HARRIS

HA-4620/22/25

Wideband, High Performance Quad Operational Amplifier

Not Recommended For New Designs See HA-5114

FEATURES

- Wide Gain Bandwidth Product 70MHz
- High Slew Rate ±20V/μs
- Low Offset Voltage 0.3mV
- Fast Settling (0.01%, 10V Step) 2.5μs
- Total Harmonic Distortion <.01% to 30kHz
- Low Drift 2μV/°C
- Low Power Consumption 35mW/Amp
- Supply Range ±5V to ±20V

APPLICATIONS

- High Q Wide Band Filters
- Pulse Amplifiers
- Audio Amplifiers
- Data Acquisition Systems
- Absolute Value Circuits
- Video and R.F. Amplifiers

DESCRIPTION

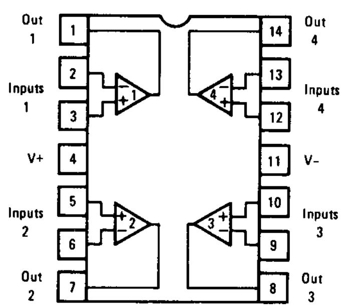
The HA-4620 series are wide band quad operational amplifiers featuring high slew rate, wide bandwidth and fast settling time specifications complemented by low input offset voltage, low drift and input noise voltage.

These dielectrically isolated devices are optimized to offer excellent features suitable for applications where a gain of 10 or greater is to be used. The 35mW/amp and a 70MHz gain-bandwidth-product make these monolithic amplifiers valuable components for many active filter circuits. HA-4620 series offers 0.3mW offset voltages and 2μV/°C offset voltage drift for very accurate signal conditioning designs. In high performance audio applications, these amplifiers deliver 260kHz full power bandwidth and $8nV\sqrt{Hz}$ noise voltage. For fast accurate data acquisition systems HA-4620 series offer 20Vμs slew rate and settling time of 2.5μsecs to 0.1% 10V step.

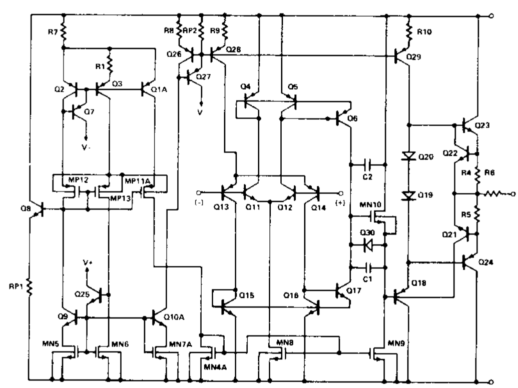
HA-4620 series are available in 14 pin CERDIP packages and are interchangeable with most other quad op amps. HA-4625 is also available in chip form. HA-4620/4622-2 is specified from -55°C to +125°C and HA-4620/4625-5 is specified over 0°C to +75°C range.

PINOUT

TOP VIEW



SCHEMATIC



ONE FOURTH ONLY (HA-4620)

SPECIFICATIONS

ABSOLUTE MAXIMUM RATINGS (Note 1)

T_A = +25°C unless otherwise stated		Power Dissipation (Note 4)	880mW
Voltage between V+ and V- Terminals	40.0V	Operating Temperature Ranges:	
Differential Input Voltage	±7V	HA-4620/22-2	$-55°C \leq T_A \leq +125°C$
Input Voltage (Note 2)	±15.0V	HA-4620/25-5	$0°C \leq T_A \leq +75°C$
Output Short Circuit Duration (Note 3)	Indefinite	Storage Temperature Range	$-65°C \leq T_A \leq +150°C$

