

To our customers,

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## Old Company Name in Catalogs and Other Documents

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

April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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# HD74LV2G53A

## 2-channel Analog Multiplexer / Demultiplexer

REJ03D0094-0400Z  
(Previous ADE-205-567C (Z))  
Rev.4.00  
Sep.25.2003

### Description

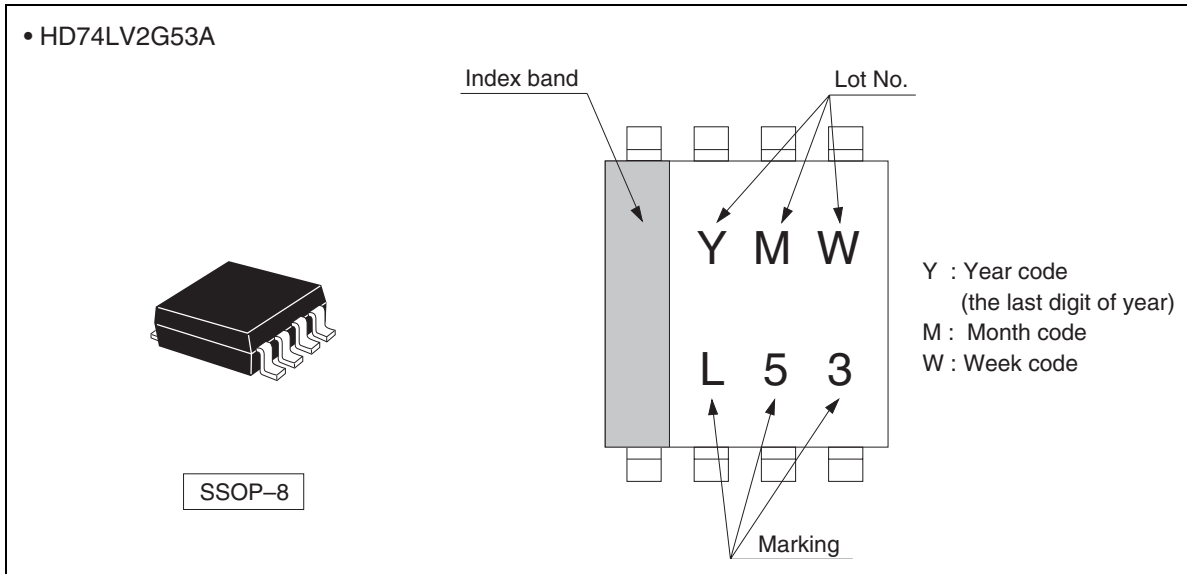
The HD74LV2G53A has 2-channel analog multiplexer / demultiplexer in an 8 pin package. Applications include signal gating, chopping, modulation, or demodulation (modem), and signal multiplexing for analog to digital and digital to analog conversion systems. Low voltage and high-speed operation is suitable 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.
- Supplied on emboss taping for high-speed automatic mounting.
- Electrical characteristics equivalent to the HD74LV4053A  
Supply voltage range : 1.65 to 5.5 V  
Operating temperature range : -40 to +85°C
- Control inputs  $V_{IH}$  (Max.) = 5.5 V (@ $V_{CC}$  = 0 V to 5.5 V)
- Control inputs have hysteresis voltage for the slow transition.
- Ordering Information

Part Name	Package Type	Package Code	Package Abbreviation	Taping Abbreviation (Quantity)
HD74LV2G53AUSE	SSOP-8 pin	TTP-8DBV	US	E (3,000 pcs/reel)

