

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<sub>CC</sub> 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 <sub>PHL</sub> / t <sub>PLH</sub>	propagation delay I <sub>n</sub> to Y, $\bar{Y}$ S <sub>n</sub> to Y, $\bar{Y}$ E to Y E to $\bar{Y}$	C <sub>L</sub> = 15 pF V <sub>CC</sub> = 5 V	17 19 12 14	19 20 13 18	ns ns ns ns
C <sub>I</sub>	input capacitance		3.5	3.5	pF
C <sub>PD</sub>	power dissipation capacitance per package	notes 1 and 2	40	40	pF

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

Notes

1. C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> 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<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  
 Σ (C<sub>L</sub> x V<sub>CC</sub><sup>2</sup> x f<sub>o</sub>) = 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
4, 3, 2, 1, 15, 14, 13, 12	I <sub>0</sub> to I <sub>7</sub>	multiplexer inputs
5	Y	multiplexer output
6	$\bar{Y}$	complementary multiplexer output
7	E	enable input (active LOW)
8	GND	ground (0 V)
11, 10, 9	S <sub>0</sub> , S <sub>1</sub> , S <sub>2</sub>	select inputs
16	V <sub>CC</sub>	positive supply voltage

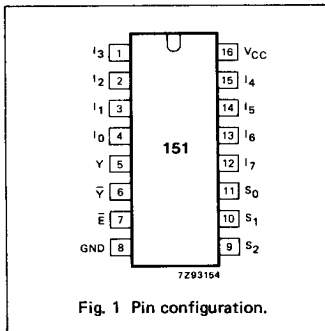


Fig. 1 Pin configuration.

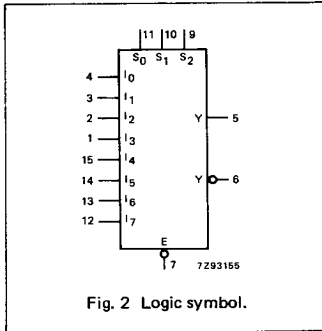


Fig. 2 Logic symbol.

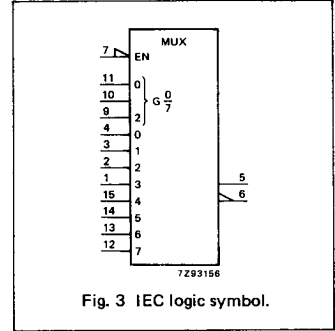
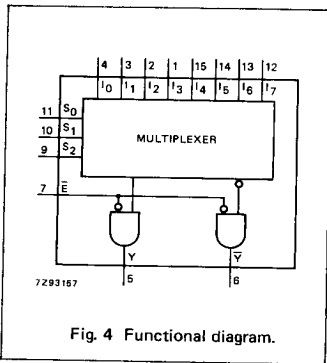


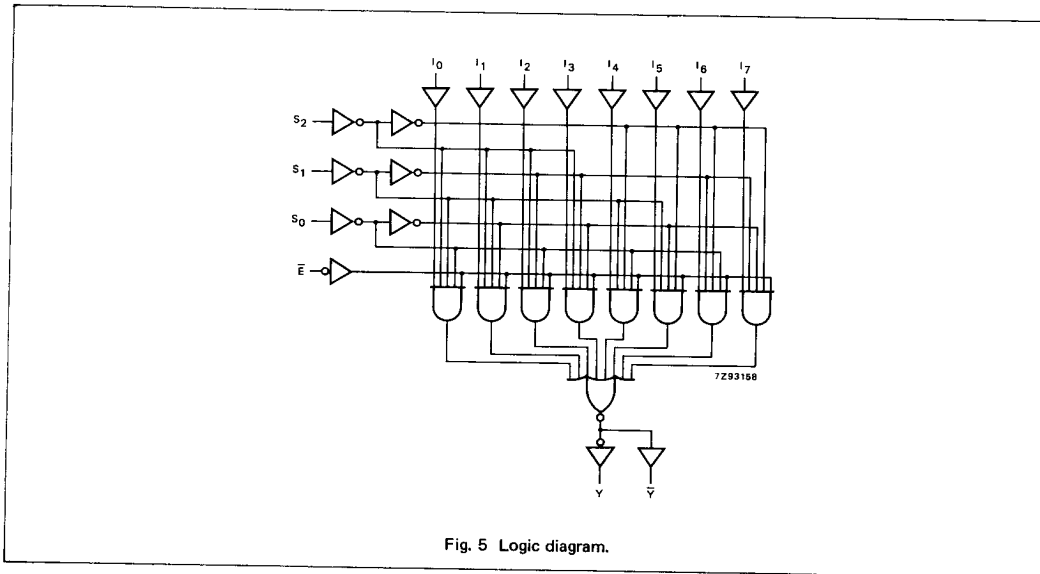
Fig. 3 IEC logic symbol.



