

PRELIMINARY

August 1991

Features

- Low Offset Voltage 300 μ V (Max)
- Low Offset Drift 2 μ V/ $^{\circ}$ C
- Low Supply Current <1mA/Amp
- High Gain, CMRR and PSRR

Applications

- Audio Amplifiers
- Low Impedance Sensors
- Universal Active Filters
- Process Control Equipment

Description

The HA-5232 and HA-5234 are dual and quad precision bipolar-input op amps. They are intended for use in multi-channel data acquisition systems where moderate-to-high level of accuracy is required. This relatively high level of accuracy is maintained across temperature with an Average Offset Drift of 2 μ V/ $^{\circ}$ C for the high grade parts.

Large volume applications will be in process control and environment monitoring where many low impedance sensors such as thermocouples, thermistors, strain gauges, and pressure transducers are used to assess the state of the system. Other systems with similar requirements include mainframe computers, aircraft, and semiconductor fab and test equipment.

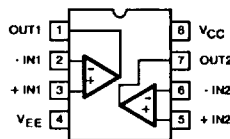
The HA-5232 and HA-5234 were designed to offer a solution between the lower performance parts like the HA-4741 or CA324 and the higher priced precision multiple op amps like the OP-400. These parts will allow the designer to get a relatively high level of precision in his transducer preamp without having to worry about offset trimming.

The HA-5232 and HA-5234 are available in commercial and industrial temperature ranges, and a choice of packages. See the "Ordering Information" section below for more information.

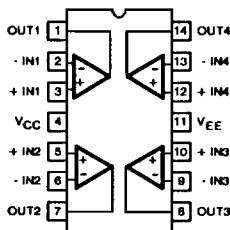
For military grade product, refer to the HA-5232/883 and HA-5234/883 data sheet.

Pinouts

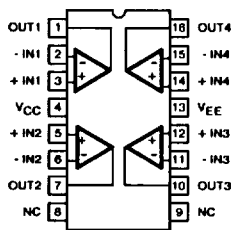
HA9P5232 (8 PIN SOIC)
HA3-5232 (8 PIN PLASTIC DIP)
TOP VIEW



HA3-5234 (14 PIN PLASTIC DIP)
TOP VIEW



HA9P5234 (16 PIN SOIC)
TOP VIEW



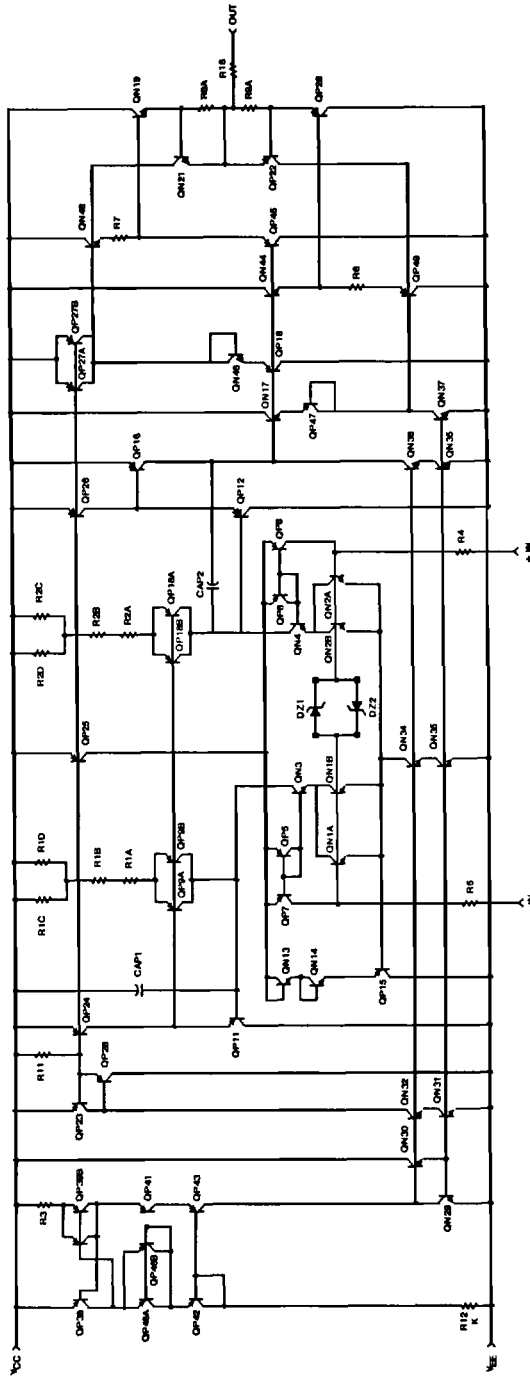
The functional pinouts will comply to the JEDEC standards for dual and quad op amps as shown above.

