AD 108 208 308

PRECISION OPERATIONAL AMPLIFIERS

DESIGN FEATURES

- Bias Current 0.8nA
- Offset Current 50pA
- Offset Voltage 0.7mV
- Offset Voltage Drift 3.0μV/°C
- Supply Current 150μA
- Operating Voltage ±2V to ±20V

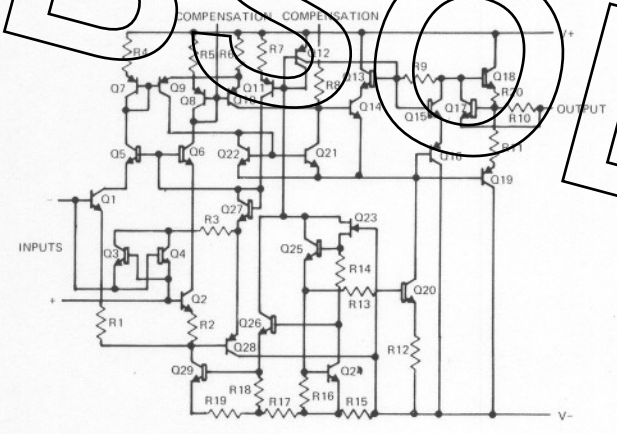
GENERAL DESCRIPTION

The ANALOG DEVICES AD108, AD208 and AD308 are precision operational amplifiers fabricated on a single silicon chip. The use of super beta transistors in the input stage, along with improved process control, results in guaranteed input currents nearly a thousand times lower than industry standards such as the AD741. Guaranteed offset voltage drift and current drift specifications permit the circuits to be used in applications requiring excellent temperature stability. Operation with supply voltages as low as ±2V, and extremely low power consumption make the devices ideal for battery powered applications. Frequency Compensation is accomplished using a single external capacitor.

The AD108 and AD208 have identical specifications, with the AD108 guaranteed over the −55°C to +125°C temperature range and the AD208 guaranteed over the −25°C to +85°C temperature range. The AD308 is specified over the 0°C to +70°C temperature range.

All devices are pin compatible with the popular AD101A, AD201A, AD301A series and are available in the TO-99 package configuration.

SCHEMATIC DIAGRAM



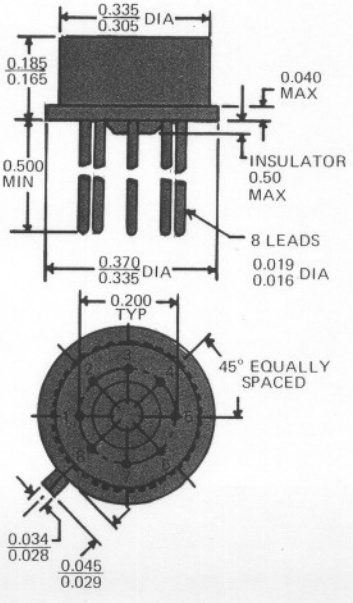
ORDERING INFORMATION

Order Number	Package Type	Operating Temperature Range
AD108H	TO-99	−55°C to +125°C
AD208H	TO-99	−25°C to +85°C
AD308H	TO-99	0°C to +70°C

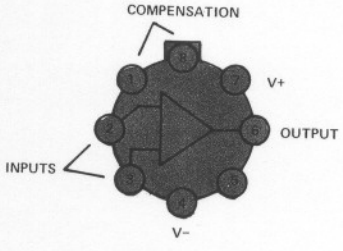
PHYSICAL DIMENSIONS

(In Inches)

(TO-99)



CONNECTION DIAGRAM



Note: Pin 4 connected to case.

