

Octal registered transceiver with 5-volt tolerant inputs/outputs; 3-state

74LVC2952A 74LVCH2952A

FEATURES

- 5-volt tolerant inputs/outputs, for interfacing with 5-volt logic
- Wide supply voltage range of 1.2 V to 3.6 V
- In accordance with the JEDEC standard no. 8-1A.
- Inputs accept voltages upto 5.5V
- CMOS low power consumption
- Flow-through pin-out architecture
- 3-state outputs
- Direct interface with TTL levels
- Bushold on all data inputs (LVCH2952A only).

DESCRIPTION

The 74LVC(H)2952A is a low-power, low-voltage, Si-gate CMOS device and superior to most advanced CMOS compatible TTL families. The 74LVC(H)2952A is an octal non-inverting registered transceiver. Two 8-bit back to back registers store data flowing in both directions between two bi-directional busses. Data applied to the inputs is entered and stored on the rising edge of the clock (CP_{nn}) provided that the clock enable ($\overline{CE}_{nn}$) is LOW. The data is then present at the 3-state output buffers, but is only accessible when the output enable input ($\overline{OE}_{nn}$) is LOW. Data flow from A inputs to B outputs is the same as for B inputs to A outputs. The '2952A' is identical to the '2953A' but has non-inverting outputs.

QUICK REFERENCE DATA

GND = 0 V; $T_{amb} = 25^\circ\text{C}$; $t_r = t_f \leq 2.5\text{ ns}$

SYMBOL	PARAMETER	CONDITIONS	TYPICAL	UNIT
t_{PHL}/t_{PLH}	propagation delay CP_{nn} to A_n , B_n	$C_L = 50\text{ pF}$ $V_{CC} = 3.3\text{ V}$	3.2	ns
f_{max}	maximum clock frequency		350	MHz
C_i	input capacitance		5.0	pF
C_{VO}	input/output capacitance		10	pF
C_{PD}	power dissipation capacitance per buffer	notes 1 and 2	35	pF

Notes to the quick reference data

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

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

f_i = input frequency in MHz; C_L = output load capacity in pF;

f_o = output frequency in MHz; V_{CC} = supply voltage in V;

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

2. The condition is $V_i = \text{GND to } V_{CC}$.

ORDERING INFORMATION

TYPE NUMBER	PACKAGES			
	PINS	PACKAGE	MATERIAL	CODE
74LVC(H)2952AD	24	SO24	plastic	SOT137-1
74LVC(H)2952ADB	24	SSOP24	plastic	SOT340-1
74LVC(H)2952APW	24	TSSOP24	plastic	SOT355-1

PINNING

PIN	SYMBOL	NAME AND FUNCTION
8, 7, 6, 5, 4, 3, 2, 1	B_0 to B_7	B data inputs/outputs
12	GND	ground (0 V)
9, 15	$\overline{OE}_{AB}$, $\overline{OE}_{BA}$	output enable inputs (active LOW)
10, 14	CP_{AB} , CP_{BA}	clock inputs
11, 13	$\overline{CE}_{AB}$, $\overline{CE}_{BA}$	clock enable inputs
16, 17, 18, 19, 20, 21, 22, 23	A_0 to A_7	A data inputs/outputs
24	V_{CC}	positive supply voltage

FUNCTION TABLE for register A_n or B_n

INPUTS			INTERNAL Q	OPERATING MODE
A_n or B_n	CP_{nn}	$\overline{CE}_{nn}$		
X	X	H	NC	Hold data
L	$\uparrow$	L	L	Load data
H	$\uparrow$	L	H	Load data

