

To all our customers

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

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Keep safety first in your circuit designs!

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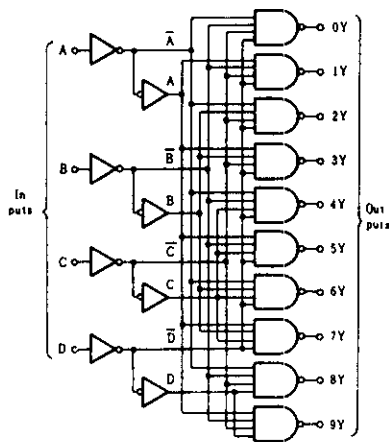
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# HD74LS42 ●BCD-to-Decimal Decoder

This monolithic decimal decoder consists of eight inverters and ten four-input NAND gates. The inverters are connected in pairs to make BCD input data available for decoding by NAND gates. Full decoding of valid input logic ensures that all outputs remain off for all invalid input conditions.

## ■BLOCK DIAGRAM

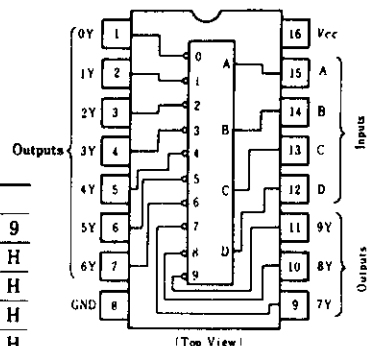


## ■FUNCTION TABLE

No.	BCD Input				Decimal Output									
	D	C	B	A	0	1	2	3	4	5	6	7	8	9
0	L	L	L	L	L	H	H	H	H	H	H	H	H	H
1	L	L	L	H	H	L	H	H	H	H	H	H	H	H
2	L	L	H	L	H	H	L	H	H	H	H	H	H	H
3	L	L	H	H	H	H	H	L	H	H	H	H	H	H
4	L	H	L	L	H	H	H	H	L	H	H	H	H	H
5	L	H	L	H	H	H	H	H	H	L	H	H	H	H
6	L	H	H	L	H	H	H	H	H	H	L	H	H	H
7	L	H	H	H	H	H	H	H	H	H	H	L	H	H
8	H	L	L	L	H	H	H	H	H	H	H	H	L	H
9	H	L	L	H	H	H	H	H	H	H	H	H	H	L
INVALID	H	L	H	L	H	H	H	H	H	H	H	H	H	H
	H	L	H	H	H	H	H	H	H	H	H	H	H	H
	H	H	L	L	H	H	H	H	H	H	H	H	H	H
	H	H	L	H	H	H	H	H	H	H	H	H	H	H
	H	H	H	L	H	H	H	H	H	H	H	H	H	H
	H	H	H	H	H	H	H	H	H	H	H	H	H	H

H: high level, L: low level

## ■PIN ARRANGEMENT



## ■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 voltage	$V_{OH}$	$V_{CC} = 4.75\text{V}$ , $V_{IH} = 2\text{V}$ , $V_{IL} = 0.8\text{V}$ , $I_{OH} = -400\mu\text{A}$	2.7	—	—	V
	$V_{OL}$	$V_{CC} = 4.75\text{V}$ , $V_{IH} = 2\text{V}$ , $V_{IL} = 0.8\text{V}$	$I_{OL} = 8\text{mA}$	—	0.5	V
			$I_{OL} = 4\text{mA}$	—	0.4	
Input current	$I_{IH}$	$V_{CC} = 5.25\text{V}$ , $V_I = 2.7\text{V}$	—	—	20	$\mu\text{A}$
	$I_{IL}$	$V_{CC} = 5.25\text{V}$ , $V_I = 0.4\text{V}$	—	—	-0.4	$\text{mA}$
	$I_I$	$V_{CC} = 5.25\text{V}$ , $V_I = 7\text{V}$	—	—	0.1	$\text{mA}$
Short-circuit output current	$I_{OS}$	$V_{CC} = 5.25\text{V}$	-20	—	-100	$\text{mA}$
Supply current	$I_{CC}^{**}$	$V_{CC} = 5.25\text{V}$	—	7	13	$\text{mA}$
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 all outputs open and all inputs grounded.

