

# RD74LVC125B

## Quad. Bus Buffer Gates with 3-state Outputs

REJ03D0498-0200

Rev.2.00

Dec. 10, 2004

### Description

The RD74LVC125B has four bus buffer gates in a 14 pin package. The device requires the three state control input  $\overline{OE}$  to be taken high to put the output into the high impedance condition. 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

- $V_{CC} = 1.65 \text{ V to } 5.5 \text{ V}$
- All inputs  $V_{IH} (\text{Max.}) = 5.5 \text{ V} (@V_{CC} = 0 \text{ V to } 5.5 \text{ V})$
- All outputs  $V_{OUT} (\text{Max.}) = 5.5 \text{ V} (@V_{CC} = 0 \text{ V or output off state})$
- Typical  $V_{OL}$  ground bounce  $< 0.8 \text{ V} (@V_{CC} = 3.3 \text{ V, } T_a = 25^\circ\text{C})$
- Typical  $V_{OH}$  undershoot  $> 2.0 \text{ V} (@V_{CC} = 3.3 \text{ V, } T_a = 25^\circ\text{C})$
- High output current
  - $\pm 4 \text{ mA} (@V_{CC} = 1.65 \text{ V})$
  - $\pm 8 \text{ mA} (@V_{CC} = 2.3 \text{ V})$
  - $\pm 12 \text{ mA} (@V_{CC} = 2.7 \text{ V})$
  - $\pm 24 \text{ mA} (@V_{CC} = 3.0 \text{ V to } 5.5 \text{ V})$
- Ordering Information

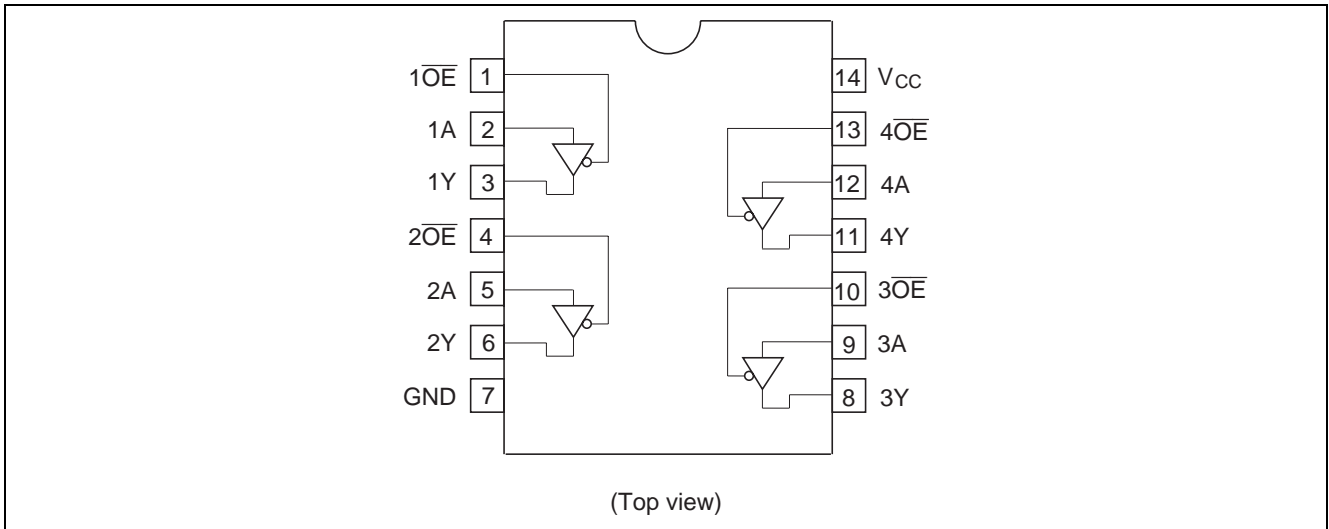
Part Name	Package Type	Package Code	Package Abbreviation	Taping Abbreviation (Quantity)
RD74LVC125BFPEL	SOP-14 pin (JEITA)	FP-14DAV	FP	EL (2,000 pcs/reel)
RD74LVC125BTELL	TSSOP-14 pin	TTP-14DV	T	ELL (2,000 pcs/reel)

