HD74LVC16245

16-bit Bus Transceivers with 3-state Outputs

HITACHI

ADE-205-120(Z)
Rev.0
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Description

The HD74LVC16245 has sixteen two direction buffers, for the fittest at two direction bus lines with three state outputs. A direction control input, DIR. When DIR is high, data flows from the A inputs to the B outputs. When DIR is high, data flows from the B inputs to the A outputs. When enable inputs ($\overline{G}$) is high, disables both A and B ports by placing then in a high impedance. Low voltage and high speed operation is suitable at the battery drive product (note type personal computer) and low power consumption extends the life of a battery for long time operation.

Features

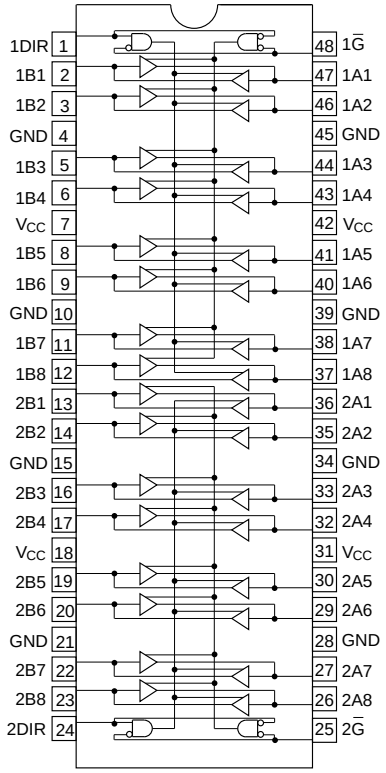
- V_{CC} = 2.0 V to 5.5 V
- All inputs V_{IH} (Max.) = 5.5 V (@V_{CC} = 0 V to 5.5 V)
- Typical V_{OL} ground bounce < 0.8 V (@V_{CC} = 3.3 V, Ta = 25°C)
- Typical V_{OH} undershoot > 2.0 V (@V_{CC} = 3.3 V, Ta = 25°C)
- High output current ±24 mA (@V_{CC} = 3.0 V to 5.5 V)

Function Table

Inputs		
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 6.0	V	
Input diode current	I_{IK}	–50	mA	V_I = –0.5 V
Input voltage	V_I	–0.5 to 6.0	V	$\overline{G}$, DIR
Output diode current	I_{OK}	–50	mA	V_O = –0.5 V
		50	mA	V_O = V_{CC}+0.5 V
Input / Output voltage	$V_{I/O}$	–0.5 to V_{CC} +0.5	V	Output "H" or "L"
Output current	I_O	±50	mA	
V_{CC}, GND current / pin	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}	1.5 to 5.5	V	Data retention
		2.0 to 5.5	V	At operation
Input / output voltage	V_I	0 to 5.5	V	$\overline{G}$, DIR
	$V_{I/O}$	0 to V_{CC}	V	Output "H" or "L"
Operating temperature	Ta	–40 to 85	°C	
Output current	I_{OH}	–12	mA	V_{CC} = 2.7 V
		–24[*2]	mA	V_{CC} = 3.0 V to 5.5 V
	I_{OL}	12	mA	V_{CC} = 2.7 V
		24[*2]	mA	V_{CC} = 3.0 V to 5.5 V
Input rise / fall time [*1]	t_r, t_f	10	ns/V	

Notes: 1. This item guarantees maximum limit when one input switches.
Waveform : Refer to test circuit of switching characteristics.
2. duty cycle ≤ 50%

