HD74LV1GW53A

2-channel Analog Multiplexer / Demultiplexer

R04DS0034EJ0300
Rev.3.00
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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.

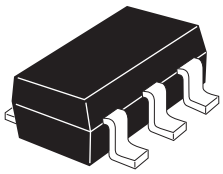
Features

- The basic gate function is lined up as Renesas 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

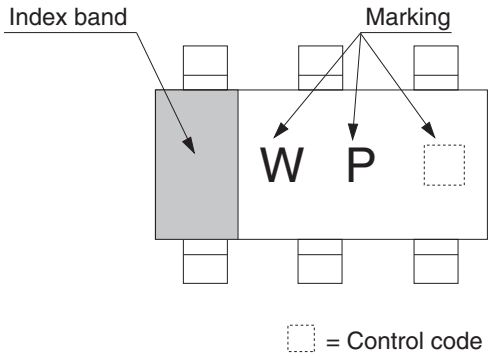
Part Name	Package Type	Package Code (Previous Code)	Package Abbreviation	Taping Abbreviation (Quantity)
HD74LV1GW53ACME	CMPAK-6 pin	PTSP0006JA-A (CMPAK-6V)	CM	E (3,000 pcs / Reel)

Outline and Article Indication

• HD74LV1GW53A



CMPAK–6

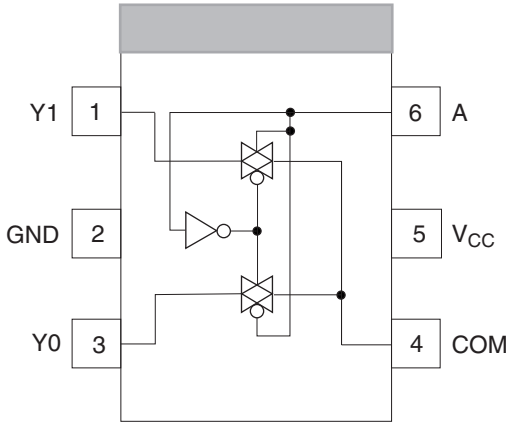


Function Table

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 Characteristics

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}	—	4.5	13.0	—	19.0	ns	C_L = 15 pF	COM or Yn	Yn or COM
	t_{PHL}	—	11.0	23.0	—	29.0		C_L = 50 pF		
Enable time	t_{ZH}	—	13.0	30.0	—	35.0	ns	C_L = 15 pF	A	Yn
	t_{ZL}	—	18.0	47.0	—	54.0		C_L = 50 pF		
Disable time	t_{HZ}	—	13.0	25.0	—	30.0	ns	C_L = 15 pF	A	Yn
	t_{LZ}	—	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}	—	2.5	10.0	—	16.0	ns	C_L = 15 pF	COM or Yn	Yn or COM
	t_{PHL}	—	5.0	12.0	—	18.0		C_L = 50 pF		
Enable time	t_{ZH}	—	7.0	18.0	—	23.0	ns	C_L = 15 pF	A	Yn
	t_{ZL}	—	9.0	28.0	—	35.0		C_L = 50 pF		
Disable time	t_{HZ}	—	9.0	18.0	—	23.0	ns	C_L = 15 pF	A	Yn
	t_{LZ}	—	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}	—	2.0	6.0	—	10.0	ns	C_L = 15 pF	COM or Yn	Yn or COM
	t_{PHL}	—	4.0	9.0	—	12.0		C_L = 50 pF		
Enable time	t_{ZH}	—	5.0	12.0	—	15.0	ns	C_L = 15 pF	A	Yn
	t_{ZL}	—	7.0	20.0	—	25.0		C_L = 50 pF		
Disable time	t_{HZ}	—	7.0	12.0	—	15.0	ns	C_L = 15 pF	A	Yn
	t_{LZ}	—	10.0	20.0	—	25.0		C_L = 50 pF		

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}	—	1.5	4.0	—	7.0	ns	C_L = 15 pF	COM or Yn	Yn or COM
	t_{PHL}	—	3.0	6.0	—	8.0		C_L = 50 pF		
Enable time	t_{ZH}	—	4.0	8.0	—	10.0	ns	C_L = 15 pF	A	Yn
	t_{ZL}	—	5.0	14.0	—	18.0		C_L = 50 pF		
Disable time	t_{HZ}	—	5.0	8.0	—	10.0	ns	C_L = 15 pF	A	Yn
	t_{LZ}	—	8.0	14.0	—	18.0		C_L = 50 pF		

