
HD74LV2G53A

2-channel Analog Multiplexer / Demultiplexer

HITACHI

ADE-205-567B (Z)

Rev.2
July 2001

Description

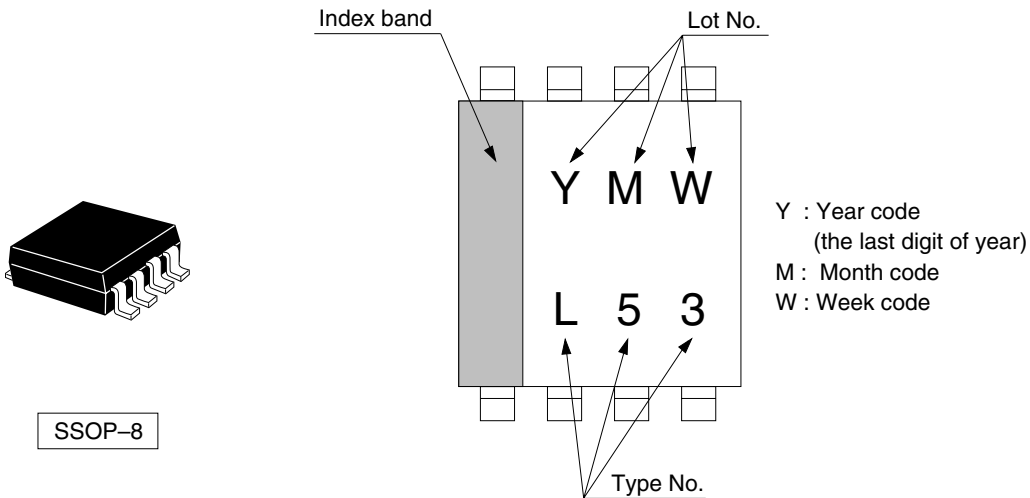
The HD74LV2G53A has 2-channel analog multiplexer / demultiplexer in a 8 pin package. Applications include signal gating, chopping, modulation or demodulation (modem), and signal multiplexing for analog to digital and digital to analog conversion systems. Low voltage and high speed operation is suitable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

Outline and Article Indication

• HD74LV2G53A



Function Table

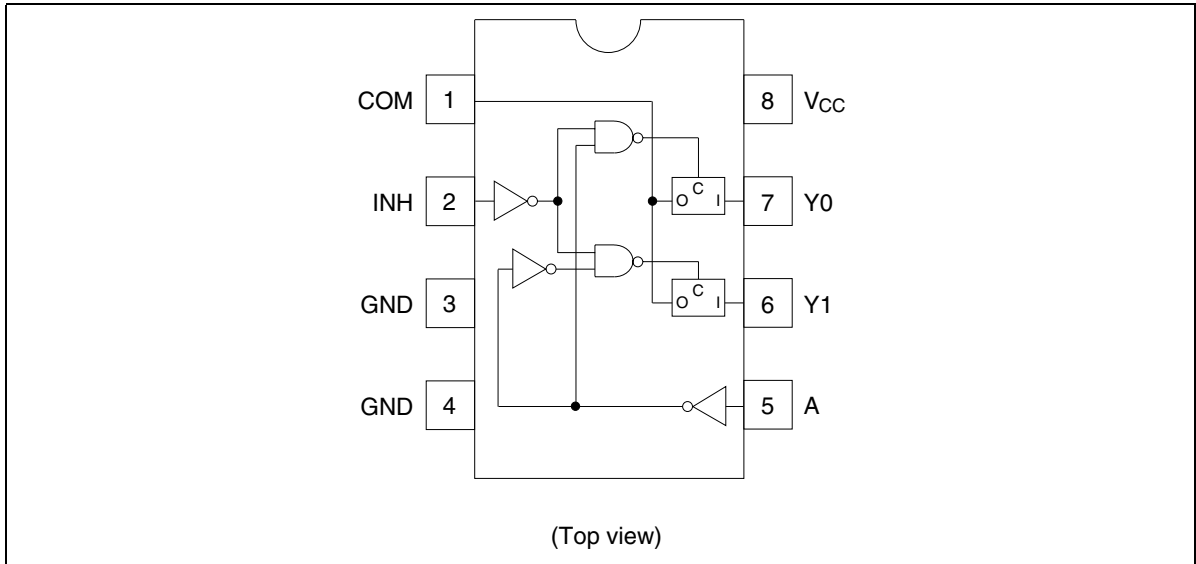
Control inputs		On channel
INH	A	
H	X	None
L	H	Y1
L	L	Y0

