National Semiconductor

February 1995

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°C to +125°C military temperature range. The LH0002C is specified for operation over the 0°C to +85°C temperature range.

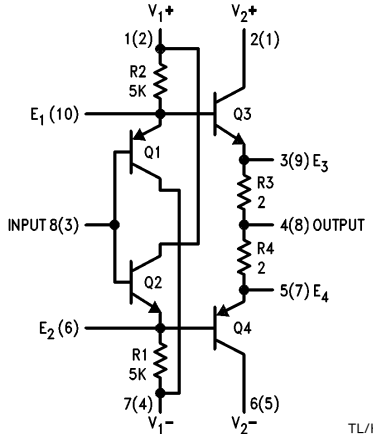
Features

- High input impedance 400 kΩ
- Low output impedance 6Ω
- 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/μs
- Operation from ±5V to ±20V

Applications

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

Schematic and Connection Diagrams



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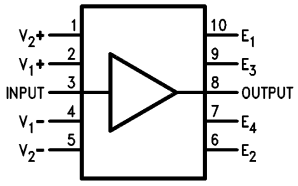
Pin numbers in parentheses denote pin connections for dual-in-line package.

Dual-In-Line Package



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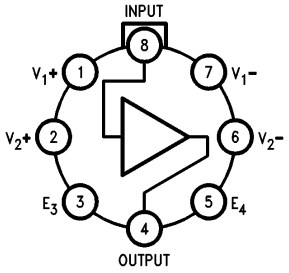
Order Number LH0002CN
See NS Package Number N10A

Metal Can Package



TL/H/5560–3

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	±22V
Power Dissipation (Note 4)	600 mW
Input Voltage	(Equal to Power Supply Voltage)
Storage Temperature Range	−65°C to +150°C
Junction Temperature	
N Package	+150°C
H Package	+175°C
Steady State Output Current	±100 mA
Pulsed Output Current (50 ms On/1 sec. Off)	±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°C to +125°C
LH0002C	0°C to +85°C
Thermal Resistance (Note 5)	
θ_{JA}, H Package	+125°C/W
θ_{JC}, H Package	+75°C/W
θ_{JA}, N Package	+120°C/W

Electrical Characteristics (Note 1)

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

Note 1: Specification applies for $T_A = 25°C$ 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°C to +85°C, while parameters for the LH0002 are guaranteed over the temperature range −55°C to +125°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.

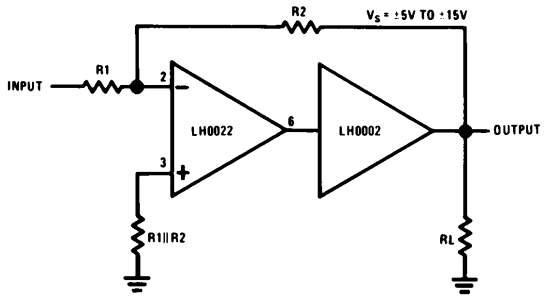
Note 4: The maximum power dissipation is a function of maximum junction temperature (T_JMax), total thermal resistance (θ_{JA}), and ambient temperature (T_A). The maximum allowable power dissipation at any ambient is $P_D = (T_J\text{Max} - T_A)/\theta_{JA}$.

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

Note 6: Human body model, 1.5 kΩ in series with 100 pF.

Typical Applications

High Current Operational Amplifier



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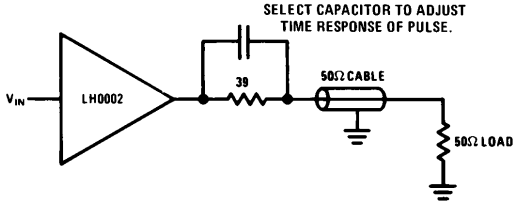
Line Driver



*Previously called NH0002/NH0002C

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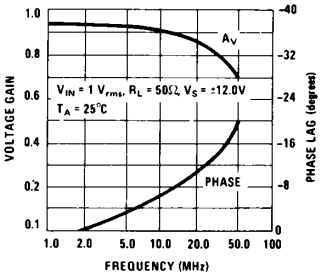
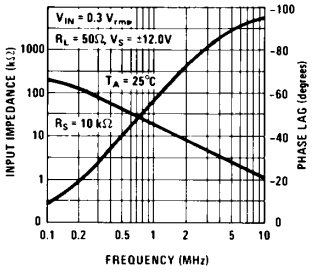
Typical Performance Characteristics

