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Renesas Electronics website: http://www.renesas.com

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (http://www.renesas.com)

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HD74LVC245A

Octal Bidirectional Transceivers with 3-state Outputs

REJ03D0353–0400Z
(Previous ADE-205-111B (Z))
Rev.4.00
Jul. 27, 2004

Description

The HD74LVC245A has eight buffers with three state outputs in a 20 pin package. When (T / $\overline{R}$) is high, data flows from the A inputs to the B outputs, and when (T / $\overline{R}$) is low, data flows from the B inputs to the A outputs. A and B bus are separated by making enable input ($\overline{OE}$) high level. 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)
- All input 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 output current ±24 mA (@V_{CC} = 3.0 V to 5.5 V)
- Ordering Information

Part Name	Package Type	Package Code	Package Abbreviation	Taping Abbreviation (Quantity)
HD74LVC245AFPEL	SOP–20 pin (JEITA)	FP–20DAV	FP	EL (2,000 pcs/reel)
HD74LVC245ATELL	TSSOP–20 pin	TTP–20DAV	T	ELL (2,000 pcs/reel)

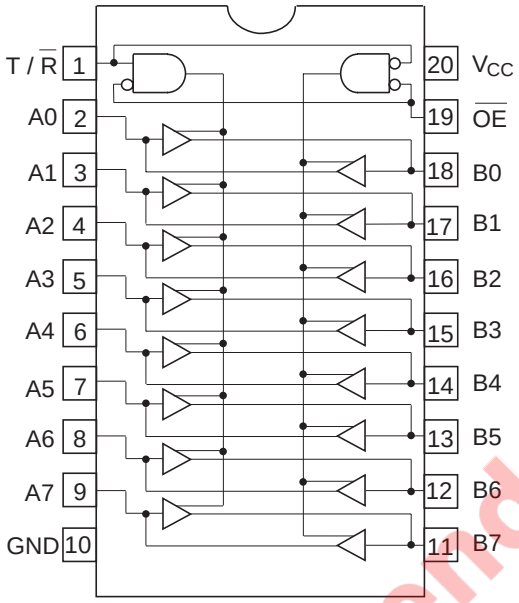
Note: Please consult the sales office for the above package availability.

Function Table

Inputs		
$\overline{OE}$	T / $\overline{R}$	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	T / $\overline{R}$, $\overline{OE}$
Output diode current	I_{OK}	–50	mA	V_O = –0.5 V
		50		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"
		–0.5 to 6.0		Output "Z" or V_{CC}:OFF
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		At operation
Input / output voltage	V_I	0 to 5.5	V	T / $\overline{R}$, $\overline{OE}$
	$V_{I/O}$	0 to V_{CC}	V	Output "H" or "L"
		0 to 5.5		Output "Z" or V_{CC}:OFF
Operating temperature	Ta	–40 to 85	°C	
Output current	I_{OH}	–12	mA	V_{CC} = 2.7 V
		–24 [*2]		V_{CC} = 3.0 V to 5.5 V
	I_{OL}	12	mA	V_{CC} = 2.7 V
		24 [*2]		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

			Ta = –40 to 85°C			
Item	Symbol	V_{CC} (V)	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_{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	—	±5.0	µA	V_{IN} = 5.5 V or GND
Off state output current	I_{OZ}	2.7 to 5.5	—	±5.0	µA	V_{IN} = V_{CC}, GND, V_{OUT} = 5.5 V or GND
Output leak current	I_{OFF}	0	—	20	µA	V_{IN} / V_{OUT} = 5.5 V
Quiescent supply current	I_{CC}	2.7 to 3.6	—	±10	µA	V_{IN} / V_{OUT} = 3.6 to 5.5 V
		2.7 to 5.5	—	10		V_{IN} = V_{OUT} or GND
	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

