FAIRCHILD SEMICONDUCTOR™

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# MM74C150 • MM82C19
# 16-Line to 1-Line Multiplexer 3-STATE • 16-Line to 1-Line Multiplexer

## General Description

The MM74C150 and MM82C19 multiplex 16 digital lines to 1 output. A 4-bit address code determines the particular 1-of-16 inputs which is routed to the output. The data is inverted from input to output.

A strobe override places the output of MM74C150 in the logical "1" state and the output of MM82C19 in the high-impedance state.

All inputs are protected from damage due to static discharge by diode clamps to $V_{CC}$ and GND.

## Features

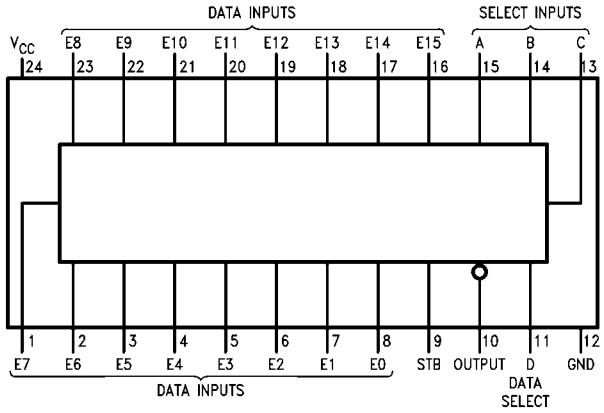
- Wide supply voltage range: 3.0V to 15V
- Guaranteed noise margin: 1.0V
- High noise immunity: 0.45 $V_{CC}$ (typ.)
- TTL compatibility: Drive 1 TTL Load

## Ordering Code:

| Order Number | Package Number | Package Description |
|---|---|---|
| MM74C150N | N24A | 24-Lead plastic Dual-In-Line Package (PDIP), JEDEC MS-010, 0.600" Wide |
| MM82C19N | N24A | 24-Lead plastic Dual-In-Line Package (PDIP), JEDEC MS-010, 0.600" Wide |