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	°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°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	$V_{I/O}$	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) *	$T_a = 25^\circ\text{C}$			$T_a = -40 \text{ to } 85^\circ\text{C}$			Unit	Test Conditions
			Min	Typ	Max	Min	Typ	Max		
Input voltage	V_{IH}	1.65 to 1.95	—	—	—	$V_{CC} \times 0.75$	—	—	V	Control input only
		2.3 to 2.7	—	—	—	$V_{CC} \times 0.7$	—	—		
		3.0 to 3.6	—	—	—	$V_{CC} \times 0.7$	—	—		
		4.5 to 5.5	—	—	—	$V_{CC} \times 0.7$	—	—		
	V_{IL}	1.65 to 1.95	—	—	—	—	—	$V_{CC} \times 0.25$		
		2.3 to 2.7	—	—	—	—	—	$V_{CC} \times 0.3$		
		3.0 to 3.6	—	—	—	—	—	$V_{CC} \times 0.3$		
		4.5 to 5.5	—	—	—	—	—	$V_{CC} \times 0.3$		
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 $V_{INH} = V_{IL}$ $I_T = 2 \text{ mA}$
		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 $V_{INH} = V_{IL}$ $I_T = 2 \text{ mA}$
		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 $V_{INH} = V_{IL}$ $I_T = 2 \text{ mA}$
		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	$V_{IN} = V_{CC}$, $V_{OUT} = \text{GND}$ or $V_{IN} = \text{GND}$, $V_O = V_{CC}$, $V_{INH} = V_{IH}$
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	$V_{IN} = 5.5 \text{ V}$ 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	
Feedthrough 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 or
	t_{PHL}	—	11.0	23.0	—	29.0		$C_L = 50\text{ pF}$	Yn	COM
Enable time	t_{ZH}	—	13.0	30.0	—	35.0	ns	$C_L = 15\text{ pF}$	INH	COM or
	t_{ZL}	—	18.0	47.0	—	54.0		$C_L = 50\text{ pF}$		Yn
Disable time	t_{HZ}	—	13.0	25.0	—	30.0	ns	$C_L = 15\text{ pF}$	INH	COM or
	t_{LZ}	—	20.0	38.0	—	45.0		$C_L = 50\text{ pF}$		Yn

• $V_{CC} = 2.5 \pm 0.2\text{ V}$

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 or
	t_{PHL}	—	5.0	12.0	—	18.0		$C_L = 50\text{ pF}$	Yn	COM
Enable time	t_{ZH}	—	7.0	18.0	—	23.0	ns	$C_L = 15\text{ pF}$	INH	COM or
	t_{ZL}	—	9.0	28.0	—	35.0		$C_L = 50\text{ pF}$		Yn
Disable time	t_{HZ}	—	9.0	18.0	—	23.0	ns	$C_L = 15\text{ pF}$	INH	COM or
	t_{LZ}	—	13.0	28.0	—	35.0		$C_L = 50\text{ pF}$		Yn

• $V_{CC} = 3.3 \pm 0.3\text{ V}$

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 or
	t_{PHL}	—	4.0	9.0	—	12.0		$C_L = 50\text{ pF}$	Yn	COM
Enable time	t_{ZH}	—	5.0	12.0	—	15.0	ns	$C_L = 15\text{ pF}$	INH	COM or
	t_{ZL}	—	7.0	20.0	—	25.0		$C_L = 50\text{ pF}$		Yn
Disable time	t_{HZ}	—	7.0	12.0	—	15.0	ns	$C_L = 15\text{ pF}$	INH	COM or
	t_{LZ}	—	10.0	20.0	—	25.0		$C_L = 50\text{ pF}$		Yn

Switching Characteristics (cont)

