
HD74CBT3253

Dual 1-of-4 FET Multiplexer / Demultiplexer

HITACHI

ADE-205-616A (Z)

Rev.1
May 2001

Description

The HD74CBT3253 is a dual 1-of-4 high-speed TTL-compatible FET multiplexer / demultiplexer. The low on-state resistance of the switch allows connections to be made with minimal propagation delay.

$\overline{1OE}$, $\overline{2OE}$, S0, and S1 select the appropriate B output for the A-input data.

Features

- Minimal propagation delay through the switch.
- $5\ \Omega$ switch connection between two ports.
- TTL-compatible input levels.
- Ultra low quiescent power.
- Ideally suited for notebook applications.

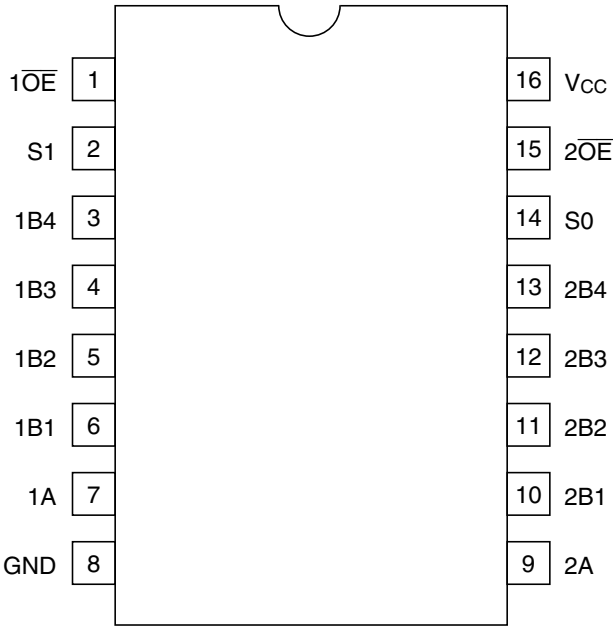
Function Table

Inputs

1 $\overline{\text{OE}}$	2 $\overline{\text{OE}}$	S1	S0	Function
X	H	X	X	Disconnect 1A and 2A
H	X	X	X	Disconnect 1A and 2A
L	L	L	L	1A to 1B1 and 2A to 2B1
L	L	L	H	1A to 1B2 and 2A to 2B2
L	L	H	L	1A to 1B3 and 2A to 2B3
L	L	H	H	1A to 1B4 and 2A to 2B4

H: High level
L: Low level
X: Immaterial

Pin Arrangement



(Top view)

Absolute Maximum Ratings

Item	Symbol	Ratings	Unit	Conditions
Supply voltage range	V_{CC}	−0.5 to 7.0	V	
Input voltage range ^{*1}	V_I	−0.5 to 7.0	V	
Input clamp current	I_{IK}	−50	mA	$V_I < 0$
Continuous output current	I_O	128	mA	$V_O = 0$ to V_{CC}
Continuous current through V_{CC} or GND	I_{CC} or I_{GND}	±100	mA	
Maximum power dissipation at $T_a = 25^\circ\text{C}$ (in still air) ^{*2}	P_T	500	mW	TSSOP
Storage temperature	T_{stg}	−65 to 150	°C	

Notes: The absolute maximum ratings are values which must not individually be exceeded, and furthermore, no two of which may be realized at the same time.