Outline and Article Indication

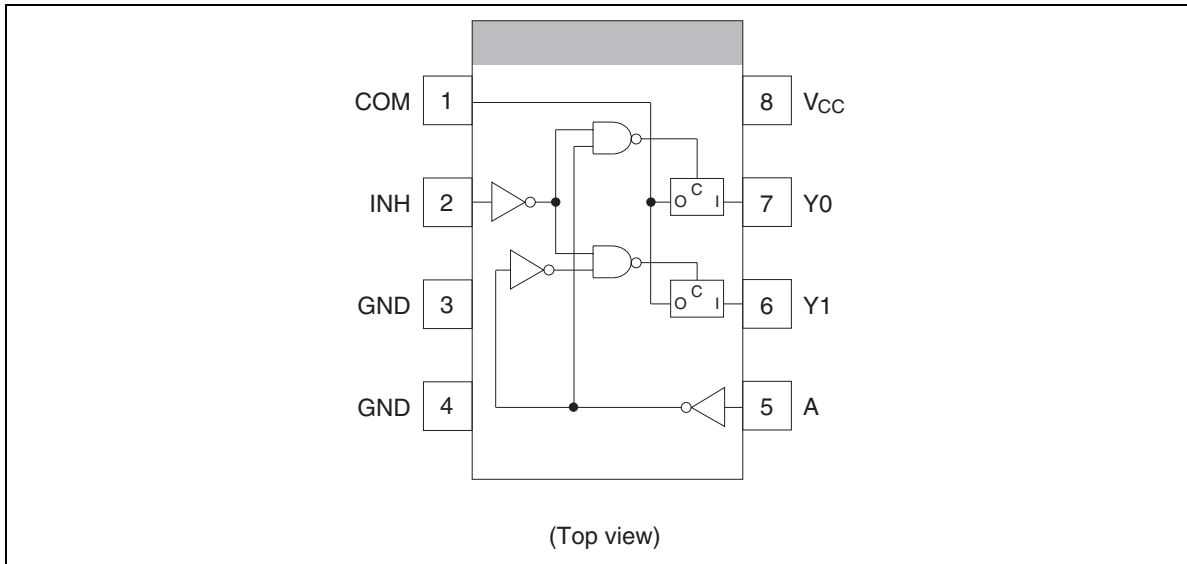


Function Table

Control inputs		On channel
INH	A	
H	X	None
L	H	Y1
L	L	Y0

H : High level  
 L : Low level  
 X : Immaterial

**Pin Arrangement**



**Absolute Maximum Ratings**

Item	Symbol	Ratings	Unit	Test Conditions
Supply voltage range	$V_{CC}$	-0.5 to 7.0	V	
Input voltage range <sup>*1</sup>	$V_I$	-0.5 to 7.0	V	
Output voltage range <sup>*1, 2</sup>	$V_O$	-0.5 to $V_{CC} + 0.5$	V	Output : H or L
Input clamp current	$I_{IK}$	-20	mA	$V_I < 0$
Output clamp current	$I_{OK}$	$\pm 50$	mA	$V_O < 0$ or $V_O > V_{CC}$
Continuous output current	$I_O$	$\pm 25$	mA	$V_O = 0$ to $V_{CC}$
Continuous current through $V_{CC}$ or GND	$I_{CC}$ or $I_{GND}$	$\pm 50$	mA	
Maximum power dissipation at $T_a = 25^\circ\text{C}$ (in still air) <sup>*3</sup>	$P_T$	200	mW	
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.
  - 1. The input and output voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
  - 2. This value is limited to 5.5 V maximum.
  - 3. The maximum package power dissipation was calculated using a junction temperature of 150 $^\circ\text{C}$ .

**Recommended Operating Conditions**

<b>Item</b>	<b>Symbol</b>	<b>Min</b>	<b>Max</b>	<b>Unit</b>	<b>Conditions</b>
Supply voltage range	$V_{CC}$	1.65	5.5	V	
Input voltage range	$V_I$	0	5.5	V	
Input / output voltage range	$V_{IO}$	0	$V_{CC}$	V	
Input transition rise or fall rate	$\Delta t / \Delta v$	0	300	ns / V	$V_{CC} = 1.65$ to $1.95$ V
		0	200		$V_{CC} = 2.3$ to $2.7$ V
		0	100		$V_{CC} = 3.0$ to $3.6$ V
		0	20		$V_{CC} = 4.5$ to $5.5$ V
Operating free-air temperature	$T_a$	-40	85	°C	

