

74HC/HCT368  
MSI

HEX BUFFER/LINE DRIVER; 3-STATE; INVERTING

FEATURES

- Inverting outputs
- Output capability: bus driver
- I<sub>CC</sub> category: MSI

GENERAL DESCRIPTION

The 74HC/HCT368 are high-speed Si-gate CMOS devices and are pin compatible with low power Schottky TTL (LSSTTL). They are specified in compliance with JEDEC standard no. 7A.

The 74HC/HCT368 are hex inverting buffer/line drivers with 3-state outputs. The 3-state outputs (n $\bar{Y}$ ) are controlled by the output enable inputs (1 $\bar{O}E$ , 2 $\bar{O}E$ ).

A HIGH on n $\bar{O}E$  causes the outputs to assume a high impedance OFF-state.

The "368" is identical to the "367" but has inverting outputs.

| SYMBOL                                 | PARAMETER                                   | CONDITIONS                                      | TYPICAL |     | UNIT |
|--|---|---|---------|-----|------|
|  |   |   | HC      | HCT |      |
| t <sub>PHL</sub> /<br>t <sub>PLH</sub> | propagation delay<br>nA to n $\bar{Y}$      | C <sub>L</sub> = 15 pF<br>V <sub>CC</sub> = 5 V | 9       | 11  | ns   |
| C <sub>I</sub>                         | input capacitance                           |   | 3.5     | 3.5 | pF   |
| CPD                                    | power dissipation<br>capacitance per buffer | notes 1 and 2                                   | 30      | 30  | pF   |

GND = 0 V; T<sub>amb</sub> = 25 °C; t<sub>r</sub> = t<sub>f</sub> = 6 ns

Notes

1. CPD is used to determine the dynamic power dissipation (P<sub>D</sub> in  $\mu$ W):

$$P_D = CPD \times V_{CC}^2 \times f_i + \sum (C_L \times V_{CC}^2 \times f_o) \text{ where:}$$

f<sub>i</sub> = input frequency in MHz      C<sub>L</sub> = output load capacitance in pF  
f<sub>o</sub> = output frequency in MHz      V<sub>CC</sub> = supply voltage in V  
 $\sum (C_L \times V_{CC}^2 \times f_o)$  = sum of outputs

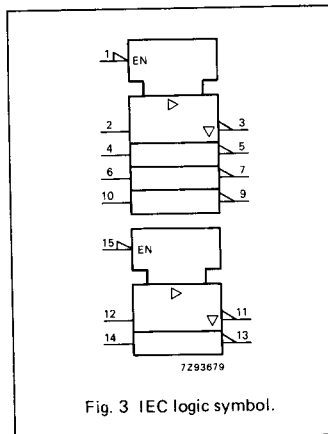
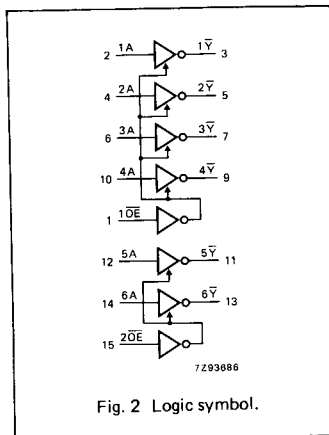
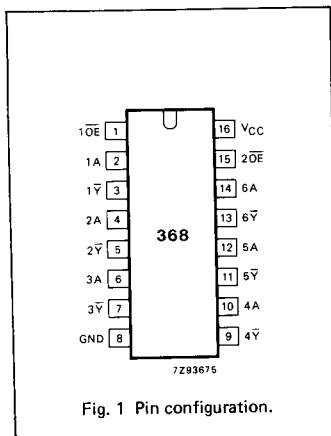
2. For HC the condition is V<sub>I</sub> = GND to V<sub>CC</sub>  
For HCT the condition is V<sub>I</sub> = GND to V<sub>CC</sub> - 1.5 V

PACKAGE OUTLINES

16-lead DIL; plastic (SOT38Z).  
16-lead mini-pack; plastic (SO16; SOT109A).

