

HD74LV2G53A

2-channel Analog Multiplexer / Demultiplexer

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

Description

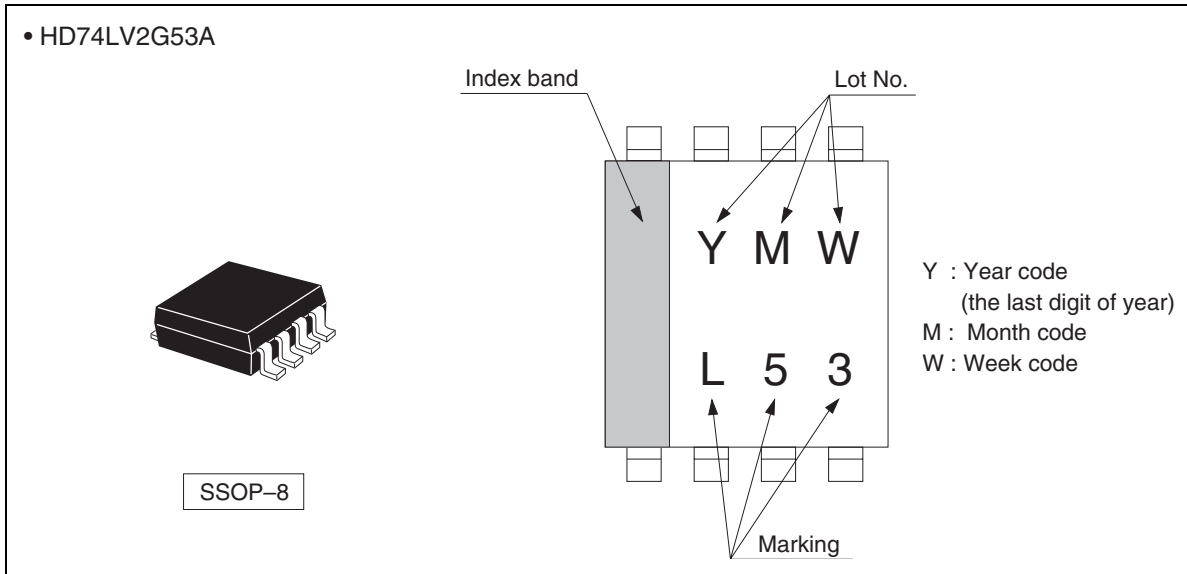
The HD74LV2G53A has 2-channel analog multiplexer / demultiplexer in an 8 pin package. Applications include signal gating, chopping, modulation, or demodulation (modem), and signal multiplexing for analog to digital and digital to analog conversion systems. Low voltage and high-speed operation is suitable 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