### Function Table

Inputs		Outputs Y
$\overline{OE}$	A	
H	X	Z
L	L	L
L	H	H

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

## Pin Arrangement



## Absolute Maximum Ratings

Item	Symbol	Ratings	Unit	Conditions
Supply voltage	$V_{CC}$	-0.5 to 7.0	V	
Input diode current	$I_{IK}$	-50	mA	$V_I = -0.5\text{ V}$
Input voltage	$V_I$	-0.5 to 7.0	V	
Output diode current	$I_{OK}$	-50	mA	$V_O = -0.5\text{ V}$
		50		$V_O = V_{CC} + 0.5\text{ V}$
Output voltage	$V_O$	-0.5 to $V_{CC} + 0.5$	V	Output "H" or "L"
		-0.5 to 7.0		Output "Z" or $V_{CC}$ : OFF
Output current	$I_O$	$\pm 50$	mA	
$V_{CC}$ , GND current / pin	$I_{CC}$ or $I_{GND}$	$\pm 100$	mA	
Storage temperature	$T_{stg}$	-65 to +150	$^{\circ}\text{C}$	

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 hold
		1.65 to 5.5		At operation
Input / output voltage	$V_I$	0 to 5.5	V	
	$V_O$	0 to $V_{CC}$ 0 to 5.5	V	Output "H" or "L" Output "Z" or $V_{CC}$ : OFF
Operating temperature	$T_a$	-40 to 85	°C	
Output current	$I_{OH}$	-4	mA	$V_{CC} = 1.65\text{ V}$
		-8		$V_{CC} = 2.3\text{ V}$
		-12		$V_{CC} = 2.7\text{ V}$
		-24		$V_{CC} = 3.0\text{ V to }5.5\text{ V}$
	$I_{OL}$	4	mA	$V_{CC} = 1.65\text{ V}$
		8		$V_{CC} = 2.3\text{ V}$
		12		$V_{CC} = 2.7\text{ V}$
		24		$V_{CC} = 3.0\text{ V to }5.5\text{ V}$
Input rise / fall time **1	$t_r, t_f$	20	ns/V	$V_{CC} = 1.65\text{ V to }2.7\text{ V}$
		10		$V_{CC} = 3.0\text{ V to }5.5\text{ V}$

Note: 1. This item guarantees maximum limit when one input switches.  
Waveform: Refer to test circuit of switching characteristics.

## Electrical Characteristics

Item	Symbol	V <sub>CC</sub> (V)	Ta = -40 to 85°C		Unit	Test Conditions
			Min	Max		
Input voltage	V <sub>IH</sub>	1.65 to 1.95	V <sub>CC</sub> ×0.65	—	V	
		2.3 to 2.7	1.7	—		
		2.7 to 3.6	2.0	—		
		4.5 to 5.5	V <sub>CC</sub> ×0.7	—		
	V <sub>IL</sub>	1.65 to 1.95	—	V <sub>CC</sub> ×0.35	V	
		2.3 to 2.7	—	0.7		
		2.7 to 3.6	—	0.8		
		4.5 to 5.5	—	V <sub>CC</sub> ×0.3		
Output voltage	V <sub>OH</sub>	1.65 to 5.5	V <sub>CC</sub> -0.2	—	V	I <sub>OH</sub> = -100 μA
		1.65	1.2	—		I <sub>OH</sub> = -4 mA
		2.3	1.7	—		I <sub>OH</sub> = -8 mA
		2.7	2.2	—		I <sub>OH</sub> = -12 mA
		3.0	2.4	—		I <sub>OH</sub> = -24 mA
		3.0	2.2	—		
		4.5	3.8	—		
	V <sub>OL</sub>	1.65 to 5.5	—	0.2	V	I <sub>OL</sub> = 100 μA
		1.65	—	0.45		I <sub>OL</sub> = 4 mA
		2.3	—	0.7		I <sub>OL</sub> = 8 mA
		2.7	—	0.4		I <sub>OL</sub> = 12 mA
		3.0	—	0.55		I <sub>OL</sub> = 24 mA
		4.5	—	0.55		
	Input current	I <sub>IN</sub>	0 to 5.5	—	±5.0	μA
Output leak current	I <sub>OFF</sub>	0	—	±5.0	μA	V <sub>IN</sub> / V <sub>OUT</sub> = 5.5 V
Off state output current	I <sub>OZ</sub>	2.7 to 5.5	—	±5.0	μA	V <sub>IN</sub> = V <sub>CC</sub> or GND, V <sub>OUT</sub> = 5.5 V or GND
Quiescent supply current	I <sub>CC</sub>	2.7 to 3.6	—	±5.0	μA	V <sub>IN</sub> = 3.6 V to 5.5 V
		2.7 to 5.5	—	5.0		V <sub>IN</sub> = V <sub>CC</sub> or GND
	ΔI <sub>CC</sub>	2.7 to 3.6	—	500	μA	V <sub>IN</sub> = one input at (V <sub>CC</sub> -0.6) V, other inputs at V <sub>CC</sub> or GND

