
HD74HC646/HD74HC648

Octal Bus Transceivers/Registers with Multiplexed 3-state outputs

HITACHI

ADE-205-518 (Z)
1st. Edition
Sep. 2000

Description

Six control inputs enable this device to be used as a latched transceiver, unlatched transceiver or a combination of both. As a latched transceiver, data from one bus is stored for later retrieval by the other bus. Alternately real time bus data (unlatched) may be directly transferred from one bus to another.

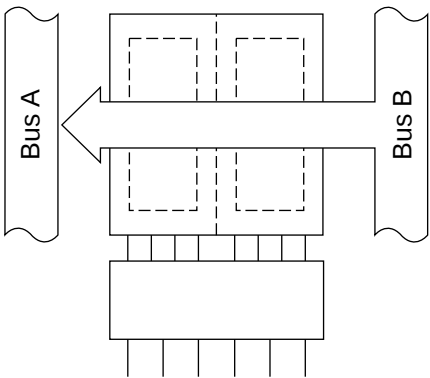
Circuit operation is determined by the Control $\overline{G}$, Direction, Clock AB, Clock BA, Select AB, Select BA control inputs. The enable input, Control $\overline{G}$, controls whether any bus outputs are enabled. The direction control Direction (DIR), determines which bus is enabled, and hence the direction data flows: The Select AB, Select BA inputs control whether the latched data (stored in D type flip-flops), or the bus data (from other bus input pins) is transferred. Each set of flip-flops has its own clock Clock AB and Clock BA, for storing data. Data is latched on the rising edge of the clock.

Features

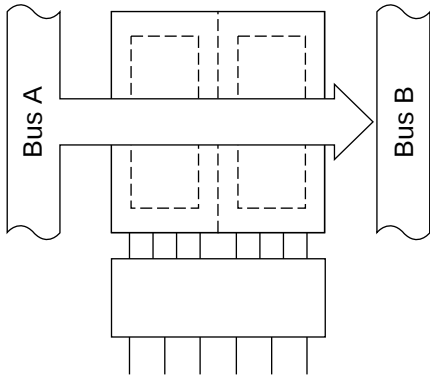
- High Speed Operation: t_{pd} (Bus to Bus) = 14 ns typ ($C_L = 50$ pF)
- High Output Current: Fanout of 15 LSTTL Loads
- Wide Operating Voltage: $V_{CC} = 2$ to 6 V
- Low Input Current: 1 μ A max
- Low Quiescent Supply Current: I_{CC} (static) = 4 μ A max ($T_a = 25^\circ\text{C}$)

Function Table

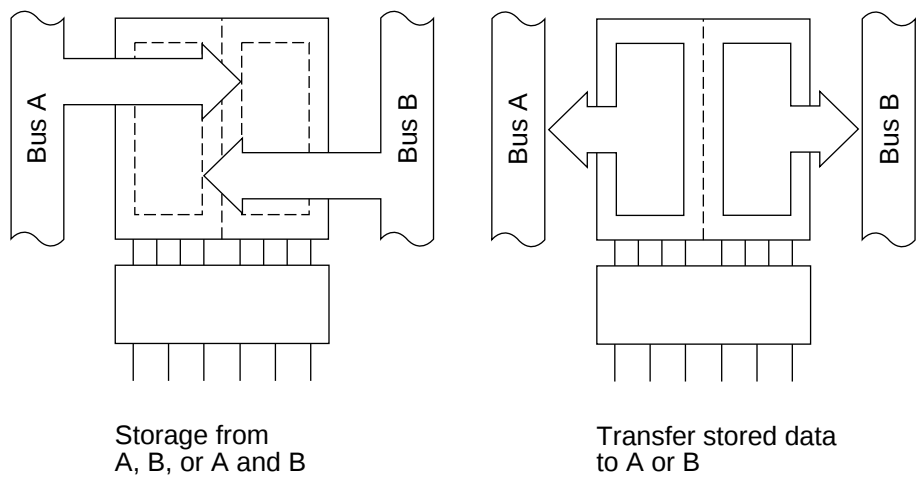
Inputs									
Control		Clock		Select		Data I/O		Operation or Function	
$\overline{G}$	Direction	BA	AB	AB	BA	A1 thru A8	B1 thru B8	HD74HC646	HD74HC648
H	X	X	X	X	X	Z (Input)	Z (Input)	Isolation	Isolation
H	X			H	H	Z (Input)	Z (Input)	Store A & B data	Store $\overline{A}$ & $\overline{B}$ data
L	L	X	X	X	L	Output	Z (Input)	B real-time data to A bus	$\overline{B}$ real-time data to A bus
L	L	H	H	X	H	Output	Z (Input)	B stored data to A bus	$\overline{B}$ stored data to A bus
L	L	L	L	X	H	Output	Z (Input)	B stored data to A bus	$\overline{B}$ stored data to A bus
L	H	X	X	L	X	Z (Input)	Output	A real-time data to B bus	$\overline{A}$ real-time data to B bus
L	H	H	H	H	X	Z (Input)	Output	A stored data to B bus	$\overline{A}$ stored data to B bus
L	H	L	L	H	X	Z (Input)	Output	A stored data to B bus	$\overline{A}$ stored data to B bus