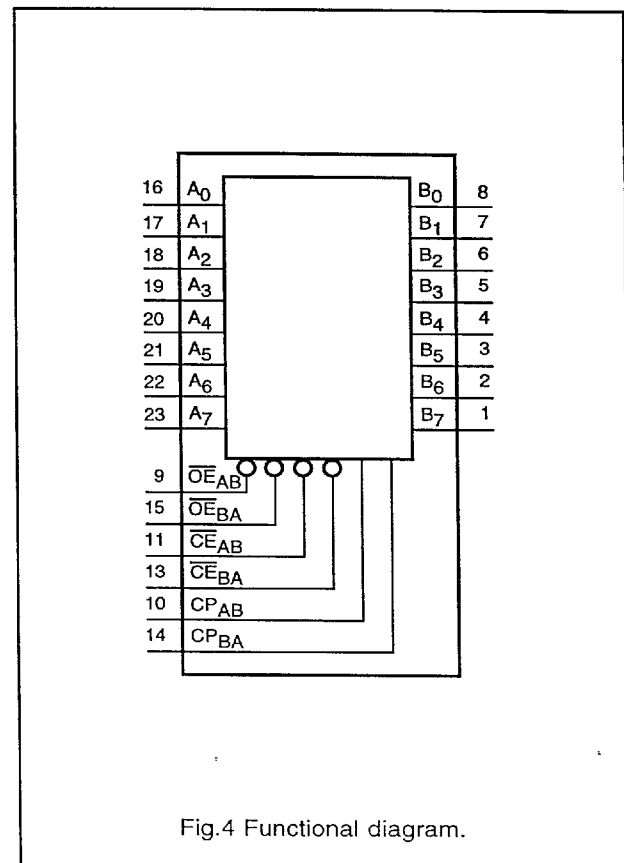
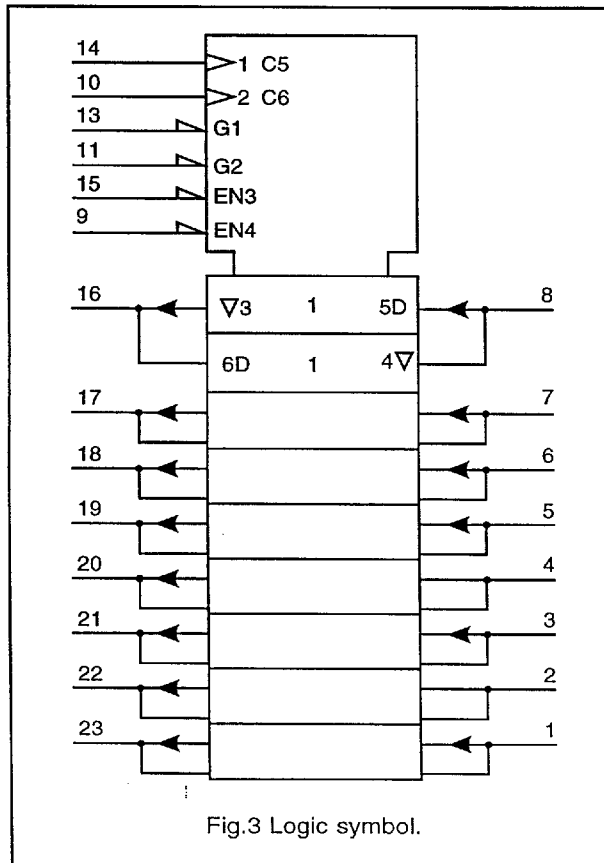
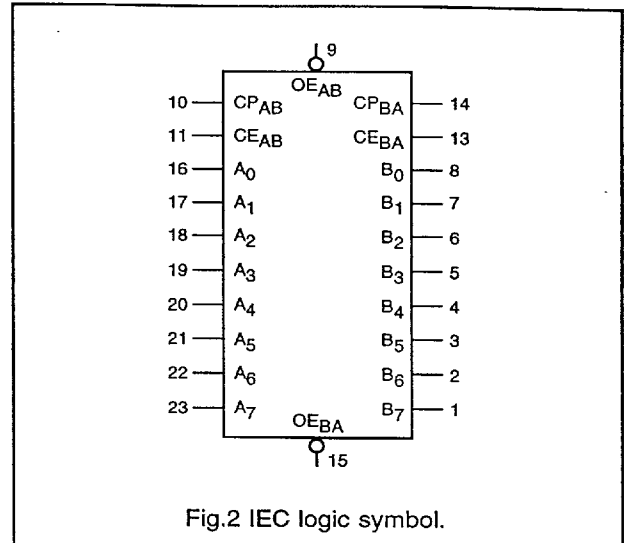
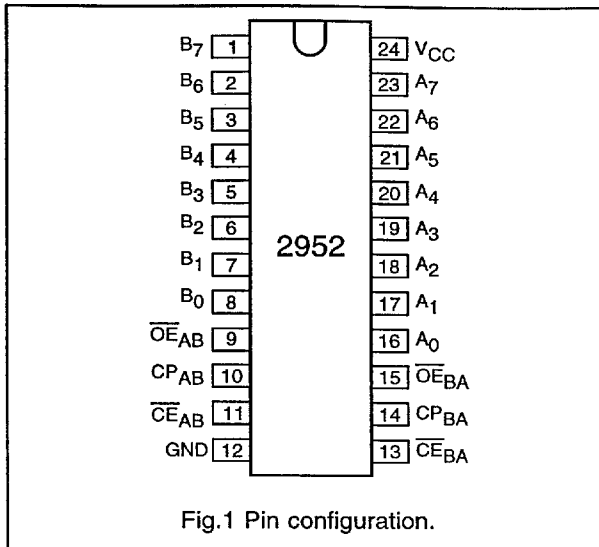
FUNCTION TABLE for output enable

