To all our customers

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Renesas Technology Corp.
Customer Support Dept.
April 1, 2003

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HD74LV1GW53A

2–channel Analog Multiplexer / Demultiplexer

ADE-205-715 (Z)

Rev.0
Jan 2003

Description

The HD74LV1GW53A has 2–channel analog multiplexer / demultiplexer in a 6 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.

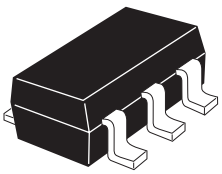
Features

- The basic gate function is lined up as Hitachi uni logic series.
- Supplied on emboss taping for high speed automatic mounting.
- Supply voltage range : 1.65 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 hysteretic voltage for the slow transition.
- Ordering Information

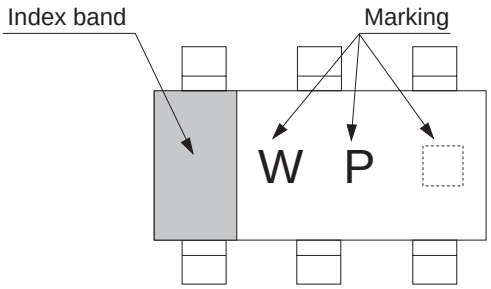
Part Name	Package Type	Package Code	Package Abbreviation	Taping Abbreviation (Quantity)
HD74LV1GW53ACME	CMPAK-6 pin	CMPAK-6V(O)	CM	E (3,000 pcs / Reel)

Outline and Article Indication

• HD74LV1GW53A



CMPAK–6

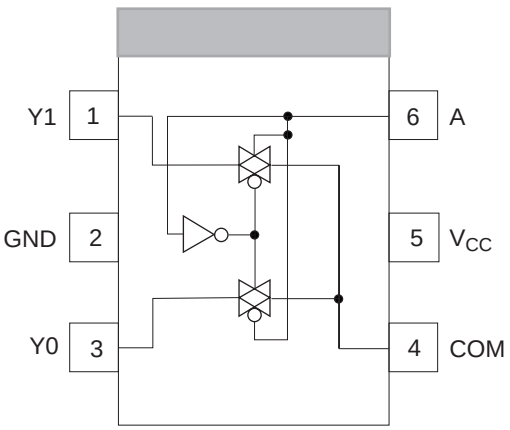


Function Table

Control inputs	On channel
L	Y_0
H	Y_1

H : High level
L : Low level

Pin Arrangement



(Top view)

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 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		
Hysteretic 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_A = V_{IH}, 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_A = V_{IH}, 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_A = V_{IH}, 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_A = V_{IH}, V_{IL}
On-state switch leakage current	$I_{s (ON)}$	5.5	—	—	±0.1	—	—	±1.0	µA	V_{IN} = V_{CC} or GND V_A = V_{IH}, 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	

Switching Characteristics

- V_{CC} = 1.8 ± 0.15 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	13.0	—	19.0	ns	C_L = 15 pF	COM or Yn	Yn or COM
		—	11.0	23.0	—	29.0		C_L = 50 pF		
Enable time	t_{ZH} t_{ZL}	—	13.0	30.0	—	35.0	ns	C_L = 15 pF	A	Yn
		—	18.0	47.0	—	54.0		C_L = 50 pF		
Disable time	t_{HZ} t_{LZ}	—	13.0	25.0	—	30.0	ns	C_L = 15 pF	A	Yn
		—	20.0	38.0	—	45.0		C_L = 50 pF		

- V_{CC} = 2.5 ± 0.2 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	10.0	—	16.0	ns	C_L = 15 pF	COM or Yn	Yn or COM
		—	5.0	12.0	—	18.0		C_L = 50 pF		
Enable time	t_{ZH} t_{ZL}	—	7.0	18.0	—	23.0	ns	C_L = 15 pF	A	Yn
		—	9.0	28.0	—	35.0		C_L = 50 pF		
Disable time	t_{HZ} t_{LZ}	—	9.0	18.0	—	23.0	ns	C_L = 15 pF	A	Yn
		—	13.0	28.0	—	35.0		C_L = 50 pF		

- V_{CC} = 3.3 ± 0.3 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	6.0	—	10.0	ns	C_L = 15 pF	COM or Yn	Yn or COM
		—	4.0	9.0	—	12.0		C_L = 50 pF		
Enable time	t_{ZH} t_{ZL}	—	5.0	12.0	—	15.0	ns	C_L = 15 pF	A	Yn
		—	7.0	20.0	—	25.0		C_L = 50 pF		
Disable time	t_{HZ} t_{LZ}	—	7.0	12.0	—	15.0	ns	C_L = 15 pF	A	Yn
		—	10.0	20.0	—	25.0		C_L = 50 pF		

Switching Characteristics (cont)

