8-INPUT MULTIPLEXER

FEATURES

- **True and complement outputs**
- **Multifunction capability**
- **Permits multiplexing from n lines to 1 line**
- **Non-inverting data path**
- **See the "251" for the 3-state version**
- **Output capability: standard**
- **I_{CC} category: MSI**

GENERAL DESCRIPTION

The 74HC/HCT151 are high-speed Si-gate CMOS devices and are pin compatible with low power Schottky TTL (LSTTL). They are specified in compliance with JEDEC standard no. 7A.

SYMBOL	PARAMETER	CONDITIONS	TYPICAL		UNIT
			HC	HCT	
t_{PHL}/ t_{PLH}	propagation delay I_n to Y, $\overline{Y}$ S_n to Y, $\overline{Y}$ $\overline{E}$ to Y $\overline{E}$ to $\overline{Y}$	$C_L = 15$ pF $V_{CC} = 5$ V	17 19 12 14	19 20 13 18	ns ns ns ns
C_I	input capacitance		3.5	3.5	pF
C_{PD}	power dissipation capacitance per package	notes 1 and 2	40	40	pF

GND = 0 V; T_{amb} = 25 °C; $t_r = t_f = 6$ ns

Notes

1. C_{PD} is used to determine the dynamic power dissipation (P_D in μW):

    $P_D = C_{PD} \times V_{CC}^2 \times f_i + \Sigma (C_L \times V_{CC}^2 \times f_o)$ where:

    f_i = input frequency in MHz C_L = output load capacitance in pF
    f_o = output frequency in MHz V_{CC} = supply voltage in V
    $\Sigma (C_L \times V_{CC}^2 \times f_o)$ = sum of outputs

2. For HC the condition is V_I = GND to V_{CC}
    For HCT the condition is V_I = GND to $V_{CC} - 1.5$ V

PACKAGE OUTLINES

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

PIN DESCRIPTION

PIN NO.	SYMBOL	NAME AND FUNCTION
4, 3, 2, 1, 15, 14, 13, 12	I_0 to I_7	multiplexer inputs
5	Y	multiplexer output
6	$\overline{Y}$	complementary multiplexer output
7	$\overline{E}$	enable input (active LOW)
8	GND	ground (0 V)
11, 10, 9	S_0, S_1, S_2	select inputs
16	V_{CC}	positive supply voltage
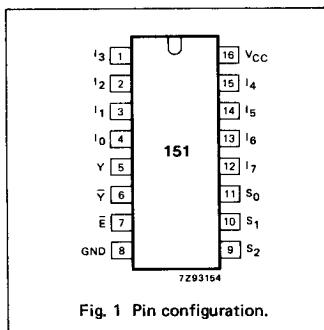
Fig. 1 Pin configuration.
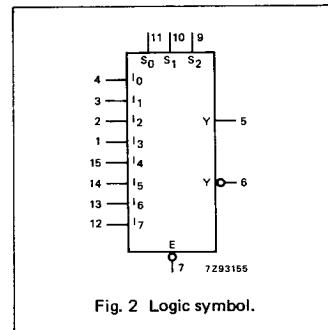
Fig. 2 Logic symbol.

Fig. 3 IEC logic symbol.

Fig. 4 Functional diagram.
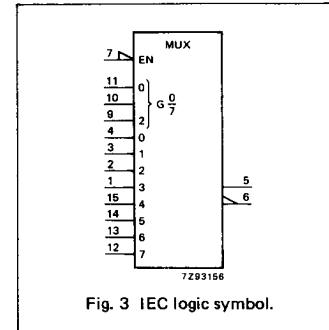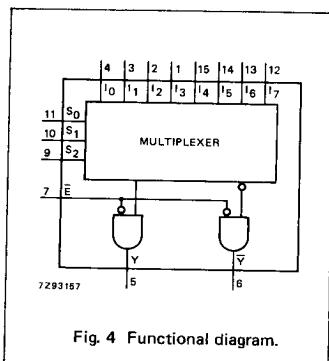
FUNCTION TABLE

INPUTS												OUTPUTS	
$\bar{E}$	S_2	S_1	S_0	I_0	I_1	I_2	I_3	I_4	I_5	I_6	I_7	$\bar{Y}$	Y
H	X	X	X	X	X	X	X	X	X	X	X	H	L
L	L	L	L	L	X	X	X	X	X	X	X	H	L
L	L	L	L	H	X	X	X	X	X	X	X	L	H
L	L	L	H	X	L	X	X	X	X	X	X	H	L
L	L	L	H	X	H	X	X	X	X	X	X	L	H
L	L	H	L	X	X	L	X	X	X	X	X	H	L
L	L	H	L	X	X	H	X	X	X	X	X	L	H
L	L	H	H	X	X	X	L	X	X	X	X	H	L
L	L	H	H	X	X	X	H	X	X	X	X	L	H
L	H	L	L	X	X	X	X	L	X	X	X	H	L
L	H	L	L	X	X	X	X	H	X	X	X	L	H
L	H	L	H	X	X	X	X	X	L	X	X	H	L
L	H	L	H	X	X	X	X	X	H	X	X	L	H
L	H	H	L	X	X	X	X	X	X	L	X	H	L
L	H	H	L	X	X	X	X	X	X	H	X	L	H
L	H	H	H	X	X	X	X	X	X	X	L	H	L
L	H	H	H	X	X	X	X	X	X	X	H	L	H

H = HIGH voltage level
L = LOW voltage level
X = don't care
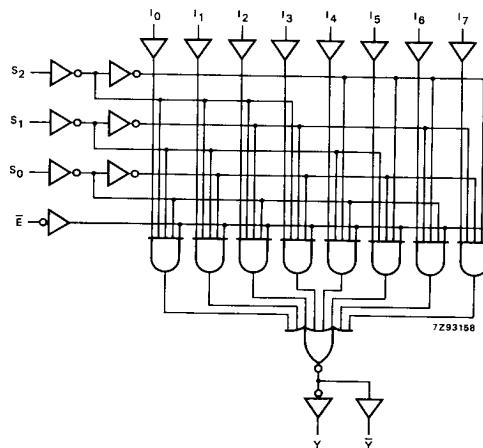

Fig. 5 Logic diagram.

