

# HD74ALVC2G53

## 2-channel Analog Multiplexer Demultiplexer

REJ03D0168-0400Z  
(Previous ADE-205-636C (Z))  
Rev.4.00  
Dec.18.2003

### Description

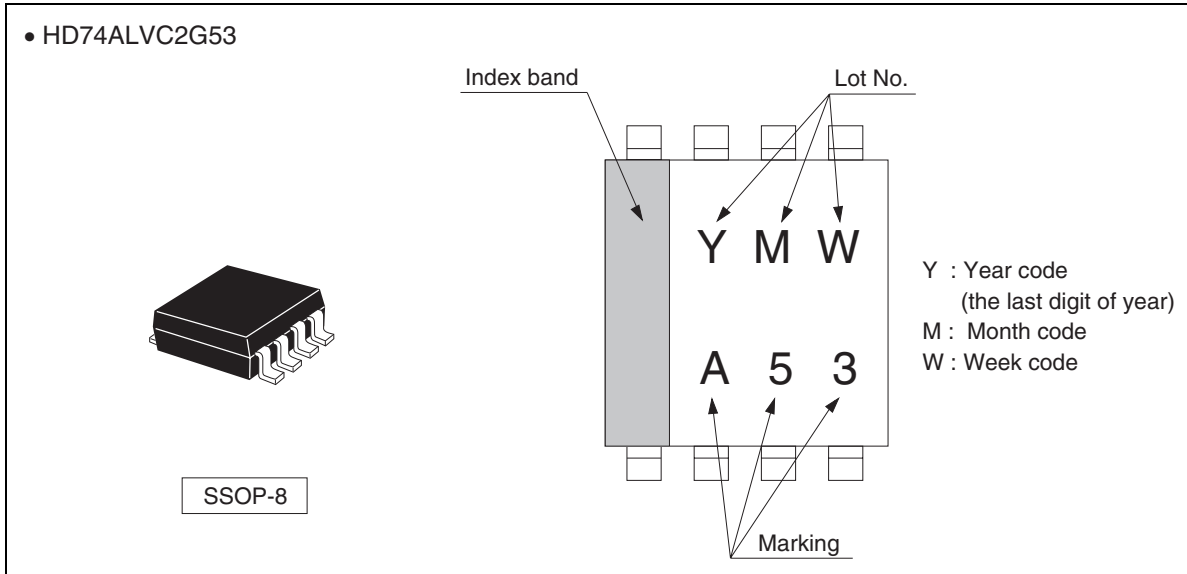
The HD74ALVC2G53 has 2-channel analog multiplexer / demultiplexer in an 8 pin package. Applications include signal gating, chopping, modulation, or demodulation (modem), and signal multiplexing for analog to digital and digital to analog conversion systems. Low voltage and high-speed operation is suitable 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.
- Supply voltage range : 1.2 to 3.6 V  
Operating temperature range: -40 to +85°C
- All control input  $V_{IH}$  (Max.) = 3.6 V (@ $V_{CC}$  = 0 V to 3.6 V)
- Ordering Information

Part Name	Package Type	Package Code	Package Abbreviation	Taping Abbreviation (Quantity)
HD74ALVC2G53USE	SSOP-8 pin	TTP-8DBV	US	E (3,000 pcs/reel)

