

HD74ALVC2G53

2-channel Analog Multiplexer Demultiplexer

HITACHI

ADE-205-636 (Z)

Preliminary

Rev. 0

July, 2001

Description

The HD74ALVC2G53 has 2-channel analog multiplexer / demultiplexer in a 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.

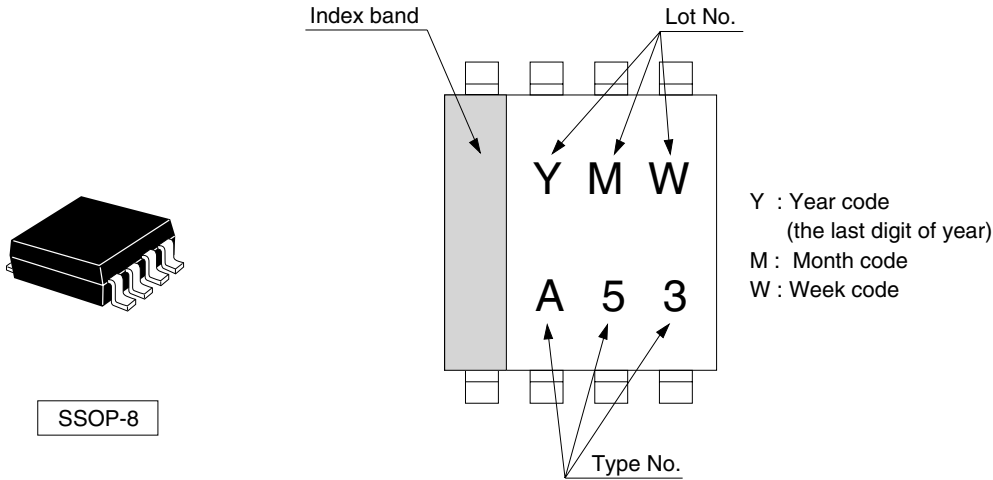
Features

- The basic gate function is lined up as hitachi 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)
- Package type

Package type	Package code	Package suffix	Taping code
SSOP-8 pin	TTP-8DB	US	E (3,000 pcs / Reel)

Outline and Article Indication

- HD74ALVC2G53



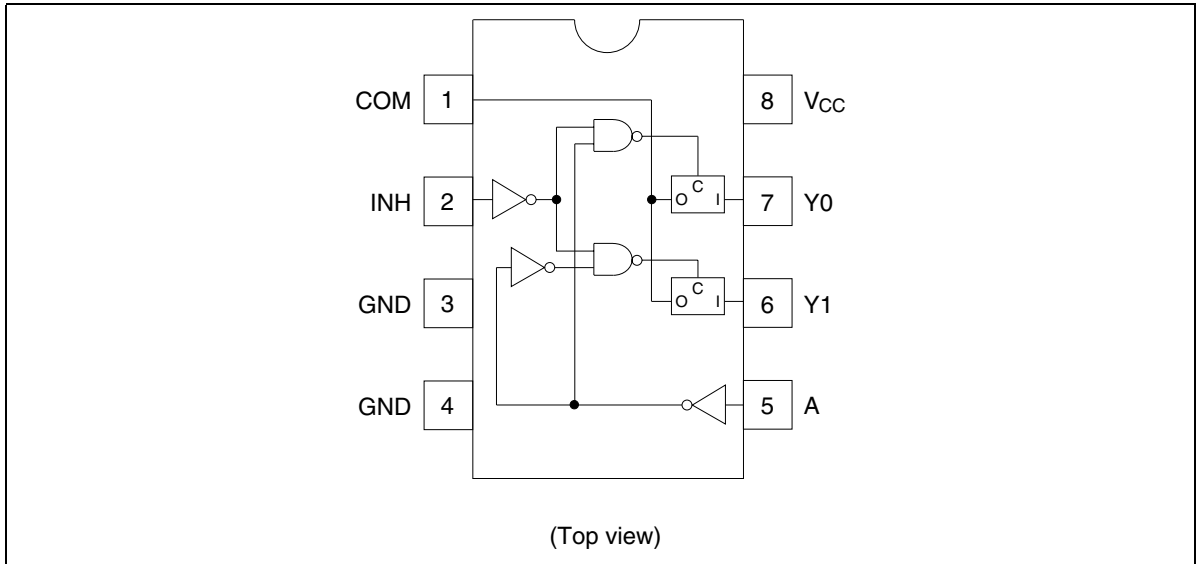
Function Table

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 ^{*1}	V_I	−0.5 to 4.6	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}	−50	mA	$V_I < 0$
Output clamp current	I_{OK}	±50	mA	$V_O < 0$ or $V_O > V_{CC}$
Continuous output current	I_O	±50	mA	$V_O = 0$ to V_{CC}
Continuous current through V_{CC} or GND	I_{CC} or I_{GND}	±100	mA	
Maximum power dissipation at $T_a = 25^{\circ}\text{C}$ (in still air) ^{*3}	P_T	200	mW	
Storage temperature	Tstg	−65 to 150	°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°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_{IO}	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		$V_{CC} = 3.3\pm0.3$ V
Operating free-air temperature	T_a	−40	85	°C	

