
HD74LV2G53A

2-channel Analog Multiplexer / Demultiplexer

HITACHI

ADE-205-567A (Z)
2nd. Edition
October 2000

Description

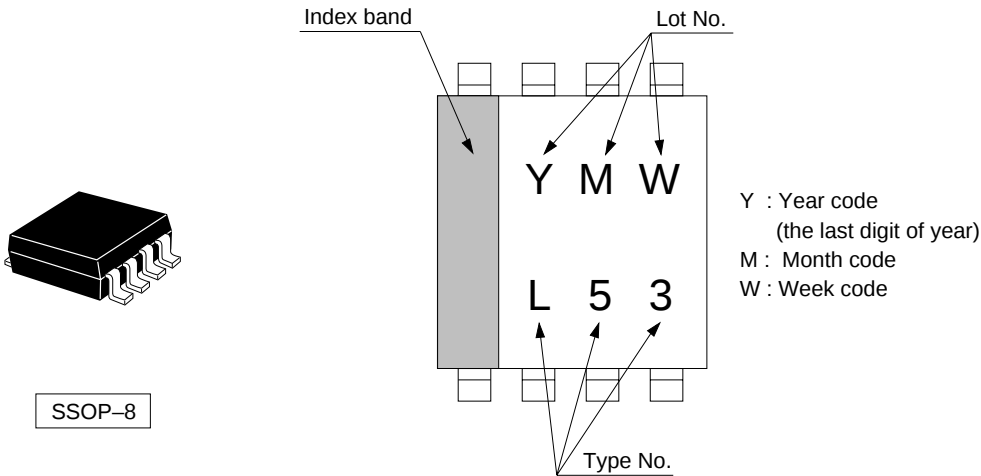
The HD74LV2G53A has 2-channel analog multiplexer / demultiplexer in a 8 pin package. Applications include signal gating, chopping, modulation or demodulation (modem), and signal multiplexing for analog to digital and digital to analog conversion systems. Low voltage and high speed operation is suitable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