Outline and Article Indication



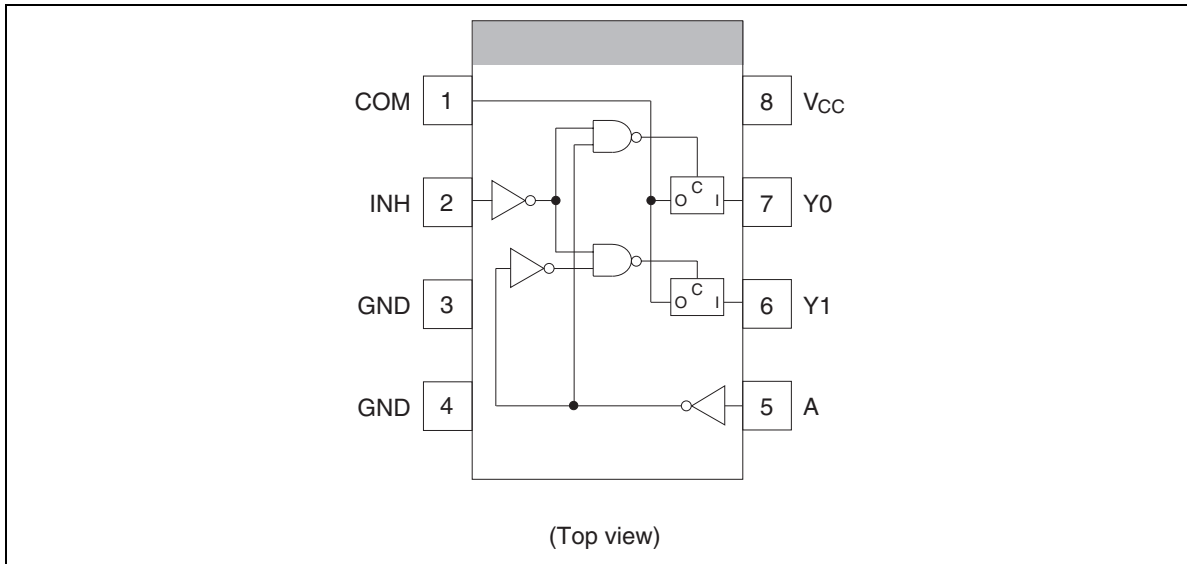
Function Table

Control inputs

INH	A	On channel
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	Conditions
Supply voltage range	$V_{CC}$	-0.5 to 4.6	V	
Input voltage range <sup>*1</sup>	$V_I$	-0.5 to 4.6	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	$I_{IK}$	-50	mA	$V_I < 0$
Output clamp current	$I_{OK}$	$\pm 50$	mA	$V_O < 0$ or $V_O > V_{CC}$
Continuous output current	$I_O$	$\pm 50$	mA	$V_O = 0$ to $V_{CC}$
Continuous current through $V_{CC}$ or GND	$I_{CC}$ or $I_{GND}$	$\pm 100$	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 4.6 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	$V_{CC}$	1.2	3.6	V	
Input voltage range	$V_I$	0	3.6	V	
Input / output voltage range	$V_{I/O}$	0	$V_{CC}$	V	
Input transition rise or fall rate	$\Delta t / \Delta v$	0	20	ns / V	$V_{CC} = 1.2$ to $2.7$ V
		0	10		$V_{CC} = 3.3 \pm 0.3$ 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

Item	Symbol	V <sub>CC</sub> (V)	Ta=25°C			Ta=-40 to 85°C			Unit	Test conditions		
			Min	Typ	Max	Min	Typ	Max				
Input voltage	V <sub>IH</sub>	1.2	—	—	—	V <sub>CC</sub> ×0.75	—	—	V	Control input only		
		1.4 to 1.6	—	—	—	V <sub>CC</sub> ×0.7	—	—				
		1.65 to 1.95	—	—	—	V <sub>CC</sub> ×0.7	—	—				
		2.3 to 2.7	—	—	—	1.7	—	—				
		3.0 to 3.6	—	—	—	2.0	—	—				
