HD74ALVCH16245

6-bit Bus Transceivers with 3-state Outputs

REJ03D0049-0500Z
(Previous ADE-205-134C(Z))
Rev.5.00
Oct.02.2003

Description

The HD74ALVCH16245 is designed for asynchronous communication between data buses. The control function implementation minimizes external timing requirements. This device can be used as two 8-bit transceivers or one 16-bit transceiver. It allow data transmission from the A bus to the B bus or from the B bus to the A bus depending upon the logic level at the direction control (DIR) input. The output enable ($\overline{OE}$) input can be used to disable the device so that the buses are effectively isolated. Active bus hold circuitry is provided to hold unused or floating data inputs at a valid logic level.

Features

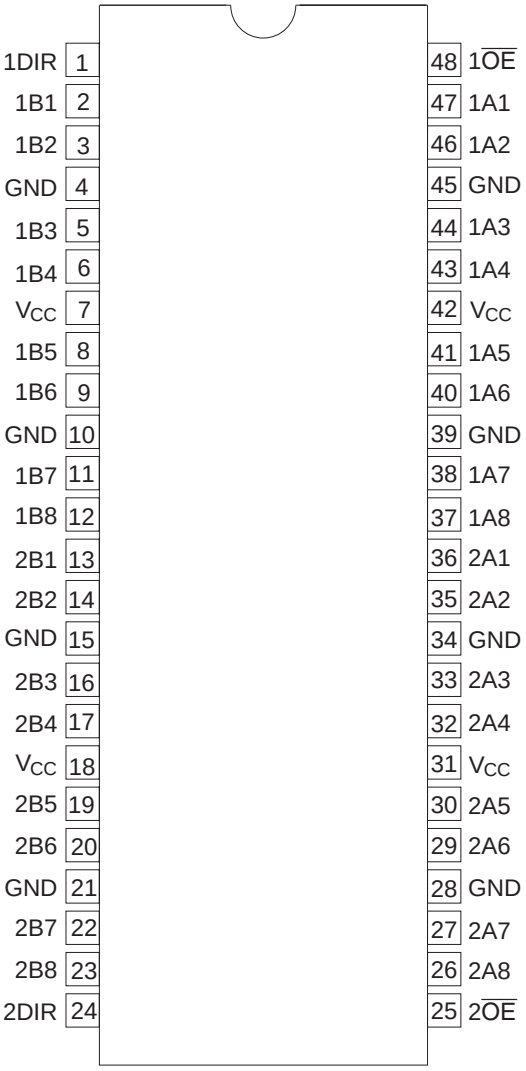
- V_{CC} = 2.3 V to 3.6 V
- Typical V_{OL} ground bounce < 0.8 V (@V_{CC} = 3.3 V, Ta = 25°C)
- Typical V_{OH} undershoot > 2.0 V (@V_{CC} = 3.3 V, Ta = 25°C)
- Bus hold on data inputs eliminates the need for external pullup / pulldown resistors

Function Table

Inputs		Operation
$\overline{OE}$	DIR	
L	L	B data to A bus
L	H	A data to B bus
H	X	Isolation

H : High level
L : Low level
X : Immaterial

Pin Arrangement



(Top view)

Absolute Maximum Ratings

Item	Symbol	Ratings	Unit	Conditions
Supply voltage	V_{CC}	–0.5 to 4.6	V	
Input voltage [*1, 2]	V_I	–0.5 to 4.6	V	Except I/O ports
		–0.5 to V_{CC} +0.5		I/O ports
Output voltage [*1, 2]	V_O	–0.5 to V_{CC} +0.5	V	
Input clamp current	I_{IK}	–50	mA	$V_I < 0$
Output clamp current	I_{OK}	±50	mA	$V_O < 0$ or $V_O > V_{CC}$
Continuous output current	I_O	±50	mA	V_O = 0 to V_{CC}
V_{CC}, GND current / pin	I_{CC} or I_{GND}	±100	mA	
Maximum power dissipation at Ta = 55°C (in still air) [*3]	P_T	0.85	W	TSSOP
Storage temperature	Tstg	–65 to 150	°C	

Notes: Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating condition” is not implied. Exposure to absolute maximum rated conditions for extended periods may affect device reliability.

