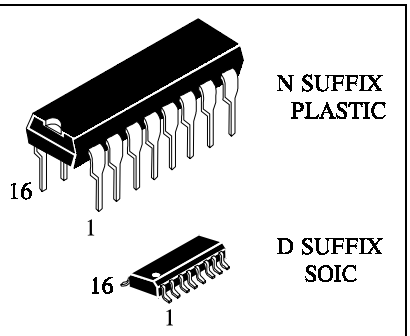
IN74LS138

3-to-8-Line Decoder/Demultiplexer

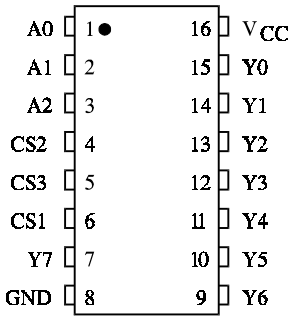
This schottky-clamped TTL MSI circuit is designed to be used in high-performance memory-decording or data-routing applications requiring very short propagation delay time. In high-performance memory systems this decode can be used to minimize the effects of system decoding. When employed with high-speed memories utilizing a fast enable circuit the delay times of this decorder and the enable time of the memory are usually less than the typical access times of the memory. This means that the effective system delay introduced by the schottky-clampled system decoder is negligible.

- Designed Specifically for High Speed Memory Decoders and Data Transmission Systems
- Incorporate 3 Enabler Inputs to Simplify Cascading AND/OR Data Reception
- Schottky Clamped for High Performance

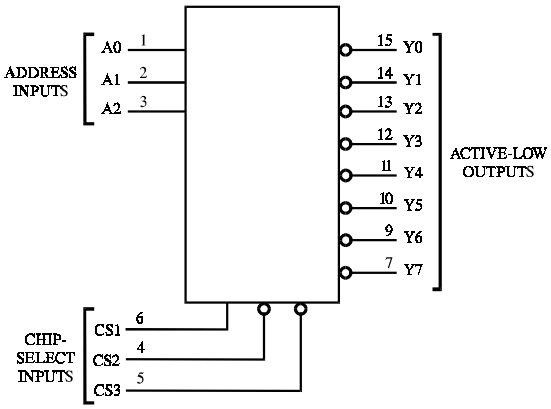


ORDERING INFORMATION
IN74LS138N Plastic
IN74LS138D SOIC
T_A = 0° to 70° C
for all packages

PIN ASSIGNMENT



LOGIC DIAGRAM



PIN 16 = V_{CC}
PIN 8 = GND

FUNCTION TABLE

Inputs		Outputs
CS1 CS2 CS3	A2 A1 A0	Y0 Y1 Y2 Y3 Y4 Y5 Y6 Y7
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 L H	H H H H H L 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

H = high level (steady state)
L = low level (steady state)
X = don't care

MAXIMUM RATINGS*

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	7.0	V
V_{IN}	Input Voltage	7.0	V
V_{OUT}	Output Voltage	5.5	V
Tstg	Storage Temperature Range	-65 to +150	°C

*Maximum Ratings are those values beyond which damage to the device may occur.
Functional operation should be restricted to the Recommended Operating Conditions.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V_{CC}	Supply Voltage	4.75	5.25	V
V_{IH}	High Level Input Voltage	2.0		V
V_{IL}	Low Level Input Voltage		0.8	V
I_{OH}	High Level Output Current		-0.4	mA
I_{OL}	Low Level Output Current		8.0	mA
T_A	Ambient Temperature Range	0	+70	°C

