Operational Amplifiers

general description

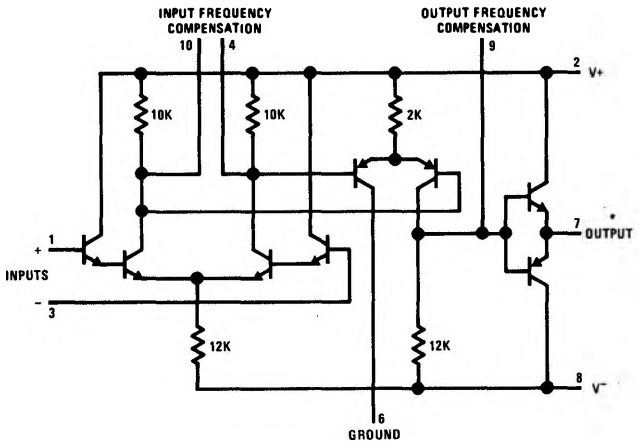
NH0005C operational amplifier

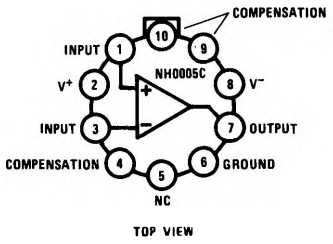
The NH0005C is a hybrid integrated circuit operational amplifier employing thick film resistors and discrete silicon semiconductors in its design. The select matching of the input pairs of transistors results in low input bias currents and a very low input offset current both of which exhibit excellent temperature tracking. In addition, the device features:

- Very high output current capability: ±40 mA into a 100 ohm load
- Low standby power dissipation: typically 60 mW at ±12V
- High input resistance: typically 2M at 25°C
- Operating range: 0° to 70°C
- Good high frequency response: unity gain at 30 MHz

With no external roll-off network, the amplifier is stable with a feedback ratio of 10 or greater. By adding a 200 pF capacitor between pins 9 and 10, and a 200 ohm resistor in series with a 75 pF capacitor from pin 4 to ground, the amplifier is stable to unity gain. The unity gain loop phase margin with the above compensation is typically 70 degrees. With a gain of 10 and no compensation the loop phase margin is typically 50 degrees.

schematic and connection diagrams

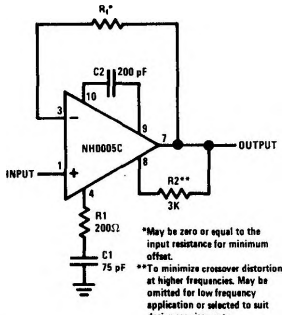




TOP VIEW

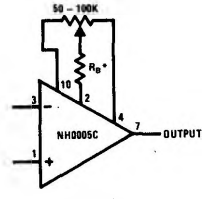
typical applications

Voltage Follower



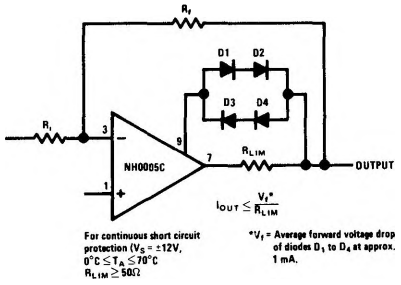
*May be zero or equal to the input resistance for minimum offset.
**To minimize crossover distortion at higher frequencies. May be omitted for low frequency application or selected to suit design requirements

Offset Balancing Circuit



*Typical value, R_B = 100K. R_B may be increased for greater sensitivity with reduction in range.

External Current Limiting

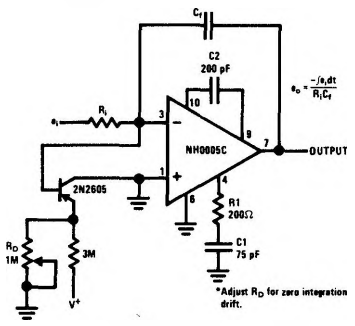


$I_{OUT} \leq \frac{V_f^*}{R_{LIM}}$

For continuous short circuit protection (V_S = ±12V, 0°C ≤ T_A ≤ 70°C, $R_{LIM} \geq 50\Omega$)

*V_f = Average forward voltage drop of diodes D_1 to D_4 at approx. 1 mA.

Integrator With Bias Current Compensation



$e_o = \frac{-\int e_i dt}{R_1 C_f}$

*Adjust R_D for zero integration drift.

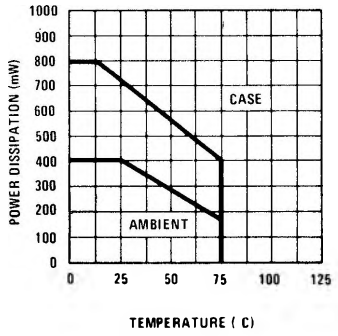
absolute maximum ratings

Supply Voltage	±20V
Power Dissipation (see Curve)	400 mW
Differential Input Voltage	±15V
Input Voltage	Equal to supply voltages
Peak Load Current	±100 mA
Storage Temperature Range	−55°C to +125°C
Operating Temperature Range	0°C to 70°C
Lead Temperature (soldering, 20 sec)	300°C; 1/16" from package

electrical characteristics

PARAMETER	CONDITIONS	NH0005C			UNITS
		MIN	TYP (Note 2)	MAX	
Input Offset Voltage 0°C to 70°C	$R_S \leq 20\ k\Omega$		3	10	mV
Input Offset Current 0°C to 70°C			5	25	nA
Input Bias Current 0°C to 70°C			20	100	nA
Large Signal Voltage Gain 0°C to 70°C	R_L = 10K, R2 = 3K, V_{OUT} = ±5V	2	5		V/mV
Output Voltage Swing 0°C to 70°C	R_L = 10 kΩ	−10		+6	V
	R_L = 100Ω	−4	±6	+4	V
Input Resistance 25°C		0.5	2		MΩ
Common Mode Rejection Ratio 25°C	V_{IN} = ±4V, $R_S \leq 20\ k\Omega$	50	60		dB
Power Supply Rejection Ratio 25°C		50	60		dB
Supply Current (+) 0°C to 70°C			3	5	mA
Supply Current (−) 0°C to 70°C			2	4	mA

Note 1: These specifications apply for pin 6 grounded, V_S = ±12V, with Resistor R1 = 200Ω in series with Capacitor C1 = 75 pF from pin 4 to ground, and C2 = 200 pF between pins 9 and 10 unless otherwise specified.
Note 2: Typical values are for 25°C only.



Maximum Power Dissipation