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

Item	Symbol	T _a = 25°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	or
	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
	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
	t _{LZ}	—	8.0	14.0	—	18.0		C _L = 50 pF		Yn

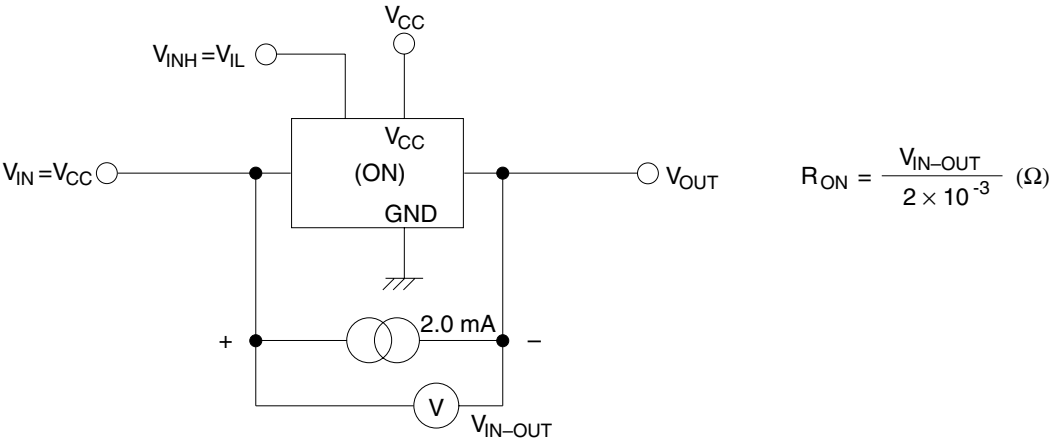
Operating Characteristics

- $C_L = 50 \text{ pF}$

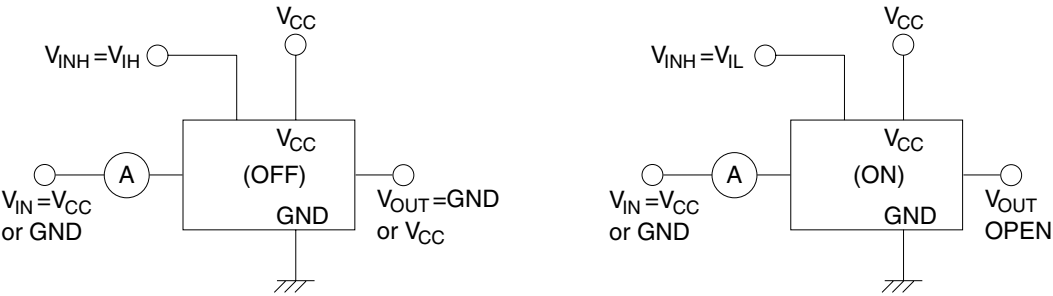
Item	Symbol	V _{CC} (V)	T _a = 25°C			Unit	Test Conditions
			Min	Typ	Max		
Power dissipation capacitance	C _{PD}	3.3	—	7.5	—	pF	f = 10 MHz
		5.0	—	8.0	—		

Test Circuit

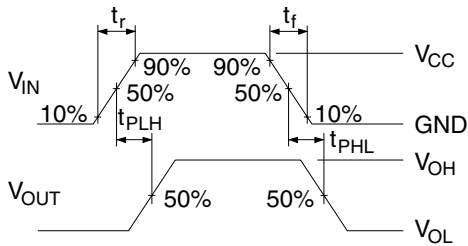
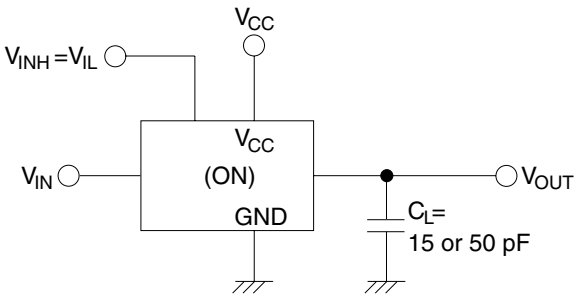
• R_{ON}



• I_S (off), I_S (on)