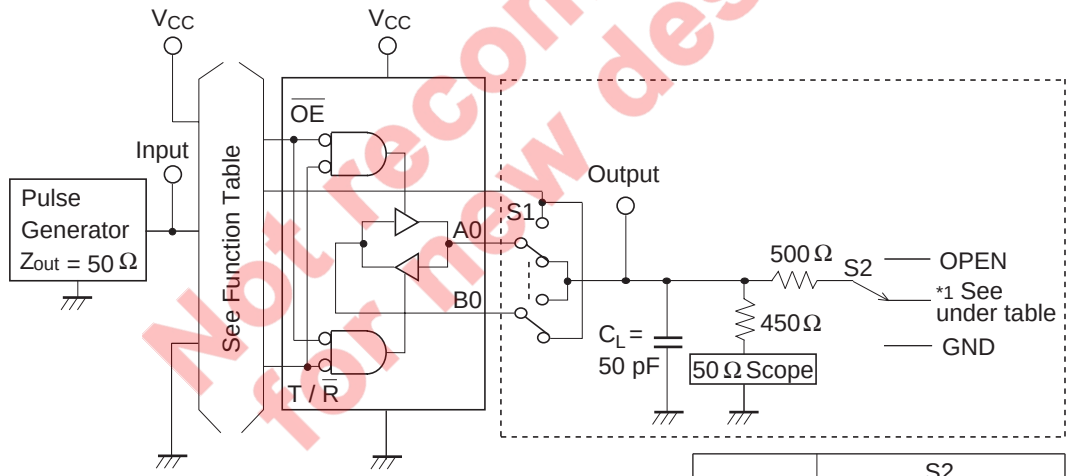
Switching Characteristics

Item	Symbol	V_{CC} (V)	Ta = –40 to 85°C			Unit	From (Input)	To (Output)
			Min	Typ	Max			
Propagation delay time	t_{PLH}	2.7	—	—	8.0	ns	A or B	B or A
	t_{PHL}	3.3±0.3	1.5	—	7.0			
		5.0±0.5	—	—	5.5			
Output enable time	t_{ZH}	2.7	—	—	9.5	ns	$\overline{OE}$	A or B
	t_{ZL}	3.3±0.3	1.5	—	8.5			
		5.0±0.5	—	—	7.0			
Output disable time	t_{ZH}	2.7	—	—	8.5	ns	$\overline{OE}$	A or B
	t_{LZ}	3.3±0.3	1.5	—	7.5			
		5.0±0.5	—	—	6.5			
Between output pins skew *1	t_{OSLH}	2.7	—	—	—	ns		
	t_{OSHL}	3.3±0.3	—	—	1.0			
		5.0±0.5	—	—	1.0			
Input capacitance	C_{IN}	2.7	—	3.0	—	pF		
Output capacitance	C_O	2.7	—	15.0	—	pF		

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

$tos_{LH} = | t_{PLHm} - t_{PLHn} |$, $tos_{HL} = | t_{PHLm} - t_{PHLn} |$

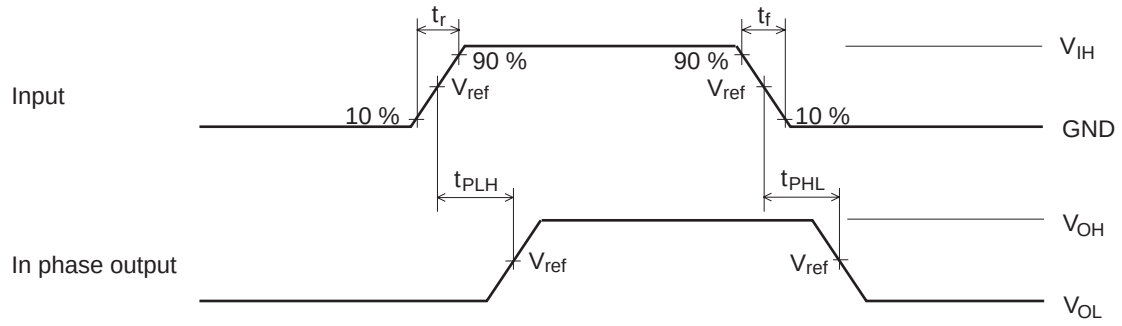
Test Circuit



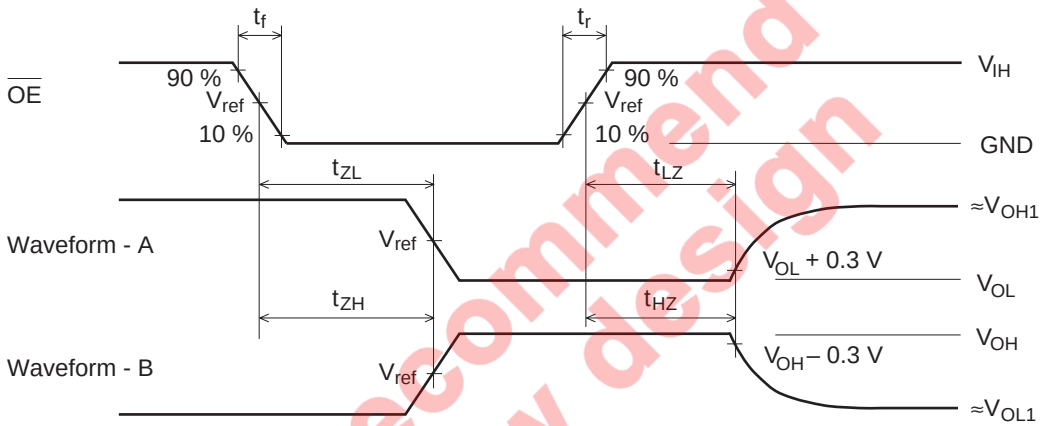
Symbol	S2	
	Vcc=2.7V, 3.3±0.3V	Vcc=5.0±0.5V
t_{PLH}/ t_{PHL}	OPEN	OPEN
t_{ZH}/ t_{HZ}	GND	GND
t_{ZL}/ t_{LZ}	6 V	2×Vcc

Note: 1. C_L includes probe and jig capacitance.

