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NTE74HC151 Integrated Circuit TTL – High Speed CMOS, 8–Channel Digital Multiplexer

Description:

The NTE74HC151 is a high speed Digital multiplexer in a 16–Lead DIP type package that utilizes advanced silicon–gate CMOS technology. Along with high noise immunity and low power dissipation of standard CMOS integrated circuits, it possesses the ability to drive 10 LS–TTL loads. The NTE74HC151 selects one of the 8 data sources, depending on the address presented on the A, B, and C inputs. It features both true (Y) and complement (W) outputs. The STROBE input must be at a low logic level to enable the multiplexer. A high logic level at the STROBE forces the W output HIGH and the Y output LOW.

The 74HC logic family is functionally, as well as pinout compatible, with the standard 74LS logic family. All inputs are protected from damage due to static discharge by internal diode clamps to V_{CC} and GND.

Features:

- Typical Propagation Delay Data Select to Output Y: 26ns
- Wide Operatin Supply Voltage Range: 2V to 6V
- Low Input Current: 1 μ A (max)
- Low Quiescent Supply Current: 80 μ A (max)
- High Ooutput Drive Current: 4mA (max)

Absolute Maximum Ratings: (Note 1, Note 2)

| | |
|---|-------------------------|
| Supply Voltage, V_{CC} | -0.5 to +7.0V |
| DC Input Voltage, V_{IN} | -1.5 to V_{CC} +1.5V |
| DC Output Voltage, V_{OUT} | -0.5 to V_{CC} + 0.5V |
| Clamp Diode Current, I_{IK}, I_{OK} | \pm 20mA |
| DC Output Current (Per Pin), I_{OUT} | \pm 25mA |
| DC V_{CC} or GND Current (Per Pin), I_{CC} | \pm 50mA |
| Power Dissipation (Note 3), P_D | 500mW |
| Storage Temperature Range, T_{stg} | -65°C to +150°C |
| Lead Temperature (During Soldering, 10sec), T_L | +260°C |

Note 1. Absolute Maximum Ratings are those values beyond which damage to the device may occur.
 Note 2. Unless otherwise specified, all voltages are referenced to GND.
 Note 3. Power Dissipation temperature derating: 12mW/°C from +65°C to +85°C.

Recommended Operating Conditions:

| Parameter | Symbol | Min | Typ | Max | Unit |
|---|-------------------|-----|-----|----------|------|
| Supply Voltage | V_{CC} | 2.0 | – | 6.0 | V |
| DC Input or Output Voltage | V_{IN}, V_{OUT} | 0 | – | V_{CC} | V |
| Operating Temperature Range | T_A | –40 | – | +85 | °C |
| Input Rise or Fall Times $V_{CC} = 2.0V$ | t_r, t_f | – | – | 1000 | ns |
| $V_{CC} = 4.5V$ | | – | – | 500 | ns |
| $V_{CC} = 6.0V$ | | – | – | 400 | ns |

DC Electrical Characteristics: ($V_{CC} = 5V \pm 10\%$ unless otherwise specified)

| Parameter | Symbol | Test Conditions | V_{CC} | $T_A = +25^\circ C$ | | $T_A = -40^\circ \text{ to } +85^\circ C$ | | Unit |
|-----------------------------------|--------------------------------------|--|----------|---------------------|-------------------|---|-------------------|------|
| | | | | Typ | Guaranteed Limits | Typ | Guaranteed Limits | |
| Minimum High Level Input Voltage | V_{IH} | | 2.0 | – | 1.5 | 1.5 | V | |
| | | | 4.5 | – | 3.15 | 3.15 | V | |
| | | | 6.0 | – | 4.2 | 4.2 | V | |
| Maximum Low Level Input Voltage | V_{IL} | | 2.0 | – | 0.5 | 0.5 | V | |
| | | | 4.5 | – | 1.35 | 1.35 | V | |
| | | | 6.0 | – | 1.8 | 1.8 | V | |
| Minimum High Level Output Voltage | V_{OH} | $V_{IN} = V_{IH} \text{ or } V_{IL}, I_{OUT} \leq 20\mu A$ | 2.0 | 2.0 | 1.9 | 1.9 | V | |
| | | | 4.5 | 4.5 | 4.4 | 4.4 | V | |
| | | | 6.0 | 6.0 | 5.9 | 5.9 | V | |
| | $V_{IN} = V_{IH} \text{ or } V_{IL}$ | $ I_{OUT} \leq 4.0mA$ | 4.5 | 4.2 | 3.98 | 3.84 | V | |
| | | $ I_{OUT} \leq 5.2mA$ | 6.0 | 5.7 | 5.48 | 5.34 | V | |
| Maximum Low Level Output Voltage | V_{OL} | $V_{IN} = V_{IH} \text{ or } V_{IL}, I_{OUT} \leq 20\mu A$ | 2.0 | 0 | 0.1 | 0.1 | V | |
| | | | 4.5 | 0 | 0.1 | 0.1 | V | |
| | | | 6.0 | 0 | 0.1 | 0.1 | V | |
| | $V_{IN} = V_{IH} \text{ or } V_{IL}$ | $ I_{OUT} \leq 4.0mA$ | 4.5 | 0.2 | 0.26 | 0.33 | V | |
| | | $ I_{OUT} \leq 5.2mA$ | 6.0 | 0.2 | 0.26 | 0.33 | V | |
| Maximum Input Current | I_{IN} | $V_{IN} = V_{CC} \text{ or } GND$ | 6.0 | – | ± 0.1 | ± 1.0 | μA | |
| Maximum Quiescent Supply Current | I_{CC} | $V_{IN} = V_{CC} \text{ or } GND, I_{OUT} = 0\mu A$ | 6.0 | – | 8 | 80 | μA | |

