

# RD74LVC2G125

## Dual Bus Buffer with 3–state Output

REJ03D0753–0100

Rev.1.00

Jul 26, 2006

### Description

The RD74LVC2G125 has dual bus buffer with 3–state output in an 8-pin package. Low voltage and high-speed operation is suitable for the battery powered products (e.g., notebook computers), and the low power consumption extends the battery life.

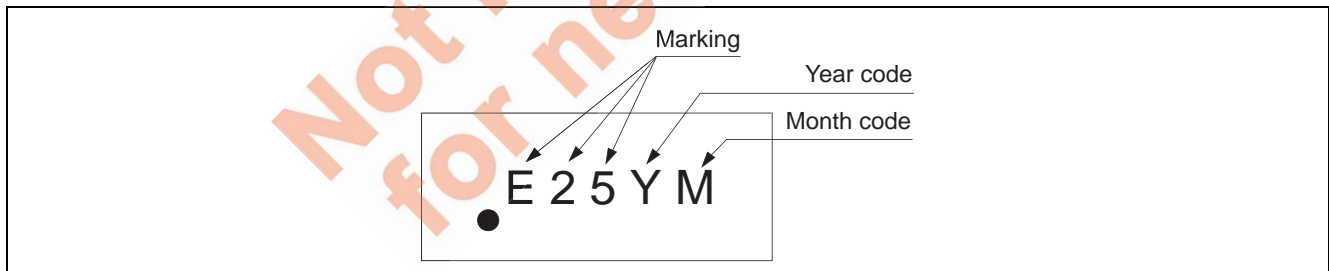
### Features

- The basic gate function is lined up as renesas uni logic series.
- Supply voltage range: 1.65 to 5.5 V
- Operating temperature range: –40 to +85°C
- All inputs:  $V_{IH}(\text{Max.}) = 5.5 \text{ V}$  (@ $V_{CC} = 0 \text{ V}$  to 5.5 V)
- All outputs:  $V_{O}(\text{Max.}) = 5.5 \text{ V}$  (@ $V_{CC} = 0 \text{ V}$ )
- Output current:
  - $\pm 4 \text{ mA}$  (@ $V_{CC} = 1.65 \text{ V}$ )
  - $\pm 8 \text{ mA}$  (@ $V_{CC} = 2.3 \text{ V}$ )
  - $\pm 24 \text{ mA}$  (@ $V_{CC} = 3.0 \text{ V}$ )
  - $\pm 32 \text{ mA}$  (@ $V_{CC} = 4.5 \text{ V}$ )

- Ordering Information

Part Name	Package Type	Package Code (Previous Code)	Package Abbreviation	Taping Abbreviation (Quantity)
RD74LVC2G125WPE	WCSP–8 pin	SXBG0008LA–A (TBS–8BV)	WP	E (3,000 pcs/reel)