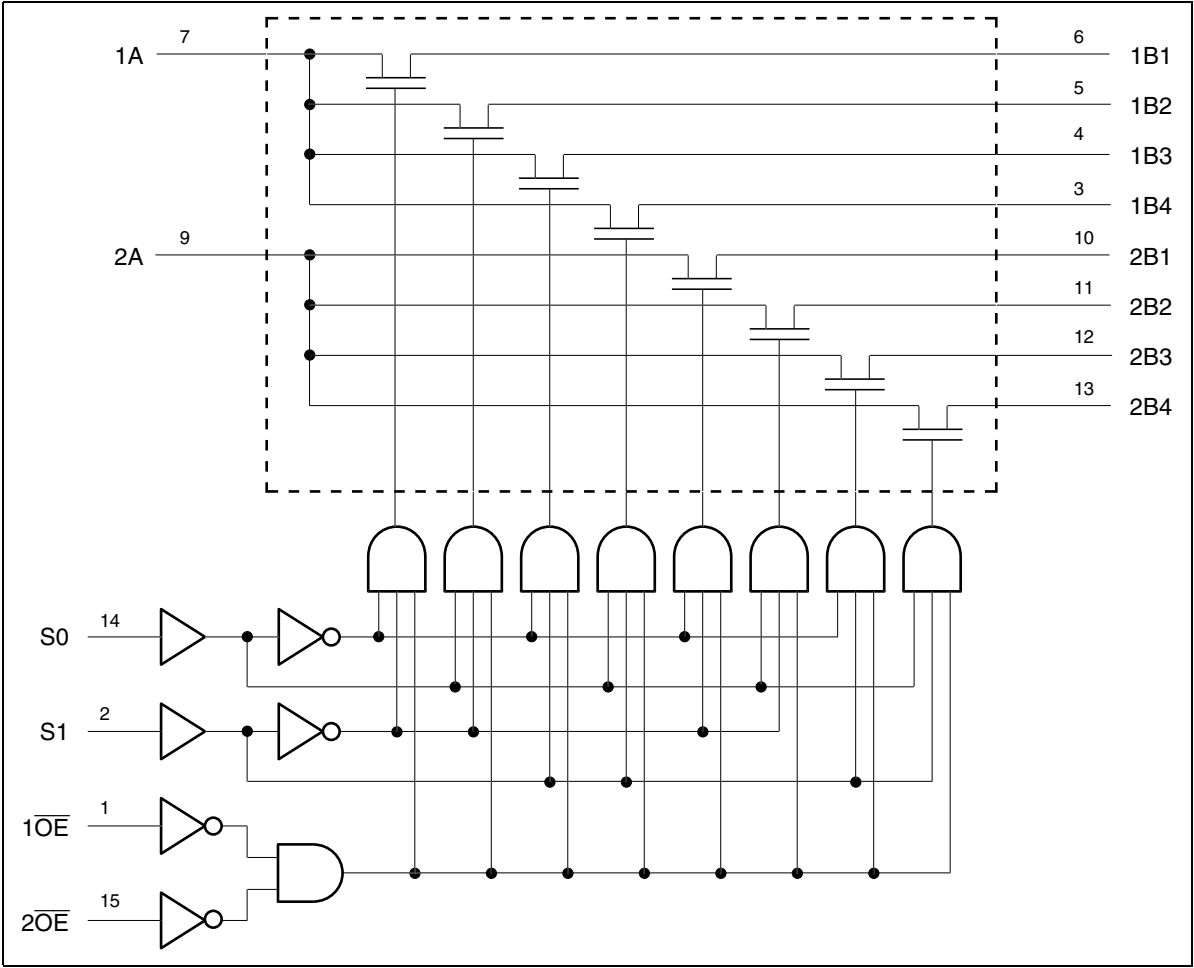
1. The input and output voltage ratings may be exceeded even if the input and output clamp-current ratings are observed.
2. The maximum package power dissipation was calculated using a junction temperature of 150°C .

Recommended Operating Conditions

Item	Symbol	Min	Max	Unit	Conditions
Supply voltage range	V_{CC}	4.0	5.5	V	
Input voltage range	V_I	0	5.5	V	
Output voltage range	V_{IO}	0	5.5	V	
Input transition rise or fall rate	$\Delta t / \Delta v$	0	5	ns / V	$V_{CC} = 4.5$ to 5.5 V
Operating free-air temperature	T_a	−40	85	°C	

Note: Unused or floating inputs must be held high or low.