FUNCTION TABLE

INPUTS												OUTPUTS	
$\bar{E}$	S <sub>2</sub>	S <sub>1</sub>	S <sub>0</sub>	I <sub>0</sub>	I <sub>1</sub>	I <sub>2</sub>	I <sub>3</sub>	I <sub>4</sub>	I <sub>5</sub>	I <sub>6</sub>	I <sub>7</sub>	$\bar{Y}$	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	L	H	X	X	X	X	X	X	L	H
L	L	L	L	L	X	L	X	X	X	X	X	L	H
L	L	L	L	L	X	H	X	X	X	X	X	L	H
L	L	L	L	L	X	X	X	X	X	X	X	L	H
L	L	L	L	L	X	X	X	X	X	X	X	L	H
L	L	L	L	L	X	X	X	L	X	X	X	H	L
L	L	L	L	L	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	L	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	L	X	X	X	X	X	X	X	H	L
L	H	L	L	X	X	X	X	L	X	X	X	H	L
L	H	L	L	X	X	X	X	X	X	X	X	H	L
L	H	L	L	X	X	X	X	X	X	X	X	H	L
L	H	L	L	X	X	X	X	X	X	X	X	H	L
L	H	L	L	X	X	X	X	X	X	X	X	H	L
L	H	L	L	X	X	X	X	X	X	X	X	H	L
L	H	L	L	X	X	X	X	X	X	X	X	H	L
L	H	L	L	X	X	X	X	X	X	X	X	H	L
L	H	L	L	X	X	X	X	X	X	X	X	H	L
L	H	L	L	X	X	X	X	X	X	X	X	H	L
L	H	L	L	X	X	X	X	X	X	X	X	H	L
L	H	L	L	X	X	X	X	X	X	X	X	H	L
L	H	L	L	X	X	X	X	X	X	X	X	H	L
L	H	L	L	X	X	X	X	X	X	X	X	H	L

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



**DC CHARACTERISTICS FOR 74HC**

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

Output capability: standard

I<sub>CC</sub> category: MSI**AC CHARACTERISTICS FOR 74HC**GND = 0 V; t<sub>r</sub> = t<sub>f</sub> = 6 ns; C<sub>L</sub> = 50 pF

SYMBOL	PARAMETER	T <sub>amb</sub> (°C)						UNIT	TEST CONDITIONS		
		74HC							V <sub>CC</sub> V	WAVEFORMS	
		+25			-40 to +85		-40 to +125				
		min.	typ.	max.	min.	max.	min.				max.
t <sub>PHL</sub> / t <sub>PLH</sub>	propagation delay I <sub>n</sub> to Y		52 19 15	170 34 29		215 43 37		255 51 43	ns	2.0 4.5 6.0	Fig. 6
t <sub>PHL</sub> / t <sub>PLH</sub>	propagation delay I <sub>n</sub> to $\bar{Y}$		58 21 17	185 37 31		230 46 39		280 56 48	ns	2.0 4.5 6.0	Fig. 6
t <sub>PHL</sub> / t <sub>PLH</sub>	propagation delay S <sub>n</sub> to Y		61 22 18	185 37 31		230 46 39		280 56 48	ns	2.0 4.5 6.0	Fig. 7
t <sub>PHL</sub> / t <sub>PLH</sub>	propagation delay S <sub>n</sub> to $\bar{Y}$		61 22 18	205 41 35		255 51 43		310 62 53	ns	2.0 4.5 6.0	Fig. 7
t <sub>PHL</sub> / t <sub>PLH</sub>	propagation delay $\bar{E}$ to Y		41 15 12	125 25 21		155 31 26		190 38 32	ns	2.0 4.5 6.0	Fig. 7
t <sub>PHL</sub> / t <sub>PLH</sub>	propagation delay $\bar{E}$ to $\bar{Y}$		47 17 14	145 29 25		180 36 31		220 44 38	ns	2.0 4.5 6.0	Fig. 7
t <sub>THL</sub> / t <sub>TLH</sub>	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<sub>CC</sub> 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
I <sub>n</sub>	0.45
S <sub>n</sub>	1.50
E	0.30

