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April 1st, 2010
Renesas Electronics Corporation

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HD74LVCZ16245A

16–bit Bidirectional Transceivers with 3–state Outputs

REJ03D0375–0200
(Previous ADE-205-233 (Z))
Rev.2.00
Aug. 20.2004

Description

The HD74LVCZ16245A has sixteen two direction buffers, for the fittest at two direction bus lines with three state outputs in a 48 pin package. When (DIR) is high, data flows from the A inputs to the B outputs, and when (DIR) is low, data flows from the B inputs to the A outputs. A and B bus are separated by making enable input ($\overline{G}$) high level.

When V_{CC} is between 0 and 1.5 V, the device is in the high impedance state during power up or power down.

Low voltage and high-speed operation is suitable at battery drive product (note type personal computer) and low power consumption extends the life of a battery for long time operation.

Features

- V_{CC} = 2.7 to 5.5 V
- All inputs V_{IH} (Max) = 5.5 V (@V_{CC} = 0 to 5.5 V)
- All inputs / outputs $V_{I/O}$ (Max) = 5.5 V (@V_{CC} = 0 V or output off state)
- 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)
- High impedance state during power up and power down
- Power off disables outputs, permitting live insertion
- High output current ±24 mA (@V_{CC} = 3.0 to 5.5 V)
- Ordering Information

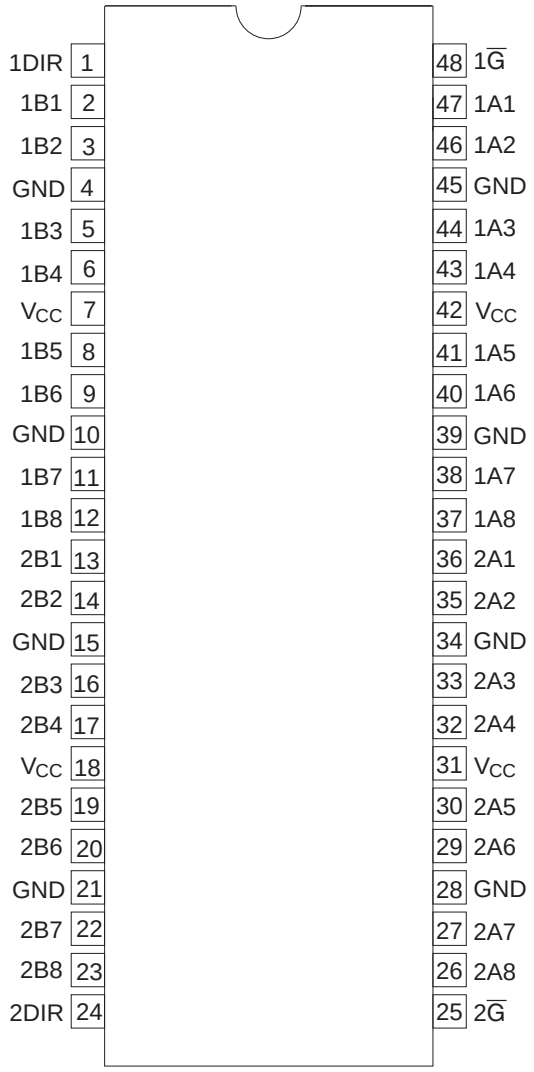
Part Name	Package Type	Package Code	Package Abbreviation	Taping Abbreviation (Quantity)
HD74LVCZ16245ATEL	TSSOP–48 pin	TTP–48DBV	T	EL (1,000 pcs/reel)

Function Table

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

H: High level
L: Low level
X: Immaterial
Z: High impedance

Pin Arrangement



(Top view)

