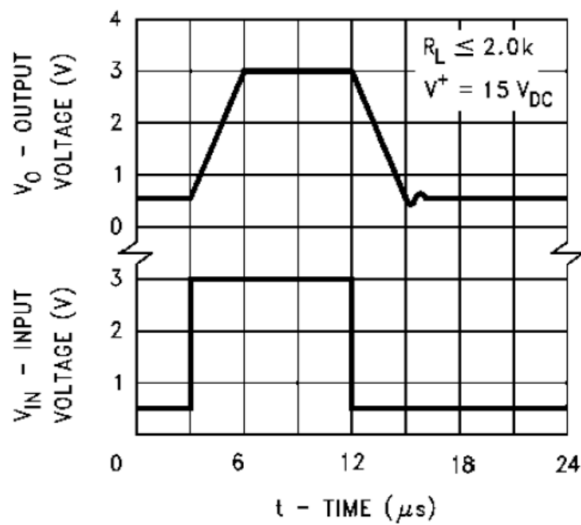
*All characteristics are measured under open-loop conditions with zero common-mode input voltage unless otherwise specified. "MAX" V_{CC} for testing Purposes is 30V. Full range is -40 °C to 85 °C.

Typical Performance Characteristics

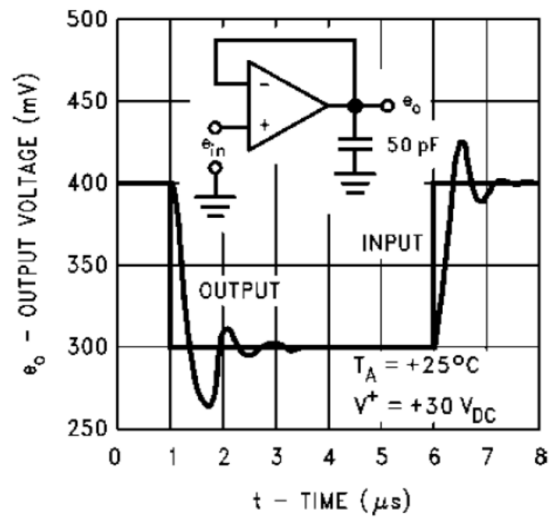


Typical Performance Characteristics (Continue)

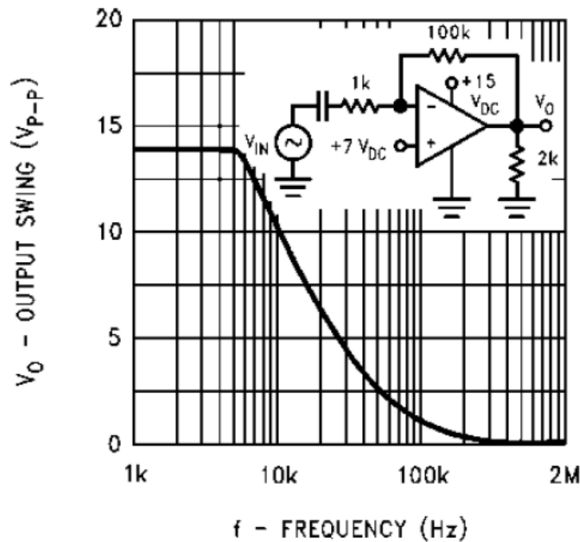
Voltage Follower Pulse Response



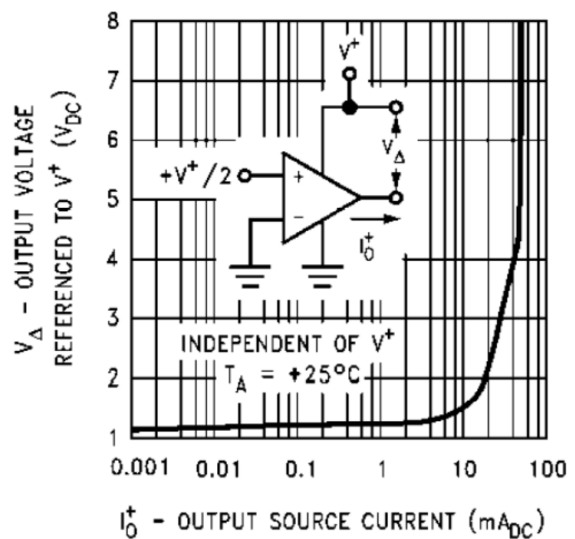
Voltage Follower Pulse Response (Small Signal)



