

### FEATURES

- 25LS138: 3-Line-to-8-Line Decoder  
1-of-8 Demultiplexer
- 25LS139: Dual 2-Line-to-4-Line Decoder  
Dual 1-of-4 Demultiplexer
- Higher Speed compared to 9LS/54LS and 9LS/74LS
- 8mA sink current over full military temperature range
- 50mV improved  $V_{OL}$  compared to 9LS/74LS
- 440 $\mu$ A source current
- 100% reliability assurance testing in compliance with MIL-STD-883.

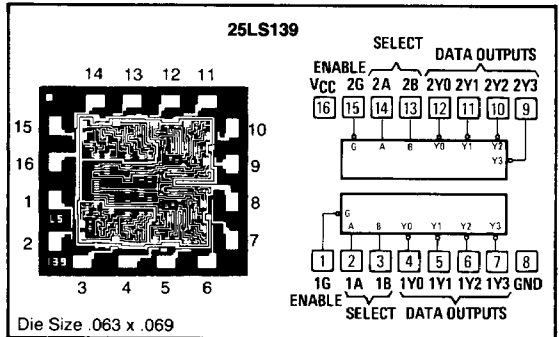
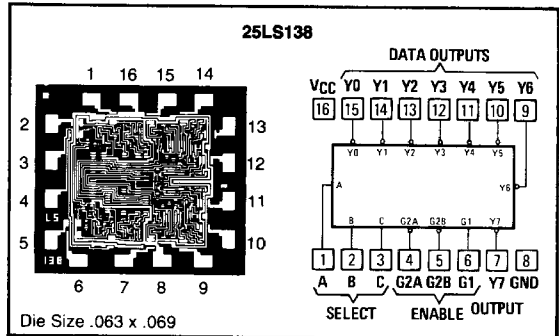
### DESCRIPTION

The 25LS138 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 inverters 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.

The 25LS139 comprises two individual two-line-to-four-line decoders in a single package. The active-low enable input can be used as a data line in demultiplexing applications.

These circuits are designed to be used in high-performance memory-decoding and data-routing applications requiring very short delay times.

### PIN-OUT DIAGRAMS



**25LS138  
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	L	H	H	H	H	H
H	L	H	L	L	H	H	H	L	H	H	H	H
H	L	H	L	H	H	H	H	L	H	H	H	H
H	L	H	H	L	H	H	H	H	L	H	H	H
H	L	H	H	H	H	H	H	H	H	L	H	H
H	L	H	H	H	H	H	H	H	H	H	L	H

\*G2 = G2A + G2B

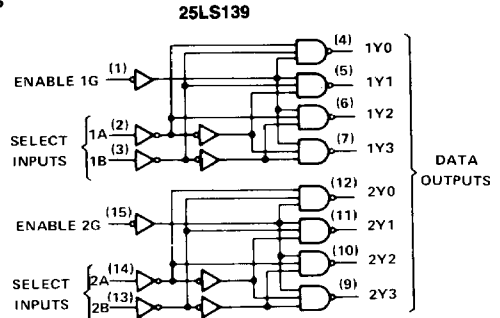
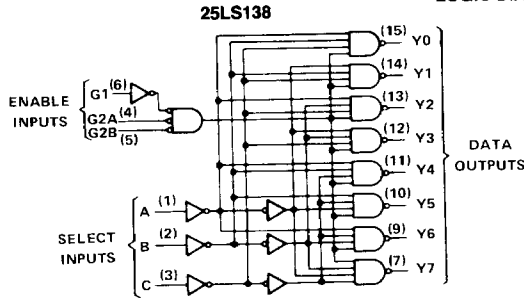
H = high level, L = low level, X = don't care

**25LS139  
FUNCTION TABLE (1/2)**

INPUTS			OUTPUTS			
ENABLE	SELECT					
G	B	A	Y0	Y1	Y2	Y3
H	X	X	H	H	H	H
L	L	L	L	H	H	H
L	L	H	H	L	H	H
L	H	L	H	H	L	H
L	H	H	H	H	H	L