INPUTS	INTERNAL Q	A_n or B_n OUTPUTS	OPERATING MODE
$\overline{OE}_{nn}$			
H	X	Z	disable outputs
L	L	L	enable outputs
L	H	H	enable outputs

H = HIGH voltage level L = LOW voltage level $\uparrow$ = Low-to-High transition NC = no change
X = don't care Z = high impedance OFF-state

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DC CHARACTERISTICS FOR 74LVC(H)2952A

For the DC characteristics see chapter "LVC(H)-A family characteristics", section "Family specifications".
I_{CC} category: MSI

AC CHARACTERISTICS FOR 74LVC(H)2952A

GND = 0 V; t_r = t_f ≤ 2.5 ns; C_L = 50 pF

SYMBOL	PARAMETER	T _{amb} (°C)			UNIT	TEST CONDITIONS	
		-40 to +85				V _{cc} (V)	WAVEFORMS
		MIN.	TYP.	MAX.			
t _{PHL} /t _{PLH}	propagation delay CP _{BA} , CP _{AB} to A _n , B _n	— — —	— — —	— 9.5 8.5	ns	1.2 2.7 3.0 to 3.6	Figs 5, 8
t _{PZH} /t _{PZL}	3-state output enable time OE _{BA} , OE _{AB} to A _n , B _n	— — —	— — —	— 9.5 8.5	ns	1.2 2.7 3.0 to 3.6	Figs 7, 8
t _{PHZ} /t _{PLZ}	3-state output disable time OE _{BA} , OE _{AB} to A _n , B _n	— — —	— — —	— 9.0 8.0	ns	1.2 2.7 3.0 to 3.6	Figs 7, 8
t _W	CP _{AB} , CP _{BA} pulse width, HIGH or LOW	3.3 3.3	— —	— —	ns	2.7 3.0 to 3.6	Fig. 5
t _{su}	set-up time, HIGH or LOW A _n , B _n to CP _{AB} , CP _{BA}	-2.5 -2.5	— —	— —	ns	2.7 3.0 to 3.6	Fig. 6
t _{su}	set-up time, HIGH or LOW OE _{AB} , OE _{BA} to CP _{AB} , CP _{BA}	2.5 2.5	— —	— —	ns	2.7 3.0 to 3.6	Fig. 6
t _h	hold time A _n , B _n to CP _{AB} , CP _{BA}	1.5 1.5	— —	— —	ns	2.7 3.0 to 3.6	Fig. 6
t _h	hold time OE _{AB} , OE _{BA} to CP _{AB} , CP _{BA}	1.5 1.5	— —	— —	ns	2.7 3.0 to 3.6	Fig. 6
f _{max}	maximum clock pulse frequency	166 250	— —	— —	MHz	2.7 3.0 to 3.6	Fig. 6

Notes: All typical values are measured at T_{amb} = 25 °C
* Typical values are measured at V_{CC} = 3.3 V.

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AC WAVEFORMS

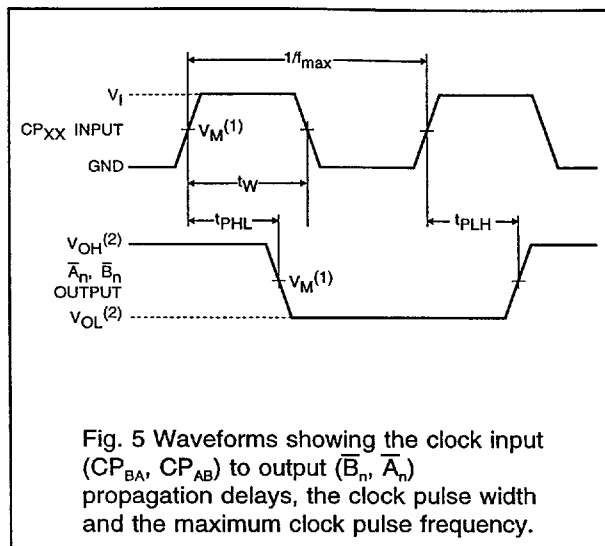


Fig. 5 Waveforms showing the clock input (CP_{BA}, CP_{AB}) to output (B_n, A_n) propagation delays, the clock pulse width and the maximum clock pulse frequency.