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

Electrical Characteristic

Item	Symbol	V <sub>CC</sub> (V) *	T <sub>a</sub> = 25°C			T <sub>a</sub> = -40 to 85°C			Unit	Test Conditions
			Min	Typ	Max	Min	Typ	Max		
Input voltage	V <sub>IH</sub>	1.65 to 1.95	—	—	—	V <sub>CC</sub> ×0.75	—	—	V	Control input only
		2.3 to 2.7	—	—	—	V <sub>CC</sub> ×0.7	—	—		
		3.0 to 3.6	—	—	—	V <sub>CC</sub> ×0.7	—	—		
		4.5 to 5.5	—	—	—	V <sub>CC</sub> ×0.7	—	—		
	V <sub>IL</sub>	1.65 to 1.95	—	—	—	—	—	V <sub>CC</sub> ×0.25		
		2.3 to 2.7	—	—	—	—	—	V <sub>CC</sub> ×0.3		
		3.0 to 3.6	—	—	—	—	—	V <sub>CC</sub> ×0.3		
		4.5 to 5.5	—	—	—	—	—	V <sub>CC</sub> ×0.3		
Hysteresis voltage	V <sub>H</sub>	1.8	—	—	—	—	0.25	—	V	V <sub>T</sub> <sup>+</sup> - V <sub>T</sub> <sup>-</sup>
		2.5	—	—	—	—	0.30	—		
		3.3	—	—	—	—	0.35	—		
		5.0	—	—	—	—	0.45	—		
On-state switch resistance	R <sub>ON</sub>	1.65	—	120	360	—	—	450	Ω	V <sub>IN</sub> = V <sub>CC</sub> or GND V <sub>INH</sub> = V <sub>IL</sub> I <sub>T</sub> = 2 mA
		2.3	—	60	180	—	—	225		
		3.0	—	50	150	—	—	190		
		4.5	—	40	75	—	—	100		
Peak on resistance	R <sub>ON(P)</sub>	1.65	—	400	1100	—	—	1400	Ω	V <sub>IN</sub> = V <sub>CC</sub> to GND V <sub>INH</sub> = V <sub>IL</sub> I <sub>T</sub> = 2 mA
		2.3	—	200	500	—	—	600		
		3.0	—	90	180	—	—	225		
		4.5	—	50	100	—	—	125		
Difference of on- state resistance between switches	ΔR <sub>ON</sub>	1.65	—	40	120	—	—	160	Ω	V <sub>IN</sub> = V <sub>CC</sub> to GND V <sub>INH</sub> = V <sub>IL</sub> I <sub>T</sub> = 2 mA
		2.3	—	20	30	—	—	40		
		3.0	—	10	20	—	—	30		
		4.5	—	7	15	—	—	20		
Off-state switch leakage current	I <sub>S(OFF)</sub>	5.5	—	—	±0.1	—	—	±1.0	μA	V <sub>IN</sub> = V <sub>CC</sub> , V <sub>OUT</sub> = GND or V <sub>IN</sub> = GND, V <sub>O</sub> = V <sub>CC</sub> , V <sub>INH</sub> = V <sub>IH</sub>
On-state switch leakage current	I <sub>S(ON)</sub>	5.5	—	—	±0.1	—	—	±1.0	μA	V <sub>IN</sub> = V <sub>CC</sub> or GND V <sub>INH</sub> = V <sub>IL</sub>
Input current	I <sub>IN</sub>	0 to 5.5	—	—	±0.1	—	—	±1.0	μA	V <sub>IN</sub> = 5.5 V or GND
Quiescent supply current	I <sub>CC</sub>	5.5	—	—	—	—	—	10	μA	V <sub>IN</sub> = V <sub>CC</sub> or GND
Control input capacitance	C <sub>IC</sub>	—	—	3.5	—	—	—	—	pF	
Switch terminal capacitance	C <sub>IN/OUT</sub>	—	—	6.0	—	—	—	—	pF	
Feed through capacitance	C <sub>IN-OUT</sub>	—	—	0.5	—	—	—	—	pF	

