

OCTAL BUS TRANSCEIVER; 3-STATE; INVERTING

FEATURES

- Octal bidirectional bus interface
- Inverting 3-state outputs
- Output capability: bus driver
- ICC category: MSI

GENERAL DESCRIPTION

The 74HC/HCT640 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.

The 74HC/HCT640 are octal transceivers featuring inverting 3-state bus compatible outputs in both send and receive directions.

The "640" features an output enable (OE) input for easy cascading and a send/receive (DIR) for direction control. OE controls the outputs so that the buses are effectively isolated.

The "640" is similar to the "245" but has inverting outputs.

SYMBOL	PARAMETER	CONDITIONS	TYPICAL		UNIT
			HC	HCT	
t_{PHL}/t_{PLH}	propagation delay A_n to B_n ; B_n to A_n	$C_L = 15 \text{ pF}$ $V_{CC} = 5 \text{ V}$	9	9	ns
C_I	input capacitance		3.5	3.5	pF
$C_{I/O}$	input/output capacitance		10	10	pF
C_{PD}	power dissipation capacitance per transceiver	notes 1 and 2	35	35	pF

GND = 0 V; $T_{amb} = 25^\circ\text{C}$; $t_r = t_f = 6 \text{ ns}$

Notes

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

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

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

C_L = output load capacitance in pF
 V_{CC} = supply voltage in V

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

ORDERING INFORMATION/PACKAGE OUTLINES

20-lead DIL; plastic (SOT146).

20-lead mini-pack; plastic (SO20; SOT163A).

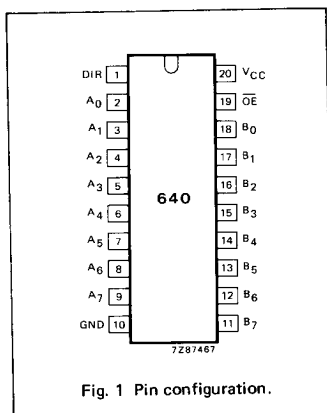


Fig. 1 Pin configuration.

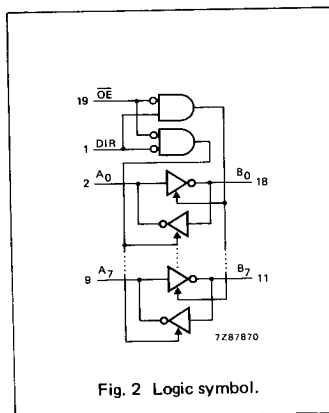


Fig. 2 Logic symbol.

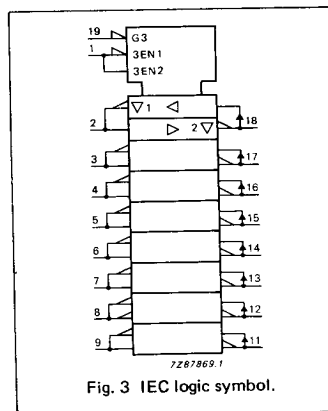


Fig. 3 IEC logic symbol.

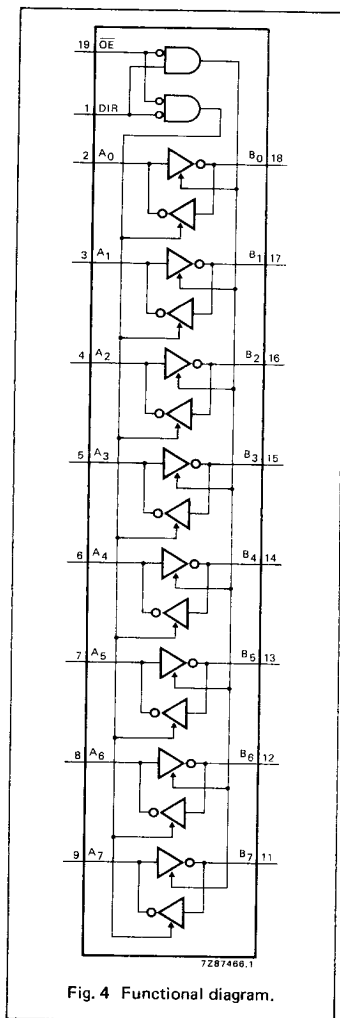


Fig. 4 Functional diagram.

PIN DESCRIPTION

PIN NO.	SYMBOL	NAME AND FUNCTION
1	DIR	direction control
2, 3, 4, 5, 6, 7, 8, 9	A ₀ to A ₇	data inputs/outputs
10	GND	ground (0 V)
18, 17, 16, 15, 14, 13, 12, 11	B ₀ to B ₇	data inputs/outputs
19	$\overline{OE}$	output enable input (active LOW)
20	VCC	positive supply voltage

FUNCTION TABLE

inputs		inputs/outputs	
$\overline{OE}$	DIR	A _n	B _n
L	L	A = $\overline{B}$	inputs
L	H	inputs	B = $\overline{A}$
H	X	Z	Z

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

DC CHARACTERISTICS FOR 74HC

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

Output capability: bus driver

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 A _n to B _n ; B _n to A _n		30 11 9	90 18 15		115 23 20		135 27 23	ns	2.0 4.5 6.0	Fig. 5	
t _{PZH} / t _{PZL}	3-state output enable time OE, DIR to A _n ; OE, DIR to B _n		44 16 13	150 30 26		190 38 33		225 45 38	ns	2.0 4.5 6.0	Fig. 6	
t _{PHZ} / t _{PLZ}	3-state output disable time OE, DIR to A _n ; OE, DIR to B _n		50 18 14	150 30 26		190 38 33		225 45 38	ns	2.0 4.5 6.0	Fig. 6	
t _{THL} / t _{TLH}	output transition time		14 5 4	60 12 10		75 15 13		90 18 15	ns	2.0 4.5 6.0	Fig. 5	

DC CHARACTERISTICS FOR 74HCT

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

Output capability: bus driver

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.

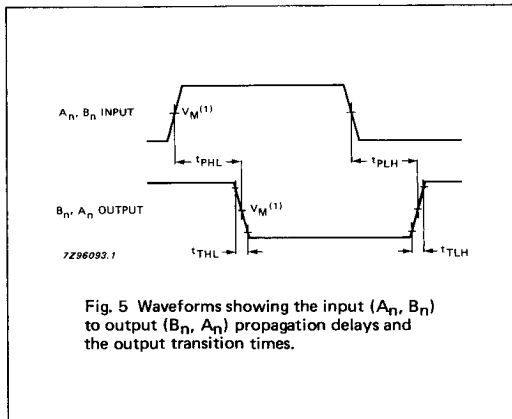
INPUT	UNIT LOAD COEFFICIENT
A _n	1.50
B _n	1.50
OE	1.50
DIR	0.90

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 A _n to B _n ; B _n to A _n		11	22		28		33	ns	4.5	Fig. 5
t _{PZH} / t _{PZL}	3-state output enable time OE, DIR to A _n ; OE, DIR to B _n		18	30		38		45	ns	4.5	Fig. 6
t _{PHZ} / t _{PLZ}	3-state output disable time OE, DIR to A _n ; OE, DIR to B _n		19	30		38		45	ns	4.5	Fig. 6
t _{THL} / t _{TLH}	output transition time		5	12		15		18	ns	4.5	Fig. 5

AC WAVEFORMS



Note to AC waveforms

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