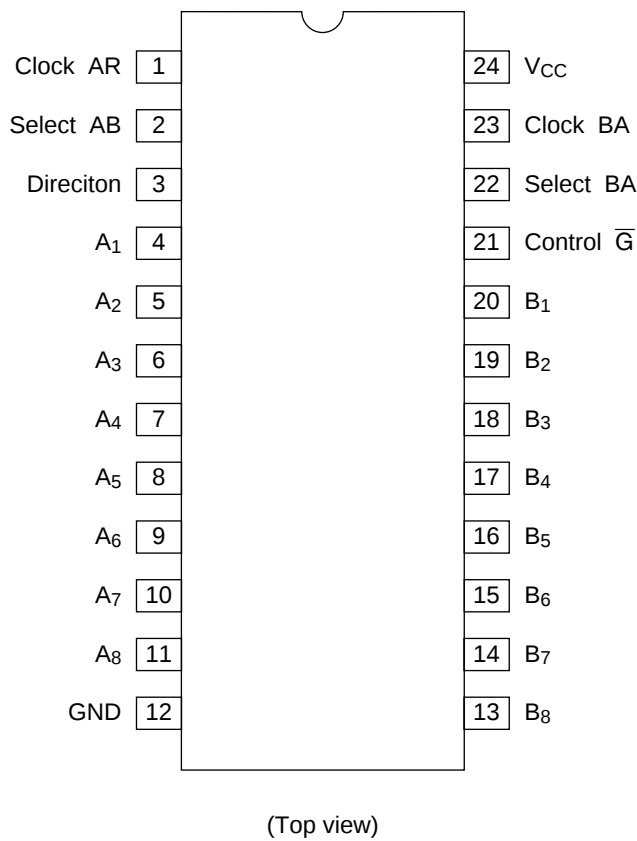
Real-time transfer
Bus B to Bus A



Real-time transfer
Bus A to Bus B



Pin Arrangement



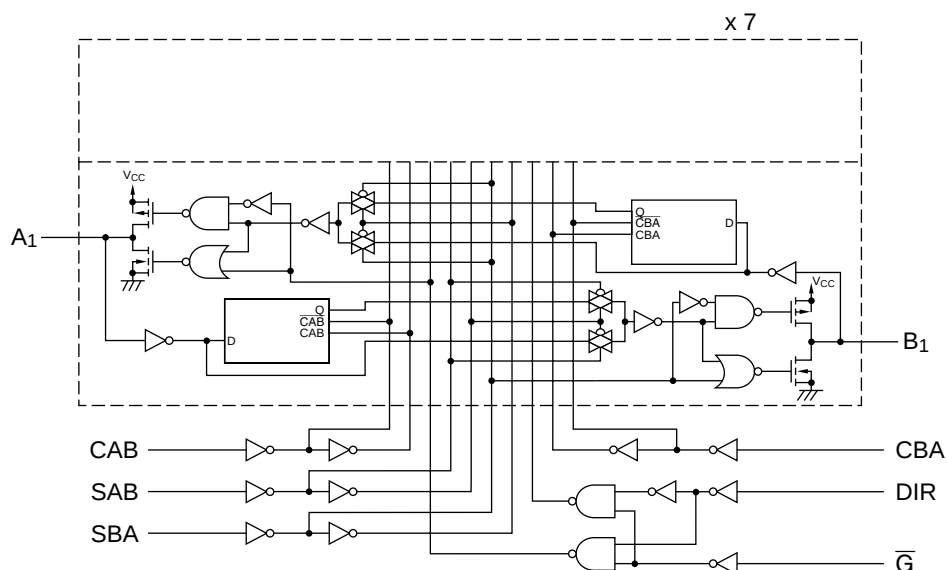
HD74HC646/HD74HC648

Absolute Maximum Ratings

Item	Symbol	Rating	Unit
Supply voltage range	V_{CC}	-0.5 to +7.0	V
Input voltage	V_{IN}	-0.5 to $V_{CC} + 0.5$	V
Output voltage	V_{OUT}	-0.5 to $V_{CC} + 0.5$	V
Output current	I_{OUT}	±35	mA
DC current drain per V_{CC} , GND	I_{CC} , I_{GND}	±75	mA
DC input diode current	I_{IK}	±20	mA
DC output diode current	I_{OK}	±20	mA
Power Dissipation per package	P_T	500	mW
Storage temperature	Tstg	-65 to +150	°C