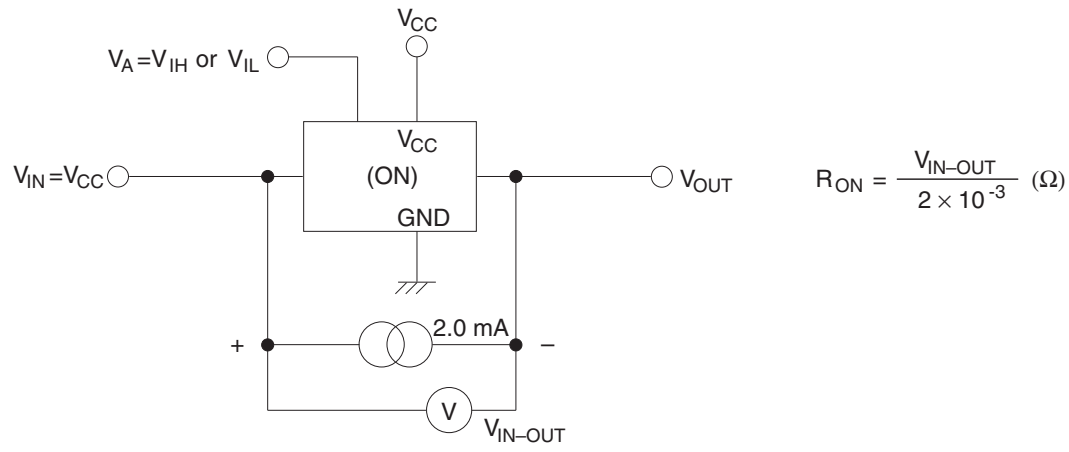
Operating Characteristics

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	—		

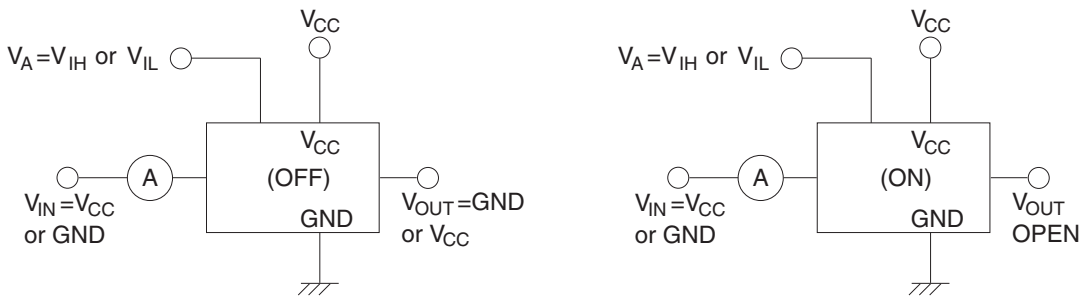
Test Circuit

• R_{ON}

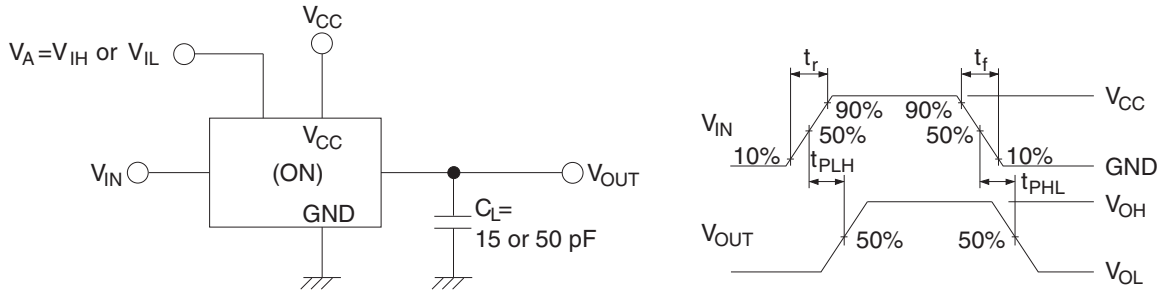


$$R_{ON} = \frac{V_{IN-OUT}}{2 \times 10^{-3}} \ (\Omega)$$

• I_S (off), I_S (on)