### Article Indication

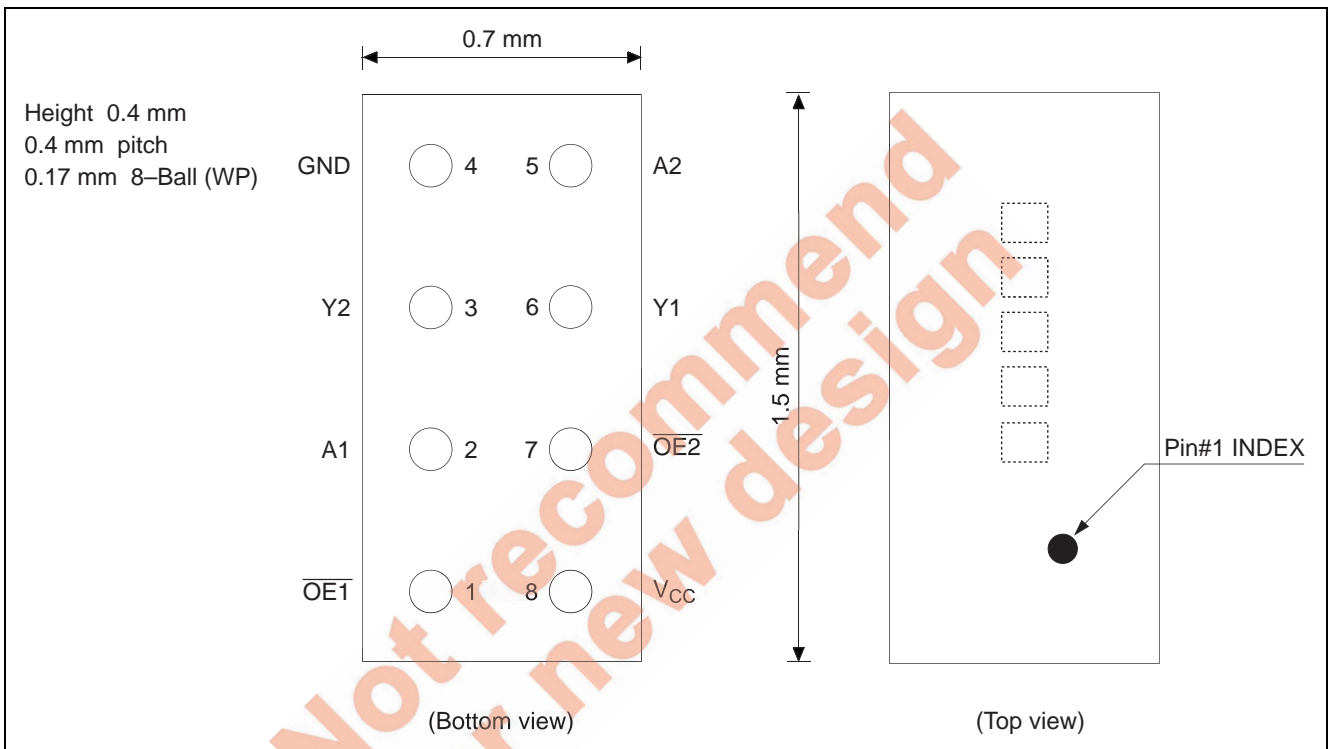


**Function Table**

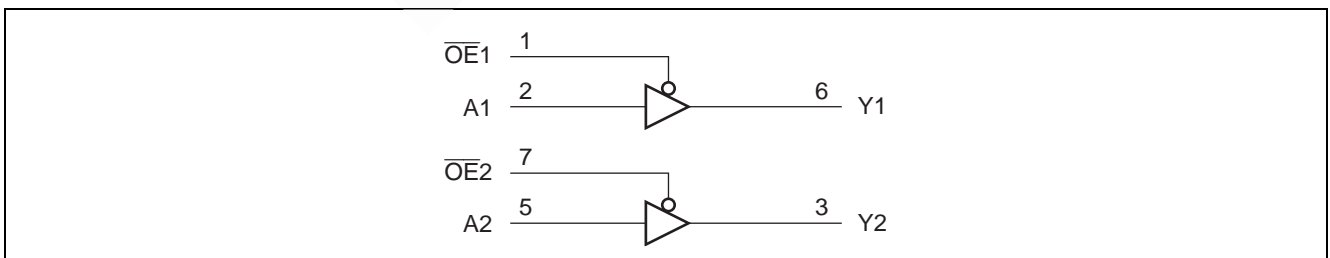
Inputs		Output Y
$\overline{OE}$	A	
L	H	H
L	L	L
H	X	Z

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

**Pin Arrangement**



**Logic Diagram**



## Absolute Maximum Ratings

Item	Symbol	Ratings	Unit	Test Conditions
Supply voltage range	$V_{CC}$	-0.5 to 6.5	V	
Input voltage range <sup>*1</sup>	$V_I$	-0.5 to 6.5	V	
Output voltage range <sup>*1, 2</sup>	$V_O$	-0.5 to $V_{CC} + 0.5$	V	Output : H or L
		-0.5 to 6.5		$V_{CC}$ : OFF or Output "Z"
Input clamp current	$I_{IK}$	-50	mA	$V_I < 0$
Output clamp current	$I_{OK}$	-50	mA	$V_O < 0$
Continuous output current	$I_O$	$\pm 50$	mA	$V_O = 0$ to $V_{CC}$
Continuous current through $V_{CC}$ or GND	$I_{CC}$ or $I_{GND}$	$\pm 100$	mA	
Package Thermal impedance	$\theta_{ja}$	140	$^{\circ}\text{C}/\text{W}$	WP
Storage temperature	$T_{stg}$	-65 to 150	$^{\circ}\text{C}$	

Notes: 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.