Block Diagram



DC Electrical Characteristics

(Ta = -40 to 85°C)

Item	Symbol	V _{cc} (V)	Min	Typ ^{*1}	Max	Unit	Test conditions
Clamp diode voltage	V _{IK}	4.5	—	—	-1.2	V	I _{IN} = -18 mA
Input voltage	V _{IH}	4.0 to 5.5	2.0	—	—	V	
	V _{IL}	4.0 to 5.5	—	—	0.8		
On-state switch resistance ^{*2}	R _{ON}	4.5	—	5	7	Ω	V _{IN} = 0 V, I _{IN} = 64 mA
		4.5	—	5	7		V _{IN} = 0 V, I _{IN} = 30 mA
		4.5	—	10	15		V _{IN} = 2.4 V, I _{IN} = 15 mA
Input current	I _{IN}	0 to 5.5	—	—	±1.0	μA	V _{IN} = 5.5 V or GND
Off-state leakage current	I _{OZ}	5.5	—	—	±1.0	μA	0 ≤ A, B ≤ V _{cc}
Quiescent supply current	I _{cc}	5.5	—	—	3	μA	V _{IN} = V _{cc} or GND, I _O = 0 mA
Increase in I _{cc} per input ^{*3}	ΔI _{cc}	5.5	—	—	2.5	mA	One input at 3.4 V, other inputs at V _{cc} or GND

Notes: For condition shown as Min or Max use the appropriate values under recommended operating conditions.

1. All typical values are at V_{cc} = 5 V (unless otherwise noted), Ta = 25°C.
2. Measured by the voltage drop between the A and B terminals at the indicated current through the switch. On-state resistance is determined by the lower voltage of the two (A or B) terminals.
3. This is the increase in supply current for each input that is at the specified TTL voltage level rather than V_{cc} or GND.

Capacitance

(Ta = 25°C)

Item	Symbol	V _{cc} (V)	Min	Typ	Max	Unit	Test conditions
Control input capacitance	C _{IN}	5.0	—	3.5	—	pF	V _{IN} = 0 or 3 V
Input / output capacitance	A port	C _{I/O (OFF)}	5.0	15	—	pF	V _O = 0 or 3 V
	B port		5.0	5	—		OE = V _{cc}

Note: This parameter is determined by device characterization is not production tested.

Switching Characteristics

(Ta = -40 to 85°C)

- V_{CC} = 4.0 V

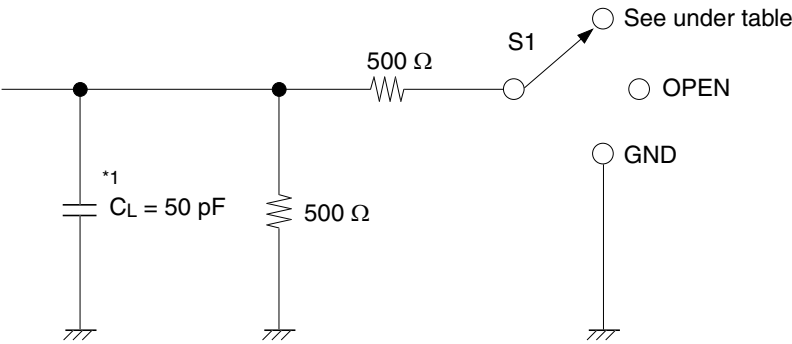
Item	Symbol	Min	Max	Unit	Test conditions	FROM (Input)	TO (Output)
Propagation delay time ¹⁾	t _{PLH} t _{PHL}	—	0.35	ns	C _L = 50 pF R _L = 500 Ω	A or B	B or A
Propagation delay time	t _{PLH} t _{PHL}	—	6.6	ns	C _L = 50 pF R _L = 500 Ω	S	A
Enable time	t _{ZH} t _{ZL}	—	7.1	ns	C _L = 50 pF R _L = 500 Ω	S	B
		—	7.3			$\overline{\text{OE}}$	A or B
Disable time	t _{HZ} t _{LZ}	—	7.9	ns	C _L = 50 pF R _L = 500 Ω	S	B
		—	7.3			$\overline{\text{OE}}$	A or B