PIN DESCRIPTION

| PIN NO.             | SYMBOL                      | NAME AND FUNCTION                 |
|---------------------|-----------------------------|-----------------------------------|
| 1, 15               | 1 $\bar{O}E$ , 2 $\bar{O}E$ | output enable inputs (active LOW) |
| 2, 4, 6, 10, 12, 14 | 1A to 6A                    | data inputs                       |
| 3, 5, 7, 9, 11, 13  | 1 $\bar{Y}$ to 6 $\bar{Y}$  | data outputs                      |
| 8                   | GND                         | ground (0 V)                      |
| 16                  | V <sub>CC</sub>             | positive supply voltage           |



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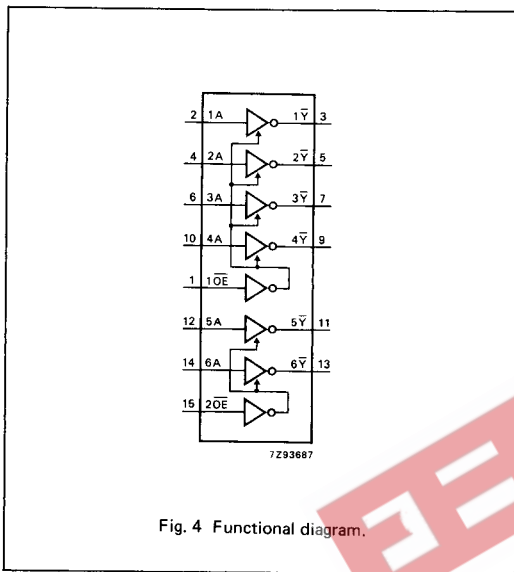


Fig. 4 Functional diagram.

FUNCTION TABLE

| INPUTS           |      | OUTPUTS         |
|------------------|------|-----------------|
| $n\overline{OE}$ | $nA$ | $n\overline{Y}$ |
| L                | L    | H               |
| L                | H    | L               |
| H                | X    | Z               |

H = HIGH voltage level  
L = LOW voltage level  
X = don't care  
Z = high impedance OFF-state

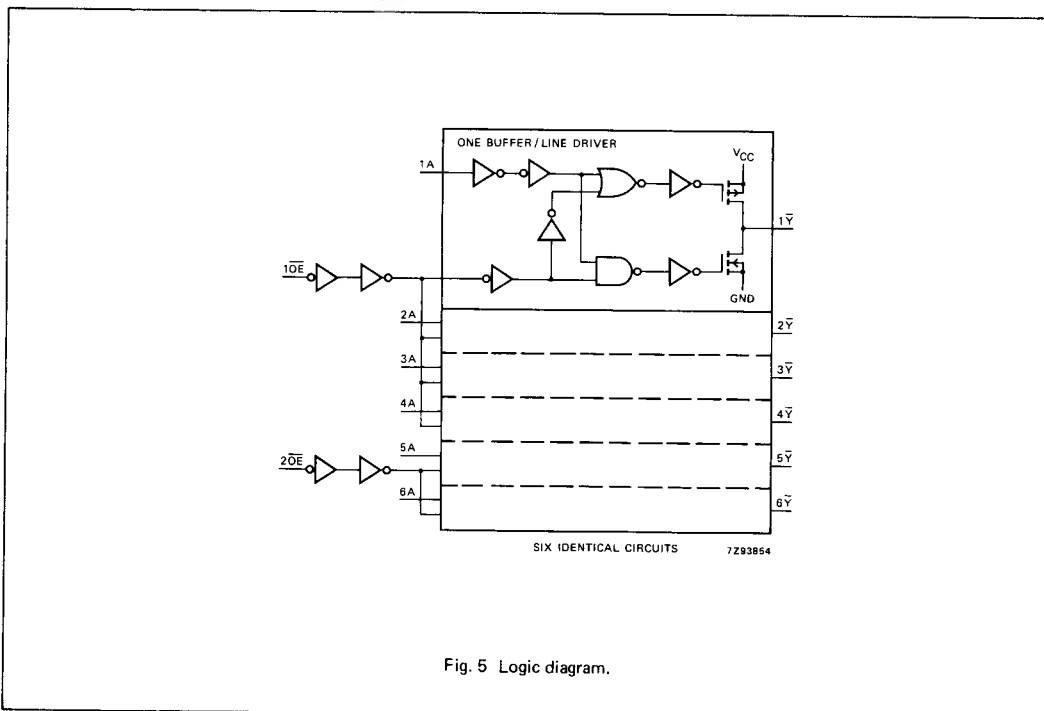
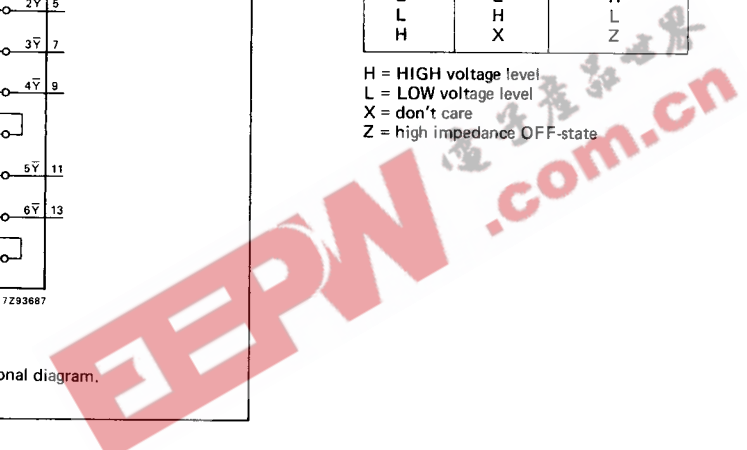