DC ELECTRICAL CHARACTERISTICS over full operating conditions

Symbol	Parameter	Test Conditions	Guaranteed Limit		Unit
			Min	Max	
V_{IK}	Input Clamp Voltage	V_{CC} = min, I_{IN} = -18 mA		-1.5	V
V_{OH}	High Level Output Voltage	V_{CC} = min, I_{OH} = -0.4 mA	2.7		V
V_{OL}	Low Level Output Voltage	V_{CC} = min, I_{OL} = 4 mA		0.4	V
		V_{CC} = min, I_{OL} = 8 mA		0.5	
I_{IH}	High Level Input Current	V_{CC} = max, V_{IN} = 2.7 V		20	µA
		V_{CC} = max, V_{IN} = 7.0 V		0.1	mA
I_{IL}	Low Level Input Current	V_{CC} = max, V_{IN} = 0.4 V		-0.4	mA
I_O	Output Short Circuit Current	V_{CC} = max, V_O = 0 V (Note 1)	-20	-100	mA
I_{CC}	Supply Current	V_{CC} = max Outputs enabled and open		10	mA

Note 1: Not more than one output should be shorted at a time, and duration should not exceed one second.

AC ELECTRICAL CHARACTERISTICS (T_A=25°C, V_{CC} = 5.0 V, C_L = 15 pF, R_L = 2 kΩ, t_r =15 ns, t_f = 6.0 ns)

Symbol	Parameter	Level	Min	Max	Unit
t_{PLH}	Maximum Propagation Delay, Input A to Output Y	2		20	ns
t_{PHL}	Maximum Propagation Delay, Input A to Output Y			41	ns
t_{PLH}	Maximum Propagation Delay, Input A to Output Y	3		27	ns
t_{PHL}	Maximum Propagation Delay, Input A to Output Y			39	ns
t_{PLH}	Maximum Propagation Delay , CS1 to Output Y	3		26	ns
t_{PHL}	Maximum Propagation Delay , CS1 to Output Y			38	ns
t_{PLH}	Maximum Output Transition Time , CS2 or CS3 to Output Y	2		18	ns
t_{PHL}	Maximum Output Transition Time , CS2 or CS3 to Output Y			32	ns

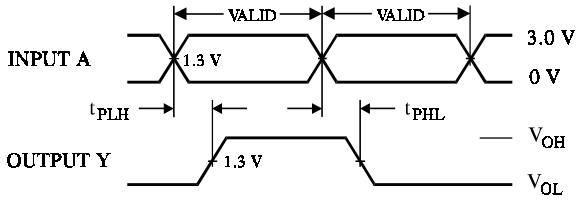


Figure 1. Switching Waveforms

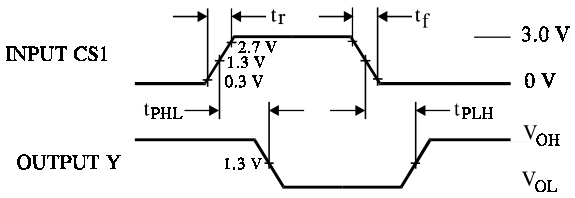


Figure 2. Switching Waveforms

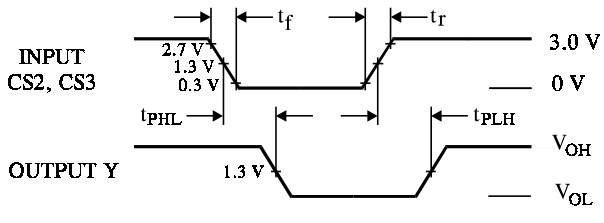
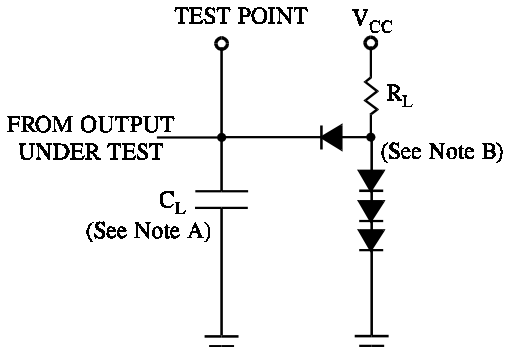


Figure 3. Switching Waveforms



NOTES A. C_L includes probe and jig capacitance.
B. All diodes are 1N916 or 1N3064.

Figure 4. Test Circuit