ANALOG DEVICES

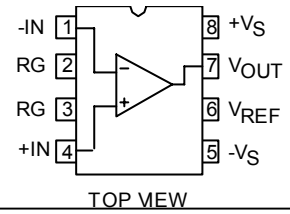
Precision Instrumentation Amplifier

Preliminary Technical Data AD8221

FEATURES:
Excellent Noise Immunity
90dB Minimum to 10kHz (G=10)
Supply Voltage Range:
Dual Supply ±2.3V to ±18V
Single Supply 4.6V to 36V
Excellent AC and DC Performance
90dB Minimum CMRR to 10kHz (G=10)
0.3 μV/°C Max Input Offset Drift
10 ppm/°C Max Gain Drift (G=1)

APPLICATIONS
Patient Monitor
Sensor Signal Conditioning
Bridge Transducer
Multiplexed Systems
4 to 20mA Converter

AD8221



CONNECTION DIAGRAM
8-Pin Plastic Micro SOIC (ARM) Package
8-Pin Plastic SOIC (AR, BR) Package

GENERAL DESCRIPTION

The AD8221 is a gain programmable, True Instrumentation Amplifier that provides the user with the highest CMRR over frequency available. This break through performance allows the user to reject common mode voltage noise out to 100 kHz.

Errors in the users system will be held to minimum with the high CMRR over frequency performance. Line noise, as well as harmonics, noise encountered in Aerospace applications, noise from motors and repair equipment on factory floors, switching power supplies, and high frequency medical equipment used during operations will all be rejected since the CMRR rejection is 90dB (G=10) minimum to 10kHz with great performance out to 100kHz.

The AD8221 also gives the user excellent DC performance by providing maximum offset and gain drift of 0.3μV/°C and 10 ppm/°C (G=1) respectively.

The AD8221 operates on both single and dual supplies. The device is specified for operation at a power supply voltage of ±15V and makes the AD8221 well suited for applications where input voltages of ±10Vare encountered.

The AD8221 is specified over the standard industrial temperature range, -40°C to 85°C.

REV. PrH 4/7/2003

One Technology Way, P.O. Box, Norwood, MA 02062-9106, U.S.A
Tel. 781/329-4700
www.analog.com
Fax: 781/326-8703

AD8221 - SPECIFICATIONS (T_A = 25C, V_S = ±15V and R_L = 10kΩ unless otherwise noted)

Parameter	Conditions	AD8221ARM Min	AD8221ARM Typ	AD8221ARM Max	AD8221AR Min	AD8221AR Typ	AD8221AR Max	AD8221BR Min	AD8221BR Typ	AD8221BR Max	Units
GAIN	G = 1+ (49.4k/R_G)							**T**	**B**	**D**	
Gain Range		1		1000	1		1000	1		1000	V/V
Gain Error	V_O=±10V										
G = 1				0.10			0.01			0.01	%
G = 10				0.2			0.10			0.10	%
G = 100				0.2			0.10			0.10	%
G = 1000				0.2			0.10			0.10	%
Gain Nonlinearity	V_O=±10V										
G = 1 - 1000	R_L = 10kΩ		10	40		10	40		10	40	ppm
±Gain vs. Temperature											
G=1			3	10		3	10		3	5	ppm/°C
G>1				50			50			50	ppm/°C
VOLTAGE OFFSET	Total RTI Error = V_{OSI} + V_{OSO}/G										
Input Offset, V_{OSI}				300			60			25	µV
Average TC				1.5			0.4			0.3	µV/°C
Output Offset, V_{OSO}				600			300			150	µV
Average TC				10			6			5	µV/°C
Offset Referred to the Input											
VS. Supply (PSR)											
G = 1		80	100		80	100		80	100		dB
G = 10		100	120		100	120		100	120		dB
G = 100		120	140		120	140		120	140		dB
G = 1000		120	140		120	140		120	140		dB
INPUT											
Input Operating Impedance											
Differential			100|| 2			100|| 2			100|| 2		GΩ|| pF
Common Mode			100|| 2			100|| 2			100|| 2		GΩ|| pF
Input Operating Voltage Range	V_S = ±3V to ±18V	-V_S+1.9		+V_S-1.4	-V_S+1.9		+V_S-1.4	-V_S+1.9		+V_S-1.4	V
Input Bias Current			0.5	2		0.5	2		0.5	2	nA
VS. Temperature			3			3			3		pA/°C
Input Offset Current			0.3	1		0.3	1		0.3	1	nA
VS. Temperature			1.5			1.5			1.5		pA/°C
Common Mode Rejection from											
60Hz to 1kHz	V_{CM} = 0V to ±10V										
G = 1		76			81			90			dB
G = 10		96			101			110			dB
G = 100		116			121			130			dB
G = 1000		120			130			145			dB
1kHz t0 10kHz	V_{CM} = 0V to ±10V										
G = 1	to 10kHz	76			81			90			dB
G = 10	to 10kHz	96			101			110			dB
G = 100	to 10kHz	110			110			120			dB
G = 1000	to 10kHz	110			110			120			dB
OUTPUT											
Output Swing	R_L = 10kΩ										V
	V_S = ±2.3V to ±18V	-V_S+1.2		V_S-1.4	-V_S+1.2		V_S-1.4	-V_S+1.2		V_S-1.4	V
DYNAMIC RESPONSE											
Small Signal -3dB Bandwidth											
G = 1			1000			1000			1000		kHz
G = 10			800			800			800		kHz
G = 100			120			120			120		kHz

AD8221 - SPECIFICATIONS (T_A = 25C, V_S = ±15V and R_L = 10kΩ unless otherwise noted)

Parameter	Conditions	AD8221ARM Min	AD8221ARM Typ	AD8221ARM Max	AD8221AR Min	AD8221AR Typ	AD8221AR Max	AD8221BR Min	AD8221BR Typ	AD8221BR Max	Units
G = 1000			12			12			12		kHz
Settling Time to 0.01%	10V Step										
G = 1			10								
1<G<100			15			15					µS
G=1000			150			150					µS
Slew Rate	G=1	1.7	2		1.7	2		1.7	2		V/µS
	G=5	2	2.5		2	2.5		2	2.5		V/µS
NOISE											
RTI, 0.01 Hz to 10 Hz											
G=1			2			2			2		µV p-p
G=10			0.4			0.4			0.4		µV p-p
G=100-1000			0.25			0.25			0.25		µV p-p
Voltage Noise, 1 kHz											
Input, Voltage Noise, e_{ni}			7	8		7	8		7	8	nV/√Hz
Output, Voltage Noise, e_{no}			40	75		50	75		50	75	nV/√Hz
POWER SUPPLY											
Operating Range		±2.3		±18	±2.3		±18	±2.3		±18	V
Quiescent Current	V_S = ±2.3V to ±18V		0.9	1		0.9	1		0.9	1	mA
TEMPERATURE RANGE											
For Specified Performance		-40		+85	-40		+85	-40		+85	°C
For extended temperature see typical performance curves		-40		+125	-40		+125	-40		+125	