Absolute Maximum Ratings

Item	Symbol	Ratings	Unit	Conditions
Supply voltage	V_{CC}	–0.5 to 7.0	V	
Input voltage	V_I	–0.5 to 7.0	V	
Input / output voltage	$V_{I/O}$	–0.5 to 7.0	V	Output “Z” or V_{CC} : OFF
		–0.5 to V_{CC}+0.5		Output “H” or “L”
Input diode current	I_{IK}	–50	mA	$V_I < 0$
Output diode current	I_{OK}	–50	mA	$V_O < 0$
Output current	I_O	±50	mA	
V_{CC}, GND current	I_{CC} or I_{GND}	±100	mA	
Storage temperature	Tstg	–65 to 150	°C	

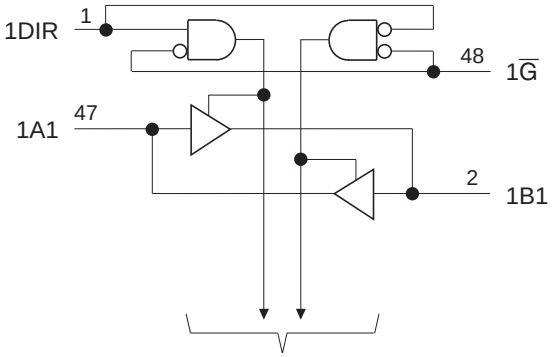
Note: The absolute maximum ratings are values, which must not individually be exceeded, and furthermore, no two of which may be realized at the same time.

Recommended Operating Conditions

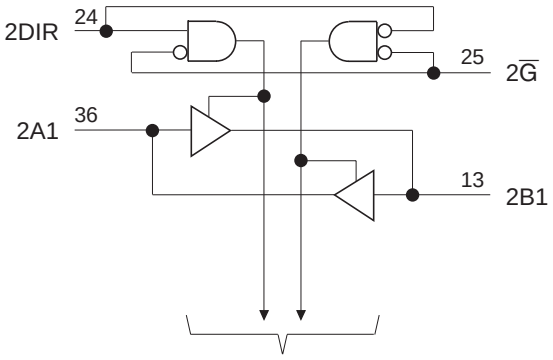
Item	Symbol	Ratings	Unit	Conditions
Supply voltage	V_{CC}	2.7 to 5.5	V	At operation
Input voltage	V_I	0 to 5.5	V	
Input / output voltage	$V_{I/O}$	0 to 5.5	V	Output “Z” or V_{CC} : OFF
		0 to V_{CC}		Output “H” or “L”
Output current	I_{OH}	–12	mA	V_{CC} = 2.7 V
		–24 *1		V_{CC} = 3.0 to 5.5 V
	I_{OL}	12	mA	V_{CC} = 2.7 V
		24 *1		V_{CC} = 3.0 to 5.5 V
Input rise / fall time	t_r, t_f	0 to 6	ns / V	
Operating temperature	Ta	–40 to +85	°C	

Note: 1. Duty cycle ≤ 50%

Logic Diagram



To seven other channels



To seven other channels

Electrical Characteristics

(Ta = –40 to 85°C)

Item	Symbol	V_{CC} (V)	Min	Typ	Max	Unit	Test Conditions
Input voltage	V_{IH}	2.7 to 3.6	2.0	—	—	V	
		4.5 to 5.5	V_{CC}×0.7	—	—		
	V_{IL}	2.7 to 3.6	—	—	0.8	V	
		4.5 to 5.5	—	—	V_{CC}×0.3		
Output voltage	V_{OH}	2.7 to 5.5	V_{CC}–0.2	—	—	V	I_{OH} = –100 µA
		2.7	2.2	—	—		I_{OH} = –12 mA
		3.0	2.4	—	—		
		3.0	2.2	—	—		I_{OH} = –24 mA
		4.5	3.8	—	—		
	V_{OL}	2.7 to 5.5	—	—	0.2	V	I_{OL} = 100 µA
		2.7	—	—	0.4		I_{OL} = 12 mA
		3.0	—	—	0.55		I_{OL} = 24 mA
		4.5	—	—	0.55		
Input current	I_{IN}	0 to 5.5	—	—	±5	µA	V_{IN} = 0 to 5.5 V
Off state output current	I_{OZ}	2.7 to 5.5	—	—	±5	µA	V_{OUT} = 0 to 5.5 V
	I_{OZPU}	0 to 1.5	—	—	±5		V_{OUT} = 0.5 to 5.5 V, Output enable = don't care
	I_{OZPD}	1.5 to 0	—	—	±5		
Output leak current	I_{OFF}	0	—	—	±5	µA	V_{IN} or V_O = 5.5 V
Quiescent supply current	I_{CC}	2.7 to 3.6	—	—	225	µA	V_{IN} = 3.6 to 5.5 V [*1], I_O = 0
		2.7 to 5.5	—	—	350		V_{IN} = V_{CC} or GND
	ΔI_{CC}	2.7 to 3.6	—	—	500	µA	V_{IN} = one input at (V_{CC}–0.6) V, other inputs at V_{CC} or GND
Input capacitance	C_{IN}	3.3	—	4.1	—	pF	V_{IN} = V_{CC} or GND
Input / output capacitance	$C_{I/O}$	3.3	—	9.2	—	pF	V_{OUT} = V_{CC} or GND