ELECTRICAL CHARACTERISTICS

		HA-4620-2 HA-4620-5			HA-4622-2 HA-4625-5			
PARAMETER	TEMP	MIN	TYP	MAX	MIN	TYP	MAX	UNITS
INPUT CHARACTERISTICS								
Offset Voltage	+25°C		0.3	2.5		3.0	9	mV
	Full			3.0			10	mV
Av. Offset Voltage Drift	Full		2			5		μV/°C
Bias Current	+25°C		130	200		200	400	nA
	Full			325			500	nA
Offset Current	+25°C		30	75		70	150	nA
	Full			125			175	nA
Common Mode Range	Full	±12			±12			V
Input Noise Voltage (f = 1kHz)	+25°C		8			8		$nV/\sqrt{Hz}$
Input Resistance	+25°C		500			500		kΩ
TRANSFER CHARACTERISTICS								
Large Signal Voltage Gain (Note 5)	Full	100K	250K		75K	250K		V/V
Common Mode Rejection Ratio (Note 6)	Full	86			80			dB
Channel Separation (Note 7)	+25°C		-108			-108		dB
Gain Bandwidth Products (Note 8)	+25°C		70			70		MHz
OUTPUT CHARACTERISTICS								
Output Voltage Swing (R_L = 10K)	Full	±12	±13		±12	±13		V
(R_L = 2K)	Full	±10	±12		±10	±12		V
Full Power Bandwidth (Note 9)	+25°C		260			260		kHz
Output Current (Note 7)	Full	±10	±15		±8	±15		mA
Output Resistance	+25°C		200			200		Ω
TRANSIENT RESPONSE (Note 11)								
Rise Time	+25°C		38	60		38		ns
Overshoot	+25°C		45	60		45		%
Slew Rate	+25°C	±12	±20		±12	±20		V/μs
Settling Time (Note 10)			2.5			2.5		μs
POWER SUPPLY CHARACTERISTICS								
Supply Current	+25°C		4.6	5.5		5.0	7.5	mA
Power Supply Rejection Ratio (Note 9)	Full	86			74			dB

NOTES:

1. Absolute maximum ratings are limiting values, applied individually, beyond which the serviceability of the circuit may be impaired. Functional operability under any of these conditions is not necessarily implied.

2. For supply voltages < ± 15V, the absolute maximum input voltage is equal to the supply voltage.

3. Any one amplifier may be shorted to ground indefinitely.

4. Derate 5.8mW/°C above T_A = +25°C.

5 V_{OUT} = ±10V, R_L = 2KΩ

6. ΔV = ±5.0V.

7. Channel separation value is referred to the input of the amplifier. Input test conditions are: f = 10kHz; V_{IN} = 200mV peak to peak; R_S = 1kΩ. (Refer to Channel Separation vs. Frequency Curve for test circuits.)

8. A_V = 10; R_L = 2K; $C_L \leq$ 10pF.

9. Full power bandwidth is guaranteed by equation:

   $$\text{Full power bandwidth} = \frac{\text{Slew Rate}}{2\pi V\ \text{Peak}}$$

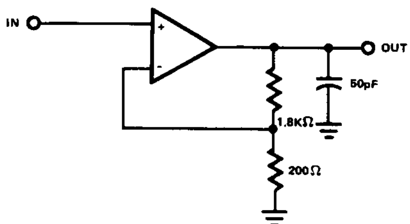
10. Output current is measured with V_{OUT} = ±5V.

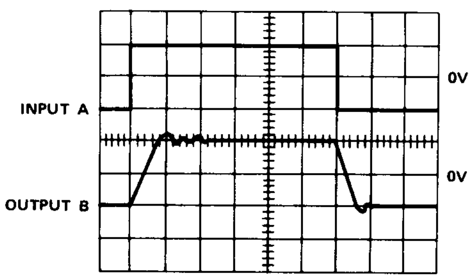
11. Refer to Test Circuits section of the data sheet.