- V_{CC} = 5.0 ± 0.5 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	4.0	—	7.0	ns	C_L = 15 pF	COM or Yn	Yn or COM
		—	3.0	6.0	—	8.0		C_L = 50 pF		
Enable time	t_{ZH} t_{ZL}	—	4.0	8.0	—	10.0	ns	C_L = 15 pF	A	Yn
		—	5.0	14.0	—	18.0		C_L = 50 pF		
Disable time	t_{HZ} t_{LZ}	—	5.0	8.0	—	10.0	ns	C_L = 15 pF	A	Yn
		—	8.0	14.0	—	18.0		C_L = 50 pF		

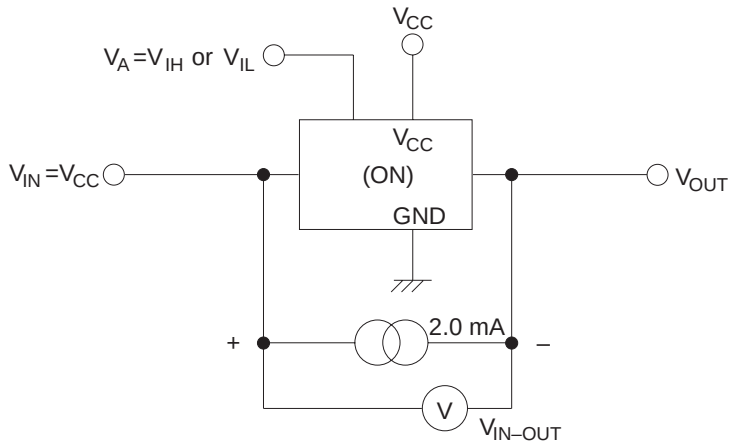
Operating Characteristics

- 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	—		

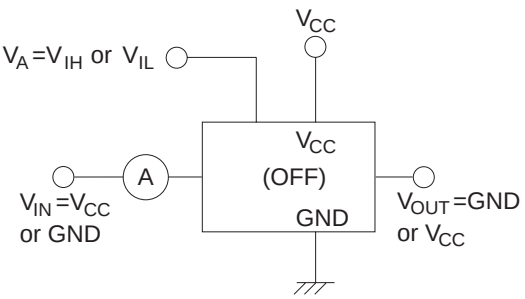
Test Circuit

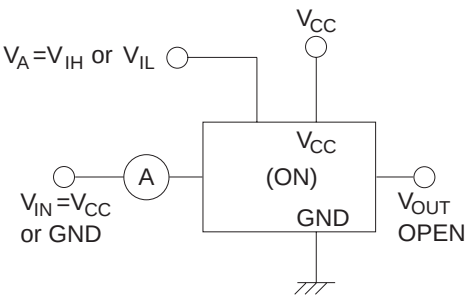
• R_{ON}



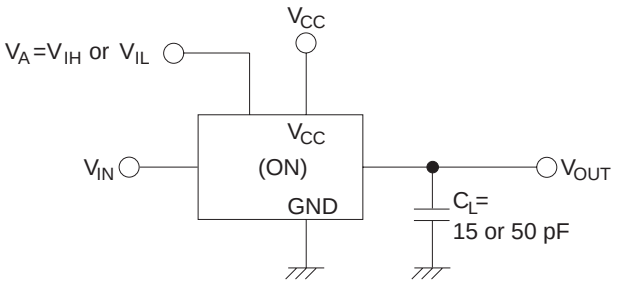
$$R_{ON} = \frac{V_{IN-OUT}}{2 \times 10^{-3}} \ (\Omega)$$

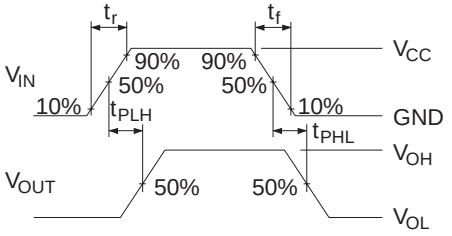
• I_S (off), I_S (on)





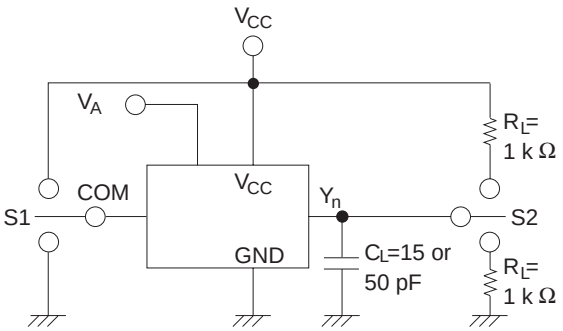
• t_{PLH}, t_{PHL}



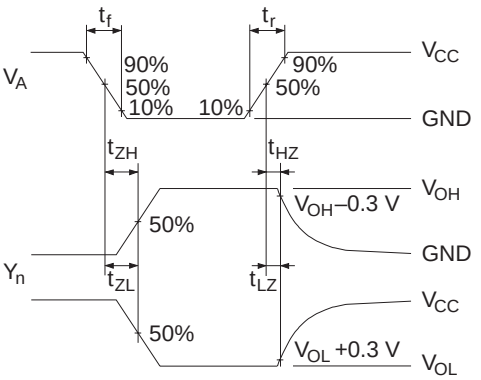


Notes: 1. Input waveform : PRR ≤ 1 MHz, Zo = 50 Ω, t_r ≤ 3 ns, t_f ≤ 3 ns.
2. The output are measured one at a time with one transition per measurement.