## Connection Diagram

**Pin Assignments for DIP**

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## Truth Table

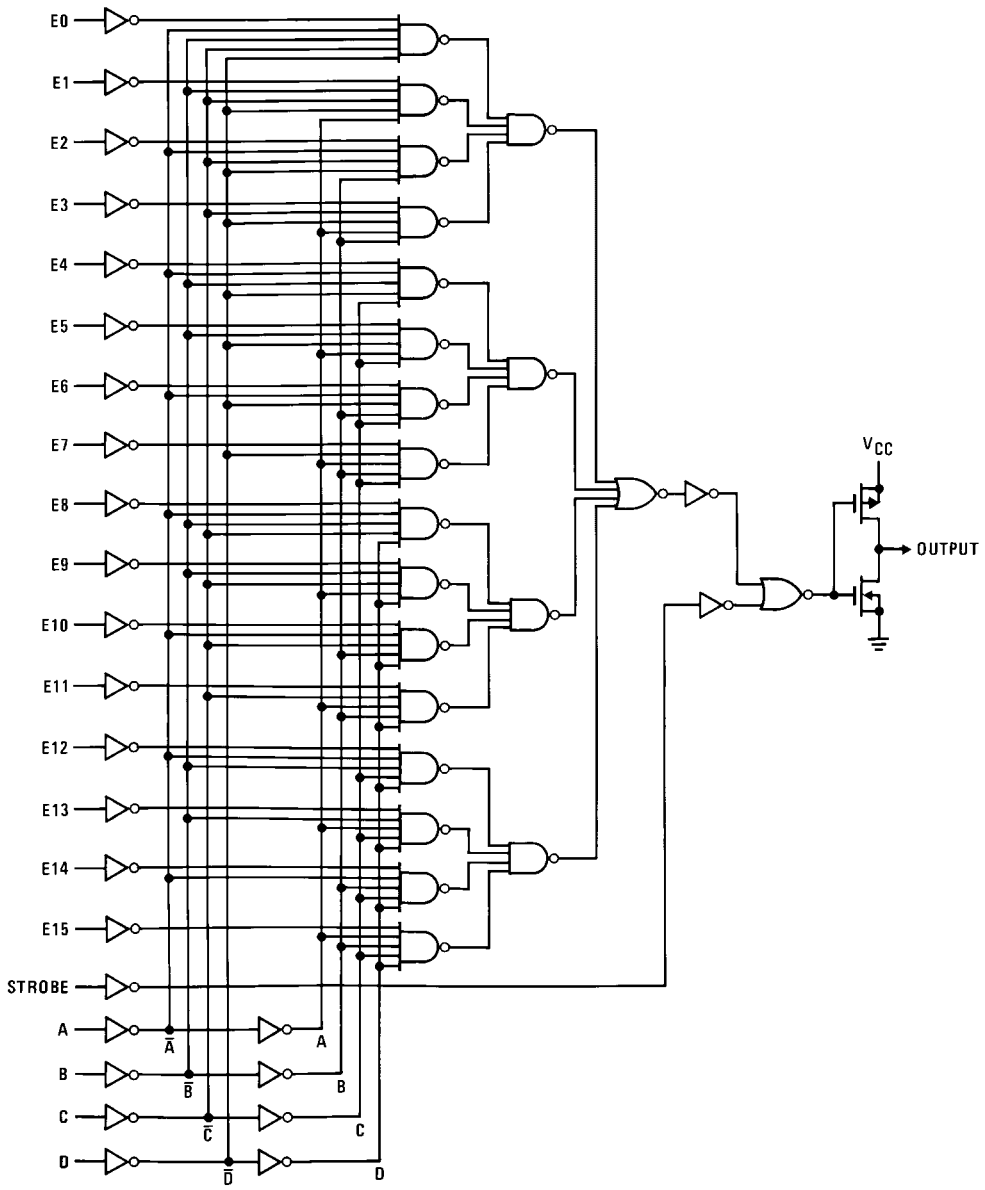
**MM74C150**

| Inputs | | | | | | | | | | | | | | | | | | | | Output |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D | C | B | A | STROBE | E0 | E1 | E2 | E3 | E4 | E5 | E6 | E7 | E8 | E9 | E10 | E11 | E12 | E13 | E14 | E15 | W |
| X | X | X | X | 1 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | 1 (Note 1) |
| 0 | 0 | 0 | 0 | 0 | 0 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | 1 |
| 0 | 0 | 0 | 0 | 0 | 1 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | 0 |
| 0 | 0 | 0 | 1 | 0 | X | 0 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | 1 |
| 0 | 0 | 0 | 1 | 0 | X | 1 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | 0 |
| 0 | 0 | 1 | 0 | 0 | X | X | 0 | X | X | X | X | X | X | X | X | X | X | X | X | X | 1 |
| 0 | 0 | 1 | 0 | 0 | X | X | 1 | X | X | X | X | X | X | X | X | X | X | X | X | X | 0 |
| 0 | 0 | 1 | 1 | 0 | X | X | X | 0 | X | X | X | X | X | X | X | X | X | X | X | X | 1 |
| 0 | 0 | 1 | 1 | 0 | X | X | X | 1 | X | X | X | X | X | X | X | X | X | X | X | X | 0 |
| 0 | 1 | 0 | 0 | 0 | X | X | X | X | 0 | X | X | X | X | X | X | X | X | X | X | X | 1 |
| 0 | 1 | 0 | 0 | 0 | X | X | X | X | 1 | X | X | X | X | X | X | X | X | X | X | X | 0 |
| 0 | 1 | 0 | 1 | 0 | X | X | X | X | X | 0 | X | X | X | X | X | X | X | X | X | X | 1 |
| 0 | 1 | 0 | 1 | 0 | X | X | X | X | X | 1 | X | X | X | X | X | X | X | X | X | X | 0 |
| 0 | 1 | 1 | 0 | 0 | X | X | X | X | X | X | 0 | X | X | X | X | X | X | X | X | X | 1 |