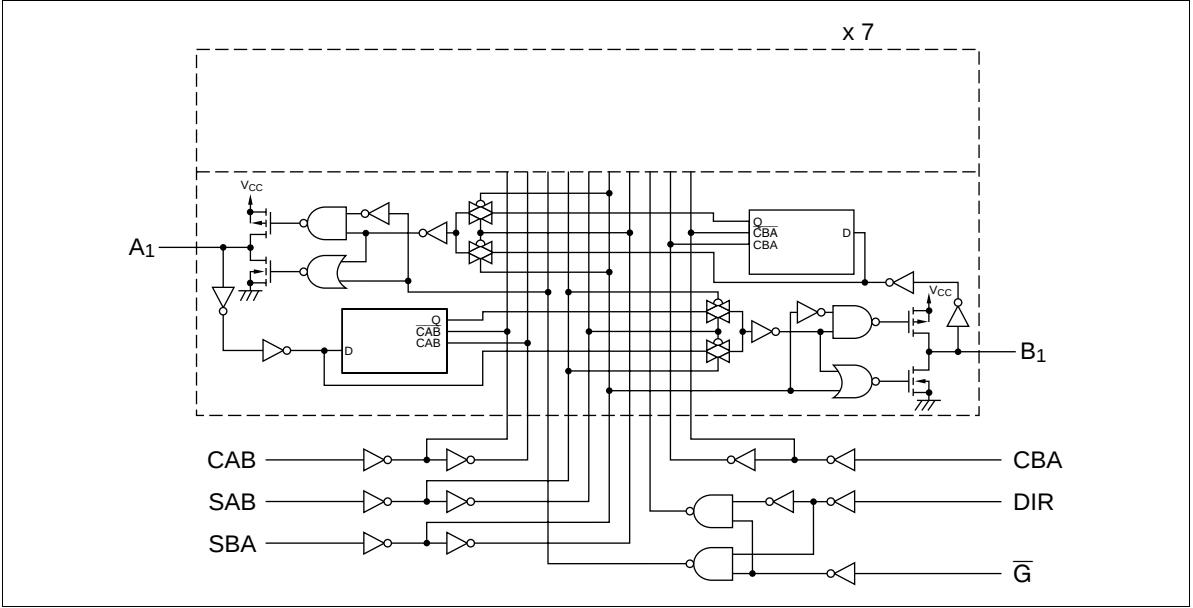
Logic Diagram

HD74HC646



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HD74HC648



DC Characteristics

Item	Symbol	V _{CC} (V)	Ta = 25°C			Ta = -40 to +85°C		Unit	Test Conditions	
			Min	Typ	Max	Min	Max			
Input voltage	V _{IH}	2.0	1.5	—	—	1.5	—	V		
		4.5	3.15	—	—	3.15	—			
		6.0	4.2	—	—	4.2	—			
	V _{IL}	2.0	—	—	0.5	—	0.5	V		
		4.5	—	—	1.35	—	1.35			
		6.0	—	—	1.8	—	1.8			
Output voltage	V _{OH}	2.0	1.9	2.0	—	1.9	—	V	Vin = V _{IH} or V _{IL} I _{OH} = -20 μA	
		4.5	4.4	4.5	—	4.4	—			
		6.0	5.9	6.0	—	5.9	—			
		4.5	4.18	—	—	4.13	—			I _{OH} = -6 mA
		6.0	5.68	—	—	5.63	—			I _{OH} = -7.8 mA
	V _{OL}	2.0	—	0.0	0.1	—	0.1	V	Vin = V _{IH} or V _{IL} I _{OL} = 20 μA	
		4.5	—	0.0	0.1	—	0.1			
		6.0	—	0.0	0.1	—	0.1			
		4.5	—	—	0.26	—	0.33			I _{OL} = 6 mA
		6.0	—	—	0.26	—	0.33			I _{OL} = 7.8 mA
Off-state output current	I _{OZ}	6.0	—	—	±0.5	—	±5.0	μA	Vin = V _{IH} or V _{IL} , Vout = V _{CC} or GND	
Input current	I _{in}	6.0	—	—	±0.1	—	±1.0	μA	Vin = V _{CC} or GND	
Quiescent supply current	I _{CC}	6.0	—	—	4.0	—	40	μA	Vin = V _{CC} or GND, I _{out} = 0 μA	

AC Characteristics ($C_L = 50 \text{ pF}$, Input $t_r = t_f = 6 \text{ ns}$)

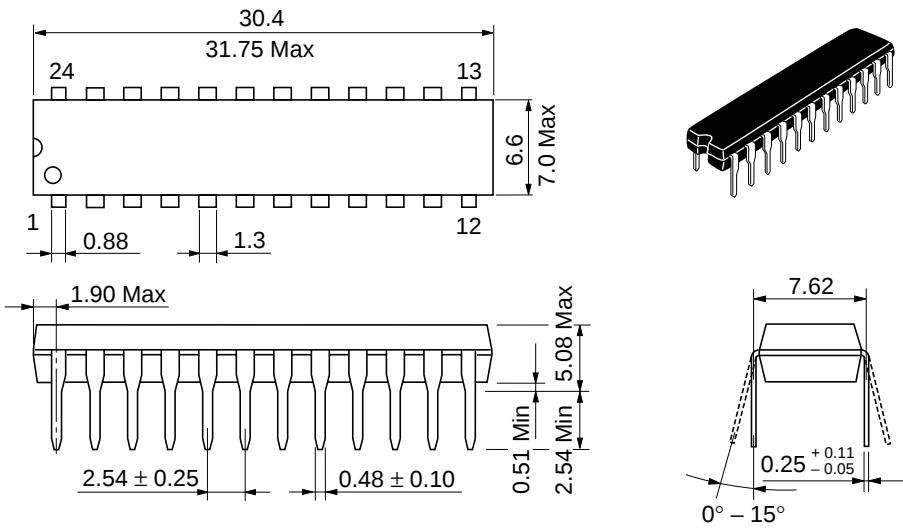
