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Jameco Part Number 23051NSC

## LH0002 Buffer

### General Description

The LH0002 is a general purpose buffer. Its features make it ideal to integrate with operational amplifiers inside a closed loop configuration to increase current output. The symmetrical output portion of the circuit also provides a low output impedance for both the positive and negative slopes of output pulses.

The LH0002 is available in an 8-lead TO-99 can. The LH0002C is available in an 8-lead TO-99, and a 10-pin molded dual-in-line package.

The LH0002 is specified for operation over the  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  military temperature range. The LH0002C is specified for operation over the  $0^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  temperature range.

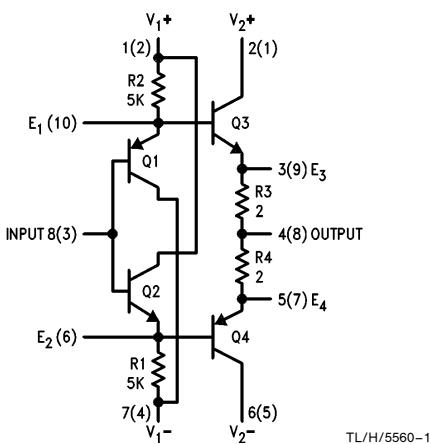
### Features

- High input impedance 400 k $\Omega$
- Low output impedance 6 $\Omega$
- High power efficiency
- Low harmonic distortion
- DC to 30 MHz bandwidth
- Output voltage swing that approaches supply voltage
- 400 mA pulsed output current
- Slew rate is typically 200 V/ $\mu\text{s}$
- Operation from  $\pm 5\text{V}$  to  $\pm 20\text{V}$

### Applications

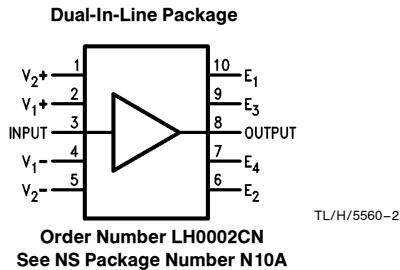
- Line driver
- 30 MHz buffer
- High speed D/A conversion

### Schematic and Connection Diagrams

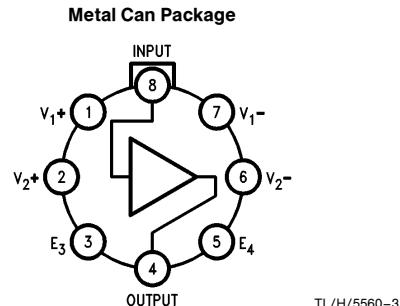


Pin numbers in parentheses denote pin connections for dual-in-line package.

TL/H/5560-1



Order Number LH0002CN  
See NS Package Number N10A



Order Number LH0002H,  
LH0002H-MIL or LH0002CH  
LH0002H/883\*  
See NS Package Number H08D

\*Available per SMD #7801301

## Absolute Maximum Ratings (Note 3)

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

### (Note 2)

|   |                                   |
|---|-----------------------------------|
| Supply Voltage                                | $\pm 22V$                         |
| Power Dissipation (Note 4)                    | 600 mW                            |
| Input Voltage (Equal to Power Supply Voltage) |                                   |
| Storage Temperature Range                     | $-65^{\circ}C$ to $+150^{\circ}C$ |
| Junction Temperature                          |                                   |
| N Package                                     | $+150^{\circ}C$                   |
| H Package                                     | $+175^{\circ}C$                   |
| Steady State Output Current                   | $\pm 100$ mA                      |
| Pulsed Output Current (50 ms On/1 sec. Off)   | $\pm 400$ mA                      |
| Lead Temperature Soldering (10 seconds)       |                                   |
| Metal Can                                     | 300°C                             |
| Plastic                                       | 260°C                             |
| ESD Rating (Note 6)                           | 2 kV                              |

## Operating Ratings (Note 3)

|                   |                                   |
|-------------------|-----------------------------------|
| Temperature Range |                                   |
| LH0002            | $-55^{\circ}C$ to $+125^{\circ}C$ |
| LH0002C           | $0^{\circ}C$ to $+85^{\circ}C$    |

### Thermal Resistance (Note 5)

|                           |                   |
|---------------------------|-------------------|
| $\theta_{JA}$ , H Package | $+125^{\circ}C/W$ |
| $\theta_{JC}$ , H Package | $+75^{\circ}C/W$  |
| $\theta_{JA}$ , N Package | $+120^{\circ}C/W$ |