- V_{CC} = 5.0±0.5 V

Item	Symbol	Min	Max	Unit	Test conditions	FROM (Input)	TO (Output)
Propagation delay time ¹⁾	t _{PLH} t _{PHL}	—	0.25	ns	C _L = 50 pF R _L = 500 Ω	A or B	B or A
Propagation delay time	t _{PLH} t _{PHL}	1.6	6.2	ns	C _L = 50 pF R _L = 500 Ω	S	A
Enable time	t _{ZH} t _{ZL}	1.3	6.3	ns	C _L = 50 pF R _L = 500 Ω	S	B
		1.4	6.4			$\overline{\text{OE}}$	A or B
Disable time	t _{HZ} t _{LZ}	1.1	7.4	ns	C _L = 50 pF R _L = 500 Ω	S	B
		2.3	7.0			$\overline{\text{OE}}$	A or B

Note: 1. The propagation delay is the calculated RC time constant of the typical on-state resistance of the switch and the specified load capacitance, when driven by an ideal voltage source (zero output impedance).

Test Circuit

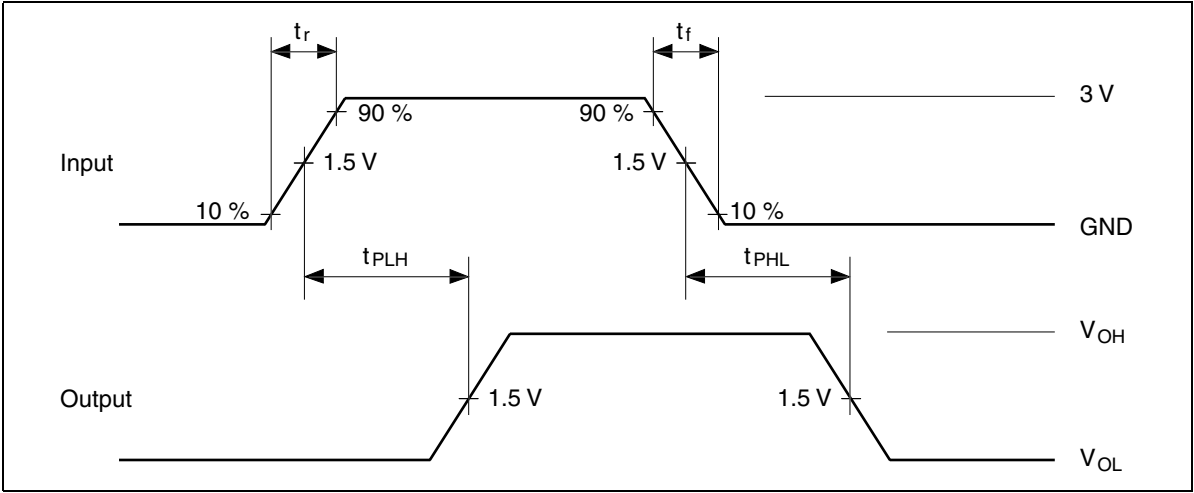


Load circuit for outputs

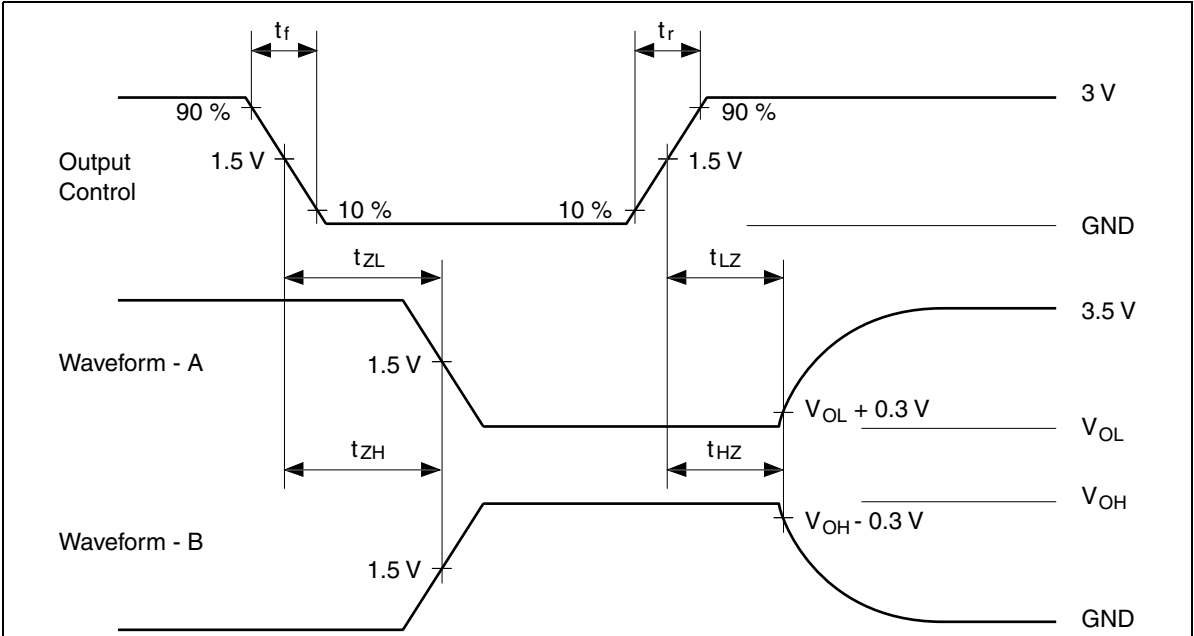
Symbol	S1
t _{PLH} / t _{PHL}	OPEN
t _{ZH} / t _{HZ}	OPEN
t _{ZL} / t _{LZ}	7 V