Switching Characteristics

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

Item	Symbol	$T_a = 25^\circ\text{C}$			$T_a = -40 \text{ to } 85^\circ\text{C}$		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Propagation delay time	$t_{PLH}$	—	4.5	13.0	—	19.0	ns	$C_L = 15 \text{ pF}$	COM or Yn	Yn or COM
	$t_{PHL}$	—	11.0	23.0	—	29.0		$C_L = 50 \text{ pF}$		
Enable time	$t_{ZH}$	—	13.0	30.0	—	35.0	ns	$C_L = 15 \text{ pF}$	INH	COM or Yn
	$t_{ZL}$	—	18.0	47.0	—	54.0		$C_L = 50 \text{ pF}$		
Disable time	$t_{HZ}$	—	13.0	25.0	—	30.0	ns	$C_L = 15 \text{ pF}$	INH	COM or Yn
	$t_{LZ}$	—	20.0	38.0	—	45.0		$C_L = 50 \text{ pF}$		

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

Item	Symbol	$T_a = 25^\circ\text{C}$			$T_a = -40 \text{ to } 85^\circ\text{C}$		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Propagation delay time	$t_{PLH}$	—	2.5	10.0	—	16.0	ns	$C_L = 15 \text{ pF}$	COM or Yn	Yn or COM
	$t_{PHL}$	—	5.0	12.0	—	18.0		$C_L = 50 \text{ pF}$		
Enable time	$t_{ZH}$	—	7.0	18.0	—	23.0	ns	$C_L = 15 \text{ pF}$	INH	COM or Yn
	$t_{ZL}$	—	9.0	28.0	—	35.0		$C_L = 50 \text{ pF}$		
Disable time	$t_{HZ}$	—	9.0	18.0	—	23.0	ns	$C_L = 15 \text{ pF}$	INH	COM or Yn
	$t_{LZ}$	—	13.0	28.0	—	35.0		$C_L = 50 \text{ pF}$		

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

Item	Symbol	$T_a = 25^\circ\text{C}$			$T_a = -40 \text{ to } 85^\circ\text{C}$		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Propagation delay time	$t_{PLH}$	—	2.0	6.0	—	10.0	ns	$C_L = 15 \text{ pF}$	COM or Yn	Yn or COM
	$t_{PHL}$	—	4.0	9.0	—	12.0		$C_L = 50 \text{ pF}$		
Enable time	$t_{ZH}$	—	5.0	12.0	—	15.0	ns	$C_L = 15 \text{ pF}$	INH	COM or Yn
	$t_{ZL}$	—	7.0	20.0	—	25.0		$C_L = 50 \text{ pF}$		
Disable time	$t_{HZ}$	—	7.0	12.0	—	15.0	ns	$C_L = 15 \text{ pF}$	INH	COM or Yn
	$t_{LZ}$	—	10.0	20.0	—	25.0		$C_L = 50 \text{ pF}$		