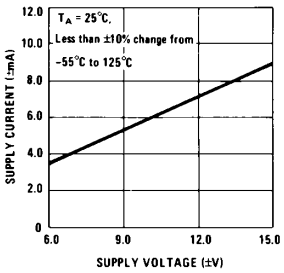
Frequency Response



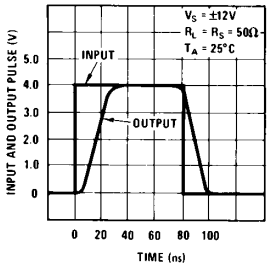
Input Impedance (Magnitude & Phase)



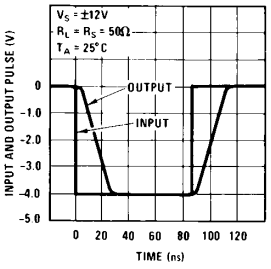
Supply Current



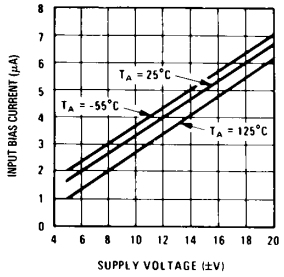
Positive Pulse



Negative Pulse



Input Bias Current



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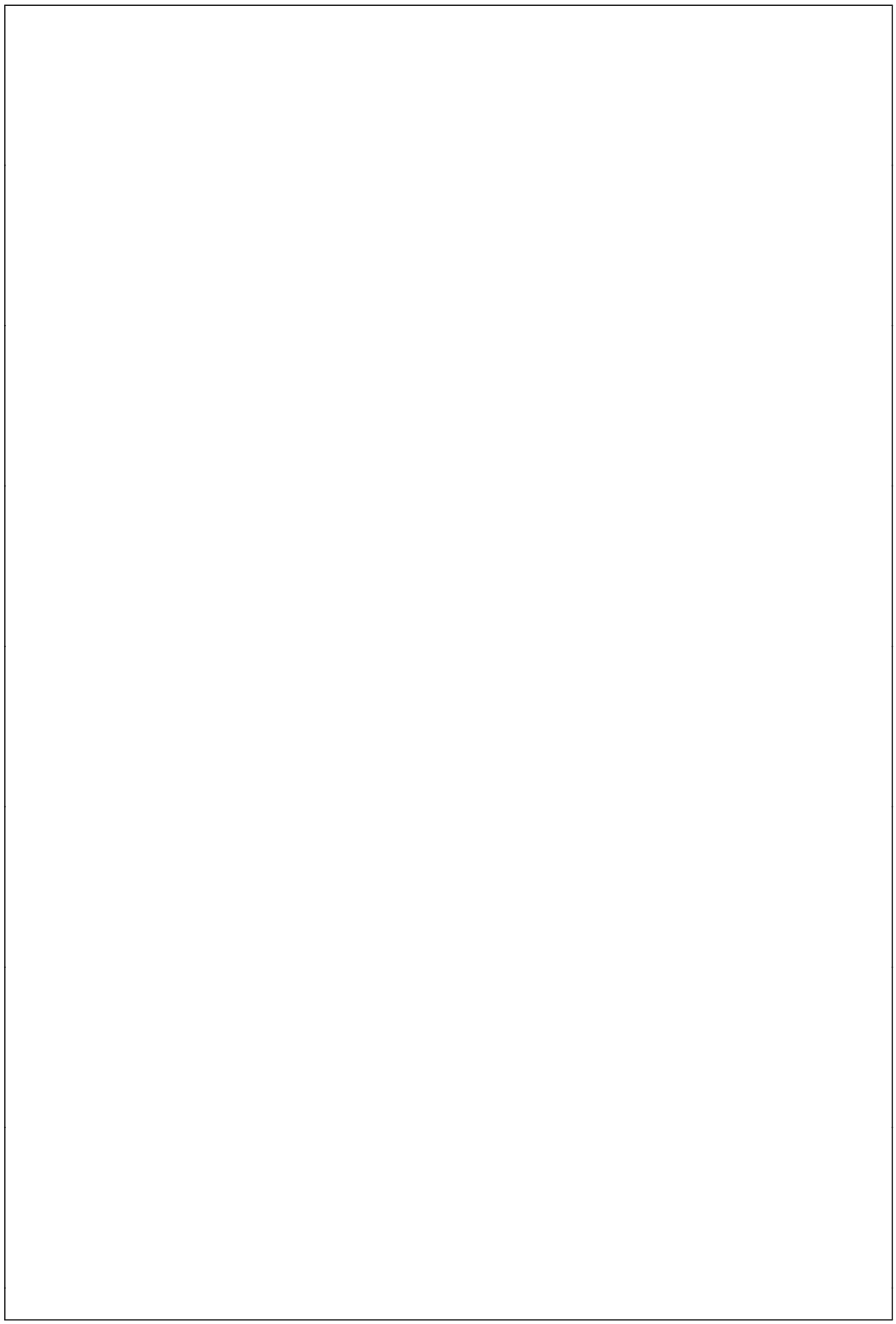