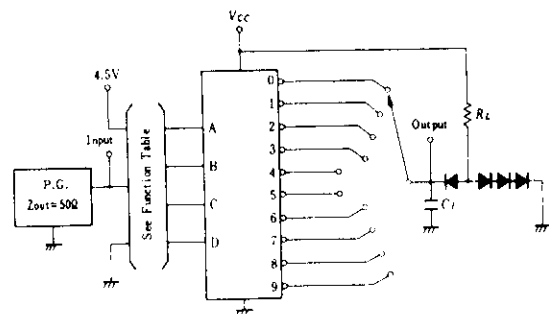
# HD74LS42

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

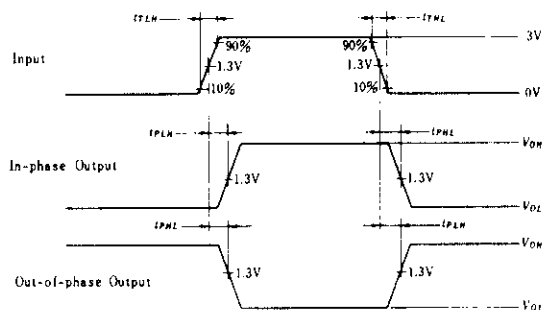
Item		Symbol	Test Conditions	min	typ	max	Unit
Propagation delay time	2 Stage	$t_{PLH}$	$C_L = 15\text{pF}, R_L = 2\text{k}\Omega$	—	15	25	ns
	3 Stage			—	20	30	
	2 Stage	$t_{PHL}$		—	15	25	ns
	3 Stage			—	20	30	

## ■ TESTING METHOD

### 1) Test Circuit

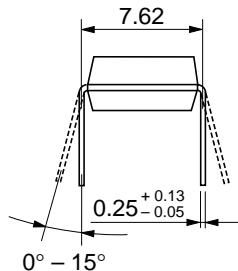
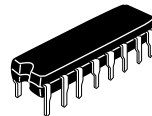
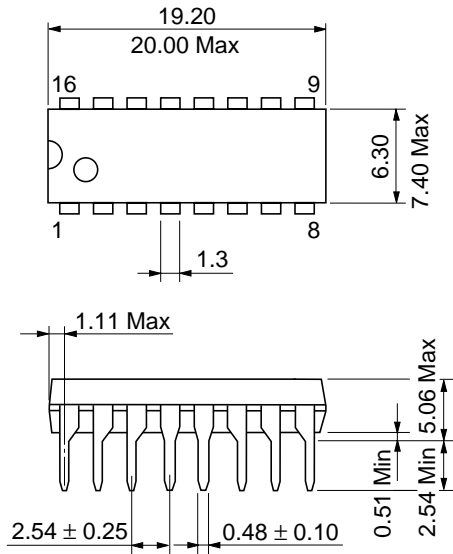


### Waveform

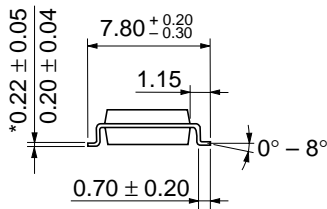
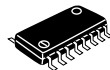
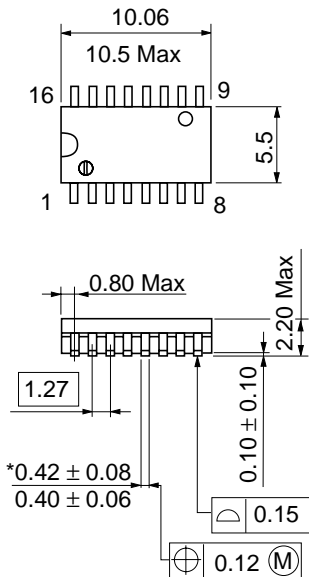


Input pulse:  $t_{TLH} \leq 15\text{ns}$ ,  $t_{THL} \leq 6\text{ns}$ ,  $PRR = 1\text{MHz}$ ,  
duty cycle 50%.

Unit: mm

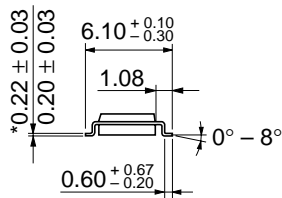
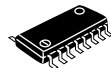
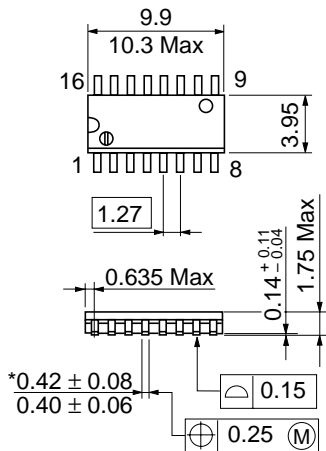


Hitachi Code	DP-16
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	1.07 g



\*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

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