• t_{ZH}, t_{ZL} / t_{HZ}, t_{LZ}



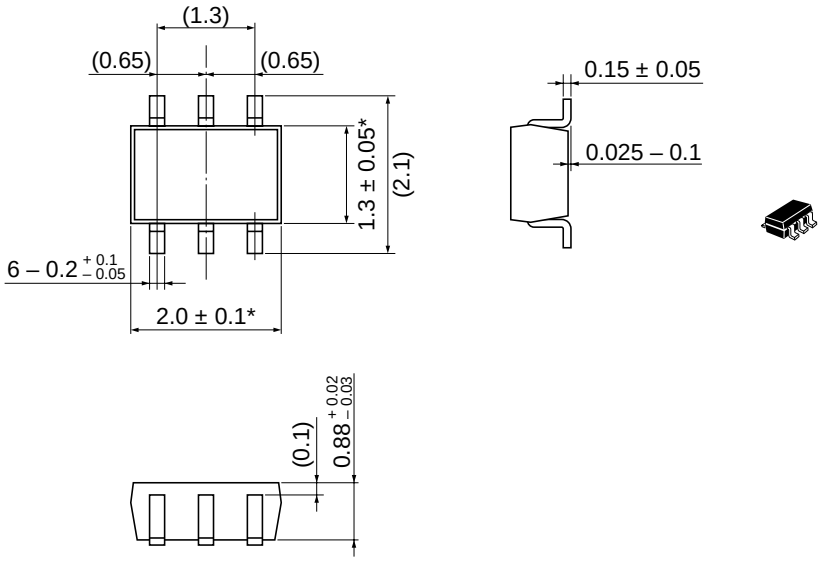
Item	S1	S2
t_{ZH}	V_{CC}	GND
t_{ZL}	GND	V_{CC}
t_{HZ}	V_{CC}	GND
t_{LZ}	GND	V_{CC}



Notes: 1. Input waveform : PRR ≤ 1 MHz, Zo = 50 Ω, t_r ≤ 3 ns, t_f ≤ 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.

Package Dimensions

Unit: mm



* Sn-Bi plating.
** The value does not include Resin Bar.
(One side: 0.15 mm (max))

Hitachi Code	CMPAK-6V(O)
JEDEC	—
JEITA	Conforms
Mass (reference value)	0.006 g

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Hitachi, Ltd.
Semiconductor & Integrated Circuits
Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan
Tel: (03) 3270-2111 Fax: (03) 3270-5109

URL http://www.hitachisemiconductor.com/

For further information write to:

Hitachi Semiconductor (America) Inc.
179 East Tasman Drive
San Jose,CA 95134
Tel: <1> (408) 433-1990
Fax: <1>(408) 433-0223

Hitachi Europe Ltd.
Electronic Components Group
Whitebrook Park
Lower Cookham Road
Maidenhead
Berkshire SL6 8YA, United Kingdom
Tel: <44> (1628) 585000
Fax: <44> (1628) 778322

Hitachi Europe GmbH
Electronic Components Group
Dornacher Str 3
D-85622 Feldkirchen
Postfach 201, D-85619 Feldkirchen
Germany
Tel: <49> (89) 9 9180-0
Fax: <49> (89) 9 29 30 00

Hitachi Asia Ltd.
Hitachi Tower
16 Collyer Quay #20-00
Singapore 049318
Tel : <65>-6538-6533/6538-8577
Fax : <65>-6538-6933/6538-3877
URL : http://semiconductor.hitachi.com.sg

Hitachi Asia Ltd.
(Taipei Branch Office)
4/F, No. 167, Tun Hwa North Road
Hung-Kuo Building
Taipei (105), Taiwan
Tel : <886>-(2)-2718-3666
Fax : <886>-(2)-2718-8180
Telex : 23222 HAS-TP
URL : http://semiconductor.hitachi.com.tw

Hitachi Asia (Hong Kong) Ltd.
Group III (Electronic Components)
7/F., North Tower
World Finance Centre,
Harbour City, Canton Road
Tsim Sha Tsui, Kowloon Hong Kong
Tel : <852>-2735-9218
Fax : <852>-2730-0281
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Colophon 7.0

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