- The input and output voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
- This value is limited to 5.5 V maximum.

## Recommended Operating Conditions

Item	Symbol	Min	Max	Unit	Conditions
Supply voltage range	$V_{CC}$	1.65	5.5	V	
Input voltage range	$V_I$	0	5.5	V	
Output voltage range	$V_O$	0	$V_{CC}$	V	
Output current	$I_{OL}$	—	4	mA	$V_{CC} = 1.65\text{ V}$
		—	8		$V_{CC} = 2.3\text{ V}$
		—	16		$V_{CC} = 3.0\text{ V}$
		—	24		$V_{CC} = 4.5\text{ V}$
		—	32		$V_{CC} = 4.5\text{ V}$
	$I_{OH}$	—	-4		$V_{CC} = 1.65\text{ V}$
		—	-8		$V_{CC} = 2.3\text{ V}$
		—	-16		$V_{CC} = 3.0\text{ V}$
		—	-24		$V_{CC} = 4.5\text{ V}$
		—	-32		$V_{CC} = 4.5\text{ V}$
Input transition rise or fall rate	$\Delta t / \Delta v$	0	20	ns / V	$V_{CC} = 1.65$ to $1.95\text{ V}$ , 2.3 to $2.7\text{ V}$
		0	10		$V_{CC} = 3.0$ to $3.6\text{ V}$
		0	5		$V_{CC} = 4.5$ to $5.5\text{ V}$
Operating free-air temperature	$T_a$	-40	85	$^{\circ}\text{C}$	

Note: Unused or floating inputs must be held high or low.

## Electrical Characteristics

Ta = -40 to 85°C

Item	Symbol	V <sub>CC</sub> (V)	Min	Typ	Max	Unit	Test condition
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	—	—		
		3.0 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		
		2.3 to 2.7	—	—	0.7		
		3.0 to 3.6	—	—	0.8		
		4.5 to 5.5	—	—	V <sub>CC</sub> ×0.3		
Output voltage	V <sub>OH</sub>	Min to Max	V <sub>CC</sub> -0.1	—	—	V	I <sub>OH</sub> = -100 μA
		1.65	1.2	—	—		I <sub>OH</sub> = -4 mA
		2.3	1.9	—	—		I <sub>OH</sub> = -8 mA
		3.0	2.4	—	—		I <sub>OH</sub> = -16 mA
			2.3	—	—		I <sub>OH</sub> = -24 mA
		4.5	3.8	—	—		I <sub>OH</sub> = -32 mA
	V <sub>OL</sub>	Min to Max	—	—	0.1		I <sub>OL</sub> = 100 μA
		1.65	—	—	0.45		I <sub>OL</sub> = 4 mA
		2.3	—	—	0.3		I <sub>OL</sub> = 8 mA
		3.0	—	—	0.4		I <sub>OL</sub> = 16 mA
			—	—	0.55		I <sub>OL</sub> = 24 mA
		4.5	—	—	0.55		I <sub>OL</sub> = 32 mA
Input current	I <sub>IN</sub>	0 to 5.5	—	—	±5	μA	V <sub>IN</sub> = 5.5 V or GND
Off state Output current	I <sub>OZ</sub>	5.5	—	—	10	μA	V <sub>O</sub> = 5.5 V or GND
Quiescent supply current	I <sub>CC</sub>	1.65 to 5.5	—	—	10	μA	V <sub>IN</sub> = V <sub>CC</sub> or GND, I <sub>O</sub> = 0
	ΔI <sub>CC</sub>	3 to 5.5	—	—	500		One input at V <sub>CC</sub> -0.6 V, Other input at V <sub>CC</sub> or GND
Output leakage current	I <sub>OFF</sub>	0	—	—	±10	μA	V <sub>IN</sub> or V <sub>O</sub> = 0 to 5.5 V
Input capacitance	C <sub>IN</sub>	3.3	—	3.5	—	pF	V <sub>IN</sub> = V <sub>CC</sub> or GND