	V <sub>IL</sub>	1.2	—	—	—	—	—	V <sub>CC</sub> ×0.25				
		1.4 to 1.6	—	—	—	—	—	V <sub>CC</sub> ×0.3				
		1.65 to 1.95	—	—	—	—	—	V <sub>CC</sub> ×0.3				
		2.3 to 2.7	—	—	—	—	—	0.7				
		3.0 to 3.6	—	—	—	—	—	0.8				
On-state switch resistance	R <sub>ON</sub>	1.2	—	14	—	—	—	—	Ω	V <sub>I</sub> = 0 V, I <sub>O</sub> = 1 mA		
			—	29	—	—	—	—		V <sub>I</sub> = 1.2 V, I <sub>O</sub> = 1 mA		
		1.4	—	12	25	—	—	30		V <sub>I</sub> = 0 V, I <sub>O</sub> = 2 mA		
			—	21	35	—	—	40		V <sub>I</sub> = 1.4 V, I <sub>O</sub> = 2 mA		
		1.65	—	10	17	—	—	20		V <sub>I</sub> = 0 V, I <sub>O</sub> = 4 mA		
			—	17	27	—	—	30		V <sub>I</sub> = 1.65 V, I <sub>O</sub> = 4 mA		
		2.3	—	8	11	—	—	13		V <sub>I</sub> = 0 V, I <sub>O</sub> = 8 mA		
			—	13	18	—	—	20		V <sub>I</sub> = 2.3 V, I <sub>O</sub> = 8 mA		
		3.0	—	7	9.5	—	—	10		V <sub>I</sub> = 0 V, I <sub>O</sub> = 24 mA		
			—	11	14.5	—	—	15.5		V <sub>I</sub> = 3.0 V, I <sub>O</sub> = 24 mA		
		Peak on resistance	R <sub>ON(p)</sub>	1.2	—	280	—	—		—	Ω	I <sub>O</sub> = 1 mA
				1.4	—	125	250	—		—	350	I <sub>O</sub> = 2 mA
1.65	—			55	110	—	—	150	I <sub>O</sub> = 4 mA			
2.3	—			20	30	—	—	35	I <sub>O</sub> = 8 mA			
3.0	—			13	18	—	—	20	I <sub>O</sub> = 24 mA			
Difference of on-state	ΔR <sub>ON</sub>	1.2	—	1.0	—	—	—	Ω	I <sub>O</sub> = 1 mA			
		1.4	—	0.8	12	—	—	15	I <sub>O</sub> = 2 mA			