**Switching Characteristics (cont)**

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

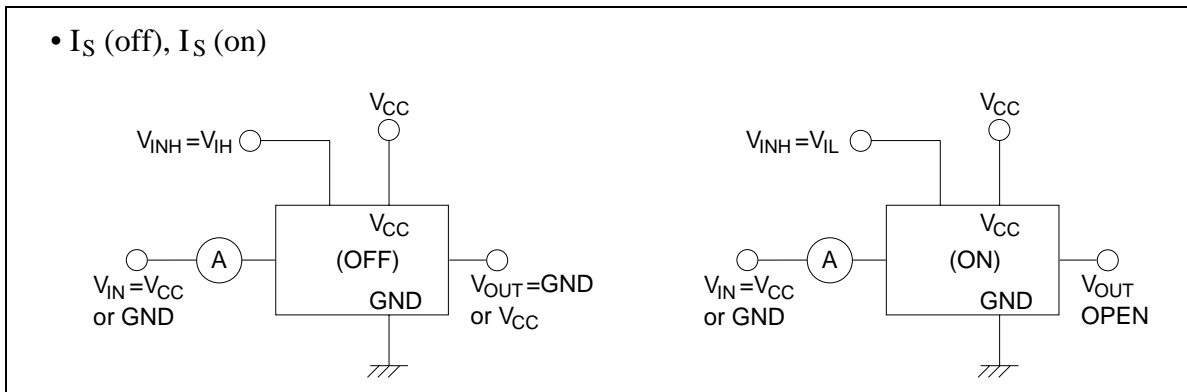
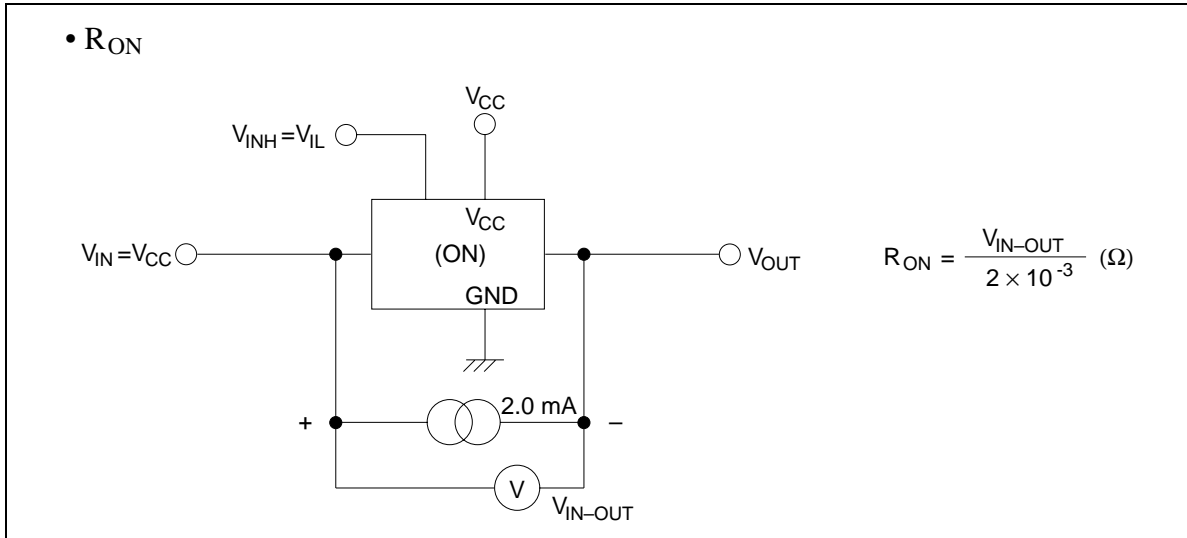
Item	Symbol	$T_a = 25^\circ\text{C}$			$T_a = -40$ to $85^\circ\text{C}$		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Propagation delay time	$t_{PLH}$	—	1.5	4.0	—	7.0	ns	$C_L = 15$ pF $C_L = 50$ pF	COM or Yn	Yn or COM
	$t_{PHL}$	—	3.0	6.0	—	8.0				
Enable time	$t_{ZH}$	—	4.0	8.0	—	10.0	ns	$C_L = 15$ pF $C_L = 50$ pF	INH	COM or Yn
	$t_{ZL}$	—	5.0	14.0	—	18.0				
Disable time	$t_{HZ}$	—	5.0	8.0	—	10.0	ns	$C_L = 15$ pF $C_L = 50$ pF	INH	COM or Yn
	$t_{LZ}$	—	8.0	14.0	—	18.0				