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

Electrical Characteristics

Item	Symbol	V_{CC} (V)	$T_a=25^{\circ}\text{C}$			$T_a=-40$ to 85°C			Unit	Test conditions
			Min	Typ	Max	Min	Typ	Max		
Input voltage	V_{IH}	1.2	—	—	—	$V_{CC}\times 0.75$	—	—	V	Control input only
		1.4 to 1.6	—	—	—	$V_{CC}\times 0.7$	—	—		
		1.65 to 1.95	—	—	—	$V_{CC}\times 0.7$	—	—		
		2.3 to 2.7	—	—	—	1.7	—	—		
		3.0 to 3.6	—	—	—	2.0	—	—		
	V_{IL}	1.2	—	—	—	—	—	$V_{CC}\times 0.25$		
		1.4 to 1.6	—	—	—	—	—	$V_{CC}\times 0.3$		
		1.65 to 1.95	—	—	—	—	—	$V_{CC}\times 0.3$		
		2.3 to 2.7	—	—	—	—	—	0.7		
		3.0 to 3.6	—	—	—	—	—	0.8		
On-state switch resistance	R_{ON}	1.2	—	15	—	—	—	—	Ω	$V_i = 0\text{ V}$, $I_o = 1\text{ mA}$
			—	27	—	—	—	—		$V_i = 1.2\text{ V}$, $I_o = 1\text{ mA}$
		1.4	—	11	25	—	—	30		$V_i = 0\text{ V}$, $I_o = 2\text{ mA}$
			—	20	35	—	—	40		$V_i = 1.4\text{ V}$, $I_o = 2\text{ mA}$
		1.65	—	9	17	—	—	20		$V_i = 0\text{ V}$, $I_o = 4\text{ mA}$
			—	16	27	—	—	30		$V_i = 1.65\text{ V}$, $I_o = 4\text{ mA}$
		2.3	—	7	10	—	—	12		$V_i = 0\text{ V}$, $I_o = 8\text{ mA}$
			—	12	18	—	—	20		$V_i = 2.3\text{ V}$, $I_o = 8\text{ mA}$
		3.0	—	6	8.5	—	—	9		$V_i = 0\text{ V}$, $I_o = 24\text{ mA}$
			—	10	13.5	—	—	14.5		$V_i = 3.0\text{ V}$, $I_o = 24\text{ mA}$
Peak on resistance	$R_{ON(p)}$	1.2	—	300	—	—	—	—	Ω	$I_o = 1\text{ mA}$
		1.4	—	135	250	—	—	350		$I_o = 2\text{ mA}$
		1.65	—	60	110	—	—	150		$I_o = 4\text{ mA}$
		2.3	—	19	30	—	—	35		$I_o = 8\text{ mA}$
		3.0	—	12	18	—	—	20		$I_o = 24\text{ mA}$

Electrical Characteristics (cont)

Item	Symbol	V _{CC} (V)	Ta=25°C			Ta=-40 to 85°C			Unit	Test conditions
			Min	Typ	Max	Min	Typ	Max		
Difference of on-state resistance between switches	ΔR_{ON}	1.2	—	1.0	—	—	—	—	Ω	$I_o = 1\text{ mA}$
		1.4	—	0.8	12	—	—	15		$I_o = 2\text{ mA}$
		1.65	—	0.6	9	—	—	12		$I_o = 4\text{ mA}$
		2.3	—	0.5	5	—	—	9		$I_o = 8\text{ mA}$
		3.0	—	0.2	3	—	—	4		$I_o = 24\text{ mA}$
Off-state switch leakage current	$I_{S(OFF)}$	3.6	—	—	± 0.1	—	—	± 1.0	μA	$V_{IN} = V_{CC}$, $V_{OUT} = \text{GND}$ or $V_{IN} = \text{GND}$, $V_O = V_{CC}$, $V_C = V_{IL}$
On-state switch leakage current	$I_{S(ON)}$	3.6	—	—	± 0.1	—	—	± 1.0	μA	$V_{IN} = V_{CC}$ or GND $V_C = V_{IH}$
Input current	I_{IN}	0 to 3.6	—	—	± 0.1	—	—	± 1.0	μA	$V_{IN} = 3.6\text{ V}$ or GND
Quiescent supply current	I_{CC}	3.6	—	—	—	—	—	10	μA	$V_{IN} = V_{CC}$ or GND
Control input capacitance	C_{IC}	—	—	TBD	—	—	—	—	pF	
Switch terminal capacitance	$C_{IN/OUT}$	—	—	TBD	—	—	—	—	pF	
Feedthrough capacitance	C_{IN-OUT}	—	—	TBD	—	—	—	—	pF	

