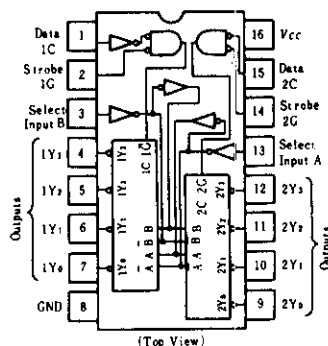


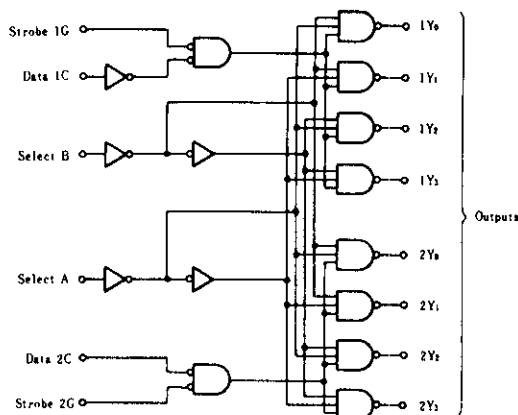
HD74LS156 ●Dual 2-line-to-4-line Decoders/Demultiplexers (with open collector outputs)

This circuit features dual 1-line-to-4-line demultiplexer with individual strobes and common binary-address inputs. When both sections are enabled by the strobes, the common binary-address inputs sequentially select and route associated input data to the appropriate output of each section. The individual strobes permit activating or inhibiting each of the 4-bit sections as desired. Data applied to input 1C is inverted through its outputs. The inverter following the 1C data input permits use as a 3-to-8-line decoder or 1-to-8-line demultiplexer without external gating.

■PIN ARRANGEMENT



■BLOCK DIAGRAM



■RECOMMENDED OPERATING CONDITIONS

| Item | Symbol | min | typ | max | Unit |
|---------------------------|----------|-----|-----|-----|------|
| High level output voltage | V_{OH} | — | — | 5.5 | V |
| Low level output current | I_{OL} | — | — | 8 | mA |

■FUNCTION TABLE

●2-to-4-line Decoder/1-to-4-line Demultiplexer

| Inputs | | | | Outputs | | | | Inputs | | | | Outputs | | | |
|--------|--------|------|----|---------|-----|-----|-----|--------|--------|------|----|---------|-----|-----|-----|
| SELECT | STROBE | DATA | | | | | | SELECT | STROBE | DATA | | | | | |
| B | A | 1G | 1C | 1Y0 | 1Y1 | 1Y2 | 1Y3 | B | A | 2G | 2C | 2Y0 | 2Y1 | 2Y2 | 2Y3 |
| X | X | H | X | H | H | H | H | X | X | H | X | H | H | H | H |
| L | L | L | H | L | H | H | H | L | L | L | L | L | H | H | H |
| L | H | L | H | H | L | H | H | L | H | L | L | H | L | H | H |
| H | L | L | H | H | H | L | H | H | L | L | L | H | H | L | H |
| H | H | L | H | H | H | H | L | H | H | L | L | H | H | H | L |
| X | X | X | L | H | H | H | H | X | X | X | H | H | H | H | H |

●3-to-8-line Decoder/1-to-8-line Demultiplexer

| Inputs | | | Outputs | | | | | | | | |
|------------------|---|---|------------------|-----|-----|-----|-----|-----|-----|-----|-----|
| SELECT | | | STROBE OR DATA | (0) | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| C ⁽¹⁾ | B | A | G ⁽²⁾ | 2Y0 | 2Y1 | 2Y2 | 2Y3 | 1Y0 | 1Y1 | 1Y2 | 1Y3 |
| X | X | X | H | H | H | H | H | H | H | H | H |
| L | L | L | L | L | H | H | H | H | H | H | H |
| L | L | H | L | H | L | H | H | H | H | H | H |
| L | H | L | L | H | H | L | H | H | H | H | H |
| L | H | H | L | H | H | H | L | H | H | H | H |
| H | L | L | L | H | H | H | H | L | H | H | H |
| H | L | H | L | H | H | H | H | H | L | H | H |
| H | H | L | L | H | H | H | H | H | H | L | H |
| H | H | H | L | H | H | H | H | H | H | H | L |

- Notes) 1. C; input 1C and 2C connected together
 2. G; inputs 1G and 2G connected together
 3. H; high level, L; low level, X; irrelevant