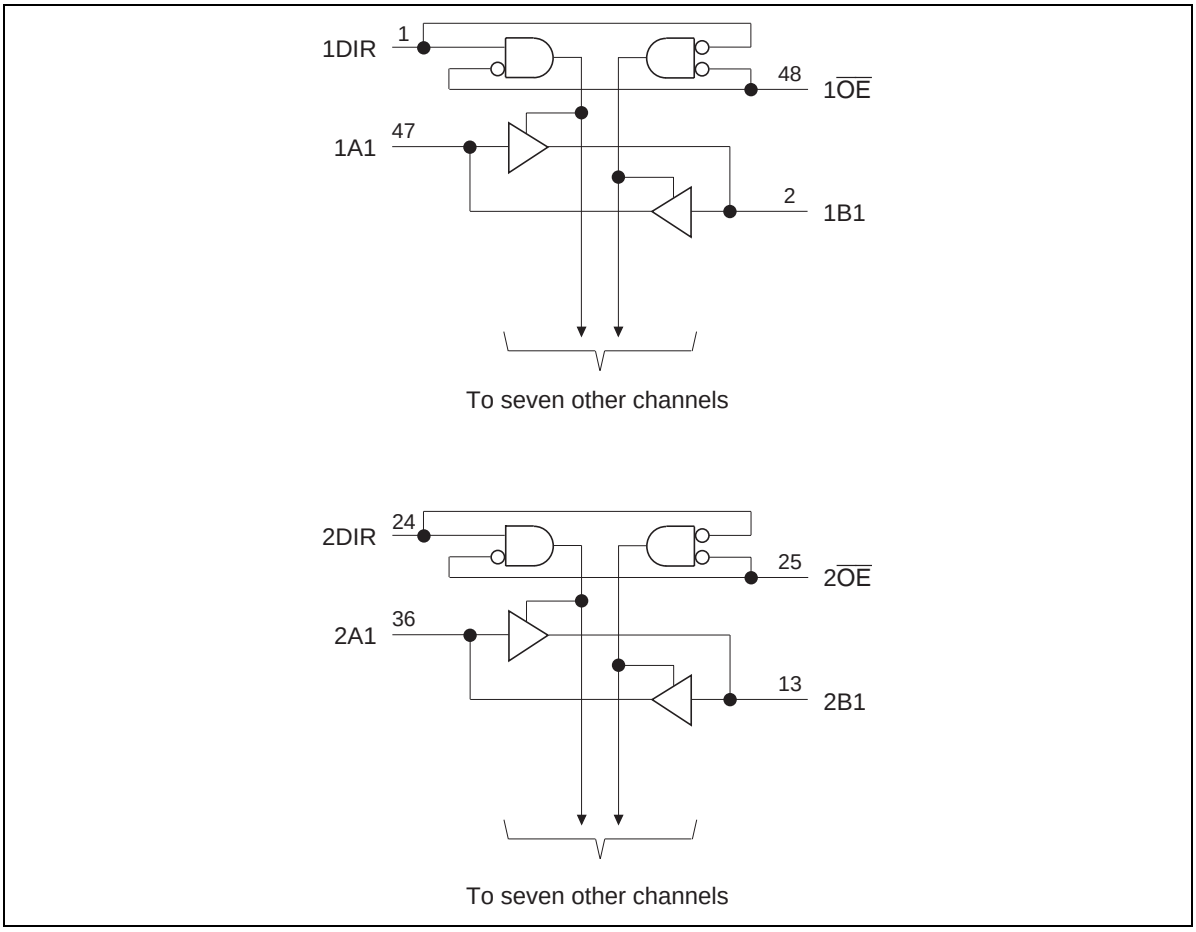
1. The input and output negative voltage ratings may be exceeded if the input and output clamp current ratings are observed.
2. This value is limited to 4.6 V maximum.
3. The maximum package power dissipation is calculated using a junction temperature of 150°C and a board trace length of 750 mils.