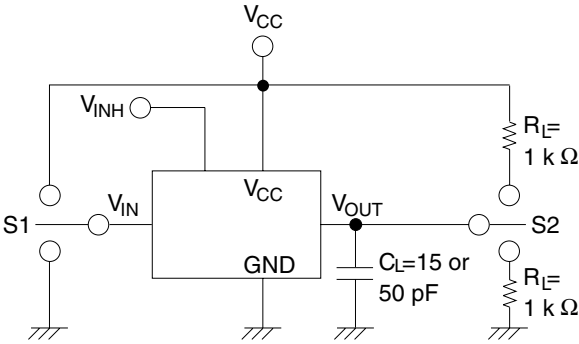


• t_{PLH}, t_{PHL}

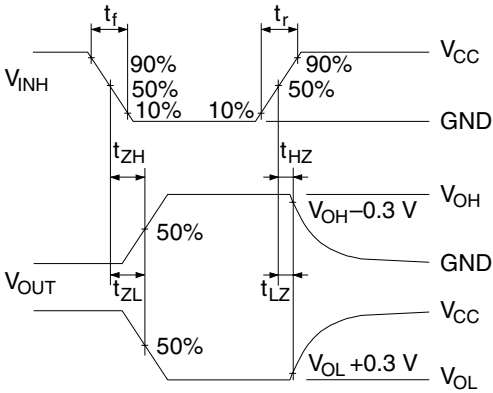


- Notes: 1. Input waveform : $PRR \leq 1 \text{ MHz}$, $Z_o = 50 \Omega$, $t_r \leq 3 \text{ ns}$, $t_f \leq 3 \text{ ns}$.
2. The output are measured one at a time with one transition per measurement.

• $t_{ZH}, t_{ZL} / t_{HZ}, t_{LZ}$

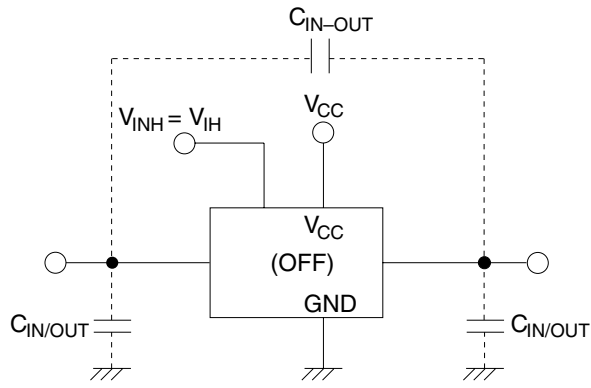


Item	S1	S2
t_{ZH}	V_{CC}	GND
t_{ZL}	GND	V_{CC}
t_{HZ}	V_{CC}	GND
t_{LZ}	GND	V_{CC}



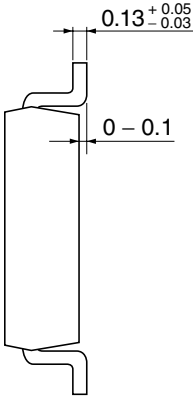
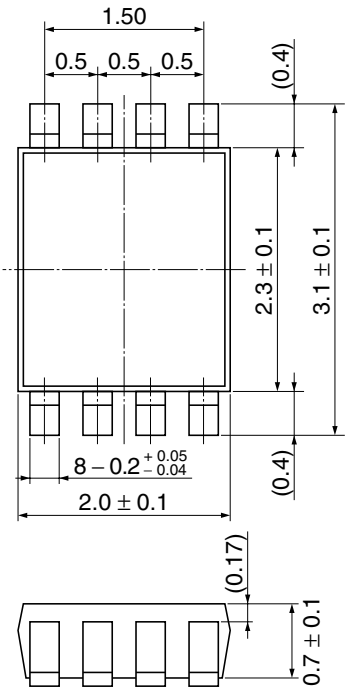
- Notes: 1. Input waveform : $PRR \leq 1 \text{ MHz}$, $Z_o = 50 \Omega$, $t_r \leq 3 \text{ ns}$, $t_f \leq 3 \text{ ns}$.
2. Waveform – A is for an output with internal conditions such that the output is low except when disabled by the output control.
3. Waveform – B is for an output with internal 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

As of January, 2001
Unit: mm



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

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