SN74LS138

1-of-8 Decoder/ Demultiplexer

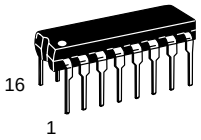
The LSTTL/MSI SN74LS138 is a high speed 1-of-8 Decoder/ Demultiplexer. This device is ideally suited for high speed bipolar memory chip select address decoding. The multiple input enables allow parallel expansion to a 1-of-24 decoder using just three LS138 devices or to a 1-of-32 decoder using four LS138s and one inverter. The LS138 is fabricated with the Schottky barrier diode process for high speed and is completely compatible with all ON Semiconductor TTL families.

- Demultiplexing Capability
- Multiple Input Enable for Easy Expansion
- Typical Power Dissipation of 32 mW
- Active Low Mutually Exclusive Outputs
- Input Clamp Diodes Limit High Speed Termination Effects

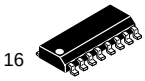
GUARANTEED OPERATING RANGES

Symbol	Parameter	Min	Typ	Max	Unit
V_{CC}	Supply Voltage	4.75	5.0	5.25	V
T_A	Operating Ambient Temperature Range	0	25	70	°C
I_{OH}	Output Current – High			–0.4	mA
I_{OL}	Output Current – Low			8.0	mA

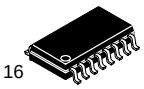
LOW POWER SCHOTTKY



PLASTIC
N SUFFIX
CASE 648



SOIC
D SUFFIX
CASE 751B



SOEIAJ
M SUFFIX
CASE 966

ORDERING INFORMATION

Device	Package	Shipping
SN74LS138N	16 Pin DIP	2000 Units/Box
SN74LS138D	SOIC–16	38 Units/Rail
SN74LS138DR2	SOIC–16	2500/Tape & Reel
SN74LS138M	SOEIAJ–16	See Note 1
SN74LS138MEL	SOEIAJ–16	See Note 1

1. For ordering information on the EIAJ version of the SOIC package, please contact your local ON Semiconductor representative.

DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE (unless otherwise specified)

Symbol	Parameter	Limits Min	Limits Typ	Limits Max	Unit	Test Conditions	
V_{IH}	Input HIGH Voltage	2.0			V	Guaranteed Input HIGH Voltage for All Inputs	
V_{IL}	Input LOW Voltage			0.8	V	Guaranteed Input LOW Voltage for All Inputs	
V_{IK}	Input Clamp Diode Voltage		–0.65	–1.5	V	V_{CC} = MIN, I_{IN} = –18 mA	
V_{OH}	Output HIGH Voltage	2.7	3.5		V	V_{CC} = MIN, I_{OH} = MAX, V_{IN} = V_{IH} or V_{IL} per Truth Table	
V_{OL}	Output LOW Voltage		0.25	0.4	V	I_{OL} = 4.0 mA	V_{CC} = V_{CC} MIN, V_{IN} = V_{IL} or V_{IH} per Truth Table
			0.35	0.5	V	I_{OL} = 8.0 mA	
I_{IH}	Input HIGH Current			20	μA	V_{CC} = MAX, V_{IN} = 2.7 V	
				0.1	mA	V_{CC} = MAX, V_{IN} = 7.0 V	
I_{IL}	Input LOW Current			–0.4	mA	V_{CC} = MAX, V_{IN} = 0.4 V	
I_{OS}	Short Circuit Current (Note 2)	–20		–100	mA	V_{CC} = MAX	
I_{CC}	Power Supply Current			10	mA	V_{CC} = MAX	

2. Not more than one output should be shorted at a time, nor for more than 1 second.

AC CHARACTERISTICS (T_A = 25°C)

Symbol	Parameter	Levels of Delay	Limits Min	Limits Typ	Limits Max	Unit	Test Conditions
t_{PLH} t_{PHL}	Propagation Delay Address to Output	2 2		13 27	20 41	ns	V_{CC} = 5.0 V C_L = 15 pF
t_{PLH} t_{PHL}	Propagation Delay Address to Output	3 3		18 26	27 39	ns	
t_{PLH} t_{PHL}	Propagation Delay $\overline{E_1}$ or $\overline{E_2}$ Enable to Output	2 2		12 21	18 32	ns	
t_{PLH} t_{PHL}	Propagation Delay E_3 Enable to Output	3 3		17 25	26 38	ns	

AC WAVEFORMS

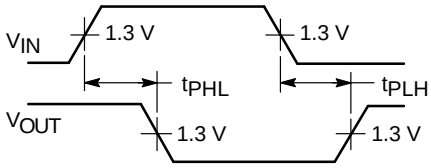


Figure 1.

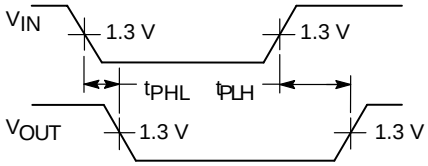


Figure 2.