**Operating Characteristics**

- $C_L = 50$  pF

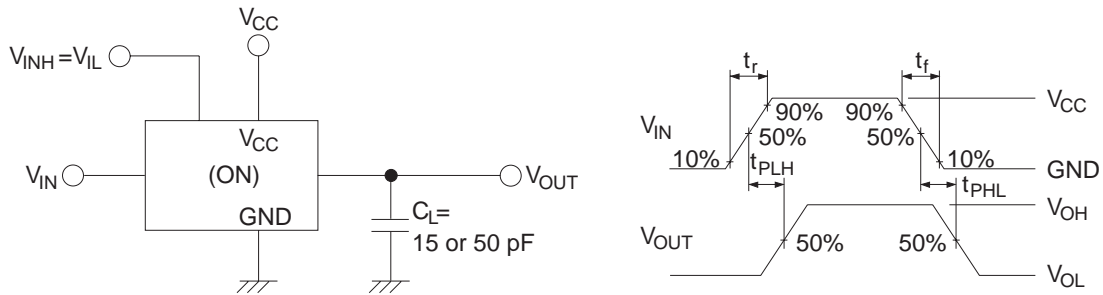
Item	Symbol	$V_{CC}$ (V)	$T_a = 25^\circ\text{C}$			Unit	Test Conditions
			Min	Typ	Max		
Power dissipation capacitance	$C_{PD}$	3.3 5.0	—	7.5	—	pF	$f = 10$ MHz
			—	8.0	—		

Test Circuit



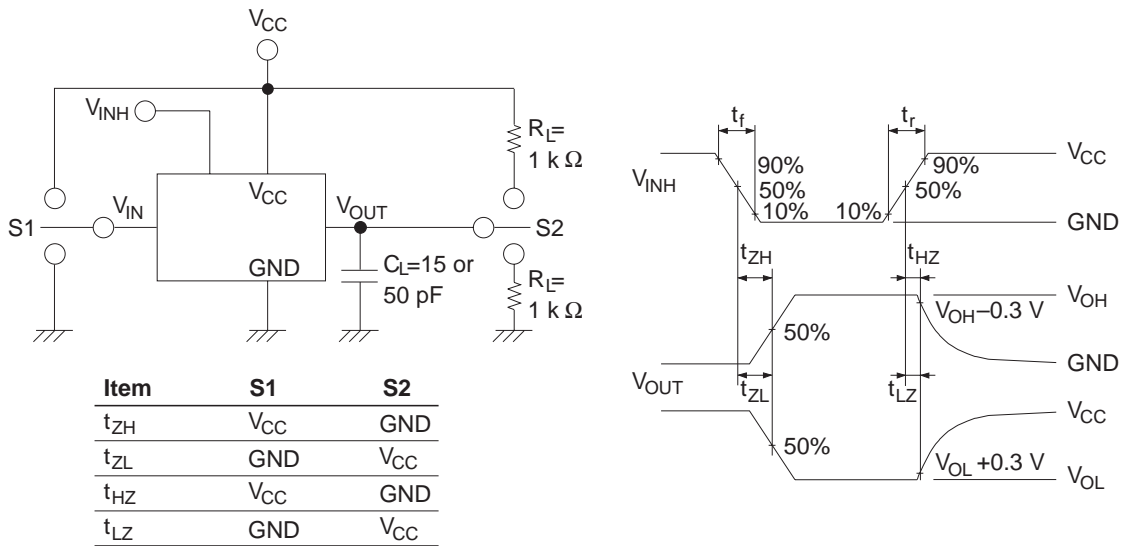
## HD74LV2G53A

### • $t_{PLH}, t_{PHL}$



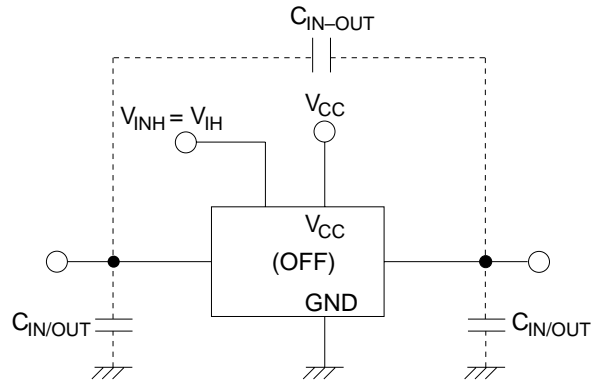
- Notes: 1. Input waveform :  $PRR \leq 1 \text{ MHz}$ ,  $Z_o = 50 \Omega$ ,  $t_r \leq 3 \text{ ns}$ ,  $t_f \leq 3 \text{ ns}$ .  
 2. The output are measured one at a time with one transition per measurement.