| 0 | 1 | 1 | 0 | 0 | X | X | X | X | X | X | 1 | X | X | X | X | X | X | X | X | X | 0 |
| 0 | 1 | 1 | 1 | 0 | X | X | X | X | X | X | X | 0 | X | X | X | X | X | X | X | X | 1 |
| 0 | 1 | 1 | 1 | 0 | X | X | X | X | X | X | X | 1 | X | X | X | X | X | X | X | X | 0 |
| 1 | 0 | 0 | 0 | 0 | X | X | X | X | X | X | X | X | 0 | X | X | X | X | X | X | X | 1 |
| 1 | 0 | 0 | 0 | 0 | X | X | X | X | X | X | X | X | 1 | X | X | X | X | X | X | X | 0 |
| 1 | 0 | 0 | 1 | 0 | X | X | X | X | X | X | X | X | X | 0 | X | X | X | X | X | X | 1 |
| 1 | 0 | 0 | 1 | 0 | X | X | X | X | X | X | X | X | X | 1 | X | X | X | X | X | X | 0 |
| 1 | 0 | 1 | 0 | 0 | X | X | X | X | X | X | X | X | X | X | 0 | X | X | X | X | X | 1 |
| 1 | 0 | 1 | 0 | 0 | X | X | X | X | X | X | X | X | X | X | 1 | X | X | X | X | X | 0 |
| 1 | 0 | 1 | 1 | 0 | X | X | X | X | X | X | X | X | X | X | X | 0 | X | X | X | X | 1 |
| 1 | 0 | 1 | 1 | 0 | X | X | X | X | X | X | X | X | X | X | X | 1 | X | X | X | X | 0 |
| 1 | 1 | 0 | 0 | 0 | X | X | X | X | X | X | X | X | X | X | X | X | 0 | X | X | X | 1 |
| 1 | 1 | 0 | 0 | 0 | X | X | X | X | X | X | X | X | X | X | X | X | 1 | X | X | X | 0 |
| 1 | 1 | 0 | 1 | 0 | X | X | X | X | X | X | X | X | X | X | X | X | X | 0 | X | X | 1 |
| 1 | 1 | 0 | 1 | 0 | X | X | X | X | X | X | X | X | X | X | X | X | X | 1 | X | X | 0 |
| 1 | 1 | 1 | 0 | 0 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | 0 | X | 1 |
| 1 | 1 | 1 | 0 | 0 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | 1 | X | 0 |
| 1 | 1 | 1 | 1 | 0 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | 0 | 1 |
| 1 | 1 | 1 | 1 | 0 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | 1 | 0 |