DC CHARACTERISTICS FOR 74HC

For the DC characteristics see chapter "HCMOS family characteristics", section "Family specifications".

Output capability: standard
I_{CC} category: MSI

AC CHARACTERISTICS FOR 74HC

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

SYMBOL	PARAMETER	T_{amb} (°C) 74HC							UNIT	V_{CC} V	WAVEFORMS
		+25			−40 to +85		−40 to +125				
		min.	typ.	max.	min.	max.	min.	max.			
$t_{PHL}/$ t_{PLH}	propagation delay I_n to Y		52 19 15	170 34 29		215 43 37		255 51 43	ns	2.0 4.5 6.0	Fig. 6
$t_{PHL}/$ t_{PLH}	propagation delay I_n to $\overline{Y}$		58 21 17	185 37 31		230 46 39		280 56 48	ns	2.0 4.5 6.0	Fig. 6
$t_{PHL}/$ t_{PLH}	propagation delay S_n to Y		61 22 18	185 37 31		230 46 39		280 56 48	ns	2.0 4.5 6.0	Fig. 7
$t_{PHL}/$ t_{PLH}	propagation delay S_n to $\overline{Y}$		61 22 18	205 41 35		255 51 43		310 62 53	ns	2.0 4.5 6.0	Fig. 7
$t_{PHL}/$ t_{PLH}	propagation delay $\overline{E}$ to Y		41 15 12	125 25 21		155 31 26		190 38 32	ns	2.0 4.5 6.0	Fig. 7
$t_{PHL}/$ t_{PLH}	propagation delay $\overline{E}$ to $\overline{Y}$		47 17 14	145 29 25		180 36 31		220 44 38	ns	2.0 4.5 6.0	Fig. 7
$t_{THL}/$ t_{TLH}	output transition time		19 7 6	75 15 13		95 19 16		110 22 19	ns	2.0 4.5 6.0	Figs 6 and 7

DC CHARACTERISTICS FOR 74HCT

For the DC characteristics see chapter "HCMOS family characteristics", section "Family specifications".

Output capability: standard
I_{CC} category: MSI

Note to HCT types

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

INPUT	UNIT LOAD COEFFICIENT
I_n	0.45
S_n	1.50
$\overline{E}$	0.30

AC CHARACTERISTICS FOR 74HCT

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

SYMBOL	PARAMETER	T_{amb} (°C) 74HCT							UNIT	V_{CC} V	WAVEFORMS
		+25			−40 to +85		−40 to +125				
		min.	typ.	max.	min.	max.	min.	max.			
t_{PHL}/t_{PLH}	propagation delay I_n to Y		22	38		48		57	ns	4.5	Fig. 6
t_{PHL}/t_{PLH}	propagation delay I_n to $\overline{Y}$		22	38		48		57	ns	4.5	Fig. 6
t_{PHL}/t_{PLH}	propagation delay S_n to Y		23	41		51		62	ns	4.5	Fig. 7
t_{PHL}/t_{PLH}	propagation delay S_n to $\overline{Y}$		25	43		54		65	ns	4.5	Fig. 7
t_{PHL}/t_{PLH}	propagation delay $\overline{E}$ to Y		16	29		36		44	ns	4.5	Fig. 7
t_{PHL}/t_{PLH}	propagation delay $\overline{E}$ to $\overline{Y}$		21	36		45		54	ns	4.5	Fig. 7
t_{THL}/t_{TLH}	output transition time		7	15		19		22	ns	4.5	Figs 6 and 7

AC WAVEFORMS
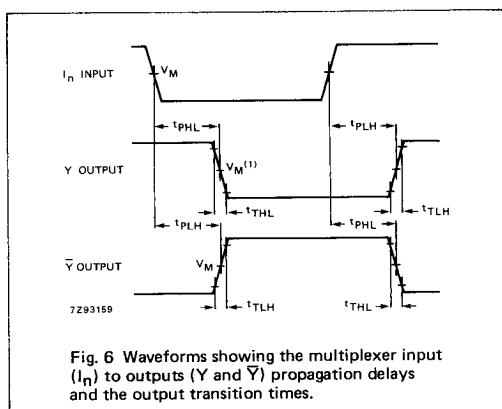
Fig. 6 Waveforms showing the multiplexer input (I_n) to outputs (Y and $\overline{Y}$) propagation delays and the output transition times.
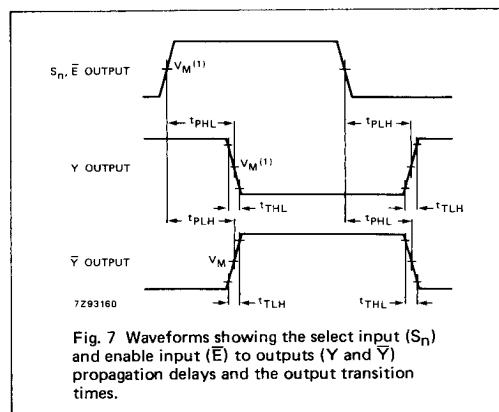
Fig. 7 Waveforms showing the select input (S_n) and enable input ($\overline{E}$) to outputs (Y and $\overline{Y}$) propagation delays and the output transition times.

Note to AC waveforms

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