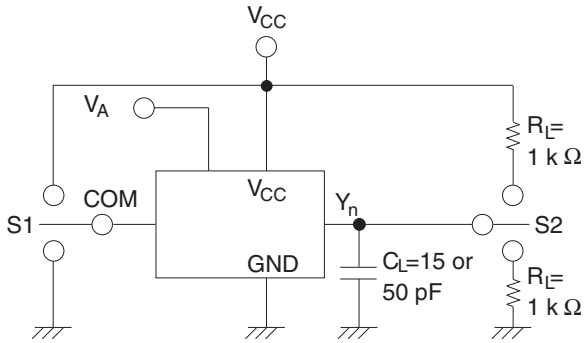


• t_{PLH} , t_{PHL}

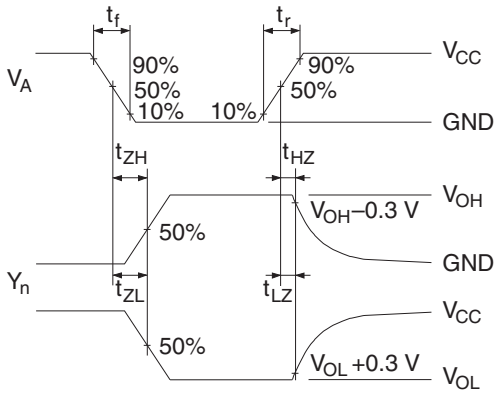


Notes: 1. Input waveform : PRR ≤ 1 MHz, Zo = 50 Ω, t_r ≤ 3 ns, t_f ≤ 3 ns.
2. The output are measured one at a time with one transition per measurement.

• t_{ZH},t_{ZL} / t_{HZ},t_{LZ}



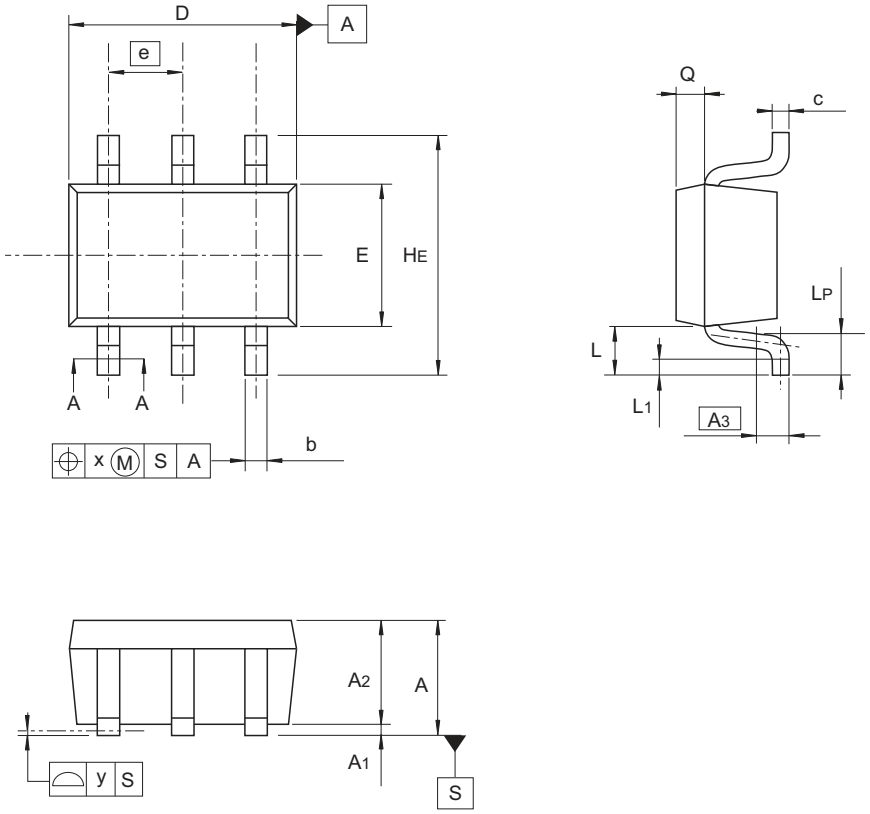
Item	S1	S2
t_{ZH}	V_{CC}	GND
t_{ZL}	GND	V_{CC}
t_{HZ}	V_{CC}	GND
t_{LZ}	GND	V_{CC}



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

JEITA Package Code	RENESAS Code	Previous Code	MASS (Typ) [g]
SC-88	PTSP0006JA-A	CMPAK-6 / CMPAK-6V	0.006



Reference Symbol	Dimensions in millimeters		
	Min	Nom	Max
A	0.8	—	1.1
A_1	0	—	0.1
A_2	0.8	0.9	1.0
$\boxed{A_3}$	—	0.25	—
b	0.15	0.2	0.25
c	0.1	0.15	0.25
D	1.8	2.0	2.2
E	1.15	1.25	1.35
$\boxed{e}$	—	0.65	—
H_E	2.0	2.1	2.2
L	0.3	—	0.7
L_1	0.1	—	0.5
L_P	0.2	—	0.6
x	—	—	0.05
y	—	—	0.05
Q	—	0.25	—

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