TOP VIEW

ANALOG DEVICES
LINEAR INTEGRATED CIRCUITS
ROUTE ONE INDUSTRIAL PARK
P. O. BOX 280, NORWOOD, MASS. 02062
TEL: 617/329-4700 TWX: 710/394-6577

ABSOLUTE MAXIMUM RATINGS

AD108, AD208, and AD308
unless otherwise specified

Supply Voltage	
AD108, AD208	±20V
AD308	±18V
Power Dissipation (Note 1)	500 mW
Differential Input Current (Note 2)	±10 mA
Input Voltage (Note 3)	±15V
Output Short-Circuit Duration	Indefinite
Operating Temperature Range	
AD108	−55°C to +125°C
AD208	−25°C to +85°C
AD308	0°C to +70°C
Storage Temperature Range	−65°C to +150°C
Lead Temperature (Soldering, 60 sec)	300°C

ELECTRICAL CHARACTERISTICS (T_A = 25°C, unless otherwise specified) (Note 4)

Parameters	Conditions	AD108 AD208 MIN	AD108 AD208 TYP	AD108 AD208 MAX	AD308 MIN	AD308 TYP	AD308 MAX	UNITS
Input Offset Voltage			0.7	2.0		2.0	7.5	mV
Input Offset Current			0.05	0.2		0.2	1	nA
Input Bias Current			0.8	2.0		1.5	7	nA
Input Resistance		30	70		10	40		MΩ
Supply Current			0.3	0.6		0.3		mA
Large Signal Voltage Gain	V_S = ±15V V_{OUT} = ±10V $R_L \geq$ 10KΩ	50	300		25	300		V/mV
The Following Specifications Apply Over The Operating Temperature Ranges (Note 4)								
Input Offset Voltage				3.0			10	mV
Average Temp. Coefficient of Input Offset Voltage			3.0	15		6.0	30	µV/°C
Input Offset Current				0.4			1.5	nA
Average Temp. Coefficient of Input Offset Current			0.5	2.5		2.0	10	pA/°C
Input Bias Current				3.0			10	nA
Supply Current	T_A = +125°C V_S = ±20V		0.15	0.4				mA
Large Signal Voltage Gain	V_S = ±15V V_{OUT} = ±10V $R_L \geq$ 10KΩ	25			15			V/mV
Output Voltage Swing	V_S = ±15V R_L = 10KΩ	±13	±14		±13	±14		V
Input Voltage Range	V_S = ±15V	±14			±14			V
Common Mode Rejection Ratio		85	100		80	100		dB
Supply Voltage Rejection Ratio		80	96		80	96		dB

NOTES:

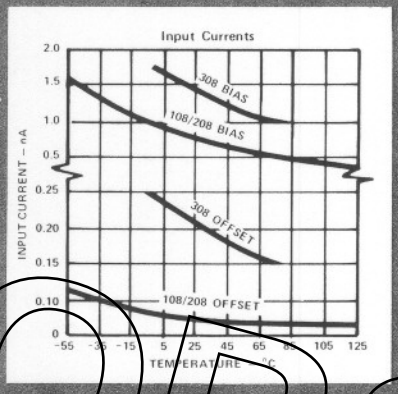
Note 1: The maximum junction temperature of the AD108 is 150°C, of the AD208 is 100°C, and of the AD308 is 85°C. For operation at elevated temperatures, the TO-99 package must be derated based on a thermal resistance of 150°C/W junction to ambient or 45°C/W junction to case.

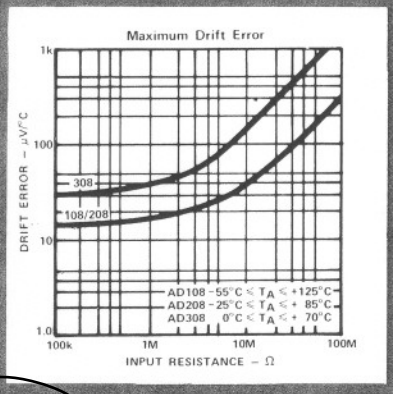
Note 2: The inputs are shunted with back-to-back diodes for overvoltage protection. Therefore, excessive current will flow if a differential input voltage in excess of 1V is applied between the inputs unless some limiting resistance is used.

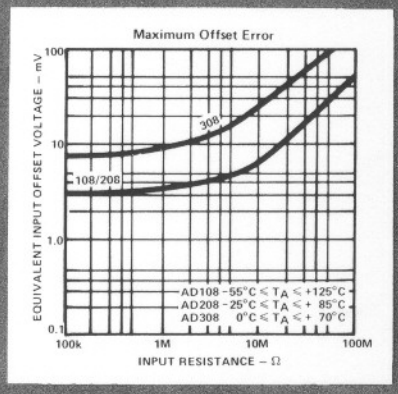
Note 3: For supply voltages less than ±15V, the absolute maximum input voltage is equal to the supply voltage.

