

HD74LV2GT53A

2-channel Analog Multiplexer / Demultiplexer

HITACHI

ADE-205-697 (Z)

Rev.0
Jul. 2002

Description

The HD74LV2GT53A 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.

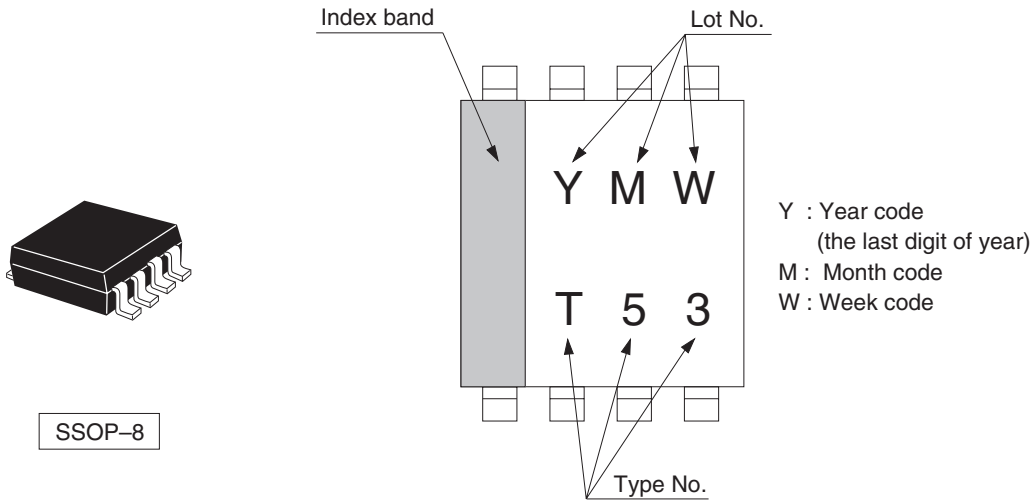
Features

- The basic gate function is lined up as hitachi uni logic series.
- Supplied on emboss taping for high speed automatic mounting.
- Control input is TTL compatible input level.
Supply voltage range : 4.5 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 hysteresis voltage for the slow transition.
- Package type

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

Outline and Article Indication

• HD74LV2GT53A



Function Table

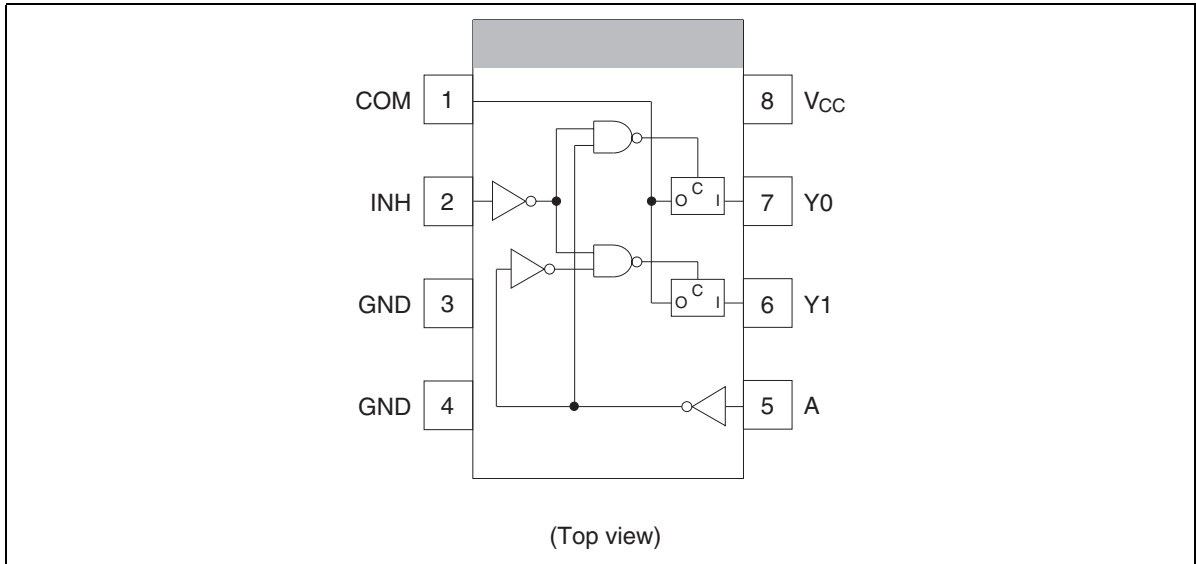
| Control inputs | | On channel |
|----------------|---|------------|
| INH | A | |
| H | X | None |
| L | H | Y1 |
| L | L | Y0 |

