

Low Power Precision Instrumentation Amplifier

Features

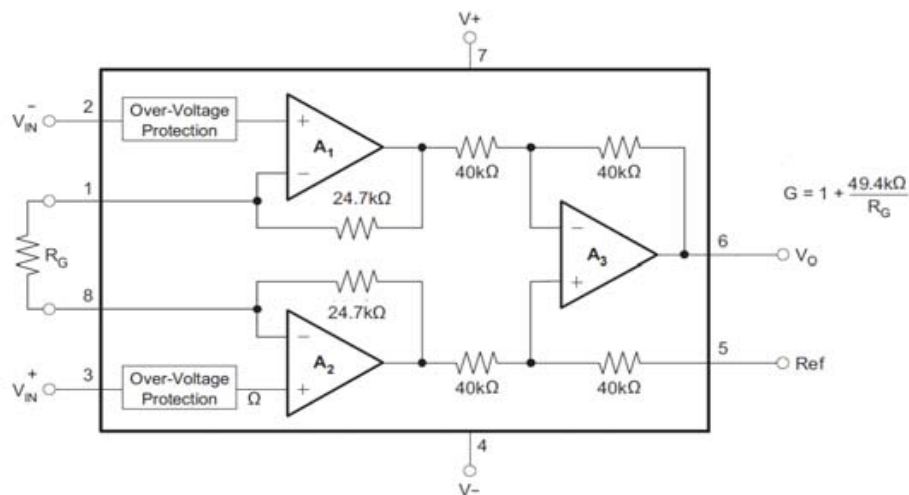
- Low Offset Voltage: 50 μ V Maximum
- Low Drift: 0.5 μ V/ $^{\circ}$ C Maximum
- Low Input Bias Current: 3nA maximum
- Wide Supply Range: \pm 2.25V ~ \pm 18V
- Low Quiescent Current: 1.4mA
- Input Over-Voltage Protection
- Available as SOP8, DIP8 package

Applications

- Medical Instrumentation
- Data Acquisition
- RTD Sensor Amplifier
- Bridge Amplifier
- Thermocouple Amplifier

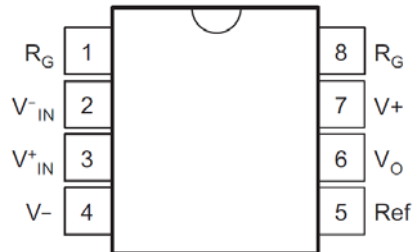
General Description

HG620 is a low-power, general purpose instrumentation amplifiers offering excellent accuracy. The versatile 3-op amp design and small size make these amplifiers ideal for a wide range of applications. A single external resistor sets any gain from 1 to 10,000. The HG620 gain equation is compatible with the AD620. The HG620 is laser-trimmed for very low offset voltage (50 μ V), drift (0.5 μ V/ $^{\circ}$ C) and high common mode rejection. The HG620 operates with power supplies as low as \pm 2.25, and quiescent current is only 1.4mA, ideal for battery-operated systems. The HG620 is available in 8-pin plastic DIP8 and SOP8 packages, specified for the -40 $^{\circ}$ C to +85 $^{\circ}$ C temperature range.



Block Diagram

1.0 Pin Configuration and Functions



Pin	Name	Description
5	Ref	Reference input. This Pin must be driven by low impedance or connected to ground
1,8	R _G	Gain setting pin. For gains greater than 1, place a gain resistor between pin1 & 8
4	V ₋	Negative supply
7	V ₊	Positive supply
2	V _{in-}	Negative input
3	V _{in+}	Positive input
6	V _o	Output

2.0 Product Specification

2.1 Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

Parameter	Min	Max	Unit
DC supply voltage V _s		±18	V
Operating junction temperature	-40	85	°C
Storage temperature	-55	125	°C
Maximum input voltage		±18	V
Differential Input voltage		25	V

2.2 Thermal Data

Parameter	Rating	Unit
Junction-Ambient Thermal Resistance	110(SOP8)/46(DIP8)	°C/W

2.3 Recommended Operating Conditions

Parameter	Rating	Unit
DC Supply Voltage	$\pm 2.25\text{V} \sim \pm 18\text{V}$	V
Input common-mode voltage range	$(V_-)+2 \sim (V_+)-2$	V
Operating ambient temperature	-40 to +85	°C