**Note 1:** For MM72C19/MM82C19 this would be Hi-Z, everything else is the same.

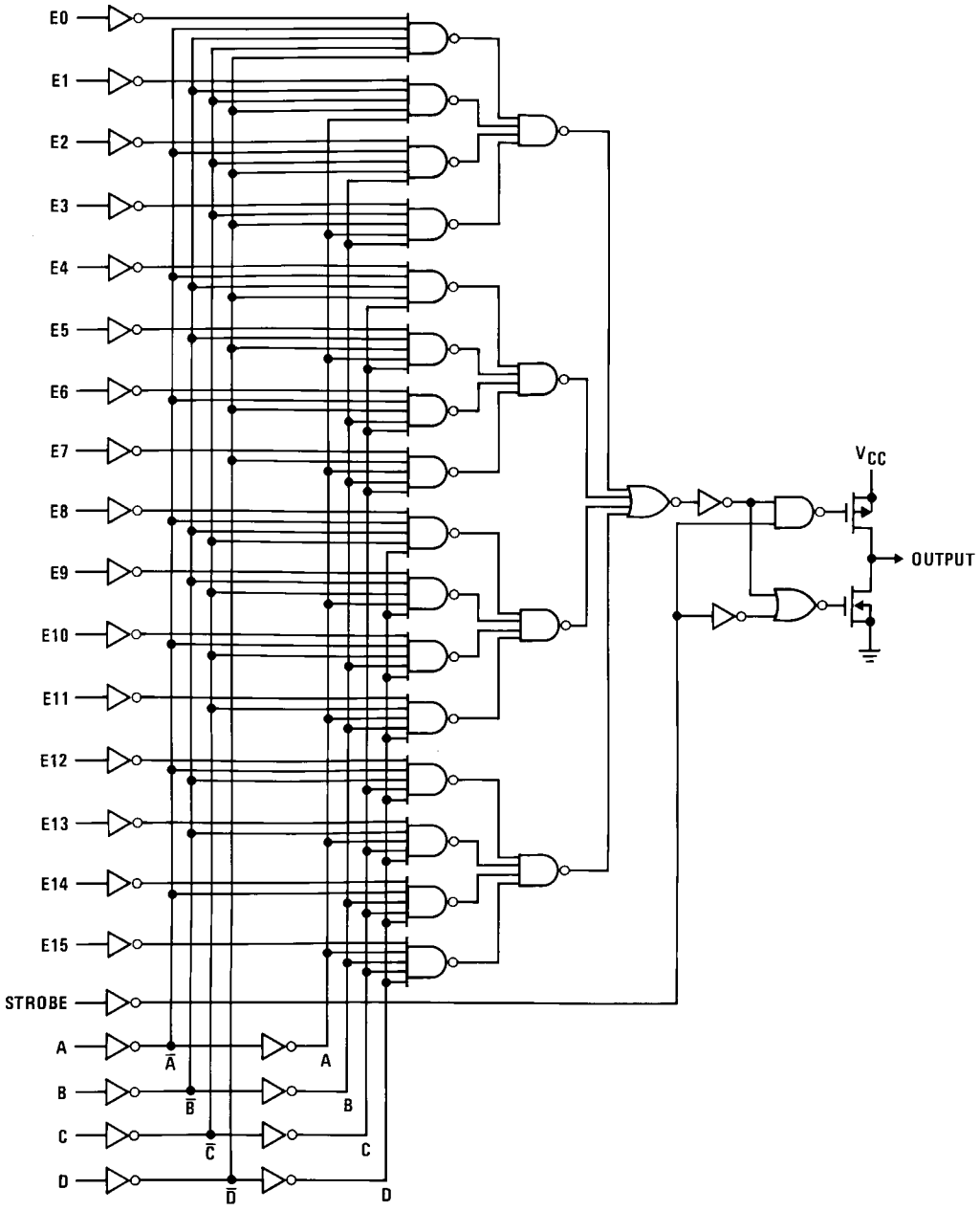
## Logic Diagrams

MM74C150



## Logic Diagrams (Continued)

**MM82C19**



## Absolute Maximum Ratings(Note 2)

| | |
|---|---|
| Voltage at Any Pin | −0.3V to $V_{CC}$+0.3V |
| Operating Temperature Range | −40°C to +85°C |
| Storage Temperature Range | −65°C to +150°C |
| Power Dissipation | |
| Dual-In-Line | 700 mW |
| Small Outline | 500 mW |
| Operating $V_{CC}$ Range | 3.0V to 15V |
| $V_{CC}$ | 18V |
| Lead Temperature | |
| (soldering, 10 seconds) | 260°C |

**Note 2:** "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 Electrical Characteristic table provides conditions for actual device operation.

## DC Electrical Characteristics

Min/Max limits apply across temperature range unless otherwise noted.