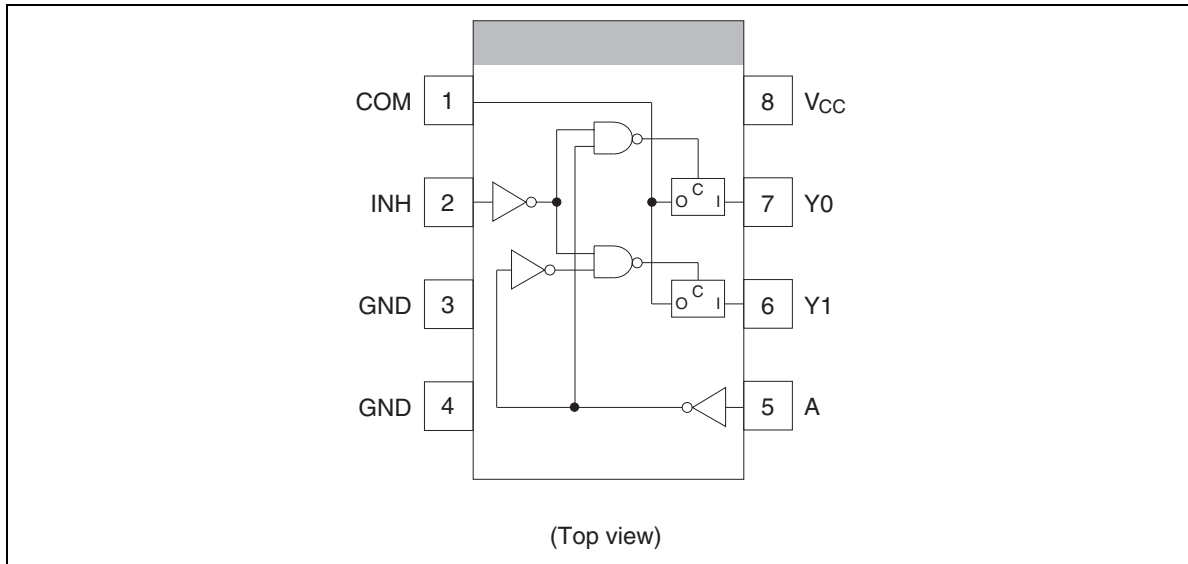


Function Table

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 ^{*1}	V_I	-0.5 to 7.0	V	
Output voltage range ^{*1, 2}	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}	± 50	mA	$V_O < 0$ or $V_O > V_{CC}$
Continuous output current	I_O	± 25	mA	$V_O = 0$ to V_{CC}
Continuous current through V_{CC} or GND	I_{CC} or I_{GND}	± 50	mA	
Maximum power dissipation at $T_a = 25^\circ\text{C}$ (in still air) ^{*3}	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

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	
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 _{CC} (V) *	T _a = 25°C			T _a = -40 to 85°C			Unit	Test Conditions
			Min	Typ	Max	Min	Typ	Max		
Input voltage	V _{IH}	1.65 to 1.95	—	—	—	V _{CC} ×0.75	—	—	V	Control input only
		2.3 to 2.7	—	—	—	V _{CC} ×0.7	—	—		
		3.0 to 3.6	—	—	—	V _{CC} ×0.7	—	—		
		4.5 to 5.5	—	—	—	V _{CC} ×0.7	—	—		
	V _{IL}	1.65 to 1.95	—	—	—	—	—	V _{CC} ×0.25		
		2.3 to 2.7	—	—	—	—	—	V _{CC} ×0.3		
		3.0 to 3.6	—	—	—	—	—	V _{CC} ×0.3		
		4.5 to 5.5	—	—	—	—	—	V _{CC} ×0.3		
Hysteresis voltage	V _H	1.8	—	—	—	—	0.25	—	V	V _T ⁺ - V _T ⁻
		2.5	—	—	—	—	0.30	—		
		3.3	—	—	—	—	0.35	—		
		5.0	—	—	—	—	0.45	—		
On-state switch resistance	R _{ON}	1.65	—	120	360	—	—	450	Ω	V _{IN} = V _{CC} or GND V _{INH} = V _{IL} I _T = 2 mA
		2.3	—	60	180	—	—	225		
		3.0	—	50	150	—	—	190		
		4.5	—	40	75	—	—	100		
Peak on resistance	R _{ON(P)}	1.65	—	400	1100	—	—	1400	Ω	V _{IN} = V _{CC} to GND V _{INH} = V _{IL} I _T = 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 _{ON}	1.65	—	40	120	—	—	160	Ω	V _{IN} = V _{CC} to GND V _{INH} = V _{IL} I _T = 2 mA
		2.3	—	20	30	—	—	40		
		3.0	—	10	20	—	—	30		
		4.5	—	7	15	—	—	20		
Off-state switch leakage current	I _{S(OFF)}	5.5	—	—	±0.1	—	—	±1.0	μA	V _{IN} = V _{CC} , V _{OUT} = GND or V _{IN} = GND, V _O = V _{CC} , V _{INH} = V _{IH}
On-state switch leakage current	I _{S(ON)}	5.5	—	—	±0.1	—	—	±1.0	μA	V _{IN} = V _{CC} or GND V _{INH} = V _{IL}
Input current	I _{IN}	0 to 5.5	—	—	±0.1	—	—	±1.0	μA	V _{IN} = 5.5 V or GND
Quiescent supply current	I _{CC}	5.5	—	—	—	—	—	10	μA	V _{IN} = V _{CC} or GND
Control input capacitance	C _{IC}	—	—	3.5	—	—	—	—	pF	
Switch terminal capacitance	C _{IN / OUT}	—	—	6.0	—	—	—	—	pF	
Feed through capacitance	C _{IN-OUT}	—	—	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