Note: 1. This applies in the disabled state only.

Switching Characteristics

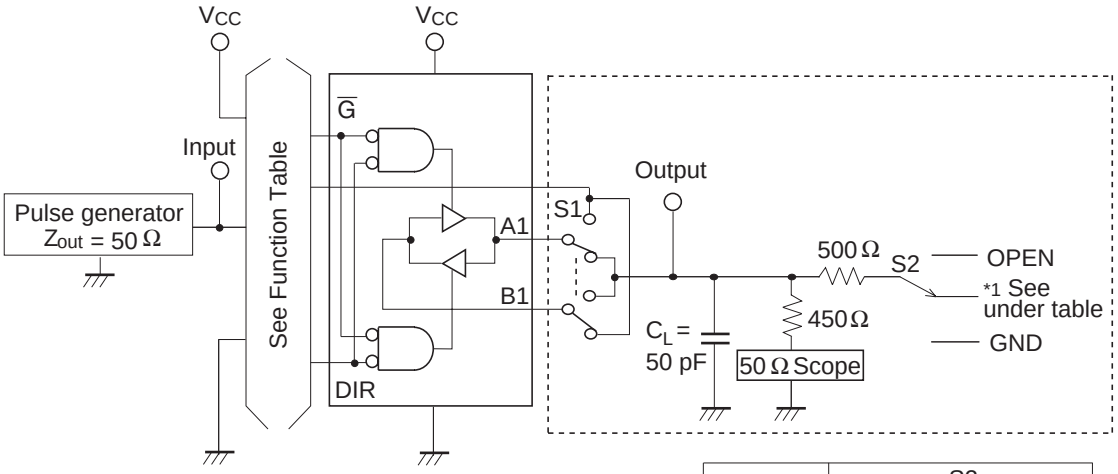
(Ta = –40 to 85°C)

Item	Symbol	V_{CC} (V)	Min	Typ	Max	Unit	FROM (Input)	TO (Output)
Propagation delay time	t_{PLH}	2.7	—	—	5.2	ns	A or B	B or A
	t_{PHL}	3.3±0.3	1.0	—	4.6			
		5.0±0.5	—	—	4.0			
Output enable time	t_{ZH}	2.7	—	—	7.3	ns	$\overline{G}$	A or B
	t_{ZL}	3.3±0.3	1.5	—	6.3			
		5.0±0.5	—	—	5.2			
Output disable time	t_{HZ}	2.7	—	—	7.5	ns	$\overline{G}$	A or B
	t_{LZ}	3.3±0.3	1.5	—	6.9			
		5.0±0.5	—	—	6.0			
Between output pin skew [*1]	t_{OSLH}	2.7	—	—	—	ns		
	t_{OSHL}	3.3±0.3	—	—	1.0			
		5.0±0.5	—	—	1.0			

Note: 1. This parameter is characterized but not tested.