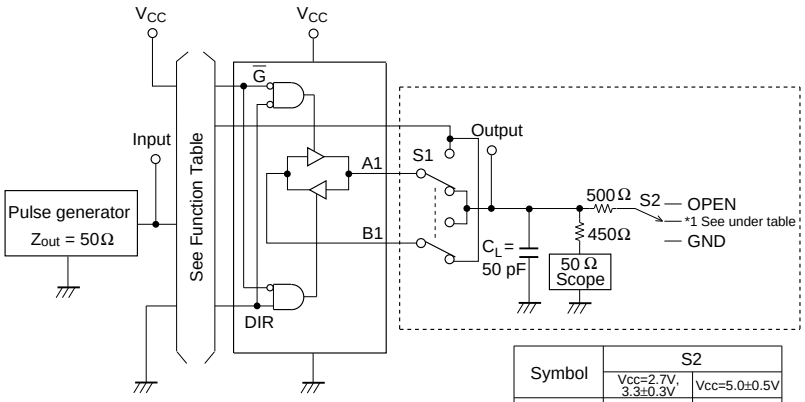
Electrical Characteristics

Item	Symbol	V_{CC} (V)	Ta = –40 to 85°C Min	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	
	V_{IL}	2.7 to 3.6	—	0.8	V	
		4.5 to 5.5	—	V_{CC}×0.3	V	
Output voltage	V_{OH}	2.7 to 5.5	V_{CC}–0.2	—	V	I_{OH} = –100 µA
		2.7	2.2	—	V	I_{OH} = –12 mA
		3.0	2.4	—	V	
		3.0	2.0	—	V	I_{OH} = –24 mA
		4.5	3.8	—	V	
	V_{OL}	2.7 to 5.5	—	0.2	V	I_{OL} = 100 µA
		2.7	—	0.4	V	I_{OL} = 12 mA
		3.0	—	0.55	V	I_{OL} = 24 mA
		4.5	—	0.55	V	
Quiescent supply current	ΔI_{CC}	3.0 to 3.6	—	500	µA	V_{IN} = one input at(V_{CC}–0.6)V, other inputs at V_{CC} or GND
Input current	I_{IN}	0 to 5.5	—	±5.0	µA	V_{IN}(G, DIR) = 5.5 V or GND V_{IN} = V_{CC} or GND (A0 to A7 or B0 to B7)
Off state output current	I_{OZ}	5.5	—	±10	µA	V_{IN} = V_{CC}, GND V_{OUT} = V_{CC} or GND
Quiescent supply current	I_{CC}	5.5	—	40	µA	V_{IN} = V_{CC} or GND

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	—	4.5	7.5	ns	A or B	B or A
	t_{PHL}	3.3±0.3	1.5	3.5	6.5	ns		
		5.0±0.5	—	2.5	5.5	ns		
Output enable time	t_{ZH}	2.7	—	6.0	9.0	ns	G	B or A
	t_{ZL}	3.3±0.3	1.5	5.0	8.0	ns		
		5.0±0.5	—	3.5	6.5	ns		
Output disable time	t_{HZ}	2.7	—	5.0	8.5	ns	G	B or A
	t_{LZ}	3.3±0.3	1.5	4.5	7.5	ns		
		5.0±0.5	—	3.0	6.5	ns		
Input capacitance	C_{IN}	2.7	—	3.0	—	pF		
Output capacitance	C_O	2.7	—	15.0	—	pF		

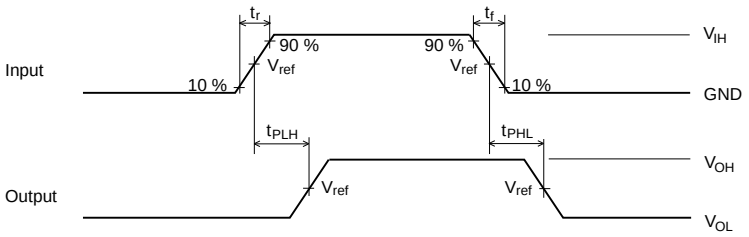
Test Circuit



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×Vcc

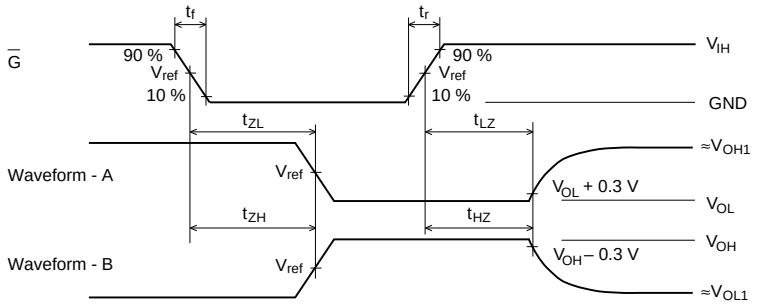
Notes: 1. C_L includes probe and jig capacitance.
2. A2-B2 to A8-B8 are identical to above load circuit.
3. S1 : Input-Output change switch.

Waveforms – 1



Notes: 1. t_r = 2.5 ns, t_f = 2.5 ns
2. Input waveform : PRR = 10 MHz, duty cycle 50%

Waveforms – 2



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

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

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