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PRELIMINARY

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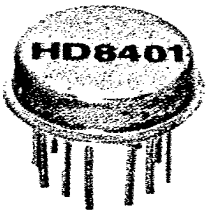
LN2

HD8401 / HD8402
Low Power Supply Voltage Instrumentation Amplifier

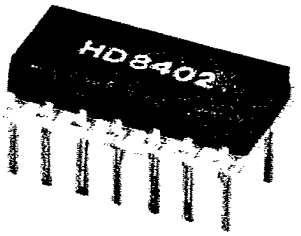
FEATURES

- ± 1 volt to ± 7.5 volt Power Supply Voltage Range
- 1.5 ma Quiescent Current (typical)
- x10 to x200 Gain Programmed by External Resistor
- 80 db CMR (minimum)
- 2mv Input Offset Voltage (typical)
- Provision for External Offset Nulling
- True Differential Input
- High Input Impedance
- Low Input Bias Current (40 na. typical)
- Wide Common Mode Input Voltage Range
- Low Cost



APPLICATIONS

- Battery Powered Equipment
- Remote Transducer Amplifier
- Biological Signal Amplifier

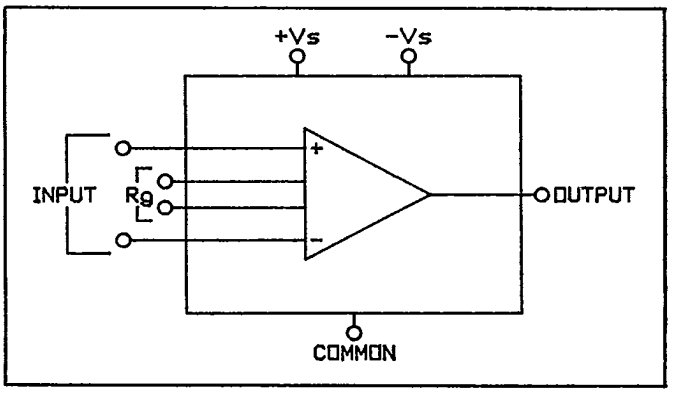


DESCRIPTION

The HD8401/HD8402 are complete hybrid instrumentation amplifiers specifically designed for sensor signal conditioning requirements of miniaturized battery operated instrumentation where the power supply voltages are limited. Gain accuracy and common mode rejection are achieved by using a laser trimmed internal thin film resistor network.

The HD8401/HD8402 are easy to use featuring a wide input voltage range and a large output voltage swing with the ability to supply ± 4 ma. of load current. For instance, with a ± 1 volt power supply, the input voltage range is typically ± .7 volts and the output voltage range is typically ± .8 volts. Internal frequency compensation insures stability with a minimum of external components. Gains of 10 to 200 can be programmed by a single external resistor. External nulling of the offset voltage in fixed gain applications is easily achieved using the recommended circuit shown in Figure 2.

The amplifier is supplied in a 12 lead TO-8 package (HD8401) hermetically sealed for environmental protection, or a 14 lead DIP package (HD8402).



ABSOLUTE MAXIMUM RATINGS

Parameter	Rating	Unit
Supply Voltage (±Vs)	±9	volts
Input Voltage	±Vs	volts
Differential Input Voltage	±Vs	volts
Output Short Circuit Duration	Indefinite	sec.
Storage Temperature	−50 to +125	°C
Operating Temperature	−25 to +85	°C
Lead Soldering Temperature	300 (for 10 sec.)	°C

RECOMMENDED OPERATING CONDITIONS

Parameter	Rating	Unit
Supply Voltage (±Vs)	±1.0 to ±7.5	volts
Input Voltage	±(.9) (Vs −.25)	volts
Temperature	−25 to +85	°C

ELECTRICAL SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Units
DC GAIN	Freq=DC, T_A=25°C	10	$(10 + \frac{360K}{Rg})$	210	V/V
ERROR					
G=10	Rg=∞			.5	%
G=210	Rg=1.8K			.5	%
TEMP. COEFF.	$T_A=T_{min}$ to T_{max}				
G=10	Rg=∞			25	ppm/°C
G=210	Rg=1.8K & 10ppm/°C			50	ppm/°C
NON LINEARITY	T_A=25°C, F=DC				
G=10				.03	% of F.S.
G=210				.1	% of F.S.
INPUT					
Voltage Range	±Vs=±1V to ±7.5V	±.9 (|Vs|−.25)			V
OFFSET VOLTAGE	T_A=25°C		±1		mV
Vs Temp.	$T_A=T_{min}$ to T_{max}		10	50	μV/°C
BIAS CURRENT			40	150	nA
Vs Temp.			2		nA/°C

Pin Configurations and Applications on back cover.

Specifications apply over full recommended operating conditions (ie ±1V < Vs < ±7.5V, −25°C to +85°C) unless otherwise stated.

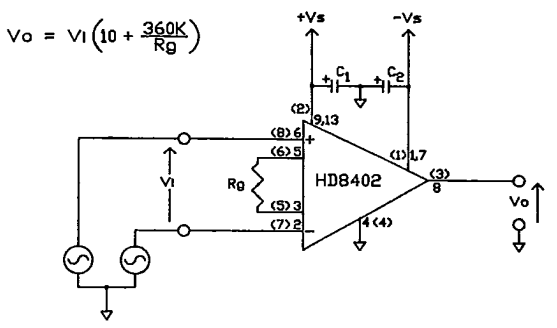
ELECTRICAL SPECIFICATIONS (cont'd.)