H = high level, L = low level, X = don't care

LOGIC DIAGRAMS



Recommended Operating Conditions

	Military			Commercial			Unit
	Min	Nom	Max	Min	Nom	Max	
Supply voltage, $V_{CC}$	4.5	5	5.5	4.75	5	5.25	V
High-level output current, $I_{OH}$			-440			-440	$\mu A$
Low-level output current, $I_{OL}$	4		8	4		8	mA
Operating free-air temperature, $T_A$	-55		125	0		70	$^{\circ}C$

Electrical Characteristics Over Recommended Free-Air Temperature Range (Unless Otherwise Noted)

Parameter	Test Conditions*	Military			Commercial			Unit
		Min	Typ**	Max	Min	Typ**	Max	
$V_{IH}$		2			2			V
$V_{IL}$				0.7			0.8	V
$V_I$	$V_{CC} = \text{MIN}, I_I = -18\text{mA}$			-1.5			-1.5	V
$V_{OH}$	$V_{CC} = \text{MIN}, V_{IH} = 2\text{V}, V_{IL} = V_{IL\text{max}}, I_{OH} = -440\mu A$	2.5	3.4		2.7	3.4		V
$V_{OL}$	$V_{CC} = \text{MIN}, V_{IH} = 2\text{V}, V_{IL} = V_{IL\text{max}}$							V
	$I_{OL} = 4\text{mA}$		0.25	0.4		0.25	0.40	mA
	$I_{OL} = 8\text{mA}$		0.3	0.45		0.35	0.45	mA
$I_I$	$V_{CC} = \text{MAX}, V_I = 7\text{V}$			0.1			0.1	mA
$I_{IH}$	$V_{CC} = \text{MAX}, V_I = 2.7\text{V}$			20			20	$\mu A$
$I_{IL}$	$V_{CC} = \text{MAX}, V_I = 0.4\text{V}$			-0.36			-0.36	mA
$I_{OS}^{\dagger}$	$V_{CC} = \text{MAX}$	-15		-85	-15		-85	mA
$I_{CC}$	$V_{CC} = \text{MAX},$ Outputs enabled and open							mA
	25LS138		6.3	10		6.3	10	
	25LS139		6.8	11		6.8	11	

\* For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable device type.

\*\* All typical values are at  $V_{CC} = 5\text{V}, T_A = 25^{\circ}C$ .

† Not more than one output should be shorted at a time.

## 25LS138

Switching Characteristics,  $V_{CC} = 5V$ ,  $T_A = +25^\circ C$

Parameter	Levels of Delay	From (input)	To (output)	+25°C			Unit
				Min	Typ	Max	
Test Conditions: $C_L = 15pF$ , $R_L = 2k\Omega$ (See Fig. A, page 2-174)							
$t_{PLH}$	2	Binary Select	Any		10	15	ns
$t_{PLH}$					14	20	ns
$t_{PLH}$	3				15	23	ns
$t_{PLH}$					18	27	ns
$t_{PLH}$	2	Enable	Any		10	15	ns
$t_{PLH}$					15	23	ns
$t_{PLH}$	3				12	18	ns
$t_{PLH}$					18	27	ns

## 25LS139

Switching Characteristics,  $V_{CC} = 5V$ ,  $T_A = +25^\circ C$

Parameters	Levels of Delay	From (input)	To (output)	+25°C			Unit
				Min	Typ	Max	
Test Conditions: $C_L = 15pF$ , $R_L = 2k\Omega$ (See Fig. A, page 2-174)							
$t_{PLH}$	2	Binary Select	Any		10	15	ns
$t_{PLH}$					12	18	ns
$t_{PLH}$	3				13	20	ns
$t_{PLH}$					14	21	ns
$t_{PLH}$	2	Enable	Any		9	12	ns
$t_{PLH}$					11	16	ns