Fig. 5 Logic diagram.

Hex buffer/line driver; 3-state; inverting

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**DC CHARACTERISTICS FOR 74HC**

For the DC characteristics see chapter "HCMOS family characteristics", section "Family specifications".  
Output capability: bus driver  
ICC category: MSI

**AC CHARACTERISTICS FOR 74HC**

GND = 0 V;  $t_r = t_f = 6$  ns;  $C_L = 50$  pF

| SYMBOL        | PARAMETER                                | Tamb (°C)      |                 |      |                 |      |                 | UNIT | TEST CONDITIONS   |           |      |
|---------------|--|----------------|-----------------|------|-----------------|------|-----------------|------|-------------------|-----------|------|
|               |  | 74HC           |                 |      |                 |      |                 |      | VCC<br>V          | WAVEFORMS |      |
|               |  | +25            |                 |      | -40 to +85      |      | -40 to +125     |      |                   |           |      |
|               |  | min.           | typ.            | max. | min.            | max. | min.            |      |                   |           | max. |
| tPHL/<br>tPLH | propagation delay<br>nA to nY            | 30<br>11<br>9  | 95<br>19<br>16  |      | 120<br>24<br>20 |      | 145<br>29<br>25 | ns   | 2.0<br>4.5<br>6.0 | Fig. 6    |      |
| tpZH/<br>tpZL | 3-state output enable time<br>nOE to nY  | 41<br>15<br>12 | 150<br>30<br>26 |      | 190<br>38<br>33 |      | 225<br>45<br>38 | ns   | 2.0<br>4.5<br>6.0 | Fig. 7    |      |
| tPHZ/<br>tPLZ | 3-state output disable time<br>nOE to nY | 55<br>20<br>16 | 150<br>30<br>26 |      | 190<br>38<br>33 |      | 225<br>45<br>38 | ns   | 2.0<br>4.5<br>6.0 | Fig. 7    |      |
| tTHL/<br>tTLH | output transition time                   | 14<br>5<br>4   | 60<br>12<br>10  |      | 75<br>15<br>13  |      | 90<br>18<br>15  | ns   | 2.0<br>4.5<br>6.0 | Fig. 6    |      |

**DC CHARACTERISTICS FOR 74HCT**

For the DC characteristics see chapter "HCMOS family characteristics", section "Family specifications".  
Output capability: bus driver  
ICC category: MSI