Item	Symbol	$V_{CC} \text{ (V)}$	$T_a = 25^\circ\text{C}$			$T_a = -40 \text{ to } +85^\circ\text{C}$		Unit	Test Conditions
			Min	Typ	Max	Min	Max		
Maximum clock frequency	$f_{\max}$	2.0	—	—	5	—	4	ns	Clock AB to B or
		4.5	—	—	27	—	21		Clock BA to A
		6.0	—	—	32	—	25		
Propagation delay time	t_{PLH}	2.0	—	—	170	—	215	ns	A or B input to B or A output (HD74HC646 only)
		4.5	—	14	34	—	43		
		6.0	—	—	29	—	37		
	t_{PHL}	2.0	—	—	150	—	190	ns	A or B input to B or A output (HD74HC648 only)
		4.5	—	14	30	—	38		
		6.0	—	—	26	—	33		
	t_{PLH}	2.0	—	—	220	—	275	ns	Clock BA or Clock AB input to A or B output
		4.5	—	18	44	—	55		
		6.0	—	—	37	—	47		
	t_{PHL}	2.0	—	—	170	—	215	ns	Select BA or Select AB input to A or B output, with A or B high
		4.5	—	15	34	—	43		
		6.0	—	—	29	—	37		
	t_{PHL}	2.0	—	—	170	—	215	ns	Select BA or Select AB input to A or B output, with A or B low
		4.5	—	16	34	—	43		
		6.0	—	—	29	—	37		
Output enable time	t_{ZH}	2.0	—	—	150	—	190	ns	Control $\overline{G}$ input or Direction to A or B output
		4.5	—	17	30	—	38		
		6.0	—	—	26	—	33		
Output disable time	t_{LZ}	2.0	—	—	150	—	190	ns	Control $\overline{G}$ input to A or B output
		4.5	—	20	30	—	38		
		6.0	—	—	26	—	33		
Setup time	t_{su}	2.0	100	—	—	125	—	ns	
		4.5	20	3	—	25	—		
		6.0	17	—	—	21	—		
Hold time	t_h	2.0	5	—	—	5	—	ns	
		4.5	5	0	—	5	—		
		6.0	5	—	—	5	—		