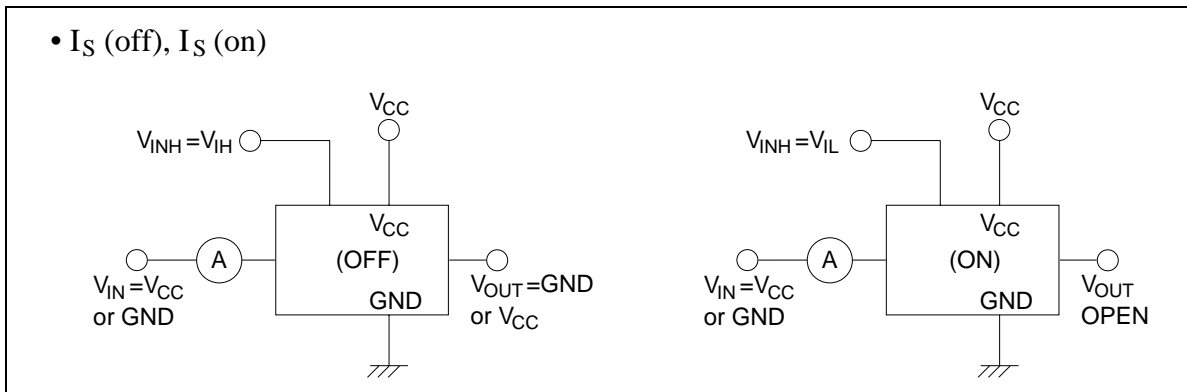
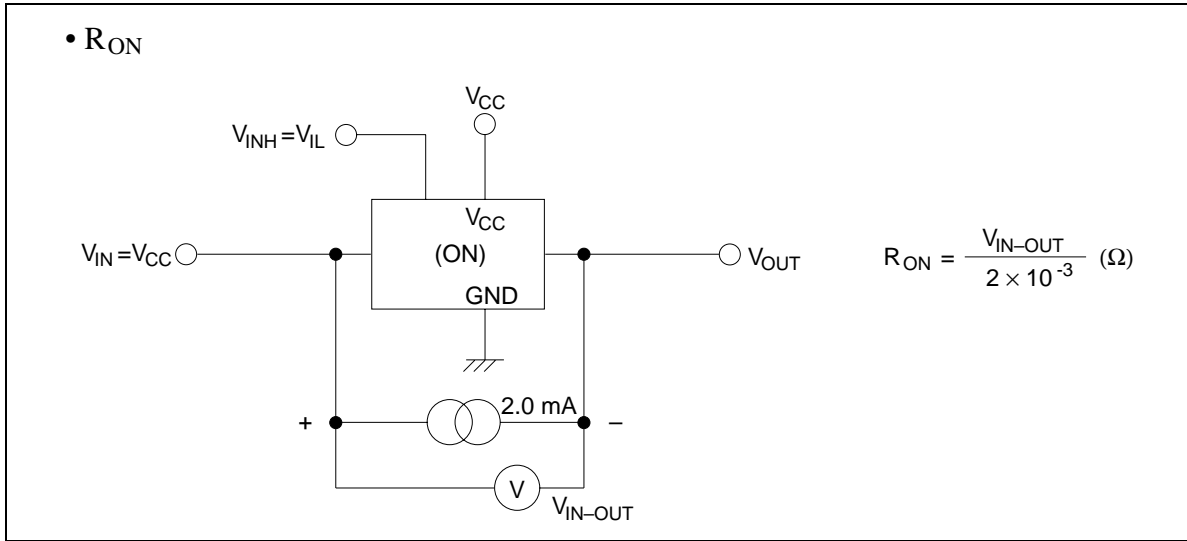
Item	Symbol	$T_a = 25^\circ\text{C}$			$T_a = -40$ to 85°C		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Propagation delay time	t_{PLH}	—	1.5	4.0	—	7.0	ns	$C_L = 15$ pF	COM or Yn	Yn or COM
	t_{PHL}	—	3.0	6.0	—	8.0		$C_L = 50$ pF	Yn	COM
Enable time	t_{ZH}	—	4.0	8.0	—	10.0	ns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