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

## Switching Characteristics

$V_{CC} = 1.8 \pm 0.15 \text{ V}$

Item	Symbol	Ta = -40 to 85°C		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Max				
Propagation delay time	t <sub>PLH</sub> t <sub>PHL</sub>	2.8	8.0	ns	C <sub>L</sub> = 30 pF, R <sub>L</sub> = 1.0 kΩ	A	Y
Output enable time	t <sub>ZH</sub> t <sub>ZL</sub>	3.3	9.4	ns		$\overline{\text{OE}}$	Y
Output disable time	t <sub>HZ</sub> t <sub>LZ</sub>	1.3	9.2	ns		$\overline{\text{OE}}$	Y

$V_{CC} = 2.5 \pm 0.2 \text{ V}$

Item	Symbol	Ta = -40 to 85°C		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Max				
Propagation delay time	t <sub>PLH</sub> t <sub>PHL</sub>	1.2	5.5	ns	C <sub>L</sub> = 30 pF, R <sub>L</sub> = 500 Ω	A	Y
Output enable time	t <sub>ZH</sub> t <sub>ZL</sub>	1.5	6.6	ns		$\overline{\text{OE}}$	Y
Output disable time	t <sub>HZ</sub> t <sub>LZ</sub>	1.0	5.0	ns		$\overline{\text{OE}}$	Y

$V_{CC} = 3.3 \pm 0.3 \text{ V}$

Item	Symbol	Ta = -40 to 85°C		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Max				
Propagation delay time	t <sub>PLH</sub> t <sub>PHL</sub>	1.0	4.5	ns	C <sub>L</sub> = 50 pF, R <sub>L</sub> = 500 Ω	A	Y
Output enable time	t <sub>ZH</sub> t <sub>ZL</sub>	1.0	5.3	ns		$\overline{\text{OE}}$	Y
Output disable time	t <sub>HZ</sub> t <sub>LZ</sub>	1.0	5.0	ns		$\overline{\text{OE}}$	Y

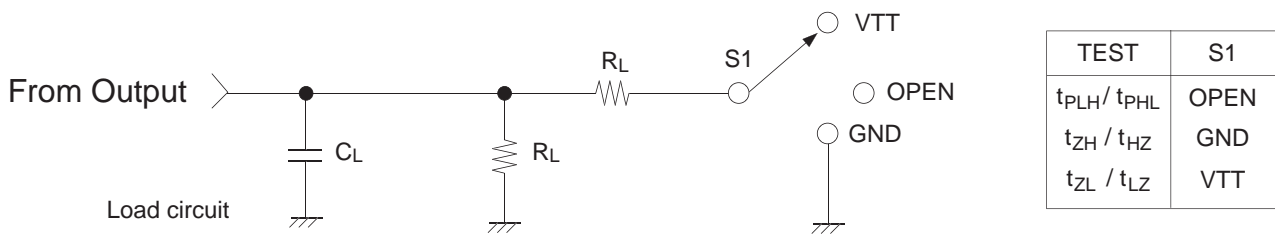
$V_{CC} = 5.0 \pm 0.5 \text{ V}$

Item	Symbol	Ta = -40 to 85°C		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Max				
Propagation delay time	t <sub>PLH</sub> t <sub>PHL</sub>	1.0	4.0	ns	C <sub>L</sub> = 50 pF, R <sub>L</sub> = 500 Ω	A	Y
Output enable time	t <sub>ZH</sub> t <sub>ZL</sub>	1.0	5.0	ns		$\overline{\text{OE}}$	Y
Output disable time	t <sub>HZ</sub> t <sub>LZ</sub>	1.0	4.2	ns		$\overline{\text{OE}}$	Y