## Electrical Characteristics (Note 1)

| Parameter                | Conditions  | Min      | Typ       | Max      | Units            |
|--------------------------|---|----------|-----------|----------|------------------|
| Voltage Gain             | $R_S = 10 \text{ k}\Omega$ , $R_L = 1.0 \text{ k}\Omega$ , $V_{IN} = \pm 10V$                     | 0.95     | 0.97      |          |                  |
| Input Impedance          | $R_S = 200 \text{ k}\Omega$ , $V_{IN} = \pm 1.0V$ , $R_L = 1.0 \text{ k}\Omega$                   | 180      | 400       |          | $\text{k}\Omega$ |
| Output Impedance         | $V_{IN} = \pm 1.0V$ , $R_L = 50\Omega$ , $R_S = 10 \text{ k}\Omega$                               |          | 6.0       | 10       | $\Omega$         |
| Output Voltage Swing     | $R_L = 1.0 \text{ k}\Omega$ , $V_{IN} = \pm 12V$  | $\pm 10$ | $\pm 11$  |          | V                |
| Output Voltage Swing     | $V_S = \pm 15V$ , $V_{IN} = \pm 12V$ , $R_S = 50\Omega$ , $R_L = 100\Omega$ , $T_A = 25^{\circ}C$ | $\pm 10$ |           |          | V                |
| DC Output Offset Voltage | $R_S = 300\Omega$ , $R_L = 1.0 \text{ k}\Omega$   |          | $\pm 10$  | $\pm 30$ | mV               |
| DC Input Bias Current    | $R_S = 10 \text{ k}\Omega$ , $R_L = 1.0 \text{ k}\Omega$  |          | $\pm 6.0$ | $\pm 10$ | $\mu\text{A}$    |
| Harmonic Distortion      | $V_{IN} = 5.0 \text{ Vrms}$ , $f = 1.0 \text{ kHz}$   |          | 0.1       |          | %                |
| Rise Time                | $R_L = 50\Omega$ , $\Delta V_{IN} = 100 \text{ mV}$   |          | 7.0       | 12       | ns               |
| Positive Supply Current  | $R_S = 10 \text{ k}\Omega$ , $R_L = 1.0 \text{ k}\Omega$  |          | $+6.0$    | $+10$    | mA               |
| Negative Supply Current  | $R_S = 10 \text{ k}\Omega$ , $R_L = 1.0 \text{ k}\Omega$  |          | $-6.0$    | $-10$    | mA               |

**Note 1:** Specification applies for  $T_A = 25^{\circ}C$  with  $+12V$  on Pins 1 and 2;  $-12V$  on Pins 6 and 7 for the metal can package and  $+12V$  on Pins 1 and 2;  $-12V$  on Pins 4 and 5 for the dual-in-line package, unless otherwise specified. The parameter guarantees for LH0002C apply over the temperature range of  $0^{\circ}C$  to  $+85^{\circ}C$ , while parameters for the LH0002 are guaranteed over the temperature range  $-55^{\circ}C$  to  $+125^{\circ}C$  unless otherwise specified.

**Note 2:** Refer to RETS0002X for LH0002 military specifications.

**Note 3:** Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is intended to be functional, but do not guarantee specific performance limits. For guaranteed specifications and test conditions, see the Electrical Characteristics. The guaranteed specifications apply only for the test conditions listed.

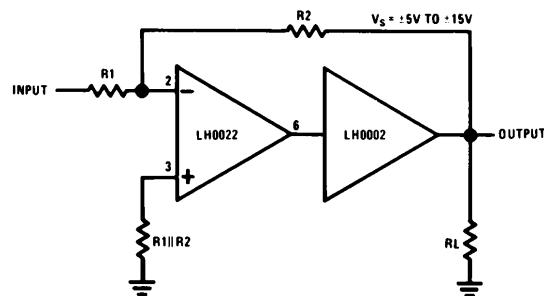
**Note 4:** The maximum power dissipation is a function of maximum junction temperature ( $T_{J\text{Max}}$ ), total thermal resistance ( $\theta_{JA}$ ), and ambient temperature ( $T_A$ ). The maximum allowable power dissipation at any ambient is  $P_D = (T_{J\text{Max}} - T_A)/\theta_{JA}$ .

**Note 5:** For operating at elevated temperatures, the device must be derated based on the thermal resistance  $\theta_{JA}$  and  $T_{J\text{Max}}$ .  $T_J = T_A + P_D\theta_{JA}$ .