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} | 4.5 | 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 | 20 | ns / V | $V_{CC} = 4.5$ 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) | $T_a = 25^\circ\text{C}$ | | | $T_a = -40 \text{ to } 85^\circ\text{C}$ | | | Unit | Test Conditions |
|--|-----------------|--------------|--------------------------|-----|-----------|--|------|-----------|---------------|---|
| | | | Min | Typ | Max | Min | Typ | Max | | |
| Input voltage | V_{IH} | 4.5 to 5.5 | — | — | — | 2.0 | — | — | V | Control input only |
| | V_{IL} | 4.5 to 5.5 | — | — | — | — | — | 0.8 | | |
| Hysteresis voltage | V_H | 5.0 | — | — | — | — | 0.15 | — | V | $V_T^+ - V_T^-$ |
| On-state switch resistance | R_{ON} | 4.5 | — | 40 | 75 | — | — | 100 | Ω | $V_{IN} = V_{CC}$ or GND $V_C = V_{IH}$ $I_T = 2 \text{ mA}$ |
| Peak on resistance | $R_{ON(P)}$ | 4.5 | — | 50 | 100 | — | — | 125 | Ω | $V_{IN} = V_{CC}$ to GND $V_C = V_{IH}$ $I_T = 2 \text{ mA}$ |
| Difference of on-state resistance between switches | ΔR_{ON} | 4.5 | — | 7 | 15 | — | — | 20 | Ω | $V_{IN} = V_{CC}$ to GND $V_{INH} = V_{IL}$ $I_T = 2 \text{ mA}$ |
| 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 |
| | ΔI_{CC} | 5.5 | — | — | — | — | — | 1.5 | mA | $V_{IN} = 3.4 \text{ V}$ |
| Control input capacitance | C_{IC} | — | — | 3.5 | — | — | — | — | pF | |
| Switch terminal capacitance | $C_{IN/OUT}$ | — | — | 6.0 | — | — | — | — | pF | |
| Feed through capacitance | C_{IN-OUT} | — | — | 0.5 | — | — | — | — | pF | |

Switching Characteristics

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

| 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 | 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 | INH | COM or 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 | INH | COM or Yn |
| | t _{LZ} | — | 8.0 | 14.0 | — | 18.0 | | C _L = 50 pF | | |