12. Setting time is measured to 0.1% of final value for a 1 volt input step, and A_V = -10.

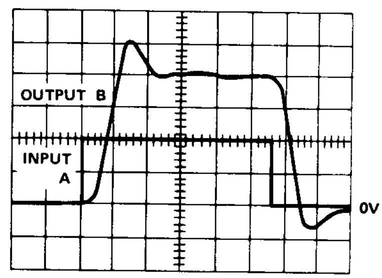
TEST CIRCUITS

LARGE AND SMALL SIGNAL RESPONSE CIRCUIT



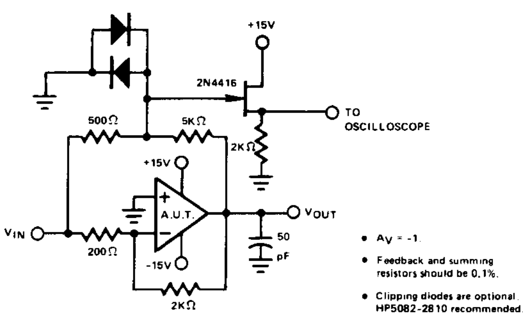


VOLTS: Input A: .5V/Div., Output B: 5V/Div.
TIME: 500ns/Div.



VOLTS: Input A: .01V/Div., Output B: 50mV/Div.
TIME: 50ns/Div.

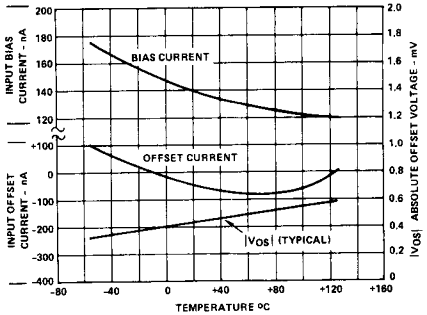
SETTLING TIME CIRCUIT



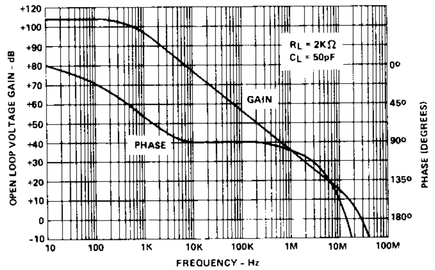
TYPICAL PERFORMANCE CURVES

V+ = +15V, T_A = +25°C Unless otherwise stated.

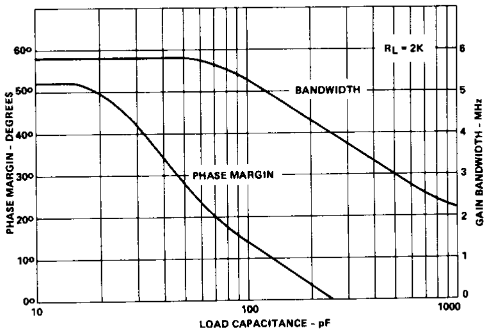
OFFSET VOLTAGE INPUT BIAS AND OFFSET CURRENT vs. TEMPERATURE



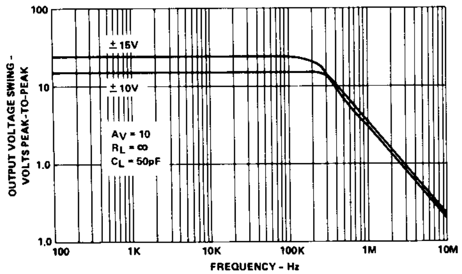
OPEN LOOP FREQUENCY RESPONSE



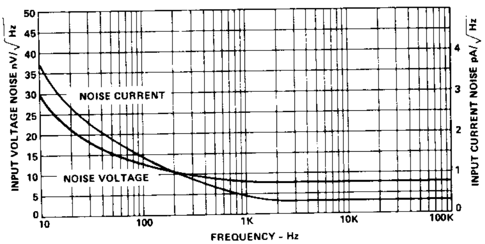
SMALL SIGNAL BANDWIDTH AND PHASE MARGIN vs. LOAD CAPACITANCE