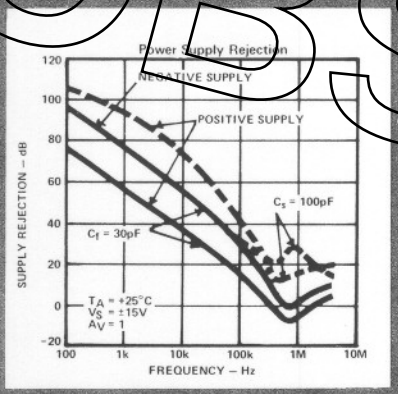
Note 4: Unless otherwise noted, these specifications apply for supply voltages and ambient temperatures of ±5V to ±20V and −55°C to +125°C for the AD108, ±5V to ±20V and −25°C to +85°C for the AD208, and ±5V to ±15V and 0°C to +70°C for the AD308.

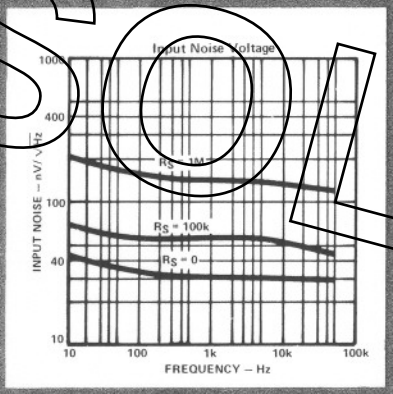
TYPICAL PERFORMANCE CURVES

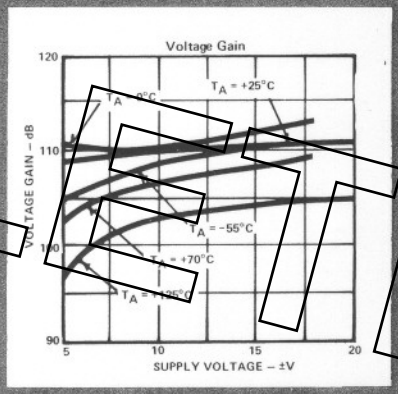


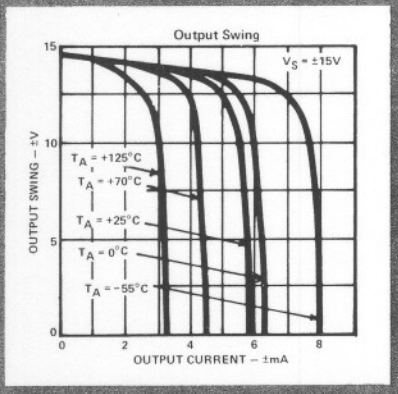


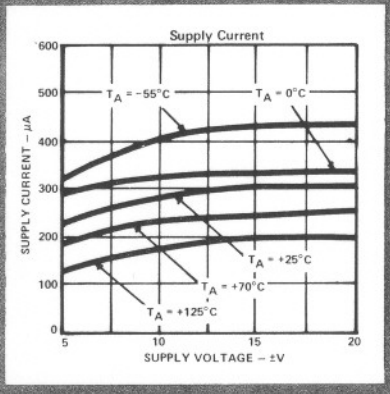


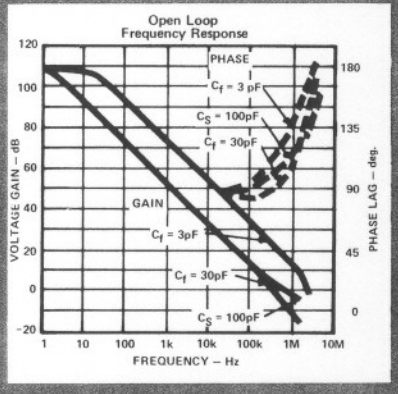


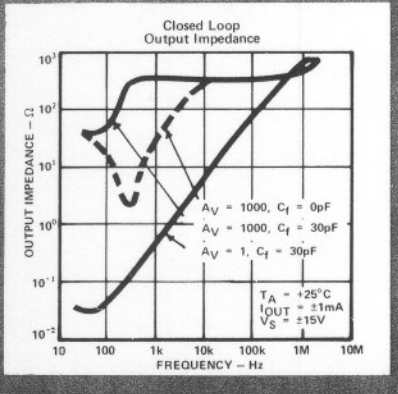


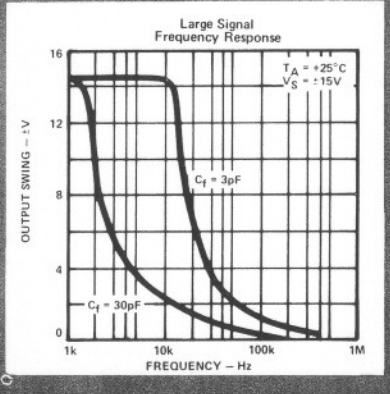


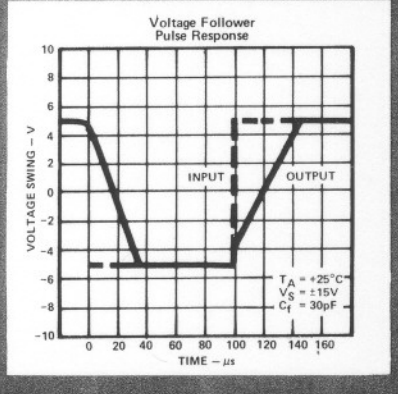






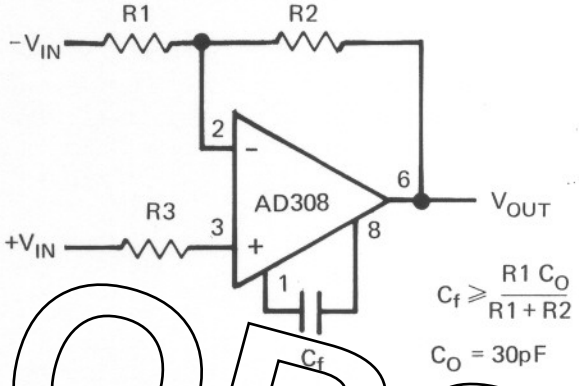






COMPENSATION CIRCUITS

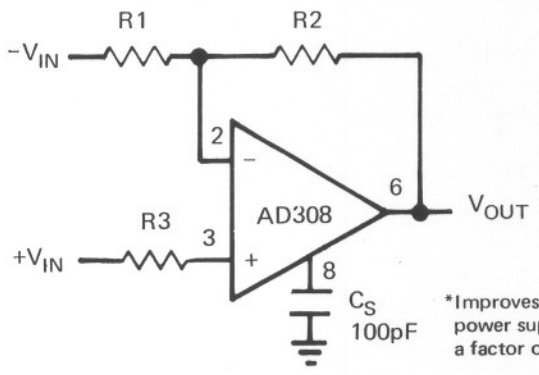
Standard Compensation Circuit



$$C_f \geq \frac{R1\ C_O}{R1 + R2}$$

C_O = 30pF

Alternate* Frequency Compensation



*Improves rejection of power supply noise by a factor of ten

For other selected Analog Devices Linear Integrated Circuits, refer to the specification sheets listed below.

Operational Amplifiers

AD101A, 201A, 301A	— General Purpose, Externally Compensated
AD108, 208, 308	— High Performance, General Purpose
AD108A, 208A, 308A	— High Performance, General Purpose
AD741, 741C, 741K	— General Purpose, Internally Compensated
AD502J, 502K, 502L	— General Purpose, Internally Compensated
AD503J, 503K	— FET Input, Internally Compensated
AD503L	— FET Input, Internally Compensated, Internally Trimmed
AD504J, 504K	— High Precision, Low Drift
AD505J, 505K	— High Speed
AD513J, 513K	— FET Input, High Speed

Special Function Circuits

AD520J, 520K	Instrumentation Amplifier
AD530J, 530K	Complete Multiplier, Divider, Squarer, Square Rooter