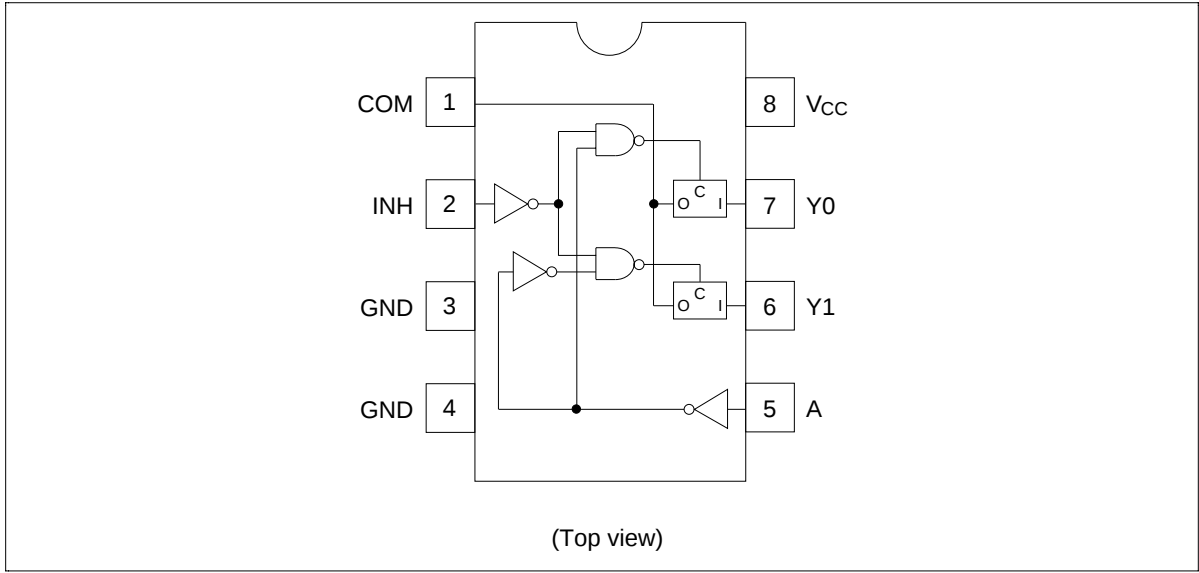


Function Table

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 Ta = 25°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 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 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°C			T _a = -40 to 85°C		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Propagation delay time	t _{PLH} t _{PHL}	—	4.5 11.0	13.0 23.0	—	19.0 29.0	ns	C _L = 15 pF C _L = 50 pF	COM or Yn	or COM
Enable time	t _{ZH} t _{ZL}	—	13.0 18.0	30.0 47.0	—	35.0 54.0	ns	C _L = 15 pF C _L = 50 pF	INH	COM or Yn
Disable time	t _{HZ} t _{LZ}	—	13.0 20.0	25.0 38.0	—	30.0 45.0	ns	C _L = 15 pF C _L = 50 pF	INH	COM or Yn

• $V_{CC} = 2.5 \pm 0.2\text{ V}$

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} t _{PHL}	—	2.5 5.0	10.0 12.0	—	16.0 18.0	ns	C _L = 15 pF C _L = 50 pF	COM or Yn	or COM
Enable time	t _{ZH} t _{ZL}	—	7.0 9.0	18.0 28.0	—	23.0 35.0	ns	C _L = 15 pF C _L = 50 pF	INH	COM or Yn
Disable time	t _{HZ} t _{LZ}	—	9.0 13.0	18.0 28.0	—	23.0 35.0	ns	C _L = 15 pF C _L = 50 pF	INH	COM or Yn

• $V_{CC} = 3.3 \pm 0.3\text{ V}$

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} t _{PHL}	—	2.0 4.0	6.0 9.0	—	10.0 12.0	ns	C _L = 15 pF C _L = 50 pF	COM or Yn	or COM
Enable time	t _{ZH} t _{ZL}	—	5.0 7.0	12.0 20.0	—	15.0 25.0	ns	C _L = 15 pF C _L = 50 pF	INH	COM or Yn
Disable time	t _{HZ} t _{LZ}	—	7.0 10.0	12.0 20.0	—	15.0 25.0	ns	C _L = 15 pF C _L = 50 pF	INH	COM or 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} t _{PHL}	—	1.5 3.0	4.0 6.0	—	7.0 8.0	ns	C _L = 15 pF C _L = 50 pF	COM or Yn	or 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

