GD54/74S138

3-TO-8 LINE DECODERS/DEMULTIPLEXERS

Feature

- Designed Specifically for High Speed Memory Decodes and Data Transmission Systems
- Incorporate 3 Enable Inputs to Simplify Cascading and/or Data Rejection
- Contains Two Fully Independent 2-to-4 Line Decoders/ Demultiplexers.

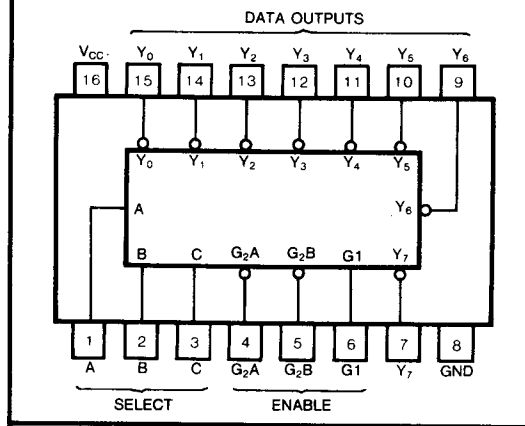
Description

This device is designed to be used in high performance memory-decoding or data-routing applications requiring very short propagation delay times. In high-performance memory systems this decoder can be used to minimize the effects of system decoding. When employd 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 time of the memory.

This means that the effect system delay introduced by the schottky-clamped system decoder is negligible.

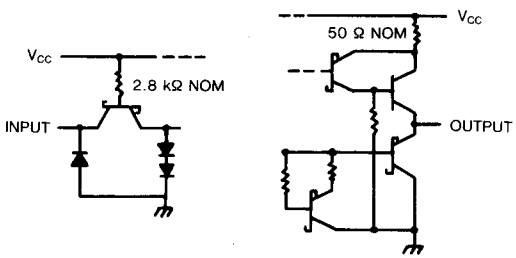
The S138 decodes one of eight lines dependent on the conditions at the three binary select inputs and the three enable inputs. Two active-low and one active-high enable inputs reduce the need for external gates or inverts when expanding. A 24-line decoder can be implemented without external inverters and a 32-line decoder requires only one inverter. An enable input can be used as a data input for demultiplexing applications.

Pin Configuration



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

Schematics of Inputs and Outputs



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 5.5V
- Operating free-air temperature range 54S ..... −55°C to 125°C
  74S ..... 0°C to 70°C
- Storage temperature range ..... −65°C to 150°C

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				−1	mA
I_{OL}	Low-level output current				20	mA
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			0.8	V
			74			0.8	
V_{IK}	Input clamp voltage	V_{CC}=Min, I_I=−18mA				−1.2	V
V_{OH}	High-level output voltage	V_{CC}=Min V_{IL}=Max, I_{OH}=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, I_{OL}=Max V_{IH}=Min				0.5	V
I_I	Input current at maximum input voltage	V_{CC}=Max, V_I=5.5V				1	mA
I_{IH}	High-level input current	V_{CC}=Max, V_I=2.7V				50	μA
I_{IL}	Low-level input current	V_{CC}=Max, V_I=0.5V				−2	mA
I_{OS}	Short-circuit output current	V_{CC}=Max (Note 2)		−40		−100	mA
I_{CC}	Supply current	V_{CC}=5.25V, See Note 3			50	90	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 of the short-circuit should not exceed one second.

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

PARAMETER*	FROM (INPUT)	TO (OUTPUT)	LEVELS of DELAY	TEST CONDITION#	MIN	TYP	MAX	UNIT
t_{PLH}	Binary Select	Any	2	C_L=15pF, R_L=280Ω		4.5	7	ns
t_{PHL}						7	10.5	
t_{PLH}			3			7.5	12	
t_{PHL}						8	12	
t_{PLH}	Enable	Any	2			5	8	ns
t_{PHL}						7	11	
t_{PLH}			3			7	11	
t_{PHL}						7	11	

* t_{PLH}=propagation delay time, low-to-high-level output* t_{PHL}=propagation delay time, high-to-low-level-output
#For load circuit and voltage waveforms, see page 3-12.