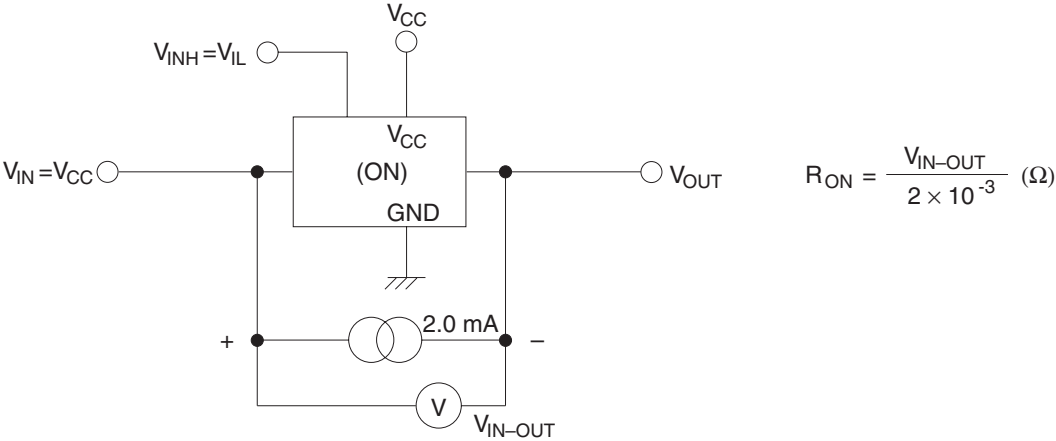
Operating Characteristics

- $C_L = 50 \text{ pF}$

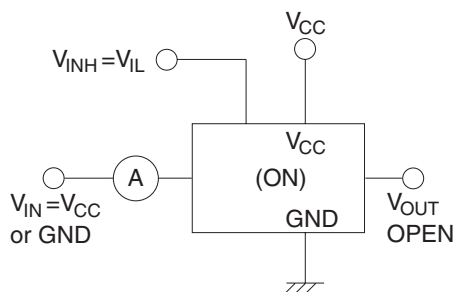
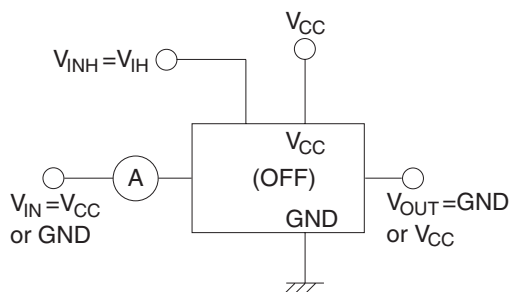
| Item | Symbol | V _{cc} (V) | T _a = 25°C | | | Unit | Test Conditions |
|-------------------------------|-----------------|---------------------|-----------------------|-----|-----|------|-----------------|
| | | | Min | Typ | Max | | |
| Power dissipation capacitance | C _{PD} | 5.0 | — | 8.0 | —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

Test Circuit

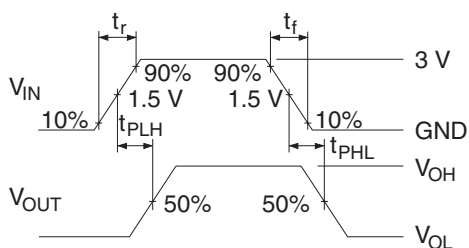
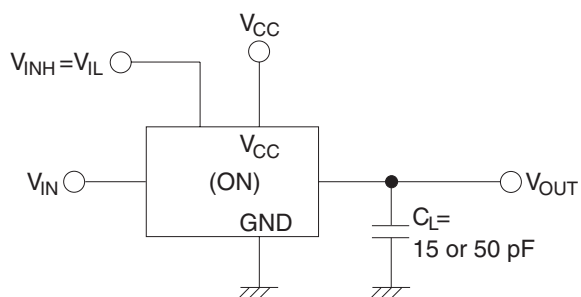
- R_{ON}



• I_S (off), I_S (on)

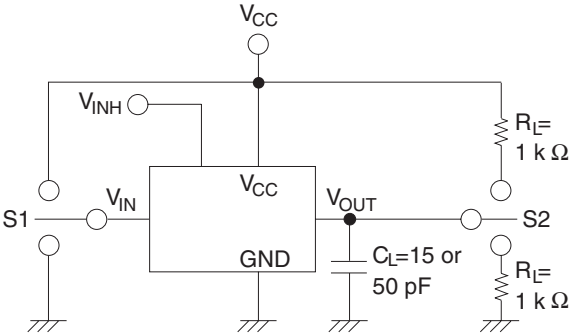


• t_{PLH} , t_{PHL}

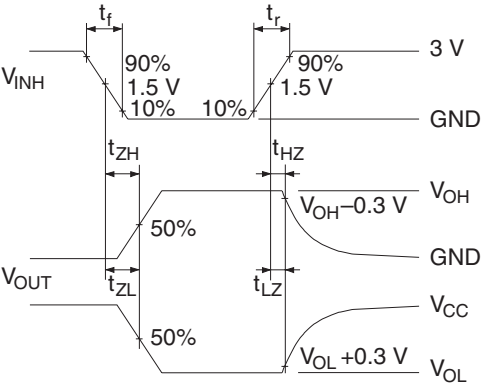


- Notes: 1. Input waveform : $PRR \leq 1$ MHz, $Z_o = 50 \Omega$, $t_r \leq 3$ ns, $t_f \leq 3$ ns.
2. The output are measured one at a time with one transition per measurement.

• $t_{ZH}, t_{ZL} / t_{HZ}, t_{LZ}$

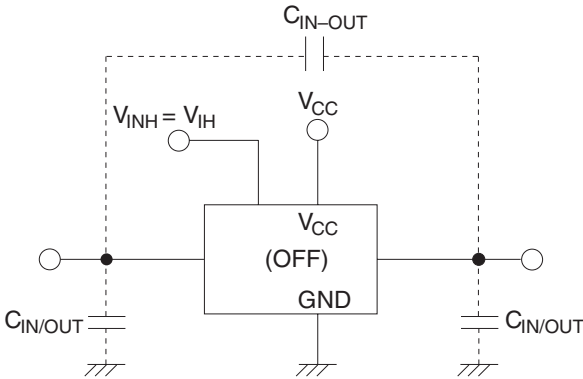


| Item | S1 | S2 |
|----------|----------|----------|
| t_{ZH} | V_{CC} | GND |
| t_{ZL} | GND | V_{CC} |
| t_{HZ} | V_{CC} | GND |
| t_{LZ} | GND | V_{CC} |