Operating Characteristics

- $C_L = 50$ pF

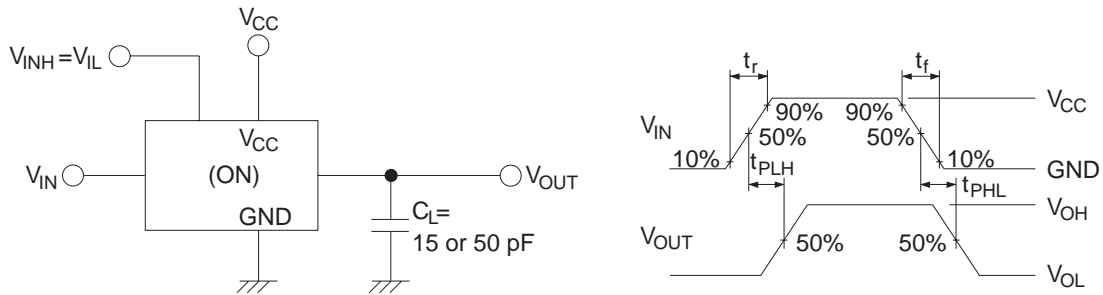
Item	Symbol	V_{CC} (V)	$T_a = 25^\circ\text{C}$			Unit	Test Conditions
			Min	Typ	Max		
Power dissipation capacitance	C_{PD}	3.3	—	7.5	—	pF	$f = 10$ MHz
			5.0	—	8.0		

Test Circuit



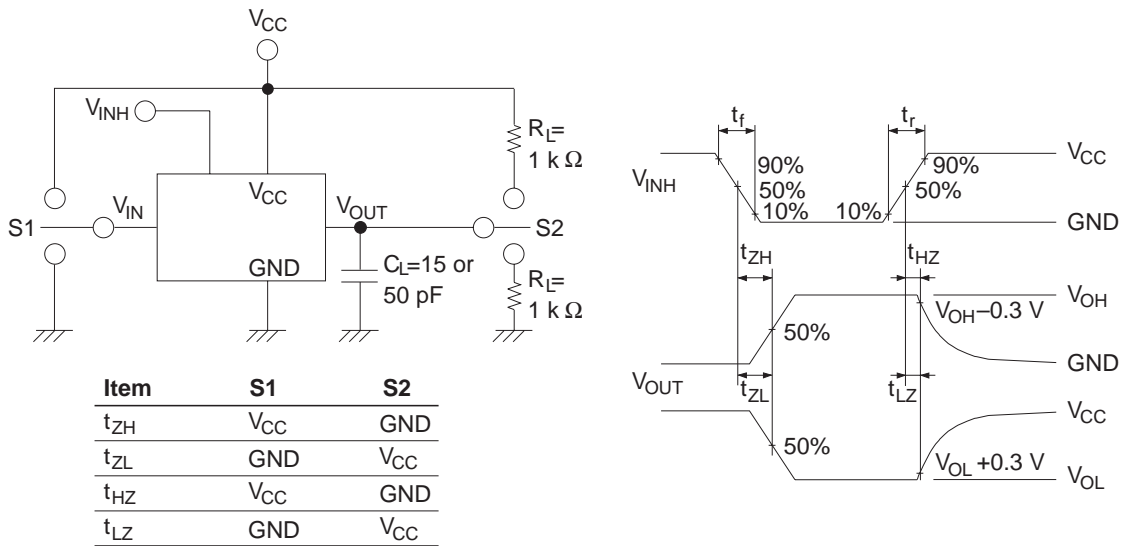
HD74LV2G53A

• t_{PLH}, t_{PHL}



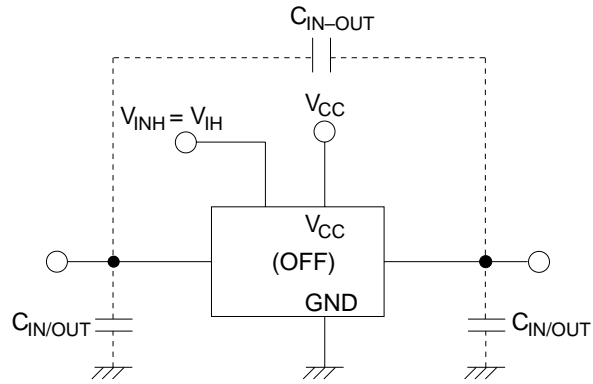
- Notes: 1. Input waveform : $PRR \leq 1$ MHz, $Z_o = 50 \Omega$, $t_r \leq 3$ ns, $t_f \leq 3$ ns.
 2. The output are measured one at a time with one transition per measurement.