Electrical Characteristics (cont)

Item	Symbol	V <sub>CC</sub> (V)	Ta=25°C			Ta=-40 to 85°C			Unit	Test conditions
			Min	Typ	Max	Min	Typ	Max		
resistance between switches		1.65	—	0.6	9	—	—	12		I <sub>O</sub> = 4 mA
		2.3	—	0.5	5	—	—	9		I <sub>O</sub> = 8 mA
		3.0	—	0.2	3	—	—	4		I <sub>O</sub> = 24 mA
Off-state switch leakage current	I <sub>S (OFF)</sub>	3.6	—	—	±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>C</sub> = V <sub>IL</sub>
On-state switch leakage current	I <sub>S (ON)</sub>	3.6	—	—	±0.1	—	—	±1.0	μA	V <sub>IN</sub> = V <sub>CC</sub> or GND V <sub>C</sub> = V <sub>IH</sub>
Input current	I <sub>IN</sub>	0 to 3.6	—	—	±0.1	—	—	±1.0	μA	V <sub>IN</sub> = 3.6 V or GND
Quiescent supply current	I <sub>CC</sub>	3.6	—	—	—	—	—	10	μA	V <sub>IN</sub> = V <sub>CC</sub> or GND
Control input capacitance	C <sub>IC</sub>	—	—	4.5	—	—	—	—	pF	
Switch terminal capacitance	C <sub>IN / OUT</sub>	—	—	5.5	—	—	—	—	pF	
Feed through capacitance	C <sub>IN-OUT</sub>	—	—	0.2	—	—	—	—	pF	

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### Switching Characteristics

( $T_a = -40$  to  $85^\circ\text{C}$ )

$V_{CC} = 1.2$  V

Item	Symbol	Min	Typ	Max	Unit	Test conditions	FROM (Input)	TO (Output)
Propagation delay time <sup>*1</sup>	$t_{PLH}$ $t_{PHL}$	—	0.4	—	ns	$C_L = 15$ pF	COM or $Y_n$	$Y_n$ or COM
Enable time	$t_{ZH}$ $t_{ZL}$	—	6.5	—	ns	$C_L = 15$ pF	INH	COM or $Y_n$
Disable time	$t_{HZ}$ $t_{LZ}$	—	7.2	—	ns	$C_L = 15$ pF	INH	COM or $Y_n$

$V_{CC} = 1.5 \pm 0.1$  V

Item	Symbol	Min	Typ	Max	Unit	Test conditions	FROM (Input)	TO (Output)
Propagation delay time <sup>*1</sup>	$t_{PLH}$ $t_{PHL}$	—	—	0.3	ns	$C_L = 15$ pF	COM or $Y_n$	$Y_n$ or COM
Enable time	$t_{ZH}$ $t_{ZL}$	2.0	—	9.0	ns	$C_L = 15$ pF	INH	COM or $Y_n$
Disable time	$t_{HZ}$ $t_{LZ}$	2.0	—	10.0	ns	$C_L = 15$ pF	INH	COM or $Y_n$