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **CMOS to CMOS** | | | | | | |
| $V_{IN(1)}$ | Logical "1" Input Voltage | $V_{CC}$ = 5.0V | 3.5 | | | V |
| | | $V_{CC}$ = 10V | 8.0 | | | V |
| $V_{IN(0)}$ | Logical "0" Input Voltage | $V_{CC}$ = 5.0V | | | 1.5 | V |
| | | $V_{CC}$ = 10V | | | 2.0 | V |
| $V_{OUT(1)}$ | Logical "1" Output Voltage | $V_{CC}$ = 5.0V, $I_O$ = −10 µA | 4.5 | | | V |
| | | $V_{CC}$ = 10V, $I_O$ = −10 µA | 9.0 | | | V |
| $V_{OUT(0)}$ | Logical "0" Output Voltage | $V_{CC}$ = 5.0V, $I_O$ = +10 µA | | | 0.5 | V |
| | | $V_{CC}$ = 10V, $I_O$ = +10 µA | | | 1.0 | V |
| $I_{IN(1)}$ | Logical "1" Input Current | $V_{CC}$ = 15V, $V_{IN}$ = 15V | | 0.005 | 1.0 | V |
| $I_{IN(0)}$ | Logical "0" Input Current | $V_{CC}$ = 15V, $V_{IN}$ = 0V | −1.0 | −0.005 | | µA |
| $I_{OZ}$ | Output Current in High Impedance State | | | | | |
| | MM82C19 | $V_{CC}$ = 15V, $V_O$ = 15V | | 0.005 | 1.0 | µA |
| | | $V_{CC}$ = 15V, $V_O$ = 0V | −1.0 | −0.005 | | µA |
| $I_{CC}$ | Supply Current | $V_{CC}$ = 15V | | 0.05 | 300 | µA |
| **CMOS/LPTTL Interface** | | | | | | |
| $V_{IN(1)}$ | Logical "1" Input Voltage | 74C, 82C, $V_{CC}$ = 4.75V | $V_{CC}$−1.5 | | | V |
| $V_{IN(0)}$ | Logical "0" Input Voltage | 74C, 82C, $V_{CC}$ = 4.75V | | | 0.8 | V |
| $V_{OUT(1)}$ | Logical "1" Output Voltage | 74C, 82C, $V_{CC}$ = 4.75V, $I_O$ = −1.6 mA | 2.4 | | | V |
| $V_{OUT(0)}$ | Logical "0" Output Voltage | 74C, 82C, $V_{CC}$ = 4.75V, $I_O$ = 1.6 mA | | | 0.4 | V |
| **Output Drive (Short Circuit Current)** | | | | | | |
| $I_{SOURCE}$ | Output Source Current (P-Channel) | $V_{CC}$ = 5.0V, $V_{OUT}$ = 0V, $T_A$ = 25°C | −4.35 | −8 | | mA |
| $I_{SOURCE}$ | Output Source Current (P-Channel) | $V_{CC}$ = 10V, $V_{OUT}$ = 0V, $T_A$ = 25°C | −20 | −40 | | mA |
| $I_{SINK}$ | Output Sink Current (N-Channel) | $V_{CC}$ = 5.0V, $V_{OUT}$ = $V_{CC}$, $T_A$ = 25°C | 4.35 | 8 | | mA |
| $I_{SINK}$ | Output Sink Current (N-Channel) | $V_{CC}$ = 10V, $V_{OUT}$ = $V_{CC}$, $T_A$ = 25°C | 20 | 40 | | mA |