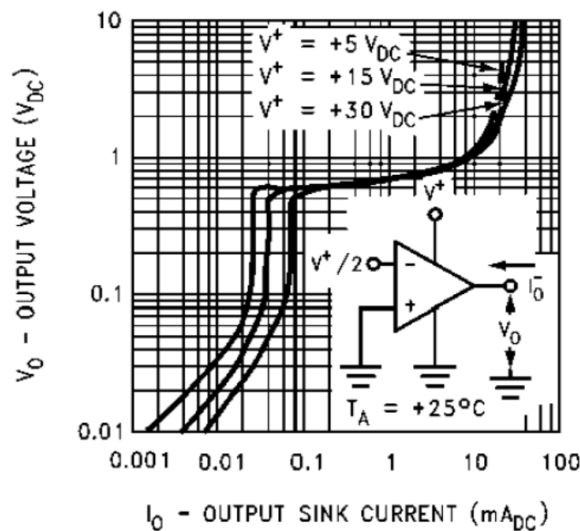
Large Signal Frequency Response



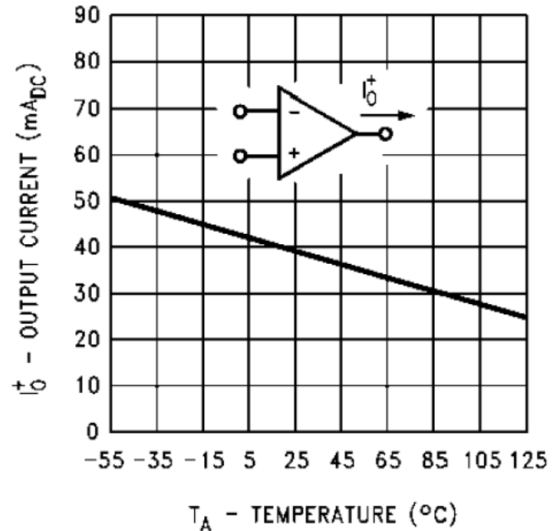
Output Characteristics Current Sourcing



Output Characteristics Current Sinking

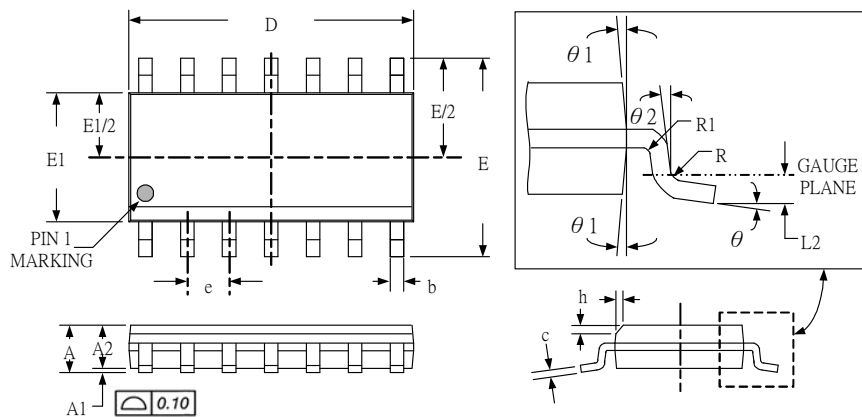


Current Limiting



Package Dimension

SOP-14 PLASTIC PACKAGE



Dimensions				
SYMBOL	Millimeters		Inches	
	MIN	MAX	MIN	MAX
A	1.35	1.75	.053	.069
A2	1.25	1.65	.049	.065
b	0.31	0.51	.012	.020
b1	0.28	0.48	.011	.019
c	0.17	0.25	.007	.010
A1	0.1(MAX)		0.004(MAX)	
D	8.65 (TYP)		.341 (TYP)	
E	6.00 (TYP)		.236 (TYP)	
E1	3.90 (TYP)		.154 (TYP)	
e	1.27 (TYP)		.050 (TYP)	
L	0.40	1.27	.016	.050
L1	1.04 (TYP)		.041 (TYP)	
L2	0.25 (TYP)		.010 (TYP)	
R	0.07	-	.003	-
R1	0.07	-	.003	-
h	0.25	0.50	.010	.020
θ	0°	8°	0°	8°
θ1	5°	15°	5°	15°
θ2	0°	-	0°	-
Lead Coplanarity	-	0.1	-	.004

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