

# **LH0020/LH0020C High Gain Operational Amplifier**

## **General Description**

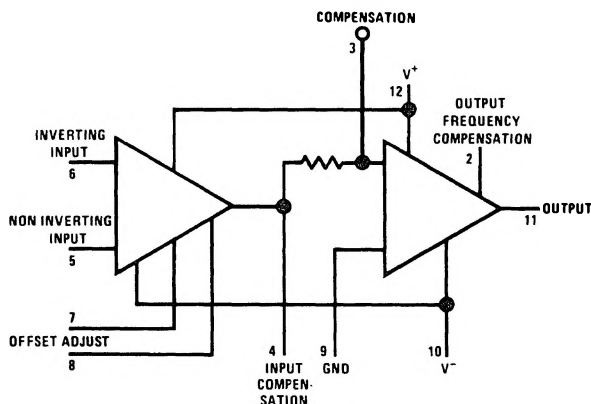
The LH0020/LH0020C is a general purpose operational amplifier designed to source and sink 50 mA output currents. In addition to its high output capability, the LH0020/LH0020C exhibits excellent open loop gain, typically in excess of 100 dB. The parameters of the LH0020 are guaranteed over the temperature range of  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  and  $\pm 5\text{V} \leq V_S \leq \pm 22\text{V}$ , while those of the LH0020C are guaranteed over the temperature range of  $0^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  and  $\pm 5\text{V} \leq V_S \leq \pm 18\text{V}$ .

Output current capability, excellent input characteristics, and large open loop gain make the LH0020/LH0020C suitable for application in a wide variety of applications from precision DC power supplies to precision medium power comparator.

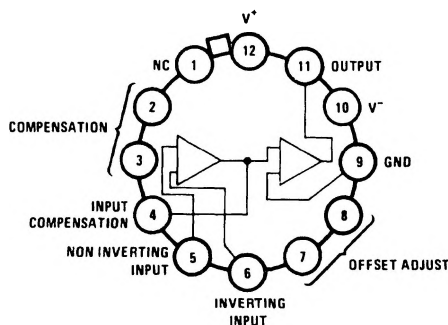
## **Features**

- Low offset voltage typically 1.0 mV at  $25^{\circ}\text{C}$  over the entire common-mode voltage range
- Low offset current typically 10 nA at  $25^{\circ}\text{C}$  for the LH0020 and 30 nA for the LH0020C
- Offset voltage is adjustable to zero with a single potentiometer
- $\pm 14\text{V}$ , 50 mA output capability

## **Schematic and Connection Diagrams**



TL/H/5554-1



TL/H/5554-2

**Top View**

**Order Number LH0020G or LH0020CG**  
**See NS Package Number G12B**

## Absolute Maximum Ratings

If Military/Aerospace specified devices are required, contact the National Semiconductor Sales Office/Distributors for availability and specifications.

(Note 3)

Supply Voltage	±22V
Power Dissipation	1.5W
Differential Input Voltage	±30V
Input Voltage (Note 1)	±15V

Output Short Circuit Duration	Continuous
Operating Temperature Range	
LH0020	–55°C to +125°C
LH0020C	0°C to +85°C
Storage Temperature	–65°C to +150°C
Lead Temperature (Soldering, 10 sec.)	300°C
ESD rating to be determined.	

## Electrical Characteristics (Note 2) $T_{\min} \leq T_A \leq T_{\max}$ unless otherwise specified

Parameter	Conditions	LH0020			LH0020C			Units
		Min	Typ	Max	Min	Typ	Max	
Input Offset Voltage	$R_S \leq 100\Omega$ , $T_A = 25^\circ\text{C}$ Over Temp.		1.0	2.5		1.0	6.0	mV
			2.0	4.0		3.0	7.5	mV
Input Offset Current	$T_A = 25^\circ\text{C}$ Over Temp.		10	50		30	200	nA
				100			300	nA
Input Bias Current	$T_A = 25^\circ\text{C}$ Over Temp.		60	250		200	500	nA
				500			800	nA
Supply Current	$V_S = \pm 15\text{V}$ , $T_A = 25^\circ\text{C}$		3.5	5.0		3.6	6.0	mA
Input Resistance	$T_A = 25^\circ\text{C}$	0.6	1.0		0.3	1.0		M $\Omega$
Large Signal Voltage Gain	$V_S = \pm 15\text{V}$ , $R_L = 300\Omega$ , $V_O = \pm 10\text{V}$ , $T_A = 25^\circ\text{C}$	100	300		50	150		V/mV
	$V_S = \pm 15\text{V}$ , $R_L = 300\Omega$ , $V_O = \pm 10\text{V}$ , $T_A = 25^\circ\text{C}$	50			30			V/mV
Output Voltage Swing	$V_S = \pm 15\text{V}$ , $R_L = 300\Omega$ , $T_A = 25^\circ\text{C}$ Over Temp.	14.2	14.5		14.0	14.2		V
		14.0			13.5			V
Output Short Circuit Current	$V_S = \pm 15\text{V}$ , $R_L = 0\Omega$ , $T_A = 25^\circ\text{C}$		100	130	25	120	140	mA
Input Voltage Range	$V_S = \pm 15\text{V}$	±12			±12			V
Common-Mode Rejection Ratio	$R_S \leq 100\Omega$	90	96		90	96		dB
Power Supply Rejection Ratio	$R_S \leq 100\Omega$	90	96		90	96		dB

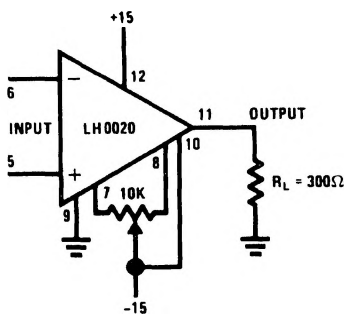
Note 1: For supply voltages less than ±15V, the absolute maximum input voltage is equal to the supply voltage.

Note 2: These specifications apply for  $\pm 5\text{V} \leq V_S \leq \pm 22\text{V}$  for the LH0020,  $\pm 5\text{V} \leq V_S \leq \pm 18\text{V}$  for the LH0020C, pin 9 grounded, and a 5000 pF capacitor between pins 2 and 3, unless otherwise specified.

Note 3: Refer to RETS0020G for LH0020G military specifications.

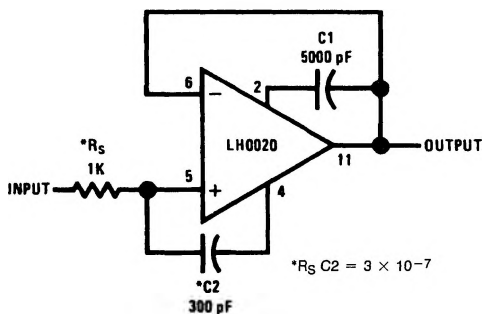
## Typical Applications

### Offset Adjustment



TL/H/5554-3

### Unity Gain Frequency Compensation



TL/H/5554-4