Recommended Operating Conditions

Item	Symbol	Min	Max	Unit	Conditions
Supply voltage	V_{CC}	2.3	3.6	V	
Input voltage	V_I	0	V_{CC}	V	
Output voltage	V_O	0	V_{CC}	V	
High level output current	I_{OH}	—	–12	mA	V_{CC} = 2.3 V
		—	–12		V_{CC} = 2.7 V
		—	–24		V_{CC} = 3.0 V
Low level output current	I_{OL}	—	12	mA	V_{CC} = 2.3 V
		—	12		V_{CC} = 2.7 V
		—	24		V_{CC} = 3.0 V
Input transition rise or fall rate	$\Delta t / \Delta v$	0	10	ns / V	
Operating temperature	Ta	–40	85	°C	

Note: Unused control inputs must be held high or low to prevent them from floating.

Logic Diagram



Electrical Characteristics

(Ta = –40 to 85°C)

Item	Symbol	V_{CC} (V) [*1]	Min	Max	Unit	Test Conditions
Input voltage	V_{IH}	2.3 to 2.7	1.7	—	V	
		2.7 to 3.6	2.0	—		
	V_{IL}	2.3 to 2.7	—	0.7		
		2.7 to 3.6	—	0.8		
Output voltage	V_{OH}	Min to Max	V_{CC}–0.2	—	V	I_{OH} = –100 µA
		2.3	2.0	—		I_{OH} = –6 mA, V_{IH} = 1.7 V
		2.3	1.7	—		I_{OH} = –12 mA, V_{IH} = 1.7 V
		2.7	2.2	—		I_{OH} = –12 mA, V_{IH} = 2.0 V
		3.0	2.4	—		I_{OH} = –12 mA, V_{IH} = 2.0 V
		3.0	2.0	—		I_{OH} = –24 mA, V_{IH} = 2.0 V
	V_{OL}	Min to Max	—	0.2		I_{OL} = 100 µA
		2.3	—	0.4		I_{OL} = 6 mA, V_{IL} = 0.7 V
		2.3	—	0.7		I_{OL} = 12 mA, V_{IL} = 0.7 V
		2.7	—	0.4		I_{OL} = 12 mA, V_{IL} = 0.8 V
		3.0	—	0.55		I_{OL} = 24 mA, V_{IL} = 0.8 V
Input current	I_{IN}	3.6	—	±5	µA	V_{IN} = V_{CC} or GND
	$I_{IN\ (hold)}$	2.3	45	—		V_{IN} = 0.7 V
		2.3	–45	—		V_{IN} = 1.7 V
		3.0	75	—		V_{IN} = 0.8 V
		3.0	–75	—		V_{IN} = 2.0 V
		3.6	—	±500		V_{IN} = 0 to 3.6 V
Off state output current [*2]	I_{OZ}	3.6	—	±10	µA	V_{OUT} = V_{CC} or GND
Quiescent supply current	I_{CC}	3.6	—	40	µA	V_{IN} = V_{CC} or GND
	ΔI_{CC}	3.0 to 3.6	—	750	µA	V_{IN} = one input at (V_{CC}–0.6) V, other inputs at V_{CC} or GND

Notes: 1. For conditions shown as Min or Max, use the appropriate values under recommended operating conditions.

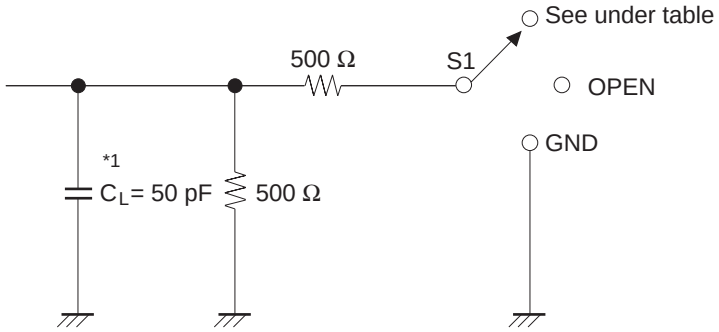
2. For I/O ports, the parameter I_{OZ} includes the input leakage current.