$t_{OSLH} = |t_{PLHm} – t_{PLHn}|$, $t_{OSHL} = |t_{PHLm} – t_{PHLn}|$

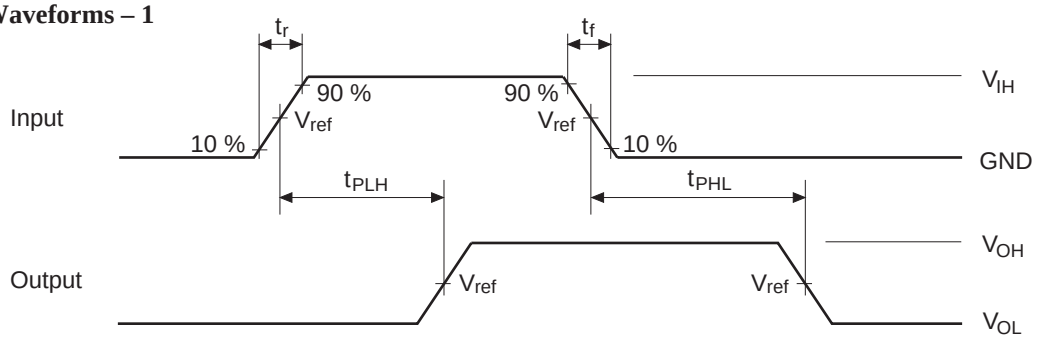
Test Circuit



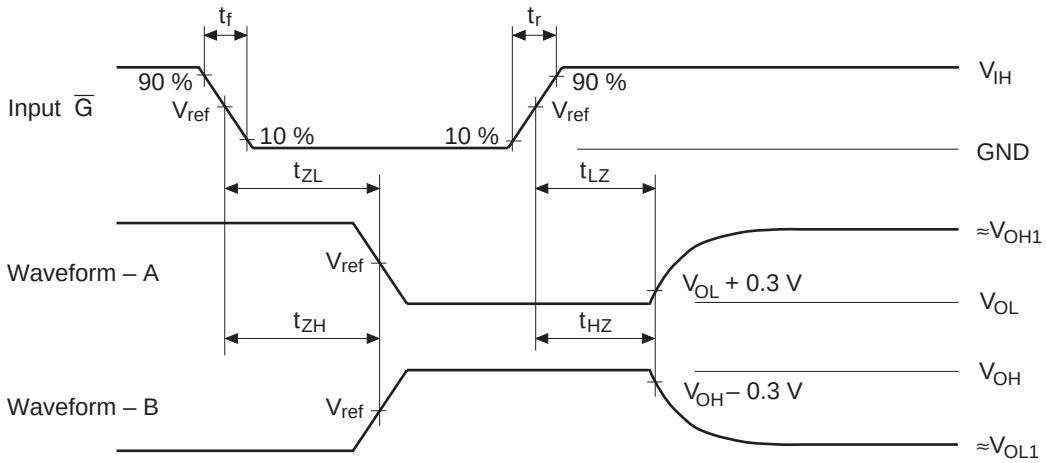
Symbol	S2	
	Vcc=2.7V, 3.3±0.3V	Vcc=5.0±0.5V
t_{PLH}/ t_{PHL}	OPEN	OPEN
t_{ZH}/ t_{HZ}	GND	GND
t_{ZL}/ t_{LZ}	6 V	2×V_{CC}

Notes: 1. C_L includes probe and jig capacitance.
2. A2–B2 to A8–B8 are identical to above load circuit.
3. S1 : Input–Output change switch.