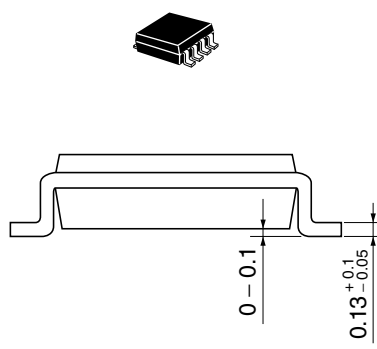
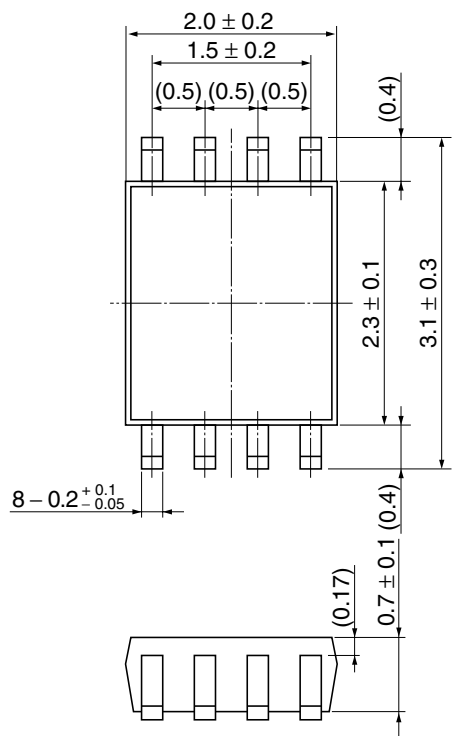
- Notes:
1. Input waveform : $PRR \leq 1 \text{ MHz}$, $Z_o = 50 \Omega$, $t_r \leq 3 \text{ ns}$, $t_f \leq 3 \text{ ns}$.
 2. Waveform – A is for an output with internal conditions such that the output is low except when disabled by the output control.
 3. Waveform – B is for an output with internal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

Unit: mm



| | |
|------------------------|----------|
| Hitachi Code | TTP-8DBV |
| JEDEC | — |
| JEITA | — |
| Mass (reference value) | 0.010 g |

Disclaimer

1. Hitachi neither warrants nor grants licenses of any rights of Hitachi's or any third party's patent, copyright, trademark, or other intellectual property rights for information contained in this document. Hitachi bears no responsibility for problems that may arise with third party's rights, including intellectual property rights, in connection with use of the information contained in this document.
 2. Products and product specifications may be subject to change without notice. Confirm that you have received the latest product standards or specifications before final design, purchase or use.
 3. Hitachi makes every attempt to ensure that its products are of high quality and reliability. However, contact Hitachi's sales office before using the product in an application that demands especially high quality and reliability or where its failure or malfunction may directly threaten human life or cause risk of bodily injury, such as aerospace, aeronautics, nuclear power, combustion control, transportation, traffic, safety equipment or medical equipment for life support.
 4. Design your application so that the product is used within the ranges guaranteed by Hitachi particularly for maximum rating, operating supply voltage range, heat radiation characteristics, installation conditions and other characteristics. Hitachi bears no responsibility for failure or damage when used beyond the guaranteed ranges. Even within the guaranteed ranges, consider normally foreseeable failure rates or failure modes in semiconductor devices and employ systemic measures such as fail-safes, so that the equipment incorporating Hitachi product does not cause bodily injury, fire or other consequential damage due to operation of the Hitachi product.
 5. This product is not designed to be radiation resistant.
 6. No one is permitted to reproduce or duplicate, in any form, the whole or part of this document without written approval from Hitachi.
 7. Contact Hitachi's sales office for any questions regarding this document or Hitachi semiconductor products.

Sales Offices

HITACHI

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) 585200 | 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 (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 URL : http://semiconductor.hitachi.com.hk |
| | Hitachi Europe GmbH Electronic Components Group Dornacher StraÙe 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. (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://www.hitachi.com.tw | |

Copyright © Hitachi, Ltd., 2002. All rights reserved. Printed in Japan.
Colophon 6.0