AC Characteristics (C_L = 50 pF, Input t_r = t_f = 6 ns) (cont)

Item	Symbol	V _{CC} (V)	Ta = 25°C			Ta = -40 to +85°C		Unit	Test Conditions
			Min	Typ	Max	Min	Max		
Pulse width	t _w	2.0	80	—	—	100	—	ns	
		4.5	16	5	—	20	—		
		6.0	14	—	—	17	—		
Output rise/fall time	t _{TLH}	2.0	—	—	60	—	75	ns	
	t _{THL}	4.5	—	4	12	—	15		
		6.0	—	—	10	—	13		
Input capacitance	Cin	—	—	5	10	—	10	pF	

Package Dimensions

Unit: mm



Hitachi Code	DP-24N
JEDEC	—
EIAJ	Conforms
Mass (reference value)	1.84 g

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Hitachi, Ltd.

Semiconductor & Integrated Circuits.
Nippon Bldg., 2-6-2, Ohite-machi, Chiyoda-ku, Tokyo 100-0004, Japan
Tel: Tokyo (03) 3270-2111 Fax: (03) 3270-5109

URL	North America	: http://semiconductor.hitachi.com/
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For further information write to:

Hitachi Semiconductor (America) Inc. 179 East Tasman Drive, San Jose, CA 95134 Tel: <1> (408) 433-1990 Fax: <1> (408) 433-0223	Hitachi Europe GmbH Electronic Components Group Dornacher Straße 3 D-85622 Feldkirchen, Munich Germany Tel: <49> (89) 9 9180-0 Fax: <49> (89) 9 29 30 00 Hitachi Europe Ltd. Electronic Components Group. Whitebrook Park Lower Cookham Road Maidenhead Berkshire SL6 8YA, United Kingdom Tel: <44> (1628) 585000 Fax: <44> (1628) 585160
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Hitachi Asia Ltd.
Hitachi Tower
16 Collyer Quay #20-00,
Singapore 049318
Tel: <65>-538-6533/538-8577
Fax: <65>-538-6933/538-3877
URL: <http://www.hitachi.com.sg>

Hitachi Asia Ltd.
(Taipei Branch Office)
4/F, No. 167, Tun Hwa North Road,
Hung-Kuo Building,
Taipei (105), Taiwan
Tel: <886>-(2)-2718-3666
Fax: <886>-(2)-2718-8180
Telex: 23222 HAS-TP
URL: <http://www.hitachi.com.tw>

Hitachi Asia (Hong Kong) Ltd.
Group III (Electronic Components)
7/F., North Tower,
World Finance Centre,
Harbour City, Canton Road
Tsim Sha Tsui, Kowloon,
Hong Kong
Tel: <852>-(2)-735-9218
Fax: <852>-(2)-730-0281
URL: <http://www.hitachi.com.hk>

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