

# HD74HC138

3-to-8-line Decoder/Demultiplexer

# HITACHI

## Description

The HD74HC138 has 3 binary select inputs (A, B and C). If the device is enabled these inputs determine which one of the eight normally high outputs will go low. Two active low and one active high enables ( $G_1$ ,  $G_{2A}$  and  $G_{2B}$ ) are provided to ease the cascading of decoders.

## Features

- High Speed Operation:  $t_{pd}$  (A, B, C to Y) = 16.5 ns typ ( $C_L = 50$  pF)
- High Output Current: Fanout of 10 LSTTL Loads
- Wide Operating Voltage:  $V_{CC} = 2$  V to 6 V
- Low Input Current: 1  $\mu$ A max
- Low Quiescent Supply Current:  $I_{CC}$  (static) = 4  $\mu$ A max ( $T_a = 25^\circ\text{C}$ )

## Function Table

Inputs			Select			Outputs							
Enable			C	B	A	$Y_0$	$Y_1$	$Y_2$	$Y_3$	$Y_4$	$Y_5$	$Y_6$	$Y_7$
$G_1$	$G_{2A}$	$G_{2B}$											
X	X	H	X	X	X	H	H	H	H	H	H	H	H
X	H	X	X	X	X	H	H	H	H	H	H	H	H
L	X	X	X	X	X	H	H	H	H	H	H	H	H
H	L	L	L	L	L	L	H	H	H	H	H	H	H
H	L	L	L	L	H	H	L	H	H	H	H	H	H
H	L	L	L	H	L	H	H	L	H	H	H	H	H
H	L	L	L	H	H	H	H	H	L	H	H	H	H
H	L	L	H	L	L	H	H	H	H	L	H	H	H
H	L	L	H	H	L	H	H	H	H	H	H	L	H
H	L	L	H	H	H	H	H	H	H	H	H	H	L



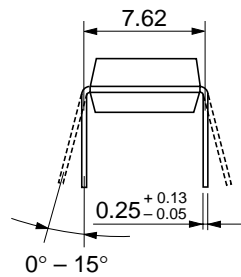
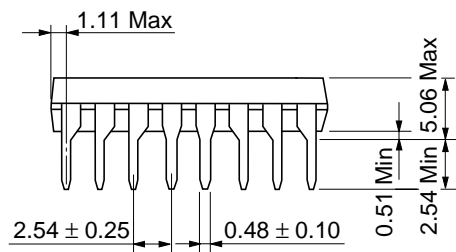
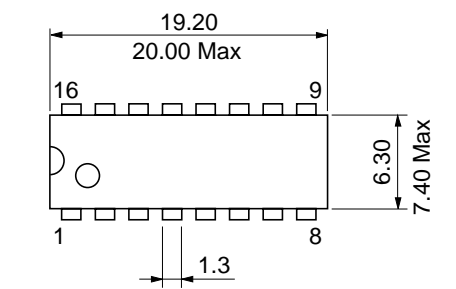
DC Characteristics

Item	Symbol	V <sub>CC</sub> (V)	Ta = 25°C			Ta = -40 to +85°C		Unit	Test Conditions	
			Min	Typ	Max	Min	Max			
Input voltage	V <sub>IH</sub>	2.0	1.5	—	—	1.5	—	V		
		4.5	3.15	—	—	3.15	—			
		6.0	4.2	—	—	4.2	—			
	V <sub>IL</sub>	2.0	—	—	0.5	—	0.5			V
		4.5	—	—	1.35	—	1.35			
		6.0	—	—	1.8	—	1.8			
Output voltage	V <sub>OH</sub>	2.0	1.9	2.0	—	1.9	—	V	Vin = V <sub>IH</sub> or V <sub>IL</sub> I <sub>OH</sub> = -20 μA	
		4.5	4.4	4.5	—	4.4	—			
		6.0	5.9	6.0	—	5.9	—			
		4.5	4.18	—	—	4.13	—			I <sub>OH</sub> = -4 mA
		6.0	5.68	—	—	5.63	—			I <sub>OH</sub> = -5.2 mA
		V <sub>OL</sub>	2.0	—	0.0	0.1	—			0.1
	4.5		—	0.0	0.1	—	0.1			
	6.0		—	0.0	0.1	—	0.1			
	4.5		—	—	0.26	—	0.33	I <sub>OL</sub> = 4 mA		
	6.0		—	—	0.26	—	0.33	I <sub>OL</sub> = 5.2 mA		
	6.0		—	—	±0.1	—	±1.0	μA	Vin = V <sub>CC</sub> or GND	
	Quiescent supply current	I <sub>CC</sub>	6.0	—	—	4.0	—	40	μA	Vin = V <sub>CC</sub> or GND, I <sub>out</sub> = 0 μA

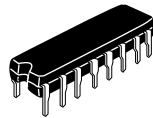
## HD74HC138

AC Characteristics ( $C_L = 50$  pF, Input  $t_r = t_f = 6$  ns)