2.4 Electrical Characteristics

(Typical values are tested at $T_A=25\text{ }^\circ\text{C}$, $V_S=\pm 15\text{V}$)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input Offset Voltage	V_{IO}		-	± 15	± 50	μV
Input Offset Voltage Drift	TC			0.1	0.6	$\mu\text{V}/^\circ\text{C}$
Input Offset Current	I_{IO}		-	± 1	± 5	nA
Input Bias Current	I_{BIAS}		-	± 2	± 5	nA
Operating Current	I_{CC}		-	1.4	1.8	mA
Common Mode Input Voltage Range	V_{ICM}		± 13	± 14	-	V
Common Mode Rejection Range	CMRR	$R_s \leq 10\text{k}\Omega$	70	100	-	dB
Supply Voltage Rejection Ratio	SVRR	$R_s \leq 10\text{k}\Omega$	80	100	-	dB
Output Voltage Swing	$V_{O(P-P)}$	$R_L \geq 10\text{k}\Omega$	± 13	± 13.8	-	V
Short Circuit Current	I_{SC}		-	± 28	-	mA
Gain Bandwidth Product	GBW	$C_L = 100\text{pF}$, $R_L = 10\text{k}\Omega$	-	1000	-	kHz
Slew Rate	SR	$C_L = 100\text{pF}$, $R_L = 10\text{k}\Omega$, $A_v = 1$	-	1.2	-	$\text{V}/\mu\text{s}$
Input Noise Voltage	e_N	$f = 1\text{kHz}$	-	6.0	-	$\text{nV}/\sqrt{\text{Hz}}$

3.0 Functional Description

3.1 Overview

The HG620 instrumentation amplifier is a type of differential amplifier that has been outfitted with input protection circuit and input buffer amplifiers, which eliminate the need for input impedance matching and make the amplifier particularly suitable for use in measurement and test equipment. Additional characteristics of the HG620 include a very low DC offset, low drift, low noise, very high open-loop gain, very high common-mode rejection ratio, and very high input impedances.

3.2 Application Information

The HG620 measures small differential voltage with high common-mode voltage developed between the noninverting and inverting input. The ability to set the reference pin to adjust the functionality of the output signal offers additional flexibility that is practical for multiple configurations.

Figure 3.1 shows the basic connections required for operation of the HG620. Applications with noisy or high impedance power supplies may require decoupling capacitors close to the device pins as shown. This must be a low-impedance connection to assure good common-mode rejection. A resistance of 8 Ω in series with the Ref pin will cause a typical device to degrade to approximately 80dB CMR.

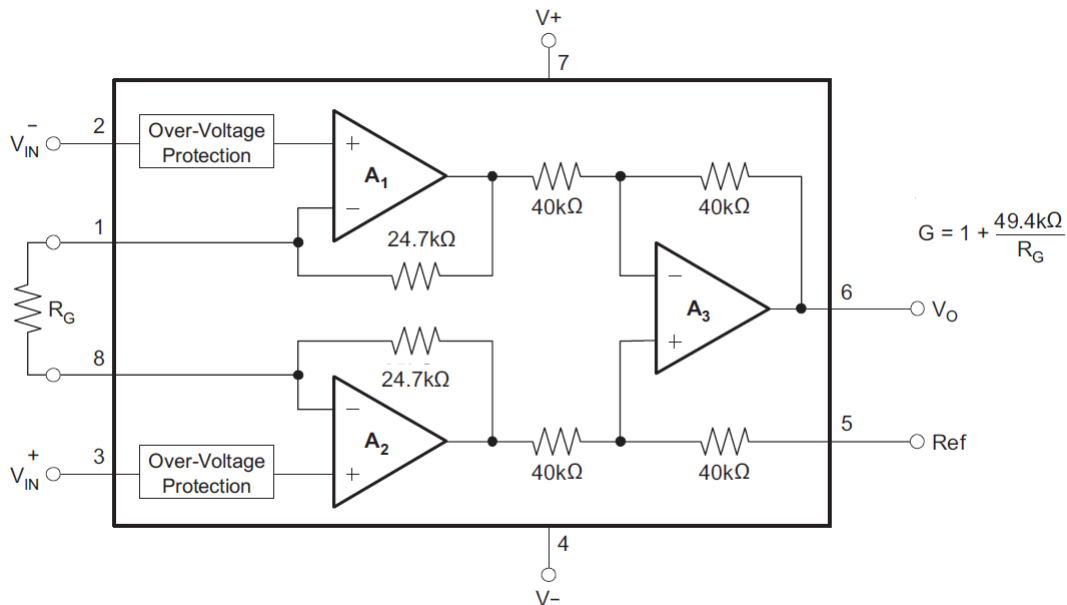


Figure 3.1 Functional Block Diagram

Gain is set by connecting a single external resistor, R_G , connected between pins 1 and 8:

$$G = 1 + 49.4 \text{ k}\Omega / R_G \quad (1)$$

Commonly used gains and resistor values are shown in Table 3.1.

Important statement:

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