**AC CHARACTERISTICS FOR 74HCT**

GND = 0 V; t<sub>r</sub> = t<sub>f</sub> = 6 ns; C<sub>L</sub> = 50 pF

SYMBOL	PARAMETER	T <sub>amb</sub> (°C)						UNIT	TEST CONDITIONS		
		74HCT							V <sub>CC</sub> V	WAVEFORMS	
		+25			-40 to +85		-40 to +125				
		min.	typ.	max.	min.	max.	min.				max.
t <sub>PHL</sub> / t <sub>PLH</sub>	propagation delay I <sub>n</sub> to Y		22	38		48		57	ns	4.5	Fig. 6
t <sub>PHL</sub> / t <sub>PLH</sub>	propagation delay I <sub>n</sub> to $\bar{Y}$		22	38		48		57	ns	4.5	Fig. 6
t <sub>PHL</sub> / t <sub>PLH</sub>	propagation delay S <sub>n</sub> to Y		23	41		51		62	ns	4.5	Fig. 7
t <sub>PHL</sub> / t <sub>PLH</sub>	propagation delay S <sub>n</sub> to $\bar{Y}$		25	43		54		65	ns	4.5	Fig. 7
t <sub>PHL</sub> / t <sub>PLH</sub>	propagation delay E to Y		16	29		36		44	ns	4.5	Fig. 7
t <sub>PHL</sub> / t <sub>PLH</sub>	propagation delay E to $\bar{Y}$		21	36		45		54	ns	4.5	Fig. 7
t <sub>THL</sub> / t <sub>TLH</sub>	output transition time		7	15		19		22	ns	4.5	Figs 6 and 7

AC WAVEFORMS

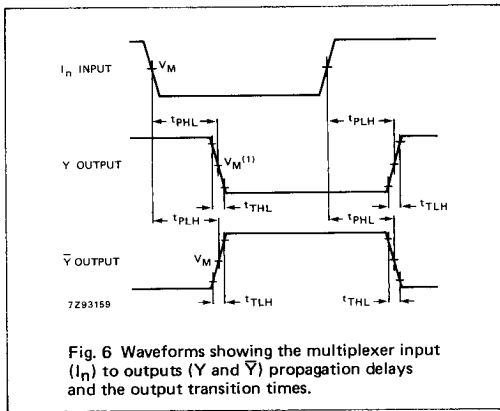


Fig. 6 Waveforms showing the multiplexer input ( $I_n$ ) to outputs (Y and  $\bar{Y}$ ) propagation delays and the output transition times.

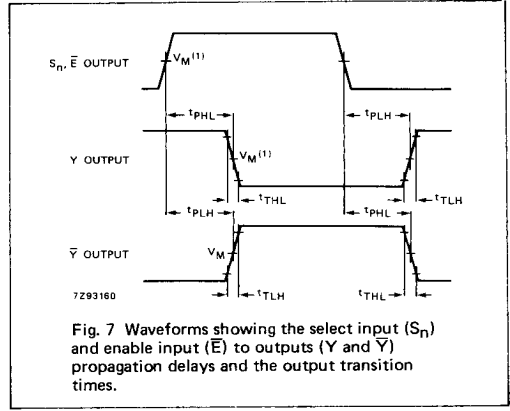


Fig. 7 Waveforms showing the select input ( $S_n$ ) and enable input ( $\bar{E}$ ) to outputs (Y and  $\bar{Y}$ ) propagation delays and the output transition times.

Note to AC waveforms

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