• $t_{ZH}, t_{ZL} / t_{HZ}, t_{LZ}$

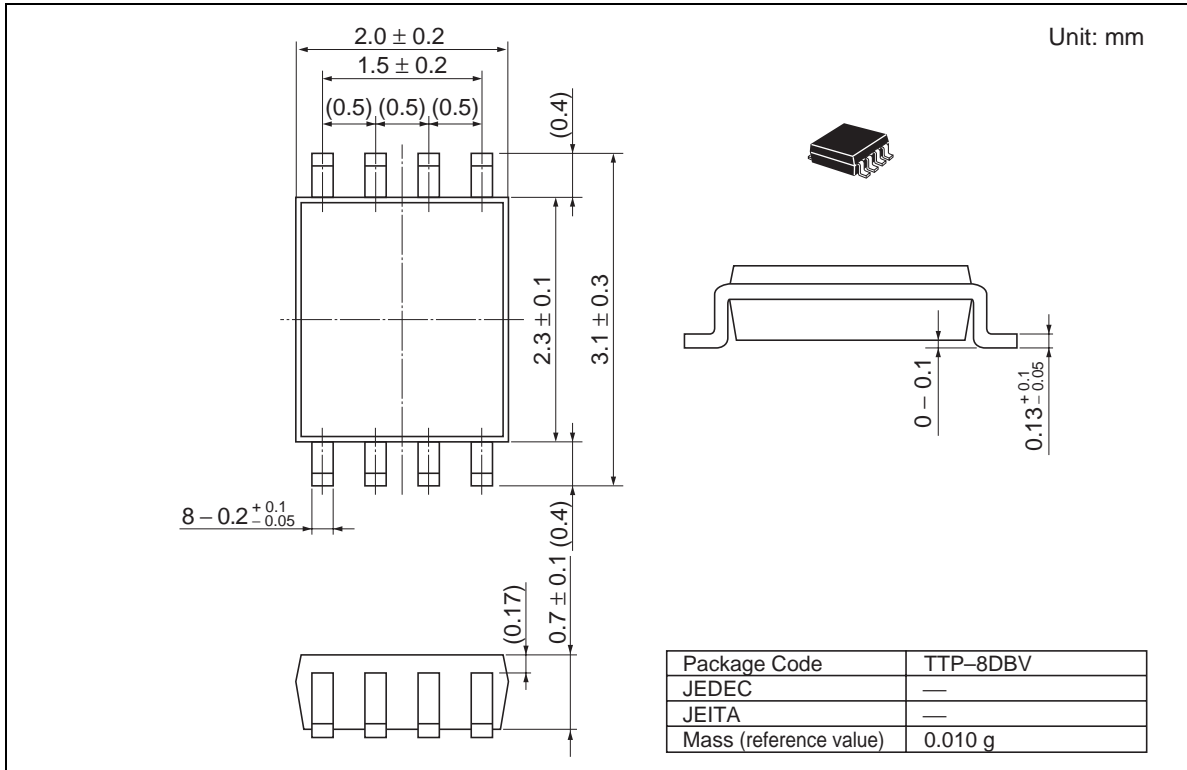


- Notes: 1. Input waveform : $PRR \leq 1$ MHz, $Z_o = 50 \Omega$, $t_r \leq 3$ ns, $t_f \leq 3$ ns.
 2. Waveform – A is for an output with internal conditions such that the output is low except when disabled by the output control.
 3. Waveform – B is for an output with internal conditions such that the 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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Renesas Technology Europe Limited.
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, United Kingdom
Tel: <44> (1628) 585 100, Fax: <44> (1628) 585 900

Renesas Technology Europe GmbH
Dornacher Str. 3, D-85622 Feldkirchen, Germany
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Renesas Technology Hong Kong Ltd.
7/F., North Tower, World Finance Centre, Harbour City, Canton Road, Hong Kong
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Renesas Technology Taiwan Co., Ltd.
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26/F., Ruijin Building, No.205 Maoming Road (S), Shanghai 200020, China
Tel: <86> (21) 6472-1001, Fax: <86> (21) 6415-2952

Renesas Technology Singapore Pte. Ltd.
1, Harbour Front Avenue, #06-10, Keppel Bay Tower, Singapore 098632
Tel: <65> 6213-0200, Fax: <65> 6278-8001