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

Item	Symbol	Min	Typ	Max	Unit	Test conditions	FROM (Input)	TO (Output)
Propagation delay time <sup>*1</sup>	$t_{PLH}$ $t_{PHL}$	—	—	0.48	ns	$C_L = 30$ pF	COM or $Y_n$	$Y_n$ or COM
Enable time	$t_{ZH}$ $t_{ZL}$	1.5	—	7.0	ns	$C_L = 30$ pF	INH	COM or $Y_n$
Disable time	$t_{HZ}$ $t_{LZ}$	1.5	—	8.0	ns	$C_L = 30$ pF	INH	COM or $Y_n$

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### Switching Characteristics (cont)

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

Item	Symbol	Min	Typ	Max	Unit	Test conditions	FROM (Input)	TO (Output)
Propagation delay time <sup>*1</sup>	t <sub>PLH</sub> t <sub>PHL</sub>	—	—	0.35	ns	C <sub>L</sub> = 30 pF	COM or Y <sub>n</sub>	Y <sub>n</sub> or COM
Enable time	t <sub>ZH</sub> t <sub>ZL</sub>	1.0	—	5.0	ns	C <sub>L</sub> = 30 pF	INH	COM or Y <sub>n</sub>
Disable time	t <sub>HZ</sub> t <sub>LZ</sub>	1.0	—	6.0	ns	C <sub>L</sub> = 30 pF	INH	COM or Y <sub>n</sub>

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

Item	Symbol	Min	Typ	Max	Unit	Test conditions	FROM (Input)	TO (Output)
Propagation delay time <sup>*1</sup>	t <sub>PLH</sub> t <sub>PHL</sub>	—	—	0.3	ns	C <sub>L</sub> = 30 pF	COM or Y <sub>n</sub>	Y <sub>n</sub> or COM
Enable time	t <sub>ZH</sub> t <sub>ZL</sub>	1.0	—	4.0	ns	C <sub>L</sub> = 30 pF	INH	COM or Y <sub>n</sub>
Disable time	t <sub>HZ</sub> t <sub>LZ</sub>	1.0	—	5.0	ns	C <sub>L</sub> = 30 pF	INH	COM or Y <sub>n</sub>

Note: 1. The propagation delay time is calculated by the RC (on-resistance and load capacitance) time constant.

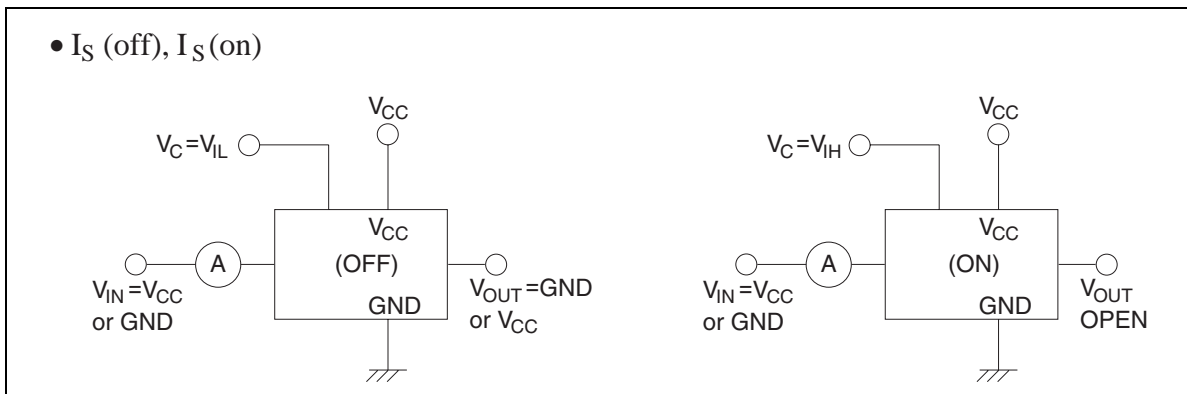
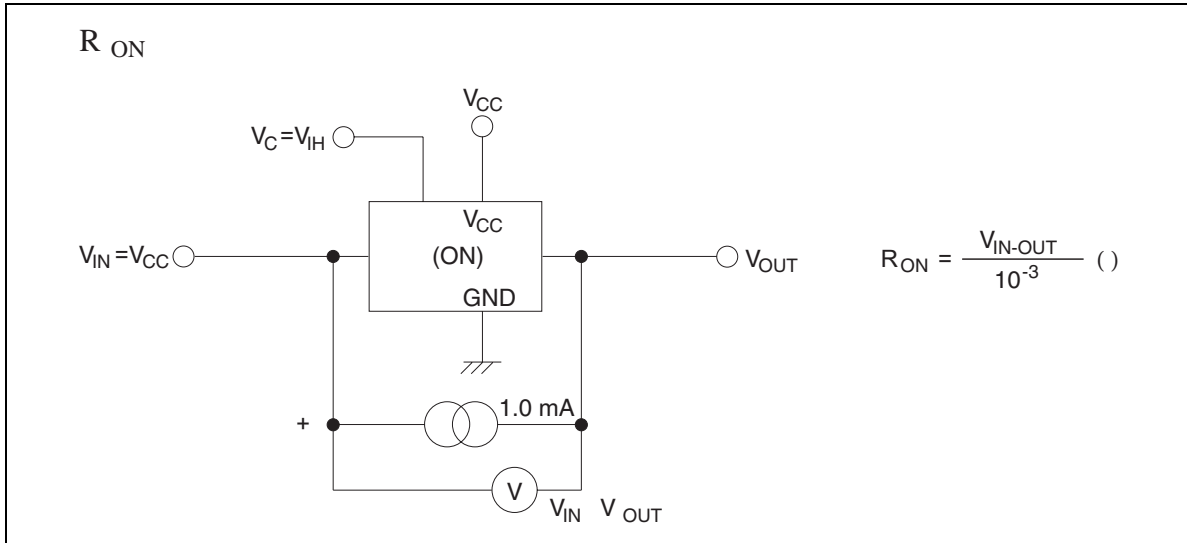
### Operating Characteristics