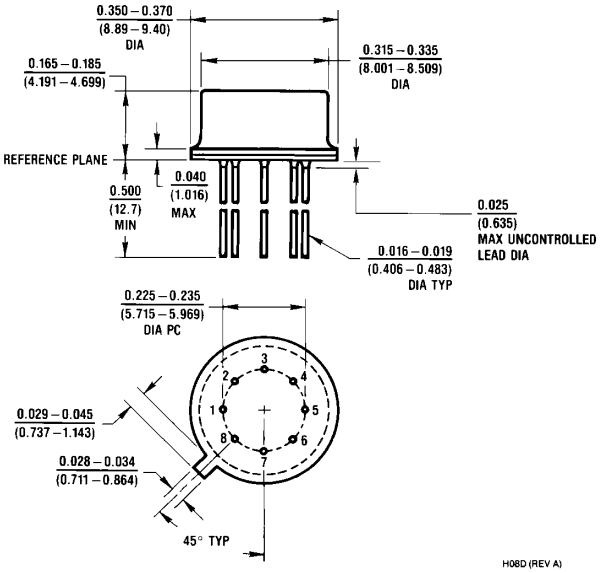
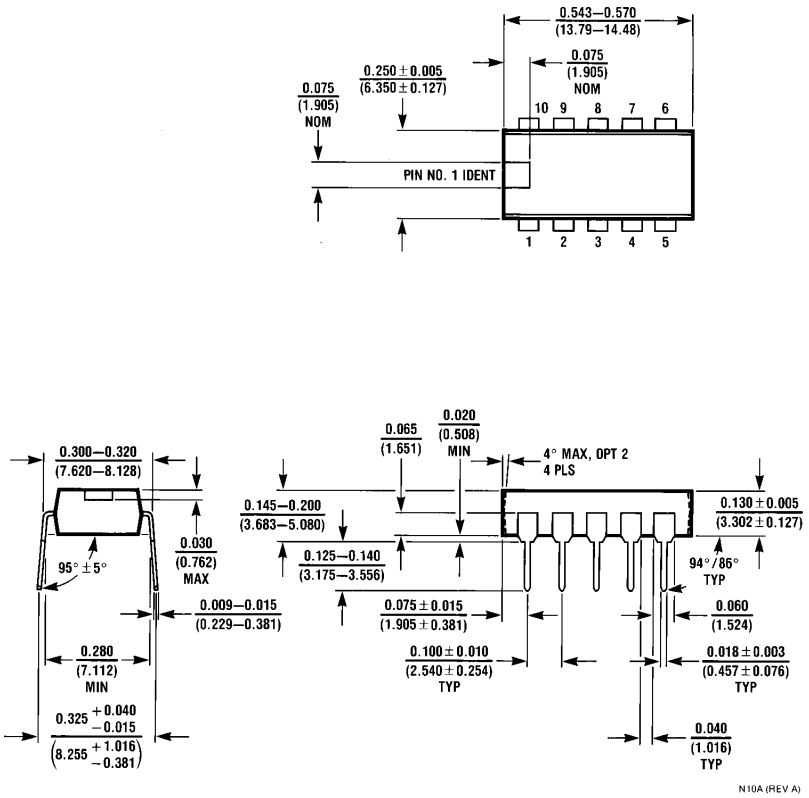


Physical Dimensions inches (millimeters)



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

Physical Dimensions inches (millimeters) (Continued)



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

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