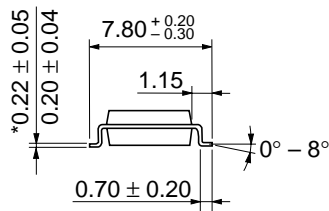
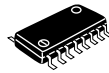
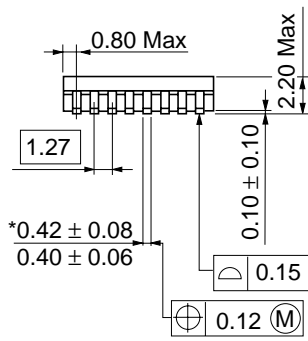
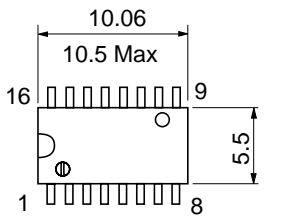
Item	Symbol	$V_{CC}$ (V)	$T_a = 25^\circ\text{C}$			$T_a = -40$ to $+85^\circ\text{C}$		Unit	Test Conditions
			Min	Typ	Max	Min	Max		
Propagation delay time	$t_{PHL}$	2.0	—	—	175	—	220	ns	A, B or C to Output
		4.5	—	17	35	—	44		
		6.0	—	—	30	—	37		
	$t_{PLH}$	2.0	—	—	150	—	190	ns	
		4.5	—	16	30	—	38		
		6.0	—	—	26	—	33		
	$t_{PHL}$	2.0	—	—	150	—	190	ns	$G_1$ to Output
		4.5	—	16	30	—	38		
		6.0	—	—	26	—	33		
	$t_{PLH}$	2.0	—	—	150	—	190	ns	
		4.5	—	17	30	—	38		
		6.0	—	—	26	—	33		
	$t_{PHL}$	2.0	—	—	175	—	220	ns	$G_{2A}$ or $G_{2B}$ to Output
		4.5	—	15	35	—	44		
		6.0	—	—	30	—	37		
	$t_{PLH}$	2.0	—	—	150	—	190	ns	
		4.5	—	17	30	—	38		
		6.0	—	—	26	—	33		
Output rise/fall time	$t_{TLH}$	2.0	—	—	75	—	95	ns	
	$t_{THL}$	4.5	—	5	15	—	19		
		6.0	—	—	13	—	16		
Input capacitance	$C_{in}$	—	—	5	10	—	10	pF	



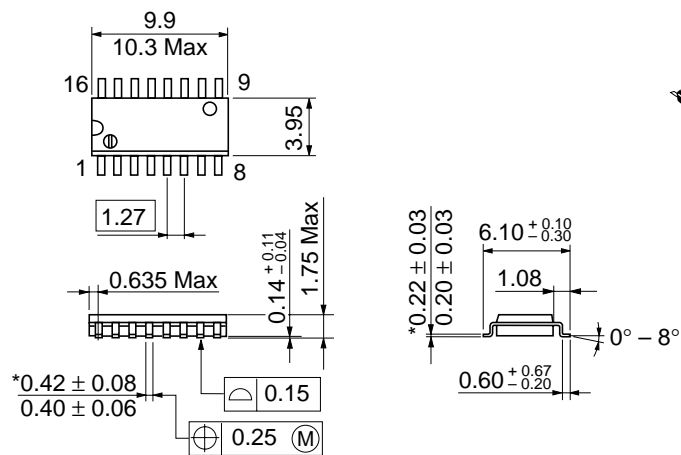
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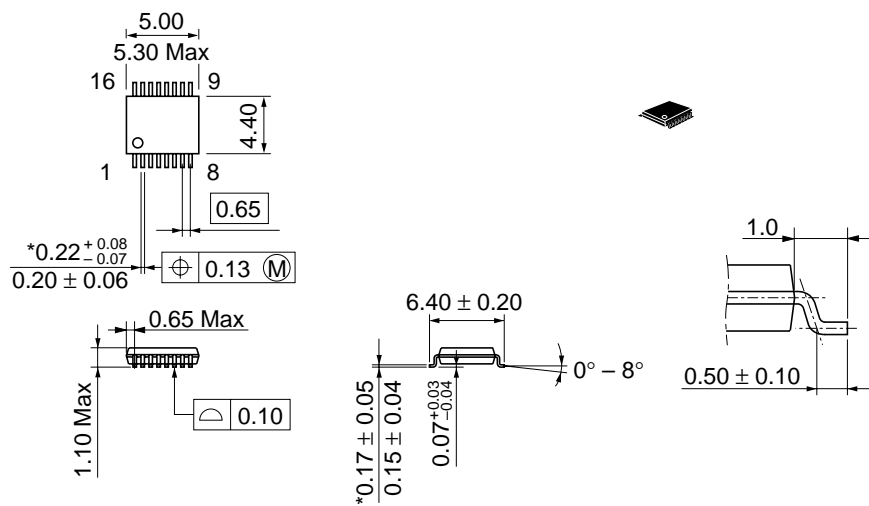
Unit: mm



Unit: mm



Unit: mm





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