Switching Characteristics

(Ta = –40 to 85°C)

Item	Symbol	V_{CC} (V)	Min	Typ	Max	Unit	FROM (Input)	TO (Output)
Propagation delay time	t_{PLH}	2.5±0.2	1.0	—	3.9	ns	A or B	B or A
	t_{PHL}	2.7	—	—	3.6			
		3.3±0.3	1.0	—	3.2			
Output enable time	t_{ZH}	2.5±0.2	1.0	—	5.7	ns	$\overline{OE}$	B or A
	t_{ZL}	2.7	—	—	5.4			
		3.3±0.3	1.0	—	4.4			
Output disable time	t_{HZ}	2.5±0.2	1.0	—	5.2	ns	$\overline{OE}$	B or A
	t_{LZ}	2.7	—	—	4.6			
		3.3±0.3	1.0	—	4.1			
Input capacitance	C_{IN}	3.3	—	4.0	—	pF	Control inputs	
Output capacitance	C_O	3.3	—	9.0	—	pF	A or B ports	

• **Test Circuit**

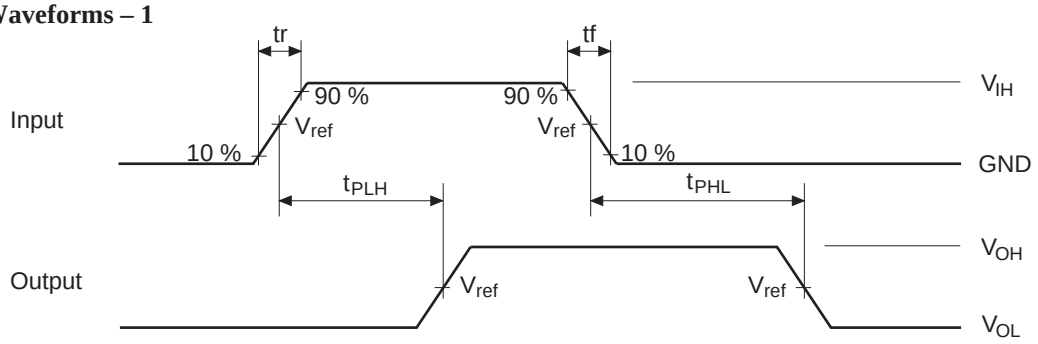


Load Circuit for Outputs

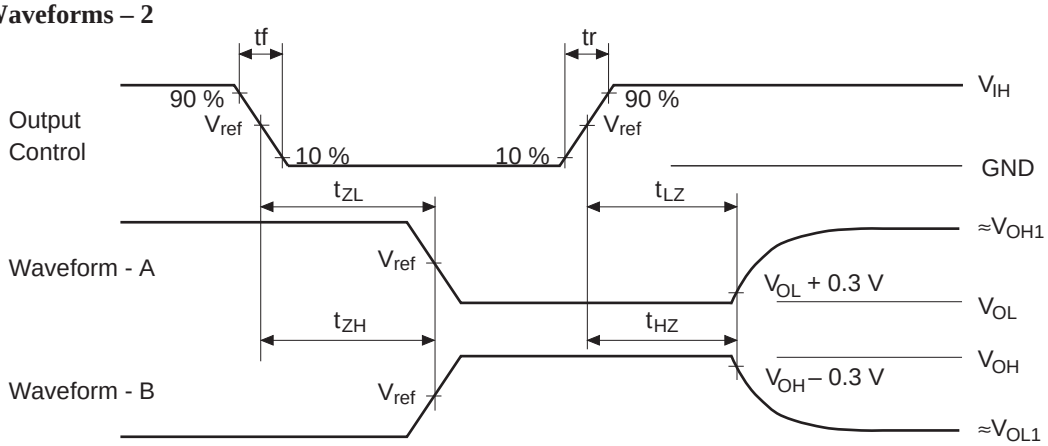
Symbol	Vcc=2.5±0.2V	Vcc=2.7V, 3.3±0.3V
t_{PLH} / t_{PHL}	OPEN	OPEN
t_{ZH} / t_{HZ}	GND	GND
t_{ZL} / t_{LZ}	4.6 V	6.0 V

Note: 1. C_L includes probe and jig capacitance.