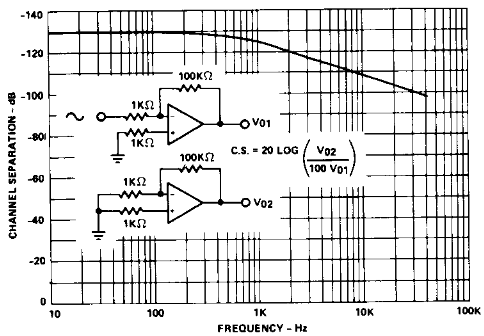
OUTPUT VOLTAGE SWING vs. FREQUENCY AND SUPPLY VOLTAGE



INPUT NOISE vs. FREQUENCY

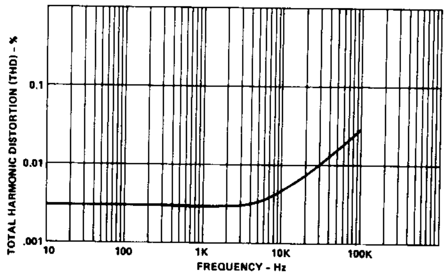


CHANNEL SEPARATION vs. FREQUENCY

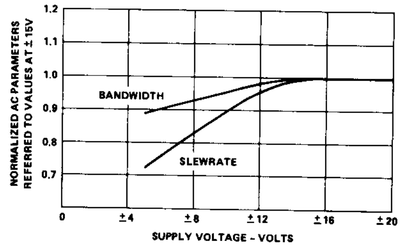


TYPICAL PERFORMANCE CURVES (Continued)

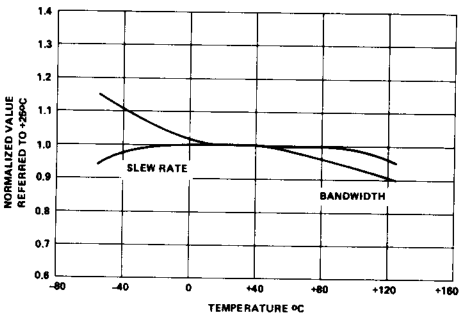
TOTAL HARMONIC DISTORTION
VS. FREQUENCY



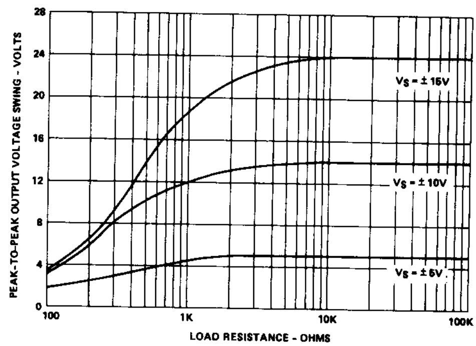
NORMALIZED AC PARAMETERS
VS. SUPPLY VOLTAGE



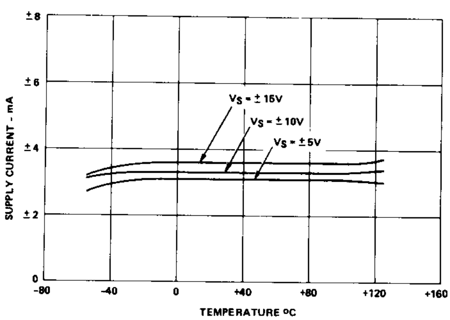
NORMALIZED AC PARAMETERS
VS. TEMPERATURE



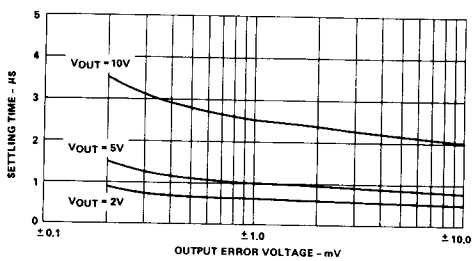
MAXIMUM OUTPUT VOLTAGE SWING VS.
LOAD RESISTANCE AND SUPPLY VOLTAGE



POWER SUPPLY CURRENT VS.
TEMPERATURE AND SUPPLY VOLTAGE



SETTLING TIME VS.
OUTPUT AMPLITUDE (A_V = -10)



APPLYING THE HA-4622/4625

1. POWER SUPPLY DISSIPATION: Although not absolutely necessary, it is recommended that all power supply lines be decoupled with 0.01μF ceramic capacitors to ground. Decoupling capacitors should be located as near to the amplifier terminals as possible. If several amplifier sections are connected in series, it is recommended that every third or fourth section be decoupled.

