# DS1630/DS3630 Hex CMOS Compatible Buffer

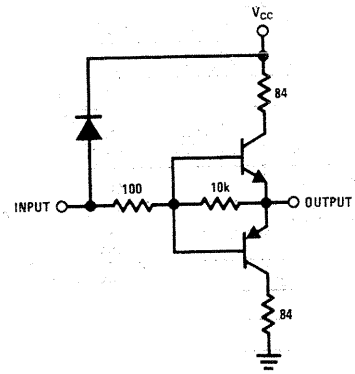
## General Description

The DS1630/DS3630 is a high current buffer intended for use with CMOS circuits interfacing with peripherals requiring high drive currents. The DS1630/DS3630 features low quiescent power consumption (typically 50μW) as well as high-speed driving of capacitive loads such as large MOS memories. The design of the DS1630/DS3630 is such that $V_{CC}$ current spikes commonly found in standard CMOS circuits cannot occur, thereby, reducing the total transient and average power when operating at high frequencies.

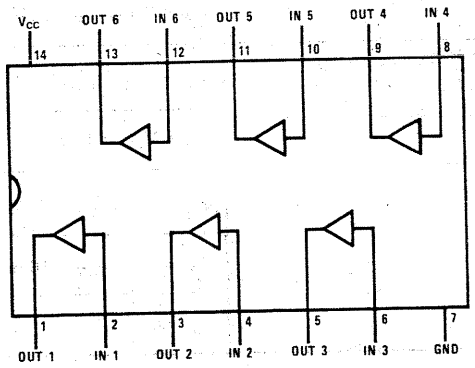
## Features

- High-speed capacitive driver
- Wide supply voltage range
- Input/output may interface to TTL
- Input/output CMOS compatibility
- No internal transient $V_{CC}$ current spikes
- 50μW typical standby power

## Equivalent Schematic and Connection Diagrams



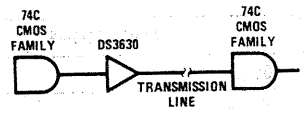

Dual-In-Line Package



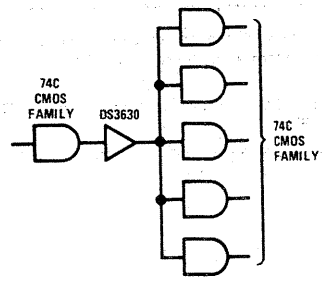

TOP VIEW

Order Number DS1630J, DS3630J or DS3630N
See NS Package J14A or N14A

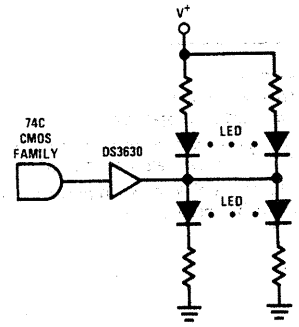
## Typical Applications




CMOS To Transmission Line Interface




CMOS To CMOS Interface




LED Driver

## Absolute Maximum Ratings (Note 1)

| | |
|---|---|
| Supply Voltage | 16V |
| Input Voltage | 16V |
| Output Voltage | 16V |
| Lead Temperature (Soldering, 10 seconds) | 300°C |

## Operating Conditions

| | MIN | MAX | UNITS |
|---|---|---|---|
| Supply Voltage ($V_{CC}$) | 3 | 15 | V |
| Temperature ($T_A$) | | | |
| DS1630 | −55 | +125 | °C |
| DS3630 | 0 | +70 | °C |

## Electrical Characteristics (Notes 2 and 3)

| PARAMETER | CONDITIONS | | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|
| $I_{INH}$ Logical "1" Input Current | $V_{IN} = V_{CC}$, $I_{OUT} = -400\mu A$ | DS1630 | | 90 | 200 | μA |
| | | DS3630 | | 90 | 200 | μA |
| | $V_{IN} = V_{CC} - 2.0V$, $I_{OUT} = 16$ mA | DS1630 | | 0.5 | 3.2 | mA |
| | | DS3630 | | 0.5 | 1.5 | mA |
| $I_{INL}$ Logical "0" Input Current | $V_{IN} = 0.4V$, $I_{OUT} = 16$ mA | DS1630 | | −0.15 | −1 | mA |
| | | DS3630 | | $V_{CC}-150$ | −800 | μA |
| $V_{OH}$ Logical "1" Output Voltage | $V_{IN} = V_{CC}$, $I_{OUT} = -400\mu A$ | DS1630 | $V_{CC}-1$ | $V_{CC}-0.75$ | | V |
| | | DS3630 | $V_{CC}-0.9$ | $V_{CC}-0.75$ | | V |
| | $V_{IN} = V_{CC} - 0.4V$, $I_{OUT} = 16$ mA | DS1630 | $V_{CC}-2.5$ | $V_{CC}-2.0$ | | V |
| | | DS3630 | $V_{CC}-2.5$ | $V_{CC}-2.0$ | | V |
| $V_{OL}$ Logical "0" Output Voltage | $V_{IN} = 0V$, $I_{OUT} = 400\mu A$ | DS1630 | | 0.75 | 1 | V |
| | | DS3630 | | 0.75 | 0.9 | V |
| | $V_{IN} = 0V$, $I_{OUT} = 16$ mA | DS1630 | | 0.95 | 1.3 | V |
| | | DS3630 | | 0.95 | 1.3 | V |
| | $V_{IN} = 0.4V$, $I_{OUT} = 16$ mA | DS1630 | | 1.2 | 1.6 | V |
| | | DS3630 | | 1.2 | 1.5 | V |