• **Waveforms – 1**



• **Waveforms – 2**



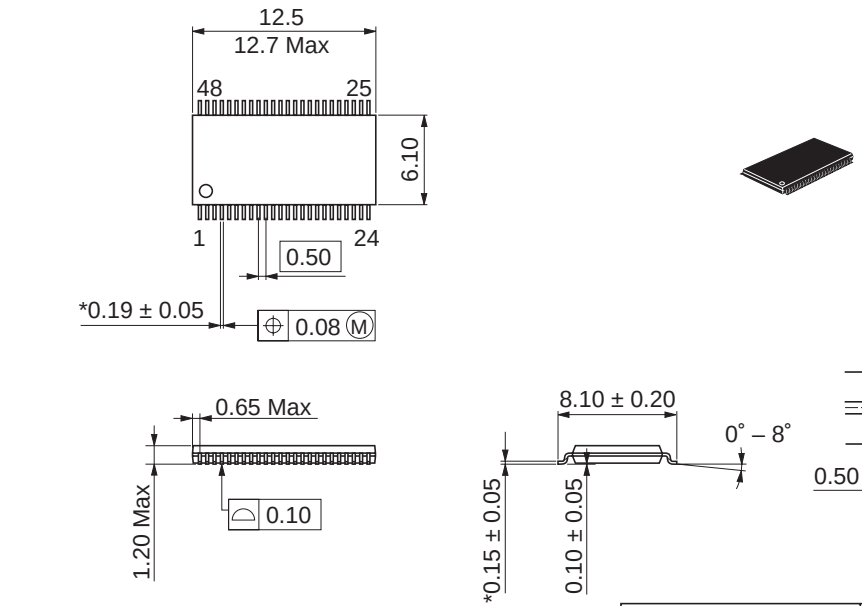
TEST	Vcc=2.5±0.2V	Vcc=2.7V, 3.3±0.3V
V_{IH}	2.3 V	2.7 V
V_{ref}	1.2 V	1.5 V
V_{OH1}	2.3 V	3.0 V
V_{OL1}	GND	GND

Notes: 1. All input pulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz, Zo = 50 Ω, tr ≤ 2.5 ns, tf ≤ 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, 2003

Unit: mm



Package Code	TTP-48DBV
JEDEC	—
JEITA	—
Mass (reference value)	0.20 g

*Ni/Pd/Au plating

Renesas Technology Corp. Sales Strategic Planning Div. Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan

RENESAS SALES OFFICES

http://www.renesas.com

Renesas Technology America, Inc.
450 Holger Way, San Jose, CA 95134-1368, U.S.A
Tel: <1> (408) 382-7500 Fax: <1> (408) 382-7501

Renesas Technology Europe Limited.
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, United Kingdom
Tel: <44> (1628) 585 100, Fax: <44> (1628) 585 900

Renesas Technology Europe GmbH
Dornacher Str. 3, D-85622 Feldkirchen, Germany
Tel: <49> (89) 380 70 0, Fax: <49> (89) 929 30 11

Renesas Technology Hong Kong Ltd.
7/F., North Tower, World Finance Centre, Harbour City, Canton Road, Hong Kong
Tel: <852> 2265-6688, Fax: <852> 2375-6836

Renesas Technology Taiwan Co., Ltd.
FL 10, #99, Fu-Hsing N. Rd., Taipei, Taiwan
Tel: <886> (2) 2715-2888, Fax: <886> (2) 2713-2999

Renesas Technology (Shanghai) Co., Ltd.
26/F., Ruijin Building, No.205 Maoming Road (S), Shanghai 200020, China
Tel: <86> (21) 6472-1001, Fax: <86> (21) 6415-2952

Renesas Technology Singapore Pte. Ltd.
1, Harbour Front Avenue, #06-10, Keppel Bay Tower, Singapore 098632
Tel: <65> 6213-0200, Fax: <65> 6278-8001

Colophon 1.0