## Switching Characteristics

Item	Symbol	V <sub>CC</sub> (V)	Ta = -40 to 85°C			Unit	From (Input)	To (Output)
			Min	Typ	Max			
Propagation delay time	t <sub>PLH</sub>	1.8±0.15	1.0	—	12.3	ns	A	Y
	t <sub>PHL</sub>	2.5±0.2	1.0	—	6.3			
		2.7	1.0	—	5.5			
		3.3±0.3	1.0	—	4.8			
		5.0±0.5	1.0	—	3.8			
Output enable time	t <sub>ZH</sub>	1.8±0.15	1.0	—	14.3	ns	$\overline{\text{OE}}$	Y
	t <sub>ZL</sub>	2.5±0.2	1.0	—	7.4			
		2.7	1.0	—	6.6			
		3.3±0.3	1.0	—	5.4			
		5.0±0.5	1.0	—	4.4			
Output disable time	t <sub>HZ</sub>	1.8±0.15	1.0	—	11.1	ns	$\overline{\text{OE}}$	Y
	t <sub>LZ</sub>	2.5±0.2	1.0	—	5.6			
		2.7	1.0	—	5.0			
		3.3±0.3	1.0	—	4.6			
		5.0±0.5	1.0	—	3.6			
Between output pins skew <sup>*1</sup>	t <sub>OSLH</sub>	1.8±0.15	—	—	—	ns		
	t <sub>OSSL</sub>	2.5±0.2	—	—	—			
		2.7	—	—	—			
		3.3±0.3	—	—	1.0			
		5.0±0.5	—	—	1.0			
Input capacitance	C <sub>IN</sub>	3.3	—	4.0	—	pF		
Output capacitance	C <sub>O</sub>	3.3	—	7.0	—	pF		

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

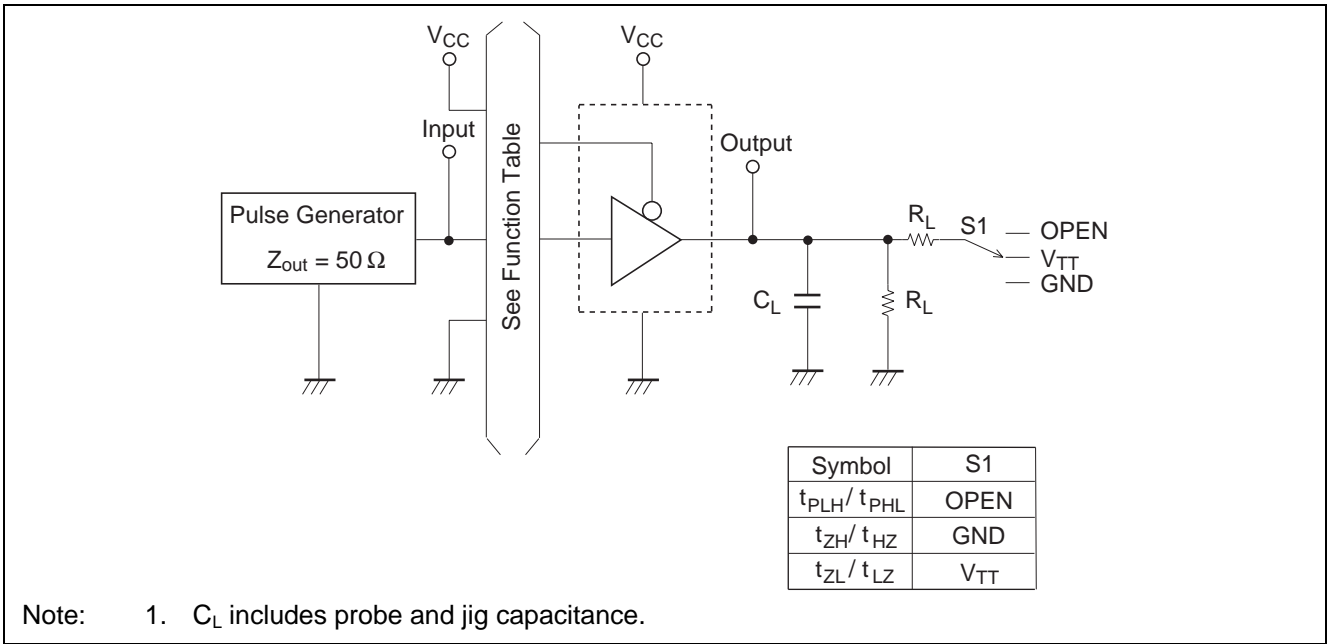
$$t_{OSLH} = |t_{PLHm} - t_{PLHn}|, t_{OSSL} = |t_{PHLm} - t_{PHLn}|$$

