DATA SHEET

For a complete data sheet, please also download:

- The IC06 74HC/HCT/HCU/HCMOS Logic Family Specifications
- The IC06 74HC/HCT/HCU/HCMOS Logic Package Information
- The IC06 74HC/HCT/HCU/HCMOS Logic Package Outlines

74HC/HCT151
8-input multiplexer

Product specification
File under Integrated Circuits, IC06

December 1990

Philips
Semiconductors

PHILIPS

8-input multiplexer 74HC/HCT151

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.

QUICK REFERENCE DATA

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

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

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

   f_o = output frequency in MHz

   Σ $(C_L \times V_{CC}^2 \times f_o)$ = sum of outputs

   C_L = output load capacitance in pF

   V_{CC} = supply voltage in V
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

ORDERING INFORMATION

See *“74HC/HCT/HCU/HCMOS Logic Package Information”*.

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

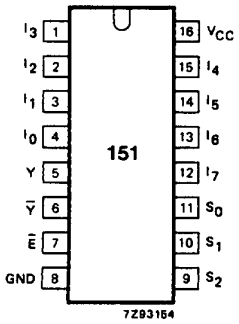


Fig.1 Pin configuration.

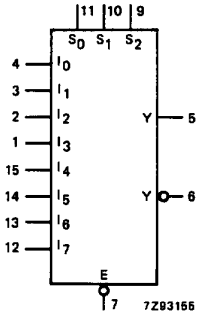


Fig.2 Logic symbol.

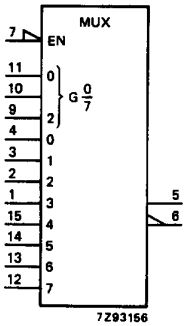


Fig.3 IEC logic symbol.

FUNCTION TABLE

INPUTS												OUTPUTS	
$\overline{E}$	S_2	S_1	S_0	I_0	I_1	I_2	I_3	I_4	I_5	I_6	I_7	$\overline{Y}$	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

Notes

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

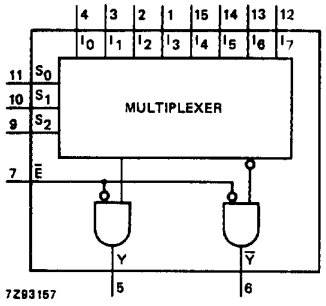


Fig.4 Functional diagram.

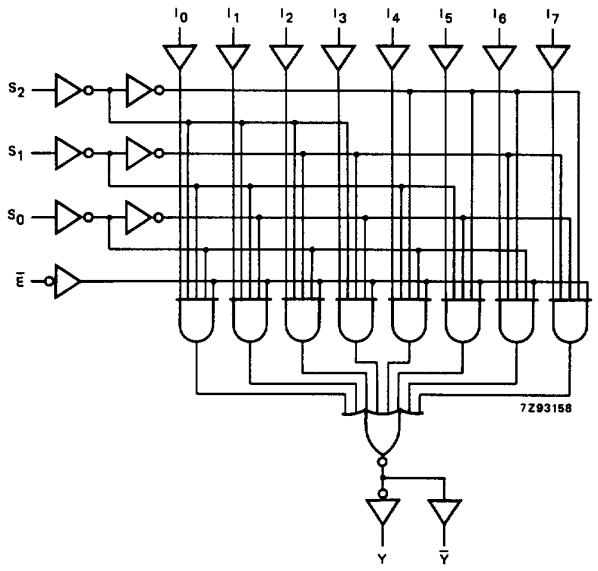


Fig.5 Logic diagram.

DC CHARACTERISTICS FOR 74HC

For the DC characteristics see *"74HC/HCT/HCU/HCMOS Logic 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)							UNIT	TEST CONDITIONS	
		74HC								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 *"74HC/HCT/HCU/HCMOS Logic 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.

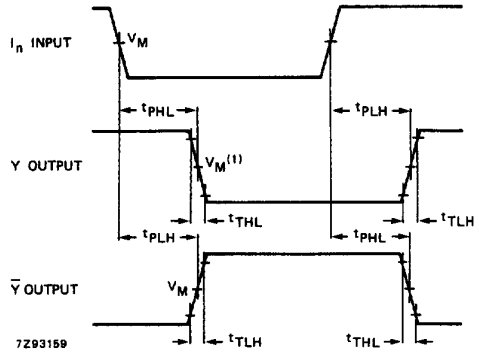
INPUT	UNIT LOAD COEFFICIENT
I_n	0.45
S_n	1.50
$\overline{E}$	0.30

AC CHARACTERISTICS FOR 74HCT

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

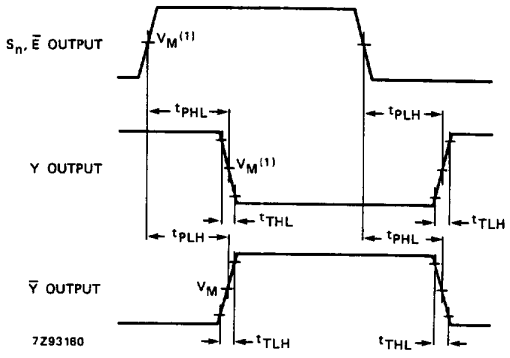
SYMBOL	PARAMETER	T_{amb} (°C)							UNIT	TEST CONDITIONS	
		74HCT								V_{CC} (V)	WAVEFORMS
		+25			–40 to +85		–40 to +125				
		min.	typ.	max.	min.	max.	min.	max.			
t_{PHL}/ t_{PLH}	propagation delay I_n to Y		22	38		48		57	ns	4.5	Fig.6
t_{PHL}/ t_{PLH}	propagation delay I_n to $\overline{Y}$		22	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



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

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



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

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.

PACKAGE OUTLINES

See *"74HC/HCT/HCU/HCMOS Logic Package Outlines"*.