## Switching Characteristics $V_{CC} = 5.0V$, $T_A = 25°C$ unless otherwise specified

| PARAMETER | CONDITIONS | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|
| $t_{pd0}$ Propagation Delay to a Logical "0" | $C_L = 50$ pF | | 30 | 45 | ns |
| | $C_L = 250$ pF | | 40 | 60 | ns |
| | $C_L = 500$ pF | | 50 | 75 | ns |
| $t_{pd1}$ Propagation Delay to a Logical "1" | $C_L = 50$ pF | | 15 | 25 | ns |
| | $C_L = 250$ pF | | 35 | 50 | ns |
| | $C_L = 500$ pF | | 50 | 75 | ns |

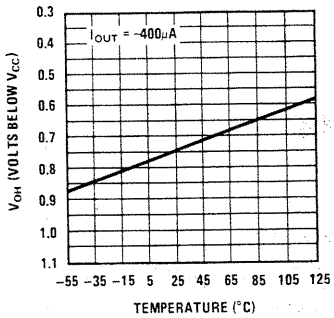
**Note 1:** "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. Except for "Operating Temperature Range" they are not meant to imply that the devices should be operated at these limits. The table of "Electrical Characteristics" provides conditions for actual device operation.

**Note 2:** Unless otherwise specified min/max limits apply across the −55°C to +125°C temperature range for the DS1630 and across the 0°C to +70°C range for the DS3630. All typicals are given for $V_{CC} = 5.0V$ and $T_A = 25°C$.

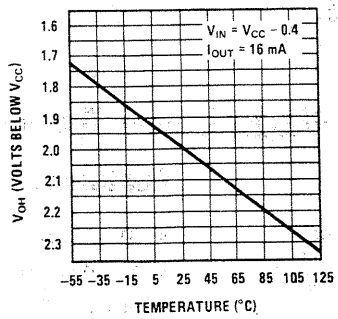
**Note 3:** All currents into device pins shown as positive, out of device pins as negative, all voltages referenced to ground unless otherwise noted. All values shown as max or min on absolute value basis.

# Typical Performance Characteristics

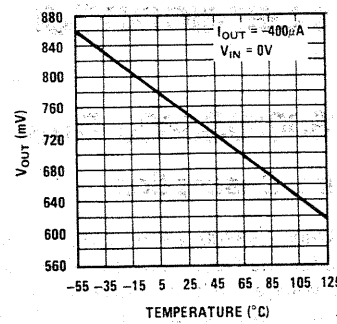
$V_{OH}$ vs Temperature, $V_{IN} = V_{CC}$



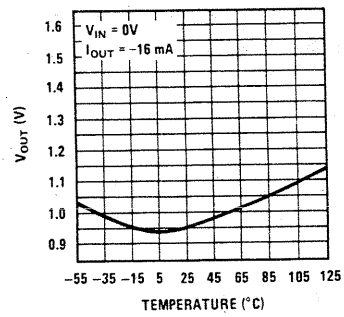

$V_{OH}$ Active vs Temperature



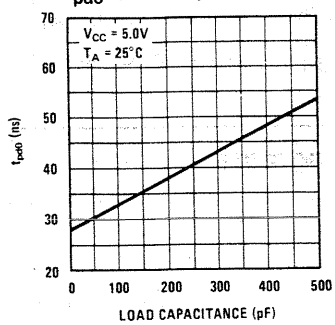

$V_{OL}$ vs Temperature



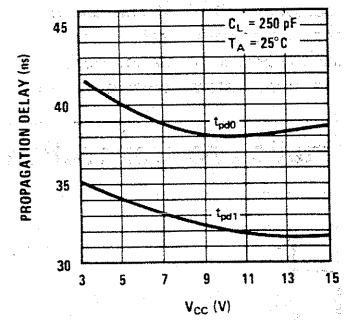

$V_{OL}$ vs Temperature



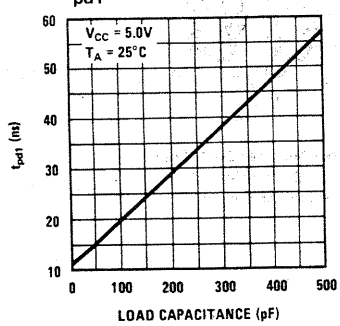

$t_{pdo}$ vs Load Capacitance



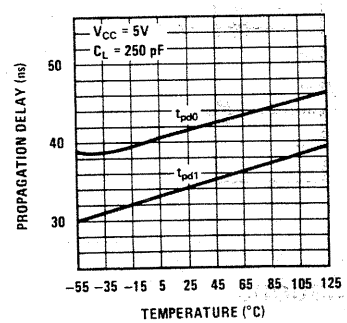

Propagation Delay vs $V_{CC}$



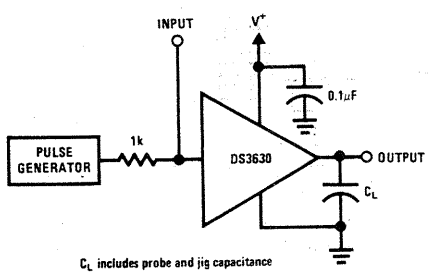

$t_{pd1}$ vs Load Capacitance



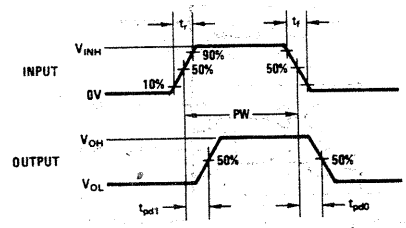

Propagation Delay vs Temperature




# AC Test Circuit and Switching Time Waveforms




$C_L$ includes probe and jig capacitance




Pulse Generator characteristics: PRR = 1.0 MHz, PW = 500 ns, $t_r = t_f < 10$ ns, $V_{IN}$ = 0 to $V_{CC}$