Waveforms – 1



Waveforms – 2

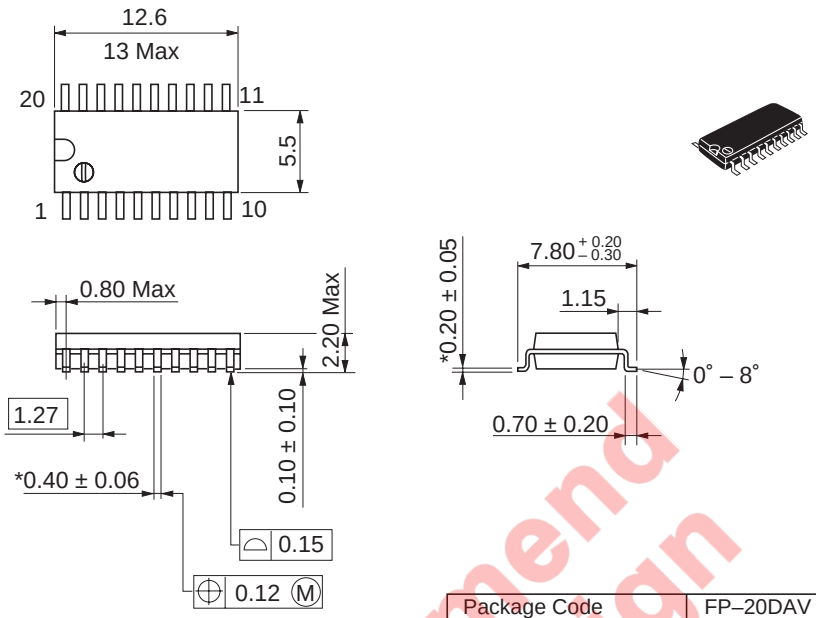


TEST	Vcc=2.7V, 3.3±0.3V	Vcc=5.0±0.5V
V_{IH}	2.7 V	Vcc
V_{ref}	1.5 V	50%Vcc
V_{OH1}	3 V	Vcc
V_{OL1}	GND	GND

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.

Package Dimensions

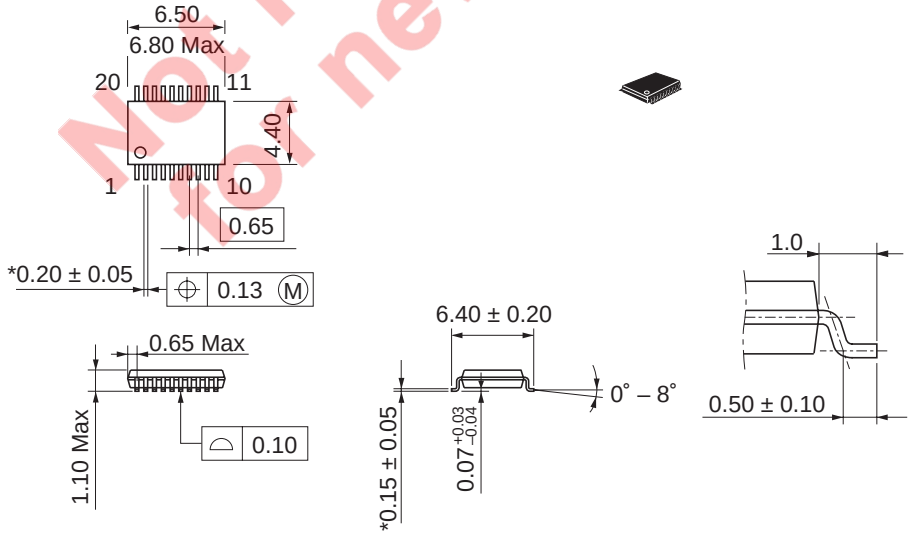
As of January, 2002
Unit: mm



Package Code	FP–20DAV
JEDEC	—
JEITA	Conforms
Mass (reference value)	0.31 g

*Pd plating

As of January, 2002
Unit: mm



Package Code	TTP–20DAV
JEDEC	—
JEITA	—
Mass (reference value)	0.07 g

*Pd plating

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