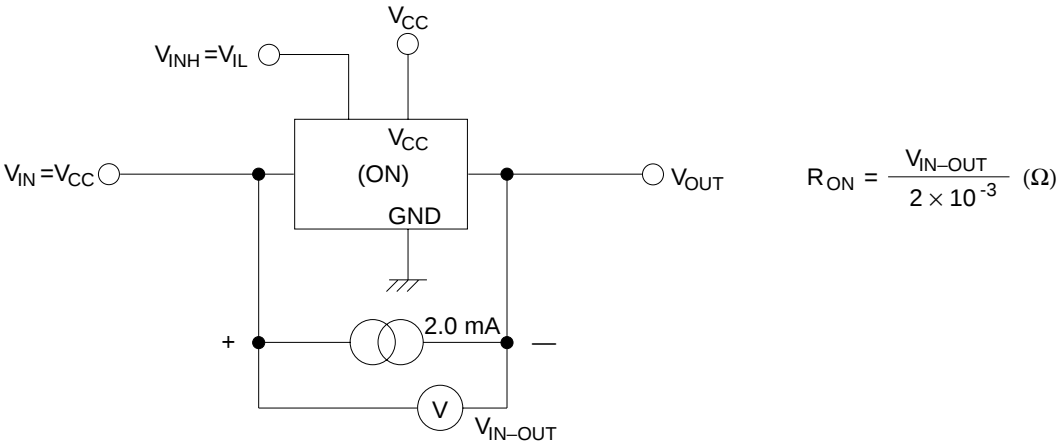
Operating Characteristics

• C_L = 50 pF

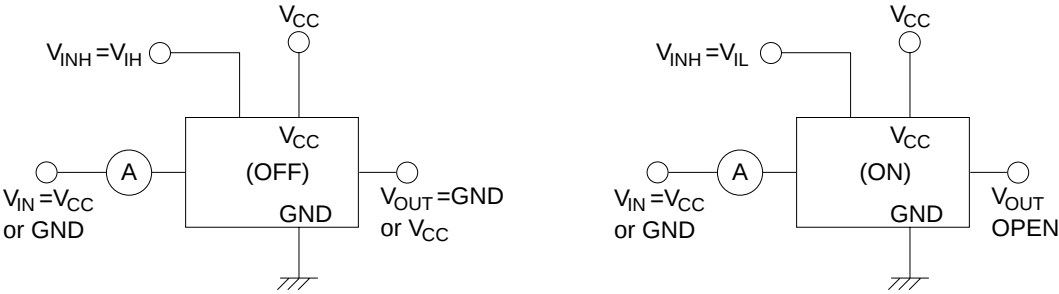
Item	Symbol	V _{CC} (V)	T _a = 25°C			Unit	Test Conditions
			Min	Typ	Max		
Power dissipation capacitance	C _{PD}	3.3	—	7.5	—	pF	f = 10 MHz
		5.0	—	8.0	—		

Test Circuit

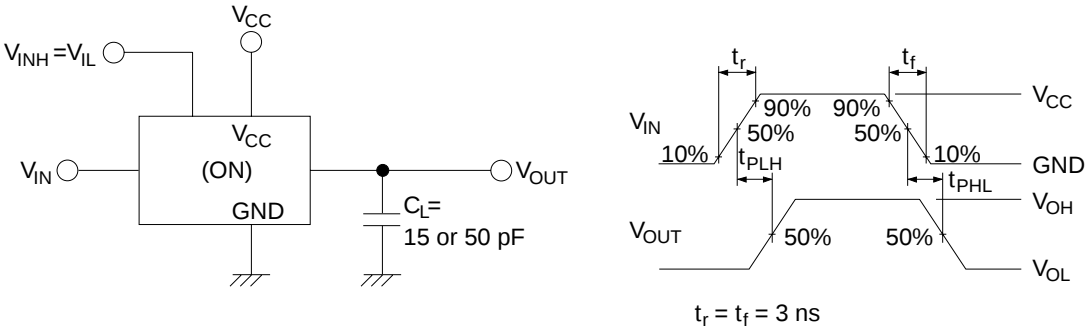
• R_{ON}



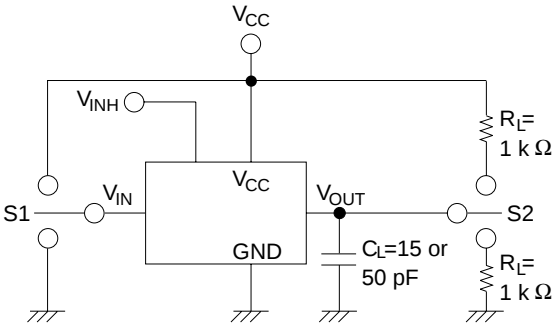
• I_S (off), I_S (on)



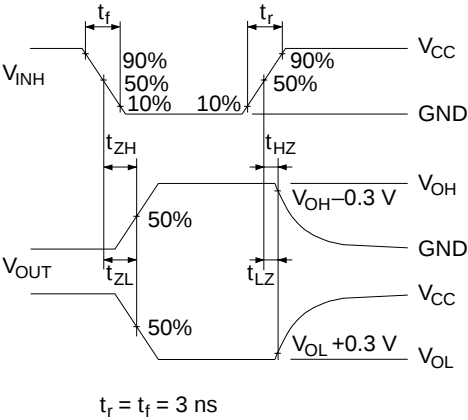
• t_{PLH} , t_{PHL}



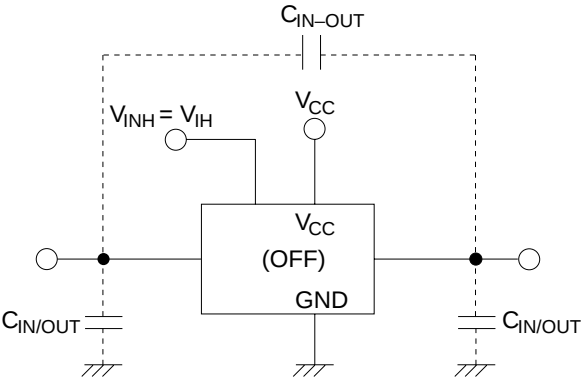
• $t_{ZH}, t_{ZL} / t_{HZ}, t_{LZ}$



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



• $C_{IN/OUT}, C_{IN-OUT}$



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