Switching Characteristics

(Ta = -40 to 85°C)

- $V_{CC} = 1.2\text{ V}$

Item	Symbol	Min	Typ	Max	Unit	Test conditions	FROM (Input)	TO (Output)
Propagation delay time ^{*1}	t_{PLH} t_{PHL}	—	0.4	—	ns	$C_L = 15\text{ pF}$	IN/OUT or OUT/IN	OUT/IN or IN/OUT
Enable time	t_{ZH} t_{ZL}	—	5.0	—	ns	$C_L = 15\text{ pF}$	C	IN/OUT or OUT/IN
Disable time	t_{HZ} t_{LZ}	—	4.5	—	ns	$C_L = 15\text{ pF}$	C	IN/OUT or OUT/IN

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

Item	Symbol	Min	Typ	Max	Unit	Test conditions	FROM (Input)	TO (Output)
Propagation delay time ^{*1}	t_{PLH} t_{PHL}	—	—	0.3	ns	$C_L = 15\text{ pF}$	IN/OUT or OUT/IN	OUT/IN or IN/OUT
Enable time	t_{ZH} t_{ZL}	2.0	—	6.0	ns	$C_L = 15\text{ pF}$	C	IN/OUT or OUT/IN
Disable time	t_{HZ} t_{LZ}	2.0	—	6.0	ns	$C_L = 15\text{ pF}$	C	IN/OUT or OUT/IN

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

Item	Symbol	Min	Typ	Max	Unit	Test conditions	FROM (Input)	TO (Output)
Propagation delay time ^{*1}	t_{PLH} t_{PHL}	—	—	0.48	ns	$C_L = 30\text{ pF}$	IN/OUT or OUT/IN	OUT/IN or IN/OUT
Enable time	t_{ZH} t_{ZL}	1.5	—	5.0	ns	$C_L = 30\text{ pF}$	C	IN/OUT or OUT/IN
Disable time	t_{HZ} t_{LZ}	1.5	—	5.0	ns	$C_L = 30\text{ pF}$	C	IN/OUT or OUT/IN

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 ^{*1}	t_{PLH} t_{PHL}	—	—	0.35	ns	$C_L = 30 \text{ pF}$	IN/OUT or OUT/IN	OUT/IN or IN/OUT
Enable time	t_{ZH} t_{ZL}	1.0	—	4.0	ns	$C_L = 30 \text{ pF}$	C	IN/OUT or OUT/IN
Disable time	t_{HZ} t_{LZ}	1.0	—	4.0	ns	$C_L = 30 \text{ pF}$	C	IN/OUT or OUT/IN

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

Item	Symbol	Min	Typ	Max	Unit	Test conditions	FROM (Input)	TO (Output)
Propagation delay time ^{*1}	t_{PLH} t_{PHL}	—	—	0.3	ns	$C_L = 30 \text{ pF}$	IN/OUT or OUT/IN	OUT/IN or IN/OUT
Enable time	t_{ZH} t_{ZL}	1.0	—	3.0	ns	$C_L = 30 \text{ pF}$	C	IN/OUT or OUT/IN
Disable time	t_{HZ} t_{LZ}	1.0	—	3.0	ns	$C_L = 30 \text{ pF}$	C	IN/OUT or OUT/IN