**Note 6:** Human body model, 1.5  $\text{k}\Omega$  in series with 100 pF.

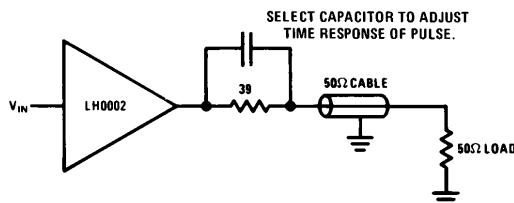
## Typical Applications

### High Current Operational Amplifier



TL/H/5560-4

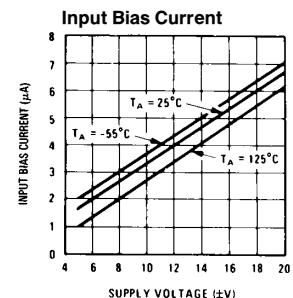
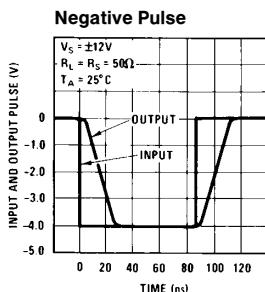
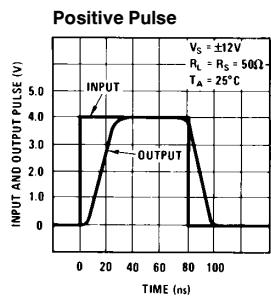
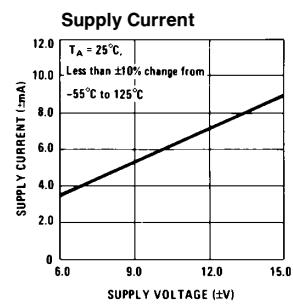
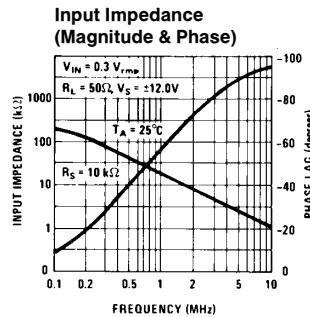
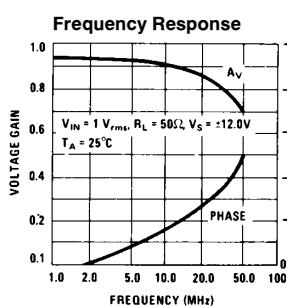
### Line Driver



TL/H/5560-5

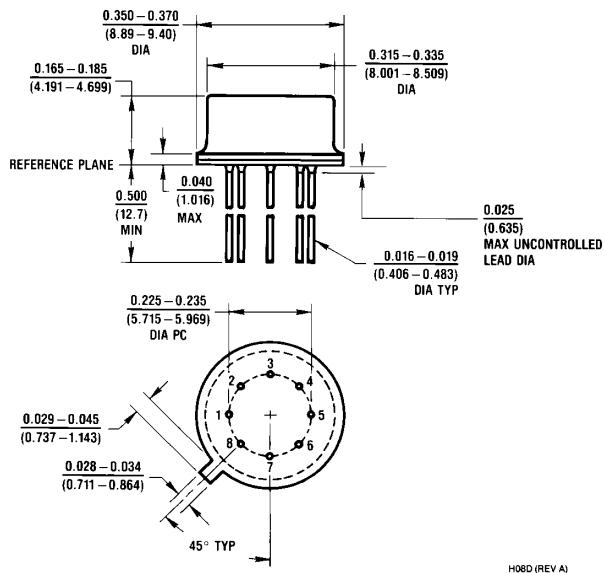
\*Previously called NH0002/NH0002C

## Typical Performance Characteristics





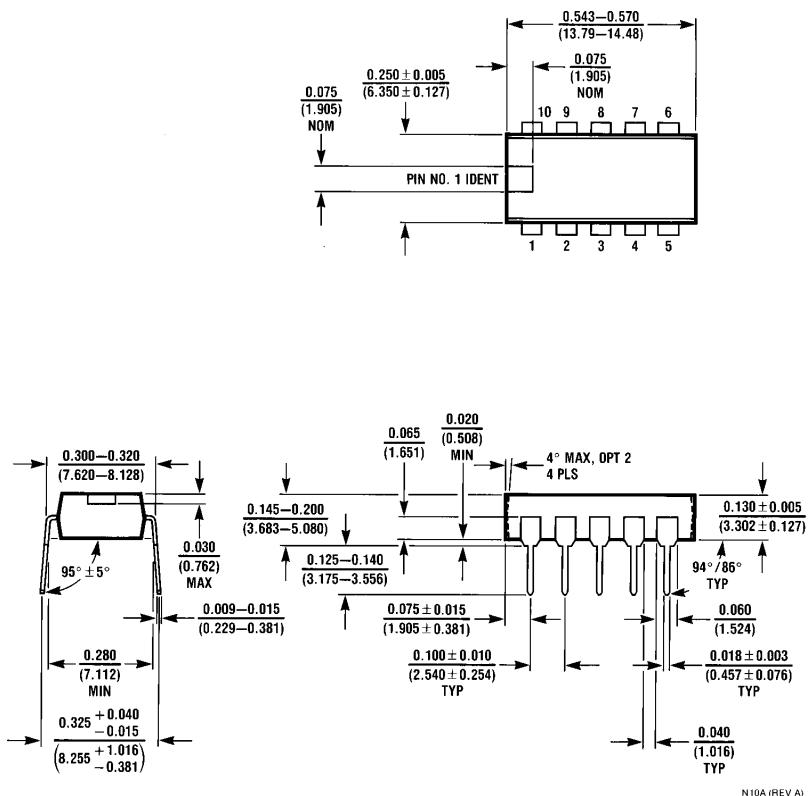
## Physical Dimensions inches (millimeters)



H08D (REV A)

**Metal Can Package (H)**  
Order Number LH0002H, LH0002H-MIL, LH0002H/883 or LH0002CH  
NS Package Number H08D

## Physical Dimensions inches (millimeters) (Continued)



N10A (REV A)

**Molded Dual-In-Line Package (N)**  
**Order Number LH0002CN**  
**NS Package Number N10A**

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