• **Waveforms – 1**



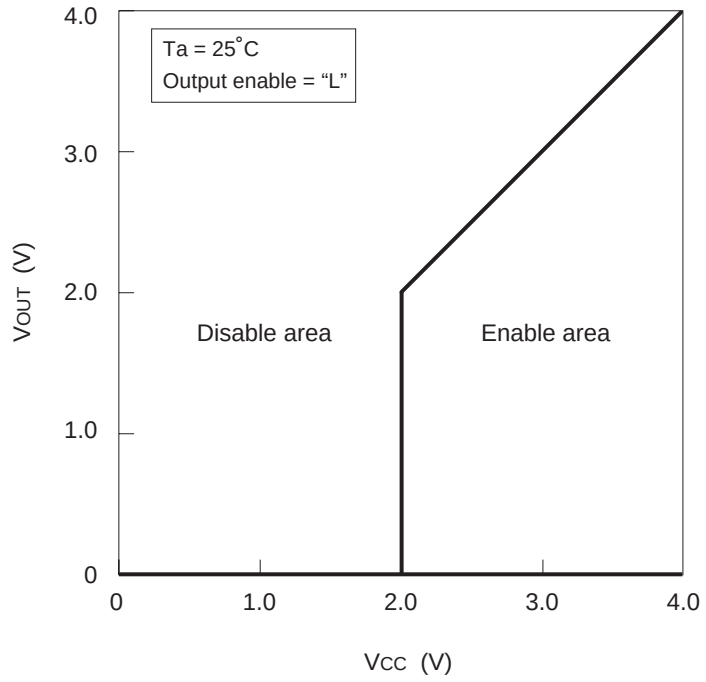
• **Waveforms – 2**



TEST	Vcc=2.7V, 3.3±0.3V	Vcc=5.0±0.5V
V_{IH}	2.7 V	V_{CC}
V_{ref}	1.5 V	50%V_{CC}
V_{OH1}	3 V	V_{CC}
V_{OL1}	GND	GND

Notes: 1. Input waveform : PRR = 10 MHz, duty cycle 50%, t_r = 2.5 ns, t_f = 2.5 ns
2. Waveform – A shows input conditions such that the output is “L” level when enabled by the output control.
3. Waveform – B shows input conditions such that the output is “H” level when enabled by the output control.

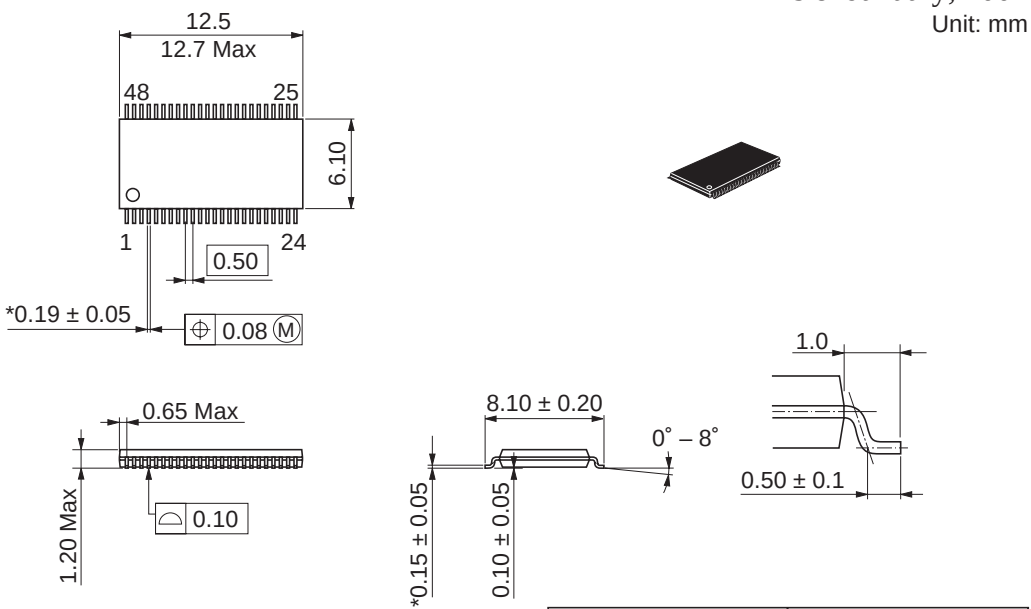
Power up / down Characteristics



Package Dimensions

As of January, 2002

Unit: mm



*Pd plating

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

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