## Operating Characteristics

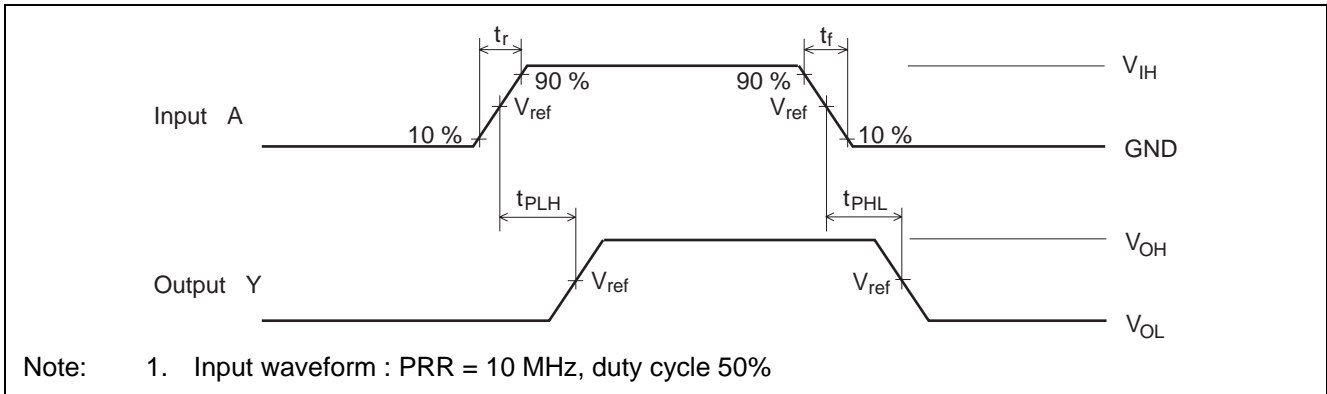
Ta = 25°C

Item	Symbol	V <sub>CC</sub> (V)	Min	Typ	Max	Unit	Test conditions
Power dissipation capacitance	C <sub>PD</sub>	1.8	—	21	—	pF	f = 10 MHz
		2.5	—	22	—		
		3.3	—	23	—		
		5.0	—	27	—		