## AC Electrical Characteristics (Note 3)

$T_A = 25°C$, $C_L = 50$ pF, unless otherwise noted

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| $t_{pd0}$, $t_{pd1}$ | Propagation Delay Time to a | $V_{CC} = 5.0V$ | | 250 | 600 | ns |
| | Logical "0" or Logical "1" | $V_{CC} = 10V$ | | 110 | 300 | ns |
| | from Data Inputs to Output | $V_{CC} = 5.0V$, $C_L = 150$ pF | | 290 | 650 | ns |
| | | $V_{CC} = 10V$, $C_L = 150$ pF | | 120 | 330 | ns |
| $t_{pd0}$, $t_{pd1}$ | Propagation Delay Time to a | $V_{CC} = 5.0V$ | | 290 | 650 | ns |
| | Logical "0" or Logical "1" | $V_{CC} = 10V$ | | 120 | 330 | ns |
| | from Data Select Inputs to | | | | | |
| | Output | | | | | |
| $t_{pd0}$, $t_{pd1}$ | Propagation Delay Time to a | $V_{CC} = 5.0V$ | | 120 | 300 | ns |
| | Logical "0" or Logical "1" | $V_{CC} = 10V$ | | 55 | 150 | ns |
| | from Strobe to Output | | | | | |
| | MM74C150 | | | | | |
| $t_{1H}$, $t_{0H}$ | Delay from Strobe to High | $V_{CC} = 5.0V$, $R_L = 10k$, $C_L = 5$ pF | | 80 | 200 | ns |
| | Impedance State | $V_{CC} = 10V$, $R_L = 10k$, $C_L = 5$ pF | | 60 | 150 | ns |
| | MM82C19 | | | | | |
| $t_{H1}$, $t_{H0}$ | Delay from Strobe to Logical | $V_{CC} = 5.0V$, $R_L = 10k$, $C_L = 5$ pF | | 80 | 250 | ns |
| | "1" Level or to Logical "0" | $V_{CC} = 10V$, $R_L = 10k$, $C_L = 5$ pF | | 30 | 120 | ns |
| | Level (from High Impedance State) | | | | | |
| | MM82C19 | | | | | |
| $C_{IN}$ | Input Capacitance | Any Input (Note 4) | | 5.0 | | pF |
| $C_{OUT}$ | Output Capacitance | (Note 4) | | 11.0 | | pF |
| | MM82C19 | | | | | |
| $C_{PD}$ | Power Dissipation Capacitance | (Note 5) | | 100 | | pF |

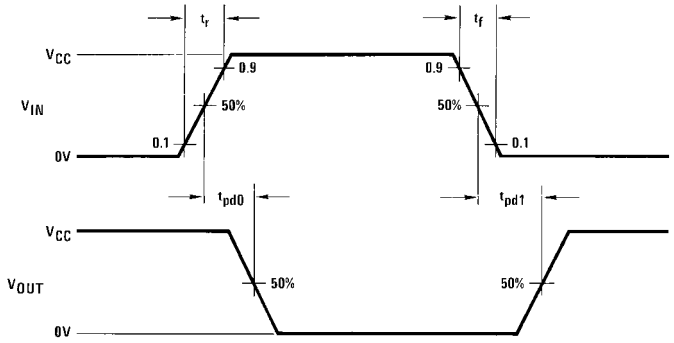
**Note 3:** AC Parameters are guaranteed by DC correlated testing.

**Note 4:** Capacitance is guaranteed by periodic testing.

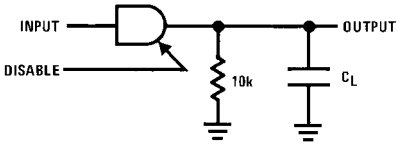
**Note 5:** $C_{PD}$ determines the no load AC power consumption of any CMOS device. For complete explanation, see Family Characteristics, application note AN-90.