AC Electrical Characteristics: ($V_{CC} = 5V, t_r = t_f = 6ns, C_L = 15pF, T_A = +25^\circ C$ unless otherwise specified)

| Parameter | Symbol | Test Conditions | Typ | Guaranteed Limits | Unit |
|--|--------------------|-----------------|-----|-------------------|------|
| Maximum Propagation Delay (A, B or C to Y) | t_{PHL}, t_{PLH} | | 26 | 35 | ns |
| Maximum Propagation Delay (A, B or C to W) | t_{PHL}, t_{PLH} | | 27 | 35 | ns |
| Maximum Propagation Delay (Any D to Y) | t_{PHL}, t_{PLH} | | 22 | 29 | ns |
| Maximum Propagation Delay (Any D to W) | t_{PHL}, t_{PLH} | | 24 | 32 | ns |
| Maximum Propagation Delay (Strobe to Y) | t_{PHL}, t_{PLH} | | 17 | 23 | ns |
| Maximum Propagation Delay (Strobe to W) | t_{PHL}, t_{PLH} | | 16 | 21 | ns |

AC Electrical Characteristics: ($V_{CC} = 5V \pm 10\%$, $t_r = t_f = 6ns$, $C_L = 50pF$ unless otherwise specified)

| Parameter | Symbol | Test Conditions | V_{CC} | $T_A = +25^\circ C$ | | $T_A = -40^\circ \text{ to } +85^\circ C$ | | Unit |
|--|--------------------|---------------------|----------|---------------------|-------------------|---|----|------|
| | | | | Typ | Guaranteed Limits | | | |
| Maximum Propagation Delay (A, B or C to Y) | t_{PHL}, t_{PLH} | | 2.0 | 90 | 205 | 256 | ns | |
| | | | 4.5 | 31 | 41 | 51 | ns | |
| | | | 6.0 | 26 | 35 | 44 | ns | |
| Maximum Propagation Delay (A, B or C to W) | t_{PHL}, t_{PLH} | | 2.0 | 95 | 205 | 256 | ns | |
| | | | 4.5 | 32 | 41 | 51 | ns | |
| | | | 6.0 | 27 | 35 | 44 | ns | |
| Maximum Propagation Delay (Any D to Y) | t_{PHL}, t_{PLH} | | 2.0 | 70 | 195 | 244 | ns | |
| | | | 4.5 | 27 | 39 | 49 | ns | |
| | | | 6.0 | 23 | 33 | 41 | ns | |
| Maximum Propagation Delay (Any D to W) | t_{PHL}, t_{PLH} | | 2.0 | 75 | 185 | 231 | ns | |
| | | | 4.5 | 29 | 37 | 46 | ns | |
| | | | 6.0 | 25 | 32 | 40 | ns | |
| Maximum Propagation Delay (Strobe to Y) | t_{PHL}, t_{PLH} | | 2.0 | 50 | 140 | 175 | ns | |
| | | | 4.5 | 21 | 28 | 35 | ns | |
| | | | 6.0 | 18 | 24 | 30 | ns | |
| Maximum Propagation Delay (Strobe to W) | t_{PHL}, t_{PLH} | | 2.0 | 45 | 127 | 159 | ns | |
| | | | 4.5 | 20 | 25 | 32 | ns | |
| | | | 6.0 | 17 | 22 | 28 | ns | |
| Maximum Output Rise and Fall Time | t_{TLH}, t_{THL} | | 2.0 | 30 | 75 | 95 | ns | |
| | | | 4.5 | 8 | 15 | 19 | ns | |
| | | | 6.0 | 7 | 13 | 16 | ns | |
| Power Dissipation Capacitance | C_{PD} | Per Package, Note 4 | - | 110 | - | - | pF | |
| Maximum Input Capacitance | C_{IN} | | - | 5 | 10 | 10 | pF | |

Note 4. C_{PD} determines the no load dynamic power consumption, $P_D = C_{PD} V_{CC}^2 f + I_{CC} V_{CC}$, and the no load dynamic current consumption, $I_S = C_{PD} V_{CC} f + I_{CC}$.

Truth Table:

| Inputs | | | | Outputs | |
|--------|---|---|--------|---------|----|
| Select | | | Strobe | Y | W |
| C | B | A | S | | |
| X | X | X | H | L | H |
| L | L | L | L | D0 | D0 |
| L | L | H | L | D1 | D1 |
| L | H | L | L | D2 | D2 |
| L | H | H | L | D3 | D3 |
| H | L | L | L | D4 | D4 |
| H | L | H | L | D5 | D5 |
| H | H | L | L | D6 | D6 |
| H | H | H | L | D7 | D7 |

H = HIGH Level

L = LOW Level

X = Don't Care

D0, D1 . . . D7 = the level of the respective D input

Pin Connection Diagram