Note: 1. C_L includes probe and jig capacitance.

Waveforms – 1



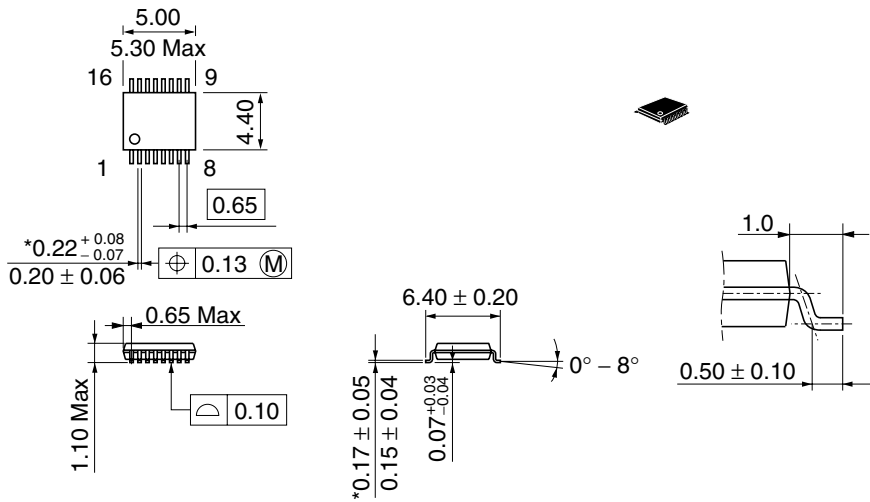
Waveforms – 2



- Notes:
1. All input pulses are supplied by generators having the following characteristics :
PRR \leq 10 MHz, $Z_O = 50 \Omega$, $t_r \leq 2.5$ ns, $t_f \leq 2.5$ ns.
 2. Waveform - A is for an output with internal conditions such that the output is low except when disabled by the output control.
 3. Waveform - B is for an output with internal conditions such that the output is high except when disabled by the output control.
 4. The output are measured one at a time with one transition per measurement.

Package Dimensions

As of January, 2001
Unit: mm



*Dimension including the plating thickness
Base material dimension

Hitachi Code	TTP-16DA
JEDEC	—
EIAJ	—
Mass (reference value)	0.05 g

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HITACHI

Hitachi, Ltd.

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

URL	NorthAmerica	: 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 Ltd. Electronic Components Group Whitebrook Park Lower Cookham Road Maidenhead Berkshire SL6 8YA, United Kingdom Tel: <44> (1628) 585000 Fax: <44> (1628) 585200
	Hitachi Europe GmbH Electronic Components Group Domacher StraÙe 3 D-85622 Feldkirchen, Munich Germany Tel: <49> (89) 9 9180-0 Fax: <49> (89) 9 29 30 00

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
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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://semiconductor.hitachi.com.hk>

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