## Switching Time Waveforms

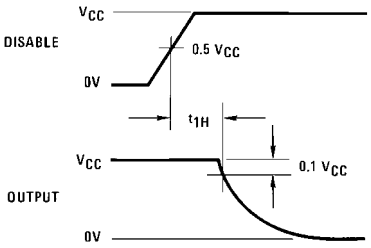
**CMOS to CMOS**



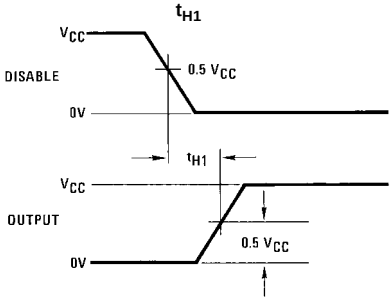

**$t_{1H}$ and $t_{H1}$**



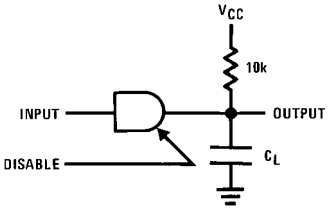

**$t_{1H}$**



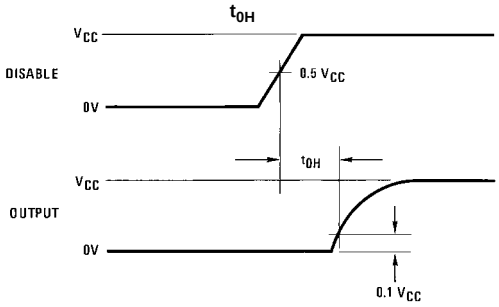

**$t_{H1}$**



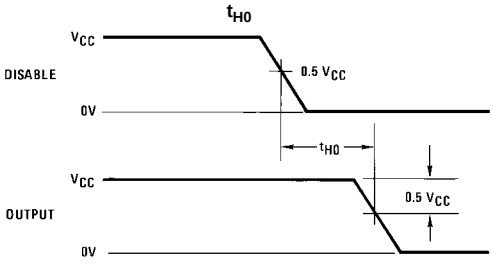

**$t_{0H}$ and $t_{H0}$**




**$t_{0H}$**

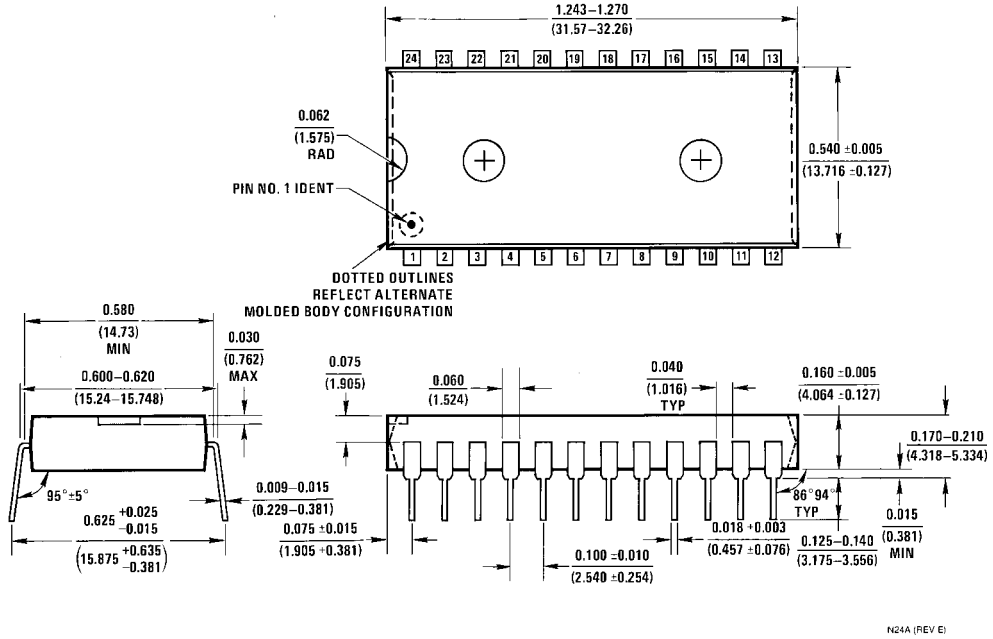



**$t_{H0}$**




**Note:** Delays measured with input $t_r$, $t_f \leq 20$ ns.

## Physical Dimensions inches (millimeters) unless otherwise noted




**24-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-010, 0.600" Wide**
**Package Number N24A**

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