### • $t_{ZH}, t_{ZL} / t_{HZ}, t_{LZ}$

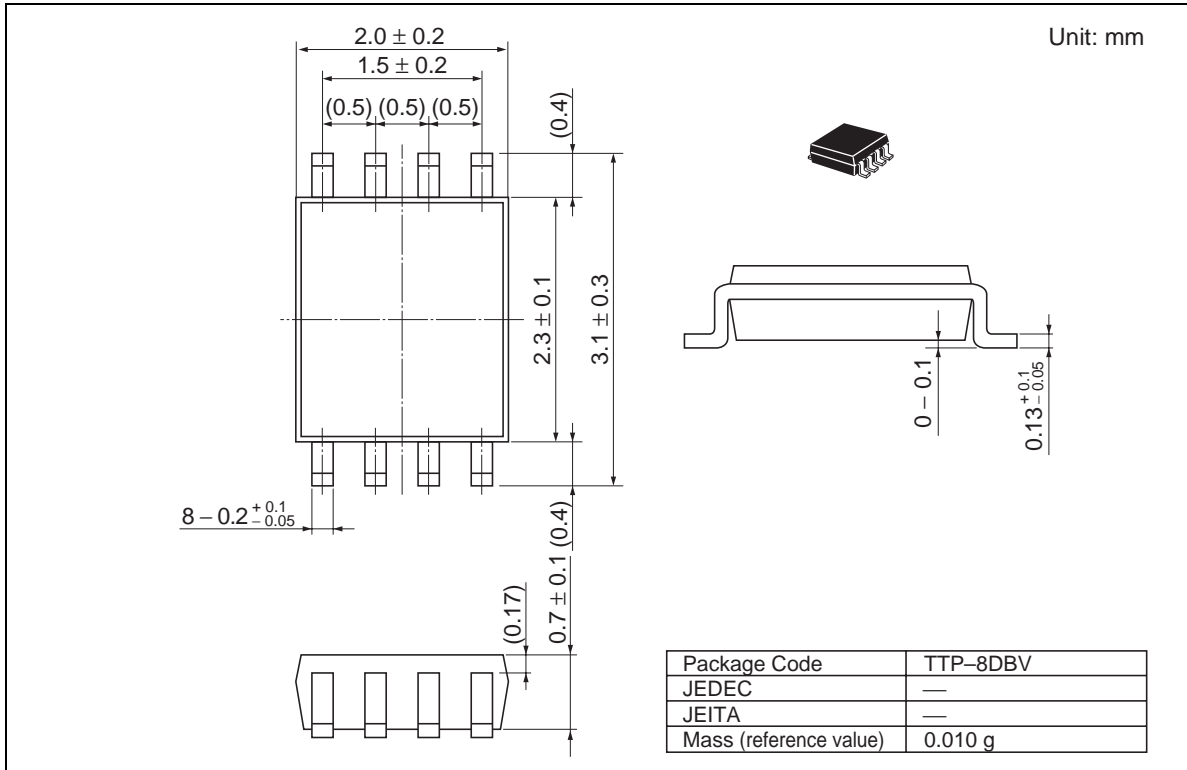


- Notes: 1. Input waveform :  $PRR \leq 1 \text{ MHz}$ ,  $Z_o = 50 \Omega$ ,  $t_r \leq 3 \text{ ns}$ ,  $t_f \leq 3 \text{ ns}$ .  
 2. Waveform – A is for an output with internal conditions such that the output is low except when disabled by the output control.  
 3. Waveform – B is for an output with internal conditions such that the output is high except when disabled by the output control.  
 4. The output are measured one at a time with one transition per measurement.

- $C_{IN/OUT}$ ,  $C_{IN-OUT}$



Package Dimensions



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