Ordering Information

PART NUMBER	TEMPERATURE RANGE	PACKAGE
HA3-5232-5/A-5	0 $^{\circ}$ C to +70 $^{\circ}$ C	8 Pin Plastic DIP
HA9P5232-5/A-5	0 $^{\circ}$ C to +70 $^{\circ}$ C	8 Pin SOIC
HA3-5234-5/A-5	0 $^{\circ}$ C to +70 $^{\circ}$ C	14 Pin Plastic DIP
HA9P5234-5/A-5	0 $^{\circ}$ C to +70 $^{\circ}$ C	16 Pin SOIC
HA3-5232-9/A-9	-40 $^{\circ}$ C to +85 $^{\circ}$ C	8 Pin Plastic DIP
HA9P5232-9/A-9	-40 $^{\circ}$ C to +85 $^{\circ}$ C	8 Pin SOIC
HA3-5234-9/A-9	-40 $^{\circ}$ C to +85 $^{\circ}$ C	14 Pin Plastic DIP
HA9P5234-9/A-9	-40 $^{\circ}$ C to +85 $^{\circ}$ C	16 Pin SOIC

HA-5232 HA-5234

Schematic



Specifications HA-5232 HA-5234

Absolute Maximum Ratings

Voltage Between V+ and V-	36V
Common Mode Voltage	V_{SUPPLY}
Differential Input Voltage	V_{SUPPLY}
Output Current Short Circuit	Protected

Operating Temperature Ranges

HA-5232-5, HA-5234-5	$0^{\circ}\text{C} \leq T_A \leq +75^{\circ}\text{C}$
HA-5232-9, HA-5234-9	$-40^{\circ}\text{C} \leq T_A \leq +85^{\circ}\text{C}$
Storage Temperature Range	$-65^{\circ}\text{C} \leq T_A \leq +150^{\circ}\text{C}$
Maximum Junction Temperature	$+175^{\circ}\text{C}$

Electrical Specifications $V_{SUPPLY} = \pm 15\text{V}$, $R_L = 100\text{k}\Omega$, $C_L = 20\text{pF}$ Unless Otherwise Specified

PARAMETER	TEMP	HA-5232A-5 or A-9 HA-5234A-5 or A-9			HA-5232-5 or -9 HA-5234-5 or -9			UNITS	
		MIN	TYP	MAX	MIN	TYP	MAX		
Offset Voltage	+25°C	-	100	200	-	100	500	μV	
	Full	-	-	300	-	-	725	μV	
Average Offset Drift	Full	-	-	2	-	-	5	$\mu\text{V}/^{\circ}\text{C}$	
Input Bias Current	+25°C	-	-	5	-	-	10	nA	
	Full	-	-	10	-	-	15	nA	
Input Offset Current	+25°C	-	-	3.5	-	-	10	nA	
	Full	-	-	6	-	-	15	nA	
Common Mode Range	Full	12	-	-	12	-	-	V	
CMRR (Note 1)	+25°C	110	-	-	100	-	-	dB	
	Full	105	-	-	100	-	-	dB	
Input Capacitance	+25°C	-	3	-	-	3	-	pF	
Input Noise Voltage 0.1Hz – 10Hz $f_o = 1\text{kHz}$	+25°C	-	0.5	-	-	0.5	-	μV_{p-p}	
	+25°C	-	11	-	-	11	-	$\text{nV}/\sqrt{\text{Hz}}$	
Input Noise Current 0.1Hz – 10Hz $f_o = 1\text{kHz}$	+25°C	-	15	-	-	15	-	pA_{p-p}	
	+25°C	-	0.4	-	-	0.4	-	$\text{pA}/\sqrt{\text{Hz}}$	
Large Signal Gain (Note 2)	+25°C	1000	-	-	250	-	-	KV/V	
	Full	1000	-	-	250	-	-	KV/V	
Unity Gain Bandwidth	+25°C	-	0.5	-	-	0.5	-	MHz	
Minimum Stable Gain	Full	1	-	-	1	-	-	V/V	
Output Swing (Note 2)	+25°C	12	-	-	12	-	-	V	
	Full	12	-	-	12	-	-	V	
Short Circuit Current	Full	-	-	50	-	-	50	mA	
Slew Rate (Note 3)	+25°C	-	0.15	-	-	0.15	-	V/ μs	
PSRR (Note 4)	+25°C	105	-	-	100	-	-	dB	
	Full	100	-	-	100	-	-	dB	
I_{CC}	HA-5232	+25°C	-	-	1.45	-	-	1.45	mA
		Full	-	-	1.55	-	-	1.55	mA
	HA-5234	+25°C	-	-	2.9	-	-	2.9	mA
		Full	-	-	3.1	-	-	3.1	mA

NOTES:

1. $V_{CM} = \pm 10\text{V}$
2. $R_L = 2\text{K}$
3. $R_L = 2\text{K}$, $C_L = 100\text{pF}$, $V_{OUT} = \pm 10\text{V}$, $A_V = +1$
4. $|V_S| = 3\text{V to }18\text{V}$