**Note to HCT types**

The value of additional quiescent supply current ( $\Delta I_{CC}$ ) for a unit load of 1 is given in the family specifications.  
To determine  $\Delta I_{CC}$  per input, multiply this value by the unit load coefficient shown in the table below.

| INPUT | UNIT LOAD COEFFICIENT |
|-------|-----------------------|
| 1OE   | 1.00                  |
| 2OE   | 0.90                  |
| nA    | 1.00                  |

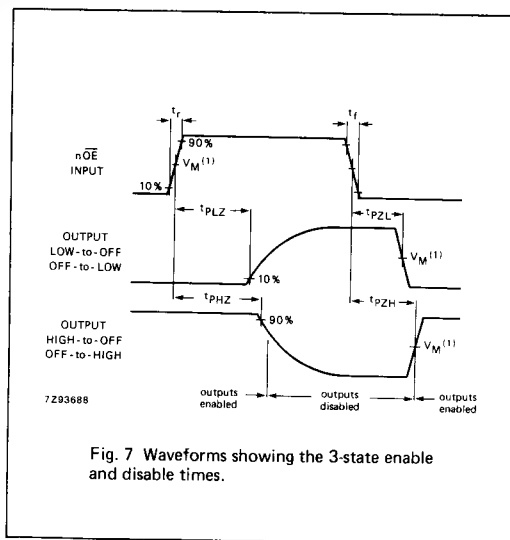
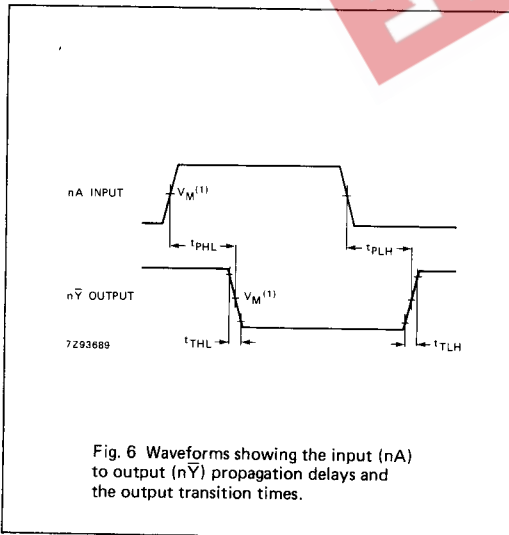
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AC CHARACTERISTICS FOR 74HCT

GND = 0 V;  $t_r = t_f = 6$  ns;  $C_L = 50$  pF

| SYMBOL            | PARAMETER                                | Tamb (°C) |      |      |            |      |             | UNIT | TEST CONDITIONS |           |        |
|-------------------|--|-----------|------|------|------------|------|-------------|------|-----------------|-----------|--------|
|                   |  | 74HCT     |      |      |            |      |             |      | VCC<br>V        | WAVEFORMS |        |
|                   |  | +25       |      |      | -40 to +85 |      | -40 to +125 |      |                 |           |        |
|                   |  | min.      | typ. | max. | min.       | max. | min.        |      |                 |           | max.   |
| $t_{PHL}/t_{PLH}$ | propagation delay<br>nA to nY            |           | 13   | 24   |            | 30   |             | 36   | ns              | 4.5       | Fig. 6 |
| $t_{PZH}/t_{PZL}$ | 3-state output enable time<br>nOE to nY  |           | 17   | 35   |            | 44   |             | 53   | ns              | 4.5       | Fig. 7 |
| $t_{PHZ}/t_{PLZ}$ | 3-state output disable time<br>nOE to nY |           | 20   | 35   |            | 44   |             | 53   | ns              | 4.5       | Fig. 7 |
| $t_{THL}/t_{TLH}$ | output transition time                   |           | 5    | 12   |            | 15   |             | 18   | ns              | 4.5       | Fig. 6 |

AC WAVEFORMS



Note to AC waveforms

(1) HC :  $V_M = 50\%$ ;  $V_I = \text{GND to } V_{CC}$ .  
HCT:  $V_M = 1.3$  V;  $V_I = \text{GND to } 3$  V.