GD54/74LS138

3-TO-8-LINE DECODERS/DEMULTIPLEXERS

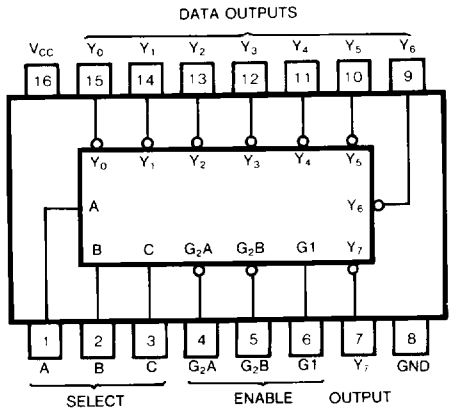
Feature

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

Description

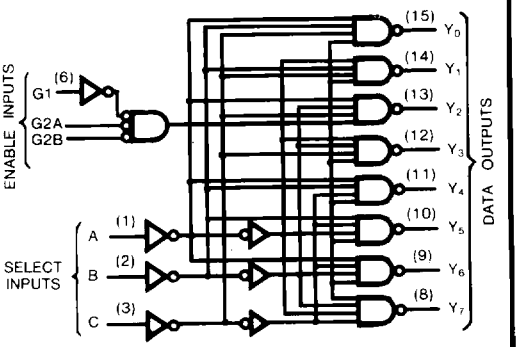
This schottky-clamped TTL MSI circuit is designed to be used in high-performance memory-decoding or data-routing applications requiring very short propagation delay time. In high-performance memory systems this decode can be used to minimize the effects of system decoding. When employed with high-speed memories utilizing a fast enable circuit the delay times of this decoder 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.

Pin Configuration



Suffix-Blank: Plastic Dual In Line Package
Suffix-J : Ceramic Dual In Line Package

Block Diagram and Logic



Function Table

INPUTS					OUTPUTS							
ENABLE		SELECT										
G1	G2*	C	B	A	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7
X	H	X	X	X	H	H	H	H	H	H	H	H
L	X	X	X	X	H	H	H	H	H	H	H	H
H	L	L	L	L	L	H	H	H	H	H	H	H
H	L	L	L	H	H	L	H	H	H	H	H	H
H	L	L	H	L	H	H	L	H	H	H	H	H
H	L	L	H	H	H	H	H	L	H	H	H	H
H	L	H	L	L	H	H	H	H	L	H	H	H
H	L	H	L	H	H	H	H	H	H	L	H	H
H	L	H	H	L	H	H	H	H	H	H	L	H
H	L	H	H	H	H	H	H	H	H	H	H	L

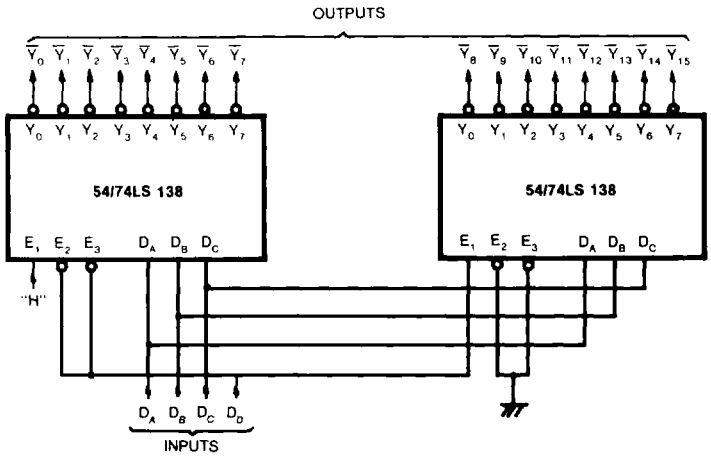
* G2=G2A+G2B

Absolute Maximum Ratings

- Supply voltage, Vcc 7V
- Input voltage 7V
- Operating free-air temperature range 54LS ..... −55°C to 125°C
  74LS ..... 0°C to 70°C
- Storage temperature range ..... −65°C to 150°C

Application Example

4-LINE TO 16-LINE DECORDER/DEMULTIPLEXER



Recommended Operating Conditions

SYMBOL	PARAMETER		MIN	NOM	MAX	UNIT
V_{CC}	Supply voltage	54	4.5	5	5.5	V
		74	4.75	5	5.25	
I_{OH}	High-level output current	54,74			−400	μA
I_{OL}	Low-level output current	54			4	mA
		74			8	
T_A	Operating free-air temperature	54	−55		125	°C
		74	0		70	

Electrical Characteristics over recommended operating free-air temperature range (unless otherwise noted)

SYMBOL	PARAMETER	TEST CONDITIONS			MIN	TYP (Note 1)	MAX	UNIT
V_{IH}	High-level input voltage				2			V
V_{IL}	Low-level input voltage			54			0.7	V
				74			0.8	
V_{IK}	Input clamp voltage	V_{CC}=Min, I_I=−18mA					−1.5	V
V_{OH}	High-level output voltage	V_{CC}=Min, I_{OH}=Max	V_{IL}=Max, V_{IH}=Min	54	2.5	3.4		V
				74	2.7	3.4		
V_{OL}	Low-level output voltage	V_{CC}=Min, V_{IL}=Max, V_{IH}=Min	I_{OL}=4mA	54,74		0.25	0.4	V
			I_{OL}=8mA	74		0.35	0.5	
I_I	Input current at maximum input voltage	V_{CC}=Max, V_I=7V					0.1	mA
I_{IH}	High-level input current	V_{CC}=Max, V_I=2.7V					20	μA
I_{IL}	Low-level input current	V_{CC}=Max, V_I=0.4V					−0.4	mA
I_{OS}	Short-circuit output current	V_{CC}=Max (Note 2)			−20		−100	mA
I_{CC}	Supply current	V_{CC}=Max, Outputs enabled and open				6.3	10	mA

Note 1: All typical values are at V_{CC}=5V, T_A=25°C.
Note 2: Not more than one output should be shorted at a time, and duration should not exceed one second.

Switching Characteristics, $V_{CC}=5V$, $T_A=25°C$

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LEVEL	TEST CONDITION#	MIN	TYP	MAX	UNIT
t_{PLH}	Binary Select	Any	2	$C_L=15pF$ $R_L=2k\Omega$		13	20	ns
t_{PHL}						27	41	ns
t_{PLH}			3			18	27	ns
t_{PHL}						26	39	ns
t_{PLH}	Enable	Any	2			12	18	ns
t_{PHL}						21	32	ns
t_{PLH}			3			17	26	ns
t_{PHL}						25	38	ns

#For load circuit and voltage waveforms, see page 3-11.