

LH0020/LH0020C High Gain Operational Amplifier

General Description

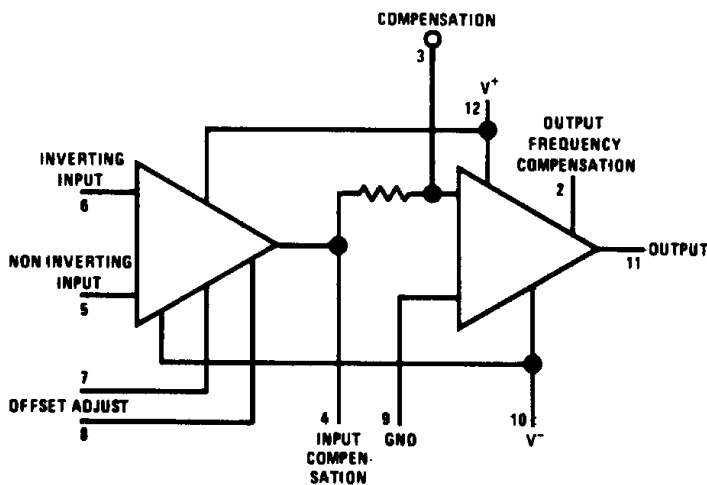
The LH0020/LH0020C is a general purpose operational amplifier designed to source and sink 50 mA output currents. In addition to its high output capability, the LH0020/LH0020C exhibits excellent open loop gain, typically in excess of 100 dB. The parameters of the LH0020 are guaranteed over the temperature range of -55°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°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.

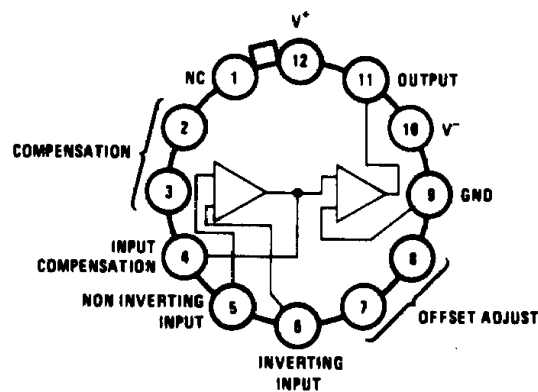
Features

- Low offset voltage typically 1.0 mV at 25°C over the entire common-mode voltage range
- Low offset current typically 10 nA at 25°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


Top View

TL/H/5554-2

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

Absolute Maximum Ratings

If Military/Aerospace specified devices are required, please 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 Ω |
| Large Signal Voltage Gain | $V_S = \pm 15\text{V}$, $R_L = 300\Omega$, $V_O = \pm 10\text{V}$, $T_A = 25^\circ\text{C}$ $V_S = \pm 15\text{V}$, $R_L = 300\Omega$, $V_O = \pm 10\text{V}$, $T_A = 25^\circ\text{C}$ | 100 | 300 | | 50 | 150 | | V/mV |
| | | 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 |

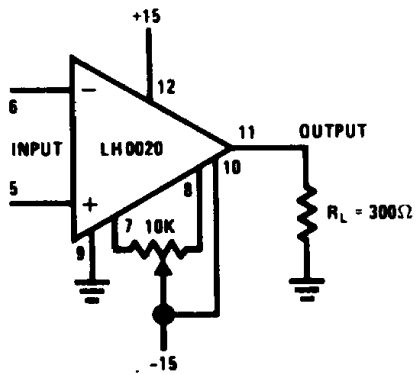
Note 1: For supply voltages less than ±15V, the absolute maximum input voltage is equal to the supply voltage.

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.

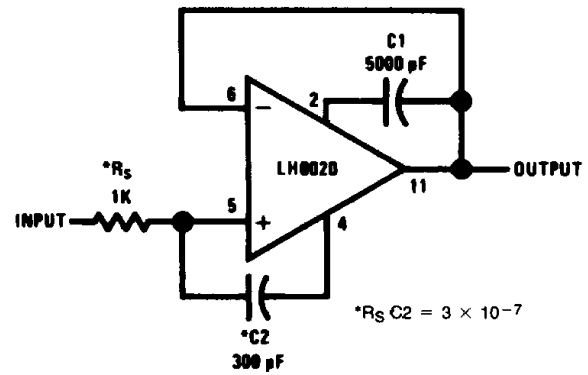
Typical Applications

Offset Adjustment



TL/H/5554-3

Unity Gain Frequency Compensation



TL/H/5554-4