HD74LS156

ELECTRICAL CHARACTERISTICS ($T_a = -20 \sim +75^{\circ}\text{C}$)

| Item | Symbol | Test Conditions | min | typ* | max | Unit |
|---------------------|----------|--|---------------------|------|------|---------------|
| Input voltage | V_{IH} | | 2.0 | — | — | V |
| | V_{IL} | | — | — | 0.8 | V |
| Output current | I_{OH} | $V_{CC}=4.75\text{V}$, $V_{IH}=2\text{V}$, $V_{IL}=0.8\text{V}$, $V_{OH}=5.5\text{V}$ | — | — | 100 | μA |
| Output voltage | V_{OL} | $V_{CC}=4.75\text{V}$, $V_{IH}=2\text{V}$, $V_{IL}=0.8\text{V}$ | $I_{OL}=4\text{mA}$ | — | 0.4 | V |
| | | | $I_{OL}=8\text{mA}$ | — | 0.5 | |
| Input current | I_{IH} | $V_{CC}=5.25\text{V}$, $V_I=2.7\text{V}$ | — | — | 20 | μA |
| | I_{IL} | $V_{CC}=5.25\text{V}$, $V_I=0.4\text{V}$ | — | — | -0.4 | mA |
| | I_i | $V_{CC}=5.25\text{V}$, $V_I=7\text{V}$ | — | — | 0.1 | mA |
| Supply current** | I_{CC} | $V_{CC}=5.25\text{V}$ | — | 6.1 | 10 | mA |
| Input clamp voltage | V_{IK} | $V_{CC}=4.75\text{V}$, $I_{IN} = -18\text{mA}$ | — | — | -1.5 | V |

* $V_{CC}=5\text{V}$, $T_a=25^{\circ}\text{C}$

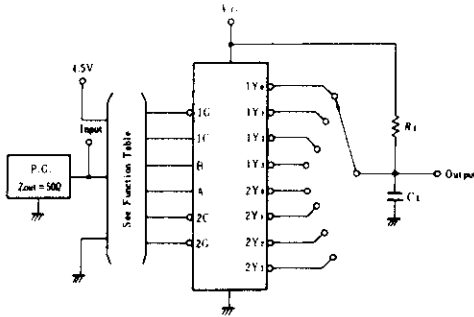
** I_{CC} is measured with outputs open, A, B, and 1C inputs at 4.5V, and 2C, 1G, and 2G inputs grounded.

SWITCHING CHARACTERISTICS ($V_{CC}=5\text{V}$, $T_a=25^{\circ}\text{C}$)

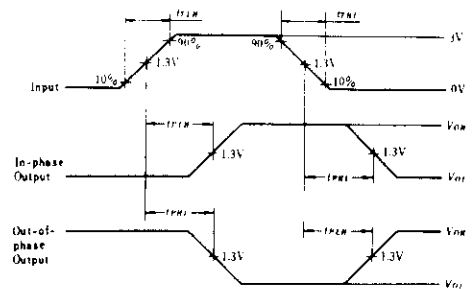
| Item | Symbol | Inputs | Output | Level of logic | Test Conditions | min | typ | max | Unit |
|------------------------|-----------|--------------------|--------|----------------|--|-----|-----|-----|------|
| Propagation delay time | t_{PLH} | A, B, 2C, 1G or 2G | Y | 2 | $C_L = 15\text{pF}$, $R_L = 2\text{k}\Omega$ | — | 25 | 40 | ns |
| | t_{PHL} | A, B, 2C, 1G or 2G | Y | 2 | | — | 34 | 51 | |
| | t_{PLH} | A or B | Y | 3 | | — | 31 | 46 | |
| | t_{PHL} | A or B | Y | 3 | | — | 34 | 51 | |
| | t_{PLH} | 1C | Y | 3 | | — | 32 | 48 | |
| | t_{PHL} | 1C | Y | 3 | | — | 32 | 48 | |

TESTING METHOD

1) Test Circuit

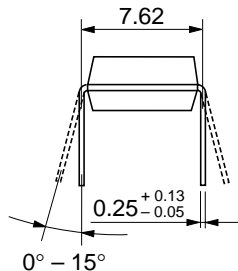
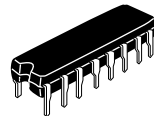
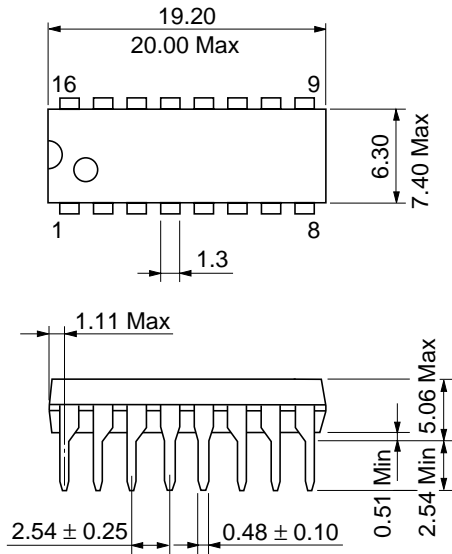