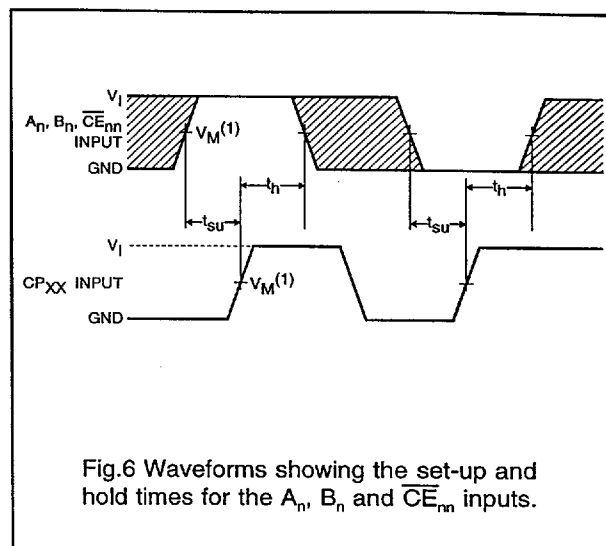


Fig. 6 Waveforms showing the set-up and hold times for the A_n, B_n and CE_{nn} inputs.

Note to Fig. 6

The shaded areas indicate when the input is permitted to change for predictable output performance.

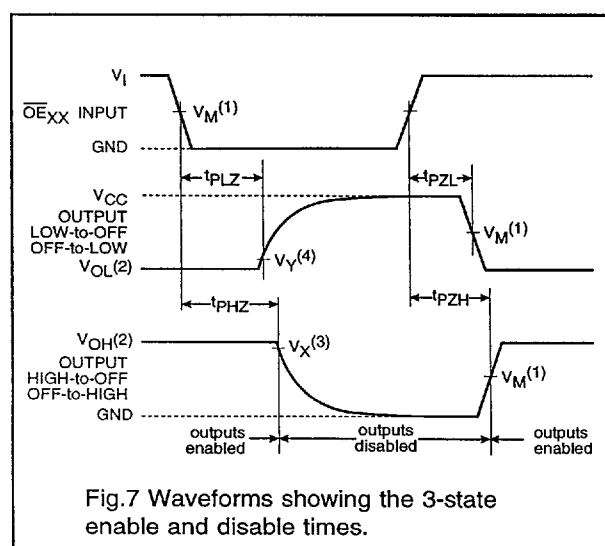


Fig. 7 Waveforms showing the 3-state enable and disable times.

- Notes:
- (1) $V_M = 0.6 \text{ V}$ at $V_{CC} = 1.2 \text{ V}$.
 $V_M = 1.0 \text{ V}$ at $V_{CC} = 2.0 \text{ V}$.
 $V_M = 1.5 \text{ V}$ at $V_{CC} = 3.0 \text{ V}$.
 - (2) V_{OL} and V_{OH} are the typical output voltage drop that occur with the 3-state output load.

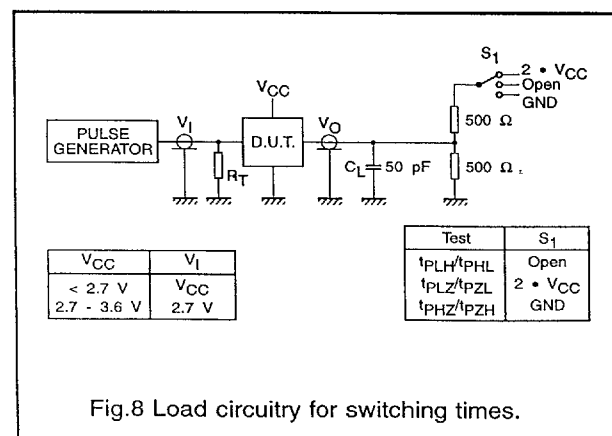


Fig. 8 Load circuitry for switching times.