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

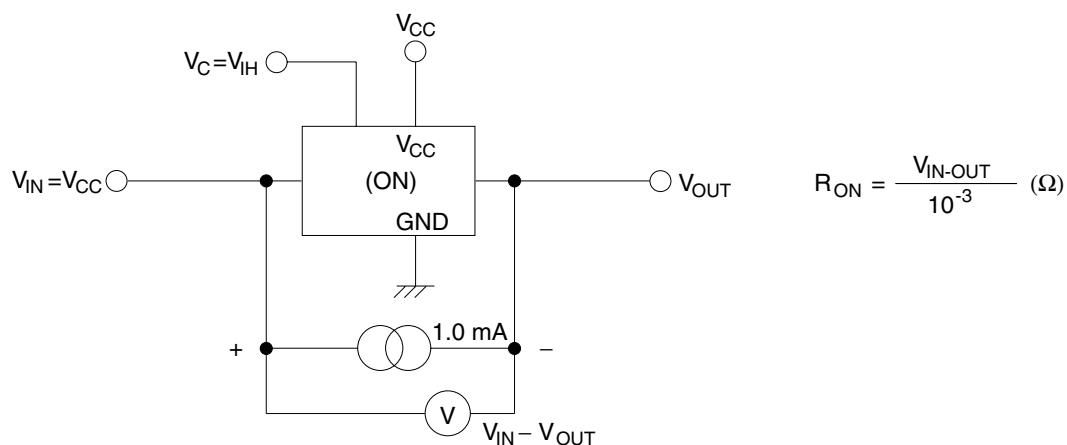
Operating Characteristics

(Ta = 25°C)

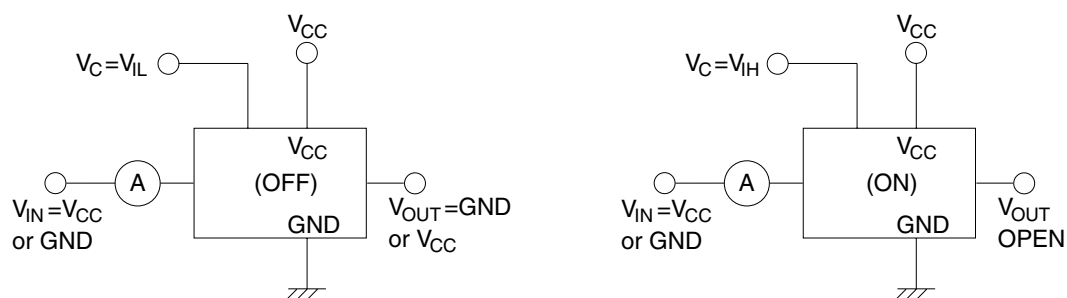
Item	Symbol	$V_{CC} \text{ (V)}$	Min	Typ	Max	Unit	Test conditions
Power dissipation capacitance	C_{PD}	1.5	—	TBD	—	pF	$f = 10 \text{ MHz}$
		1.8	—	TBD	—		
		2.5	—	TBD	—		
		3.3	—	TBD	—		

Test Circuit

• R_{ON}

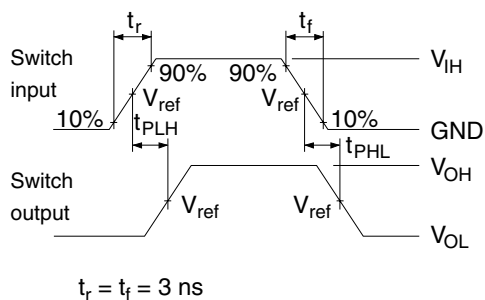
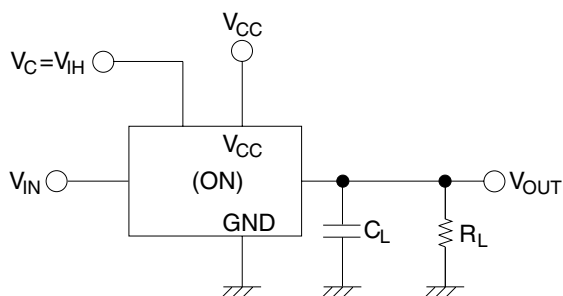


• I_S (off), I_S (on)



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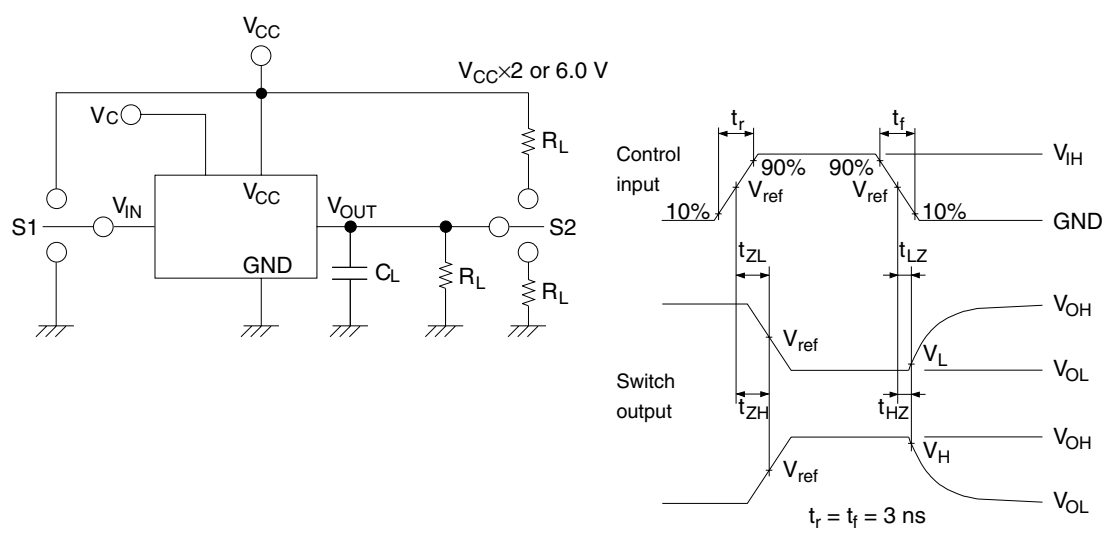
- t_{PLH} , t_{PHL}



