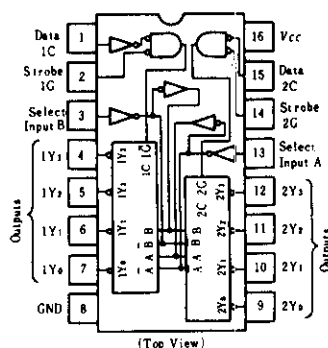


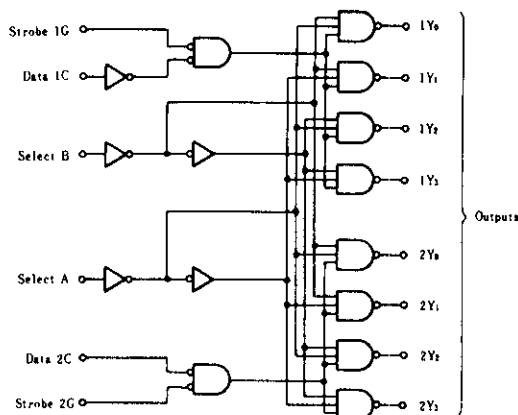
# HD74LS156 ●Dual 2-line-to-4-line Decoders/Demultiplexers (with open collector outputs)

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 <sup>1)</sup>	B	A	G <sup>2)</sup>	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 (Ta = -20 ~ +75°C)

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

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

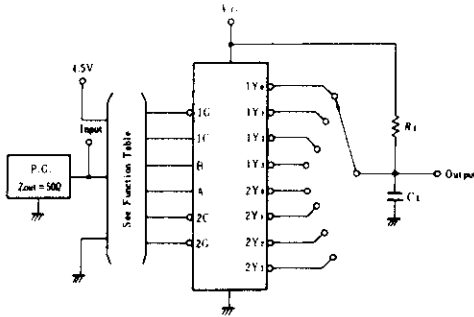
\*\*  $I_{CC}$  is measured with outputs open, A, B, and 1C inputs at 4.5V, and 2C, 1G, and 2G inputs grounded.

## SWITCHING CHARACTERISTICS (VCC = 5V, Ta = 25°C)

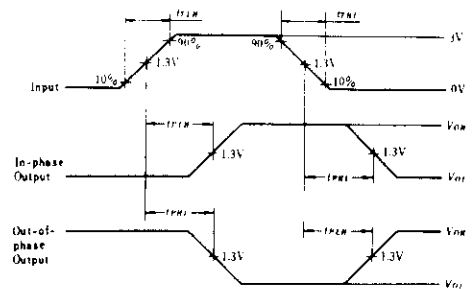
Item	Symbol	Inputs	Output	Level of logic	Test Conditions	min	typ	max	Unit
Propagation delay time	$t_{PLH}$	A, B, 2C, 1G or 2G	Y	2	$C_L = 15pF,$ $R_L = 2k\Omega$	—	25	40	ns
	$t_{PHL}$	A, B, 2C, 1G or 2G	Y	2		—	34	51	
	$t_{PLH}$	A or B	Y	3		—	31	46	
	$t_{PHL}$	A or B	Y	3		—	34	51	
	$t_{PLH}$	1C	Y	3		—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

## TESTING METHOD

### 1) Test Circuit

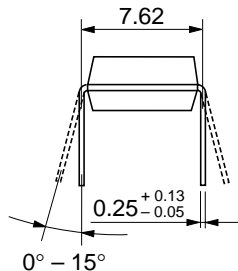
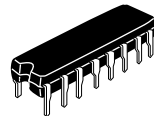
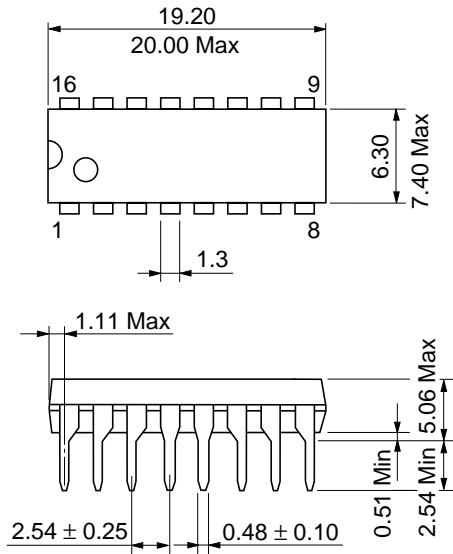


### Waveform

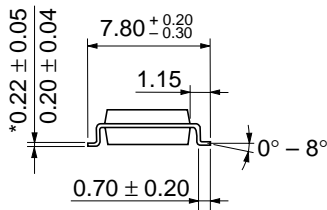
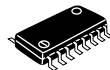
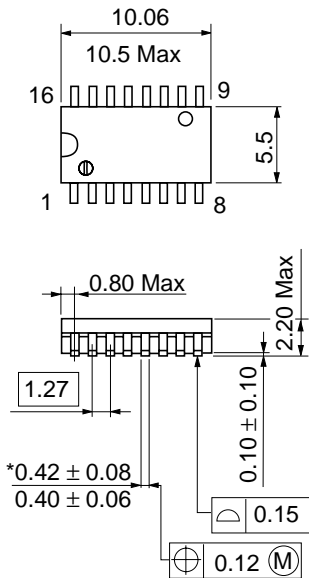


- Notes) 1. Input pulse:  $t_{TLH} \leq 15ns, t_{THL} \leq 6ns, PRR=1MHz,$   
duty cycle=50%.
2.  $C_L$  includes probe and jig capacitance.

Unit: mm

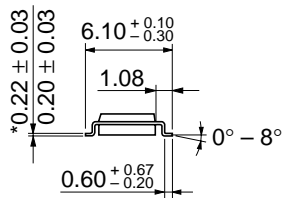
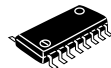
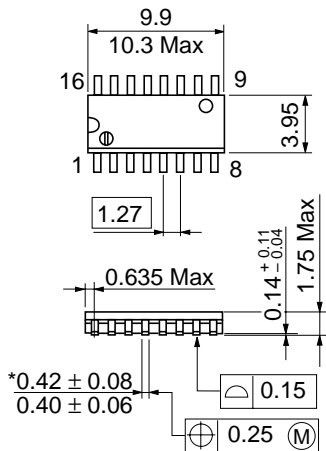


Hitachi Code	DP-16
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	1.07 g



\*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	: <a href="http://semiconductor.hitachi.com/">http://semiconductor.hitachi.com/</a>
	Europe	: <a href="http://www.hitachi-eu.com/hel/ecg">http://www.hitachi-eu.com/hel/ecg</a>
	Asia (Singapore)	: <a href="http://www.has.hitachi.com.sg/grp3/sicd/index.htm">http://www.has.hitachi.com.sg/grp3/sicd/index.htm</a>
	Asia (Taiwan)	: <a href="http://www.hitachi.com.tw/E/Product/SICD_Frame.htm">http://www.hitachi.com.tw/E/Product/SICD_Frame.htm</a>
	Asia (HongKong)	: <a href="http://www.hitachi.com.hk/eng/bo/grp3/index.htm">http://www.hitachi.com.hk/eng/bo/grp3/index.htm</a>
	Japan	: <a href="http://www.hitachi.co.jp/Sicd/indx.htm">http://www.hitachi.co.jp/Sicd/indx.htm</a>

## 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.