2. UNUSED OP AMPS: Unused op amp sections should be connected in a noninverting A_V = 10 configuration with the (+) input tied to ground in order to optimize performance of devices being used.

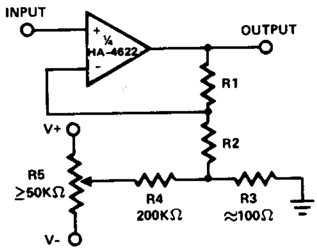
3. In high frequency applications where large value feedback resistors are used, a small capacitor (3pF) may be needed in parallel with the feedback resistor to neutralize the pole introduced by input capacitance.

4. When driving heavy capacitive loads (>100pF), a small value resistor should be connected in series with the output and inside the feedback loop.

APPLICATIONS

SUGGESTED METHODS FOR OFFSET NULLING

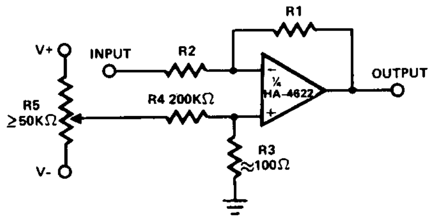
NON-INVERTING AMPLIFIER



NON-INVERTING AND INVERTING AMPLIFIERS RANGE OF ADJUSTMENT DETERMINED BY PRODUCT OF VSUPPLY AND R3/R4 RATIO

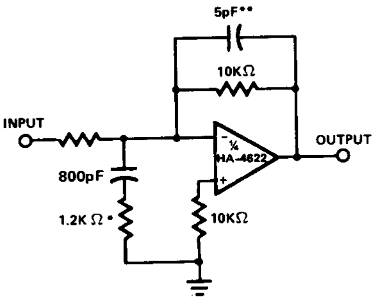
$$A_V = 1 + \frac{R1}{R2 + R3}$$

INVERTING AMPLIFIER

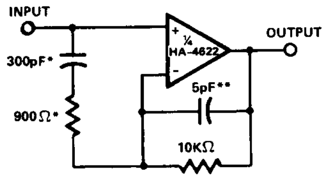


SUGGESTED COMPENSATION FOR UNITY GAIN STABILITY

INVERTING



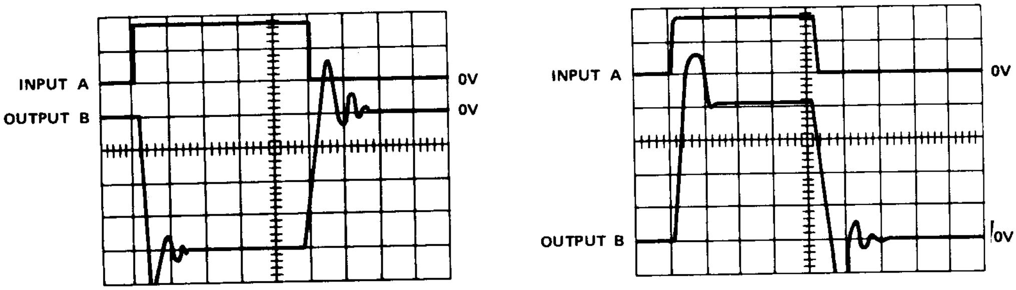
NON-INVERTING



* VALUES WERE DETERMINED EXPERIMENTALLY FOR OPTIMUM SPEED AND SETTLING TIME

** OPTIONAL

LARGE SIGNAL RESPONSE



VOLTS: Input A: 5V/Div., Output B: 2V/Div.
TIME: 1μs/Div.