$$(T_a = 25^\circ\text{C})$$

Item	Symbol	V <sub>CC</sub> (V)	Min	Typ	Max	Unit	Test conditions
Power dissipation capacitance	C <sub>PD</sub>	1.5	—	11.5	—	pF	f = 10 MHz
		1.8	—	11.5	—		
		2.5	—	12.5	—		
		3.3	—	14.0	—		

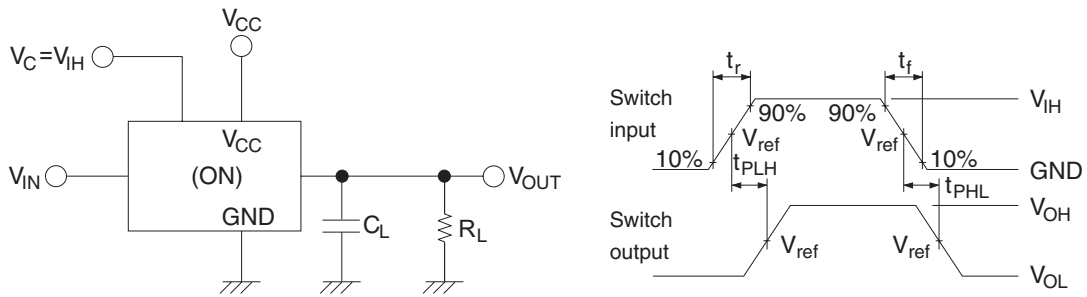


Test Circuit



## HD74ALVC2G53

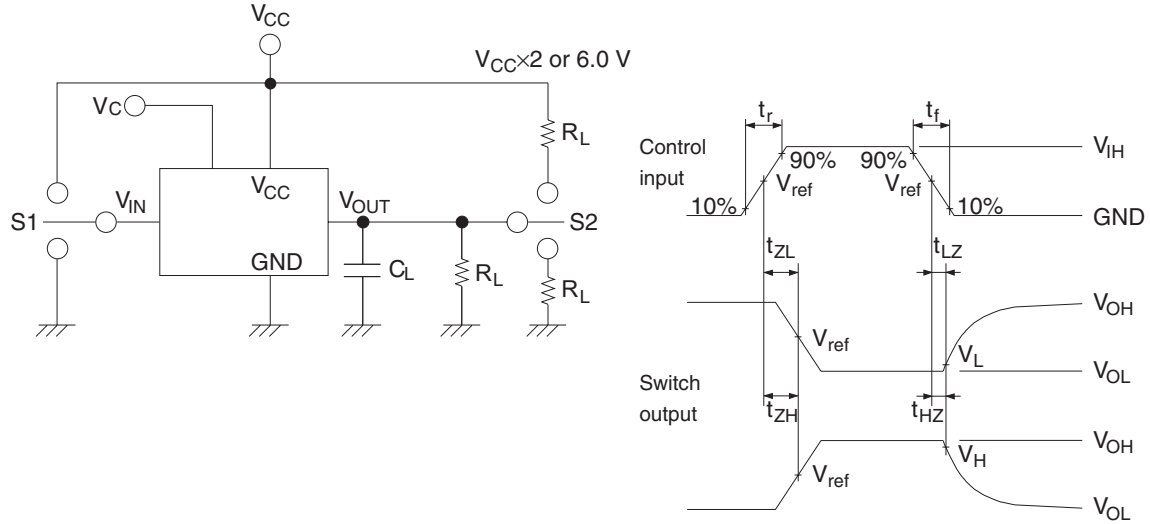
•  $t_{PLH}$ ,  $t_{PHL}$



Symbol	$V_{CC} = 1.2 \text{ V},$ $1.5 \pm 0.1 \text{ V}$	$V_{CC} = 1.8 \pm 0.15 \text{ V}$	$V_{CC} = 2.5 \pm 0.2 \text{ V},$ $3.3 \pm 0.3 \text{ V}$
$R_L$	2.0 k $\Omega$	1.0 k $\Omega$	500 $\Omega$
$C_L$	15 pF	30 pF	30 pF

Symbol	$V_{CC} = 1.2 \text{ V},$ $1.5 \pm 0.1 \text{ V},$ $1.8 \pm 0.15 \text{ V}$	$V_{CC} = 2.5 \pm 0.2 \text{ V}$	$V_{CC} = 3.3 \pm 0.3 \text{ V}$
$t_r / t_f$	2.0 ns	2.5 ns	2.5 ns
$V_{IH}$	$V_{CC}$	$V_{CC}$	2.7 V
$V_{ref}$	50%	50%	1.5 V

•  $t_{ZH}, t_{ZL} / t_{HZ}, t_{LZ}$

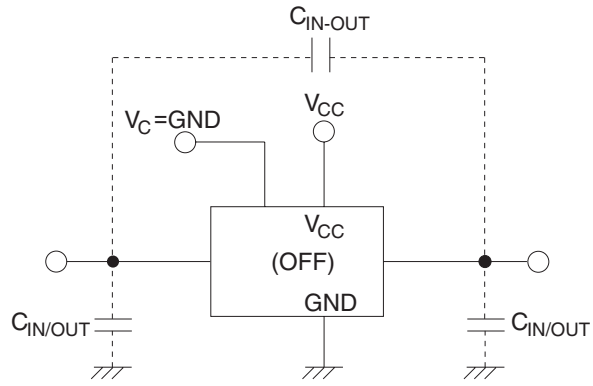


	S1		S2	
Symbol	$V_{CC} = 1.2 \text{ V},$ $1.5 \pm 0.1 \text{ V},$ $1.8 \pm 0.15 \text{ V},$ $2.5 \pm 0.2 \text{ V}$	$V_{CC} = 3.3 \pm 0.3 \text{ V}$	$V_{CC} = 1.2 \text{ V},$ $1.5 \pm 0.1 \text{ V},$ $1.8 \pm 0.15 \text{ V},$ $2.5 \pm 0.2 \text{ V}$	$V_{CC} = 3.3 \pm 0.3 \text{ V}$
$t_{HZ} / t_{ZH}$	$V_{CC}$	$V_{CC}$	GND	GND
$t_{LZ} / t_{ZL}$	GND	GND	$V_{CC} \times 2$	6.0 V