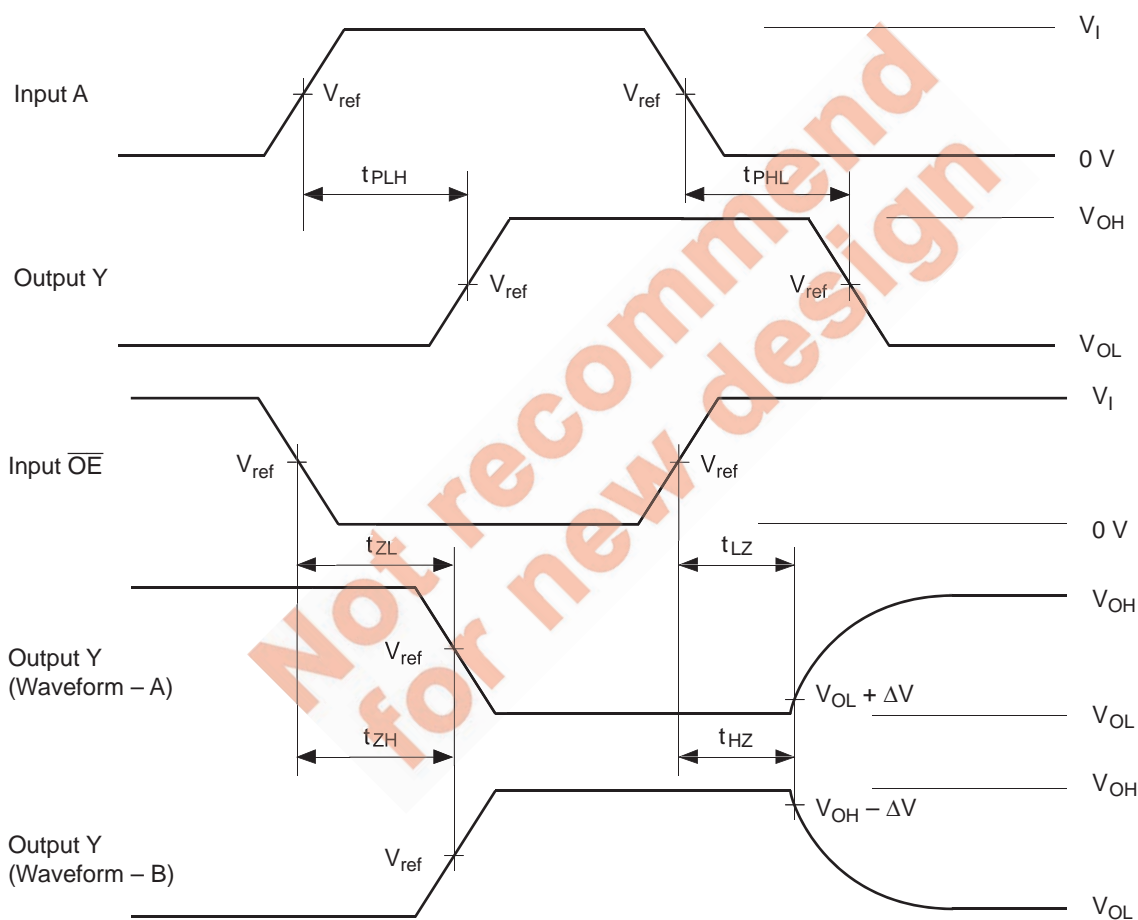
## Operating Characteristics

Item	Symbol	V <sub>CC</sub> (V)	Ta = 25°C			Unit	Test Conditions
			Min	Typ	Max		
Power dissipation capacitance	C <sub>PD</sub>	1.8	—	19	—	pF	f = 10 MHz
		2.5	—	19	—		
		3.3	—	20	—		
		5.0	—	22	—		