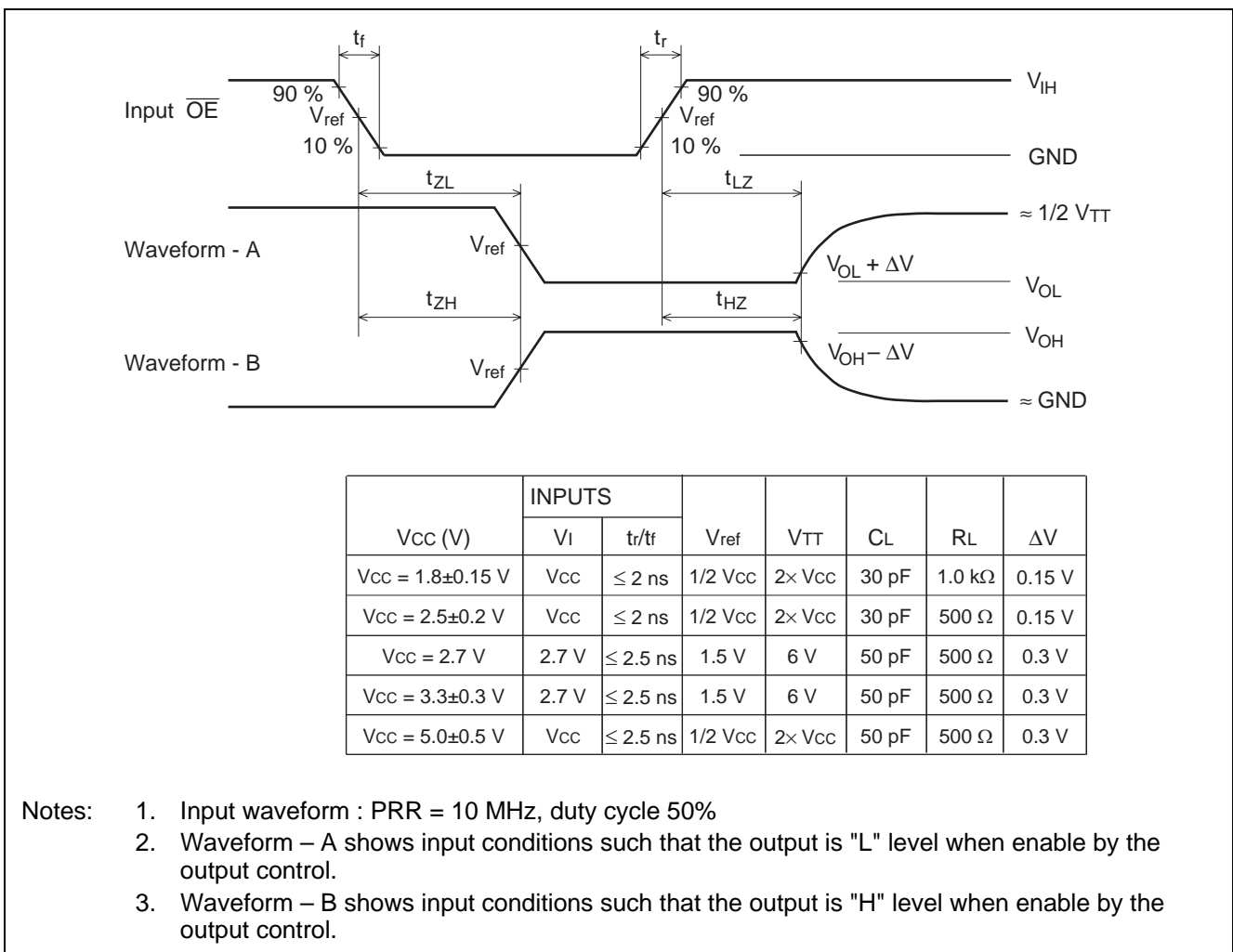
Test Circuit



Waveforms – 1

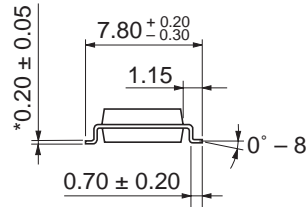
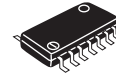
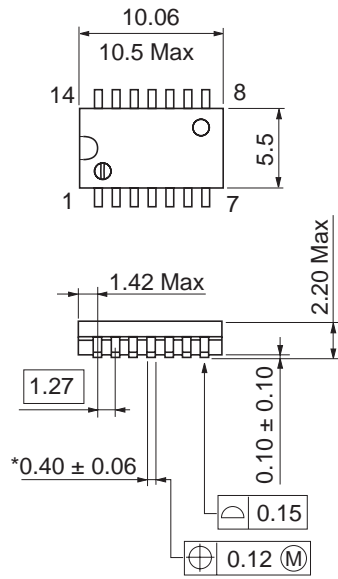


Waveforms – 2



Package Dimensions

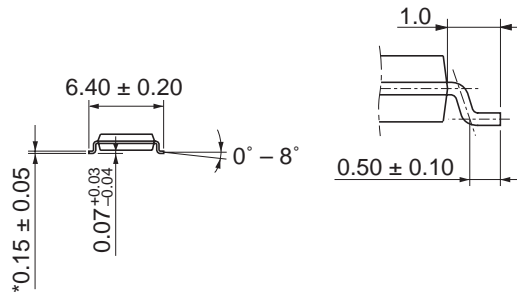
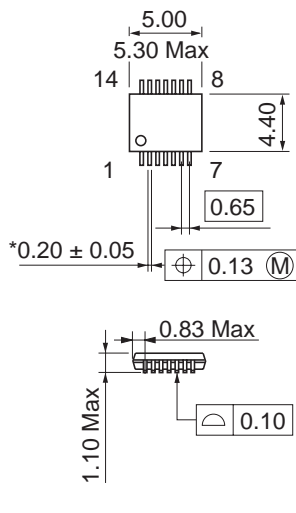
As of January, 2003  
Unit: mm



\*Ni/Pd/Au plating

Package Code	FP-14DAV
JEDEC	—
JEITA	Conforms
Mass (reference value)	0.23 g

As of January, 2003  
Unit: mm



\*Ni/Pd/Au plating

Package Code	TTP-14DV
JEDEC	—
JEITA	—
Mass (reference value)	0.05 g



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