Parameter	Conditions	Min.	Typ.	Max.	Units
OFFSET CURRENT Vs Temp.			 .5	40 1.5	nA nA/°C
IMPEDANCE	Differential Common Mode		10^9//10 10^9//10		Ω//pf Ω//pf
CMR	T_A=25°C, G=10, F=DC	80			dB
INPUT NOISE	F=1KHz		30		nV/$\sqrt{Hz}$
OUTPUT Voltage Current	R_L=10K	|Vs|−.25	 ±3		V mA
POWER SUPPLY VOLTAGE (±Vs)		±1		±7.5	V
QUIESCENT CURRENT	V_O=0		1.2	1.6	mA
POWER SUPPLY REJECTION RATIO		75			dB
DYNAMIC RESPONSE (3dB Flat) Small Signal	R_L=10K, C_L=100 pF G=10 G=210		 25 1.2		 KHz KHz
SLEW RATE			.15		V/μS
TEMPERATURE RANGE Operating Storage		 −25 −50		 +85 +125	 °C °C

Pin Configurations and Applications on back cover.

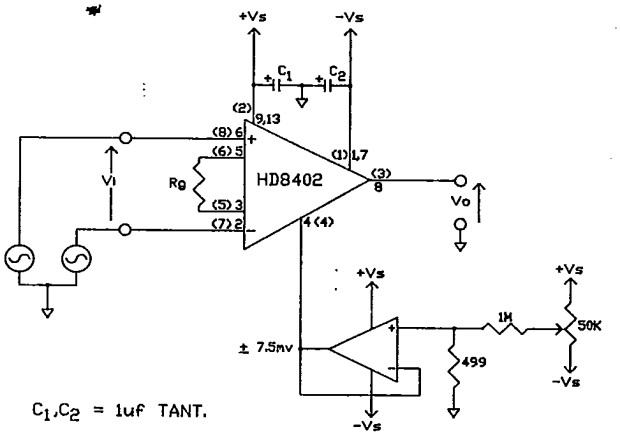
Specifications apply over full recommended operating conditions (ie ±1V < Vs < ±7.5V, −25°C to +85°C) unless otherwise stated.

FIGURE 1:
Basic Connection for the HD8401 (HD8401 in parenthesis) and HD8402



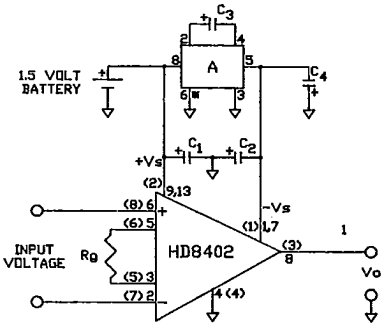
C_1, C_2 = 1uf TANT.

FIGURE 2:
Optional Offset Nulling in Fixed Gain Applications
(HD8401 in parenthesis)



C_1, C_2 = 1uf TANT.

FIGURE 3:
Operation from a Single 1.5 Volt Battery (HD8401 in parenthesis)

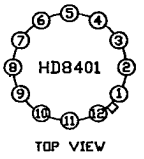


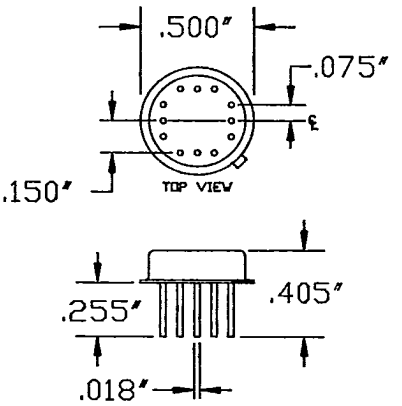
A = ICL 7660 (VOLTAGE CONVERTER)
* GROUND PIN 6 FOR BATTERY VOLTAGES BELOW 3 VOLTS

C_1, C_2 = 1uf TANT.
C_3, C_4 = 10uf TANT.

FIGURE 4:
Pinout and Physical Dimensions for HD8401

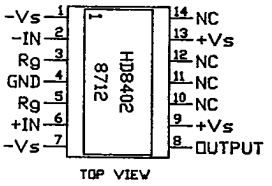
1 -Vs
2 +Vs
3 OUTPUT
4 GROUND
5 Rg
6 Rg
7 -IN
8 +IN
9 NC
10 NC
11 NC
12 CASE GROUND

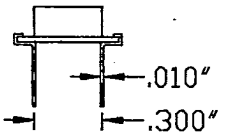


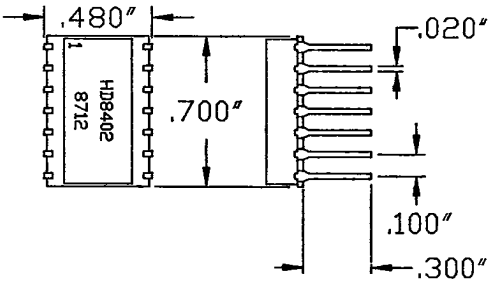


HD8401

FIGURE 5:
Pinout and Physical Dimensions for HD8402







HD8402