## Test Circuit

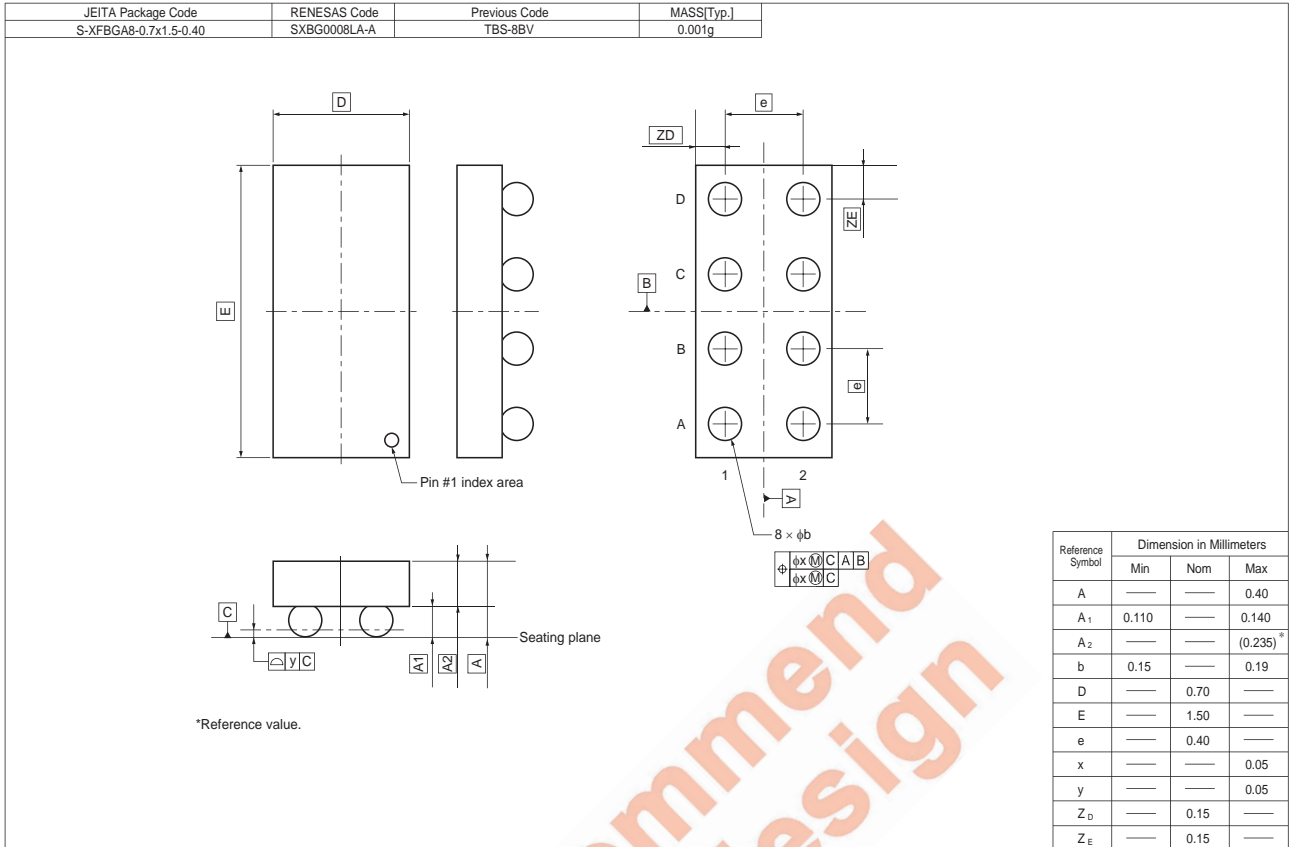


$V_{CC}$ (V)	Input		$V_{ref}$	VTT	$C_L$	$R_L$	$\Delta V$
	$V_I$	$t_r / t_f$					
$1.8 \pm 0.15$	$V_{CC}$	$\leq 2$ ns	$V_{CC} / 2$	$2 \times V_{CC}$	30 pF	1.0 k $\Omega$	0.15 V
$2.5 \pm 0.2$	$V_{CC}$	$\leq 2$ ns	$V_{CC} / 2$	$2 \times V_{CC}$	30 pF	500 $\Omega$	0.15 V
$3.3 \pm 0.3$	$V_{CC}$	$\leq 2.5$ ns	1.5 V	6 V	50 pF	500 $\Omega$	0.3 V
$5.0 \pm 0.5$	$V_{CC}$	$\leq 2.5$ ns	$V_{CC} / 2$	$2 \times V_{CC}$	50 pF	500 $\Omega$	0.3 V



- Notes:
- $C_L$  includes probe and jig capacitance.
  - Waveform-A is for an output with internal conditions such that the output is low except when disabled by the output control.
  - Waveform-B is for an output with internal conditions such that the output is high except when disabled by the output control.
  - All input pulses are supplied by generators having the following characteristics:  
PRR  $\leq$  10MHz,  $Z_o = 50 \Omega$ .
  - The output are measured one at a time with one transition per measurement.

Package Dimensions



Not recommend for new design

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