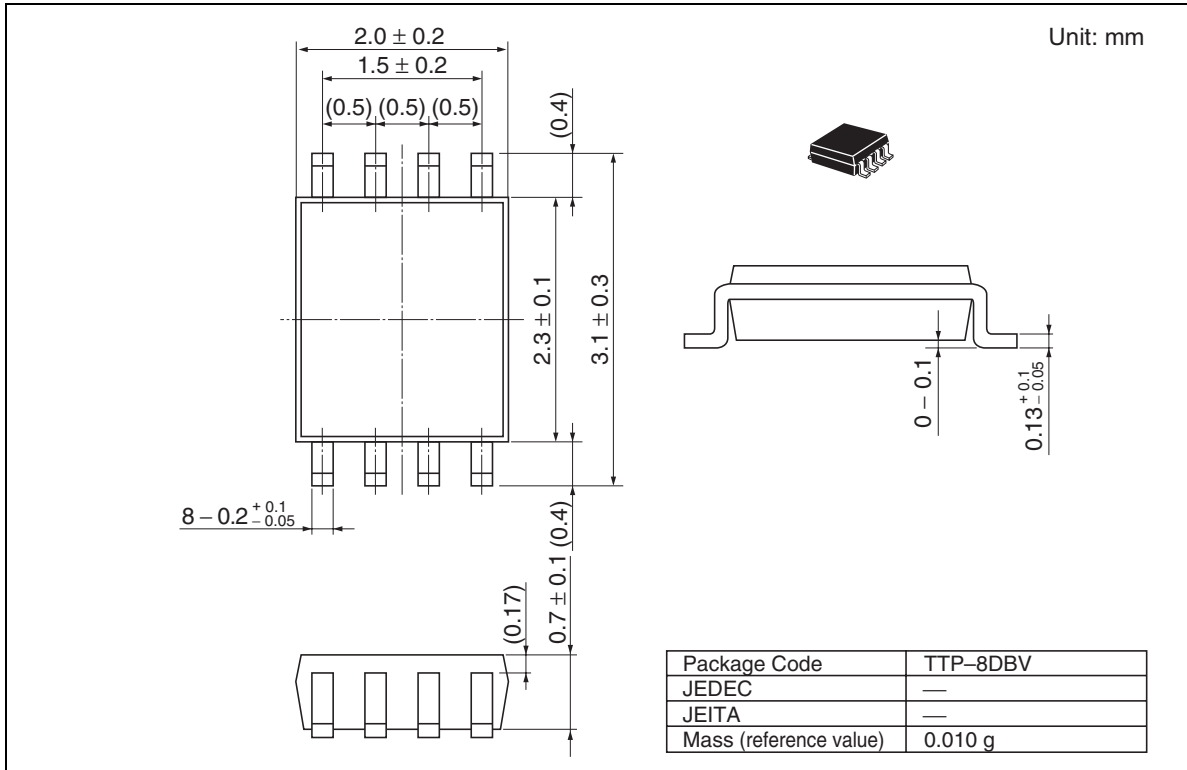
Symbol	$V_{CC} = 1.2 \text{ V},$ $1.5 \pm 0.1 \text{ V}$	$V_{CC} = 1.8 \pm 0.15 \text{ V}$	$V_{CC} = 2.5 \pm 0.2 \text{ V},$ $3.3 \pm 0.3 \text{ V}$
$R_L$	2.0 k $\Omega$	1.0 k $\Omega$	500 $\Omega$
$C_L$	15 pF	30 pF	30 pF

Symbol	$V_{CC} = 1.2 \text{ V},$ $1.5 \pm 0.1 \text{ V}$	$V_{CC} = 1.8 \pm 0.15 \text{ V}$	$V_{CC} = 2.5 \pm 0.2 \text{ V}$	$V_{CC} = 3.3 \pm 0.3 \text{ V}$
$t_r / t_f$	2.0 ns	2.0 ns	2.5 ns	2.5 ns
$V_{IH}$	$V_{CC}$	$V_{CC}$	$V_{CC}$	2.7 V
$V_{ref}$	50%	50%	50%	1.5 V
$V_H / V_L$	$V_H = V_{OH} - 0.1 \text{ V}$ $V_L = V_{OL} + 0.1 \text{ V}$	$V_H = V_{OH} - 0.15 \text{ V}$ $V_L = V_{OL} + 0.15 \text{ V}$	$V_H = V_{OH} - 0.15 \text{ V}$ $V_L = V_{OL} + 0.15 \text{ V}$	$V_H = V_{OH} - 0.3 \text{ V}$ $V_L = V_{OL} + 0.3 \text{ V}$

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



Package Dimensions



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