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	$2.0 \text{ k}\Omega$	$1.0 \text{ k}\Omega$	$500 \text{ }\Omega$
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

• $t_{ZH}, t_{ZL} / t_{HZ}, t_{LZ}$

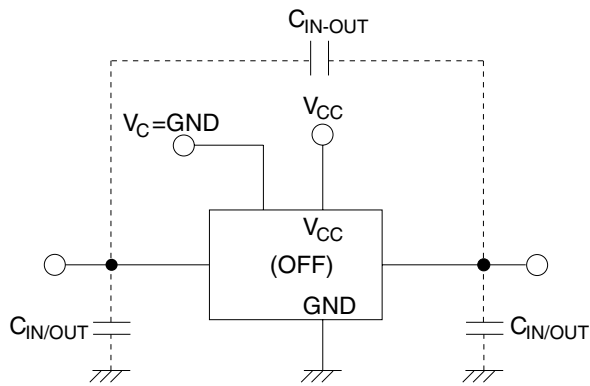


	S1		S2	
Symbol	$V_{CC} = 1.2\text{ V},$ $1.5 \pm 0.1\text{ V},$ $1.8 \pm 0.15\text{ V},$ $2.5 \pm 0.2\text{ V}$	$V_{CC} = 3.3 \pm 0.3\text{ V}$	$V_{CC} = 1.2\text{ V},$ $1.5 \pm 0.1\text{ V},$ $1.8 \pm 0.15\text{ V},$ $2.5 \pm 0.2\text{ V}$	$V_{CC} = 3.3 \pm 0.3\text{ V}$
t_{HZ} / t_{ZH}	V_{CC}	V_{CC}	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 Ω	1.0 k Ω	500 Ω
C_L	15 pF	30 pF	30 pF

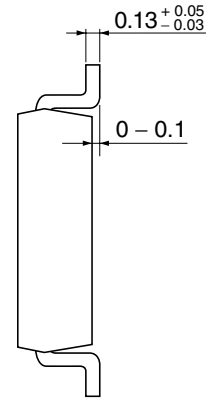
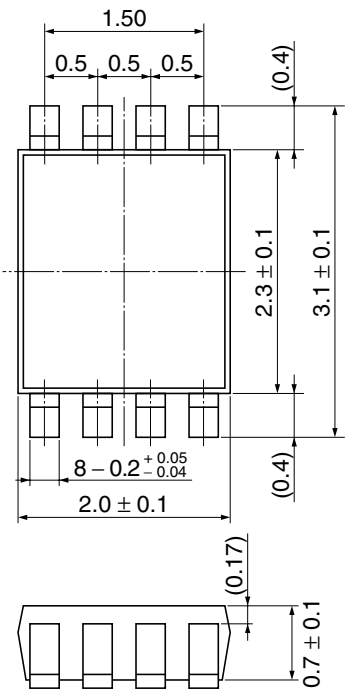
Symbol	$V_{CC} = 1.2\text{ V},$ $1.5 \pm 0.1\text{ V}$	$V_{CC} = 1.8 \pm 0.15\text{ V}$	$V_{CC} = 2.5 \pm 0.2\text{ V}$	$V_{CC} = 3.3 \pm 0.3\text{ V}$
t_r / t_f	2.0 ns	2.0 ns	2.5 ns	2.5 ns
V_{IH}	V_{CC}	V_{CC}	V_{CC}	2.7 V
V_{ref}	50%	50%	50%	1.5 V
V_H / V_L	$V_H = V_{OH} - 0.1\text{ V}$ $V_L = V_{OL}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

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



Package Dimensions

As of January, 2001
Unit: mm



Hitachi Code	TTP-8DB
JEDEC	—
EIAJ	—
Mass (reference value)	0.25 g

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