Waveform

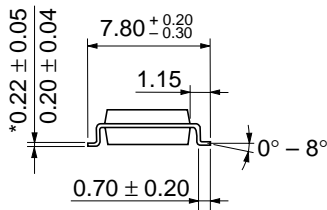
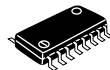
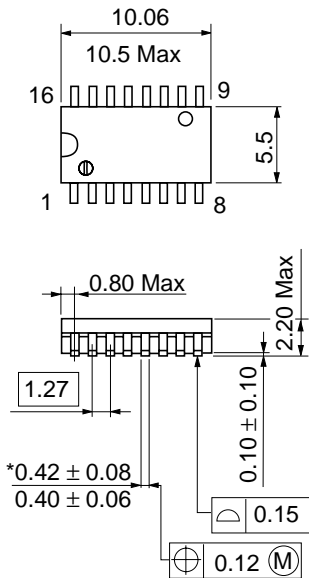


- Notes) 1. Input pulse: $t_{TLH} \leq 15\text{ns}$, $t_{THL} \leq 6\text{ns}$, $PRR=1\text{MHz}$, duty cycle=50%.
2. C_L includes probe and jig capacitance.

Unit: mm

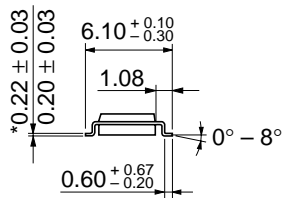
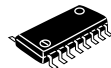
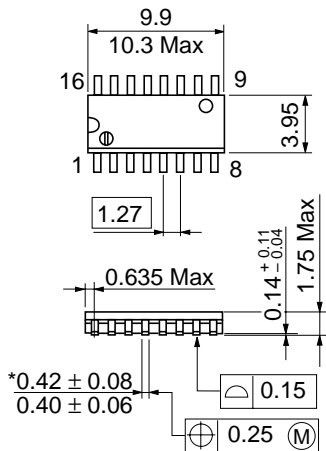


| | |
|--------------------------|----------|
| Hitachi Code | DP-16 |
| JEDEC | Conforms |
| EIAJ | Conforms |
| Weight (reference value) | 1.07 g |



*Dimension including the plating thickness
Base material dimension

| | |
|--------------------------|----------|
| Hitachi Code | FP-16DA |
| JEDEC | — |
| EIAJ | Conforms |
| Weight (reference value) | 0.24 g |



*Dimension including the plating thickness
Base material dimension

| | |
|--------------------------|----------|
| Hitachi Code | FP-16DN |
| JEDEC | Conforms |
| EIAJ | Conforms |
| Weight (reference value) | 0.15 g |

Cautions

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.

HITACHI

Hitachi, Ltd.

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

| | | |
|-----|------------------|---|
| URL | NorthAmerica | : http://semiconductor.hitachi.com/ |
| | Europe | : http://www.hitachi-eu.com/hel/ecg |
| | Asia (Singapore) | : http://www.has.hitachi.com.sg/grp3/sicd/index.htm |
| | Asia (Taiwan) | : http://www.hitachi.com.tw/E/Product/SICD_Frame.htm |
| | Asia (HongKong) | : http://www.hitachi.com.hk/eng/bo/grp3/index.htm |
| | Japan | : http://www.hitachi.co.jp/Sicd/indx.htm |

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 GmbH Electronic components Group Dornacher Straße 3 D-85622 Feldkirchen, Munich Germany Tel: <49> (89) 9 9180-0 Fax: <49> (89) 9 29 30 00 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 Asia Pte. Ltd.
16 Collyer Quay #20-00
Hitachi Tower
Singapore 049318
Tel: 535-2100
Fax: 535-1533

Hitachi Asia Ltd.
Taipei Branch Office
3F, Hung Kuo Building, No.167,
Tun-Hwa North Road, Taipei (105)
Tel: <886> (2) 2718-3666
Fax: <886> (2) 2718-8180

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> (2) 735 9218
Fax: <852> (2) 730 0281
Telex: 40815 HITEC HX

Copyright ' Hitachi, Ltd., 1999. All rights reserved. Printed in Japan.