

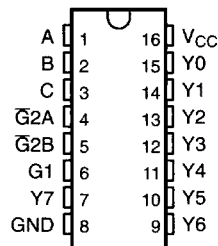
SN74LV138

3-LINE TO 8-LINE DECODER/DEMULTIPLEXER

FEBRUARY 1993

- **Space-Saving Package Option:
Shrink Small-Outline Package (DB)
Features EIAJ 0.65-mm Lead Pitch**
- **EPIC™ (Enhanced-Performance Implanted
CMOS) 2- μ m Process**
- **Typical V_{OLP} (Output Ground Bounce)
< 0.8 V at $V_{CC} = 3.3$ V, $T_A = 25^\circ\text{C}$**
- **Typical V_{OHV} (Output V_{OH} Undershoot)
> 2 V at $V_{CC} = 3.3$ V, $T_A = 25^\circ\text{C}$**
- **ESD Protection Exceeds 2000 V Per
MIL-STD-883C, Method 3015; Exceeds
200 V Using Machine Model (C = 200 pF,
R = 0)**
- **Latch-Up Performance Exceeds 250 mA
Per JEDEC Standard JESD-17**
- **Package Options Include Plastic
Small-Outline and Thin Shrink
Small-Outline Packages**

D, DB, OR PW PACKAGE
(TOP VIEW)



description

This 3-line to 8-line decoder/demultiplexer is designed for 2.7-V to 3.6-V V_{CC} operation.

The SN74LV138 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 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 time of the memory. This means that the effective system delay introduced by the decoder is negligible.

The conditions at the binary-select inputs and the three enable inputs select one of eight input lines. 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 SN74LV138 is packaged in TI's shrink small-outline package (DB), which provides the same I/O pin count and functionality of standard small-outline packages in less than half the printed-circuit-board area.

The SN74LV138 is characterized for operation from -40°C to 85°C .

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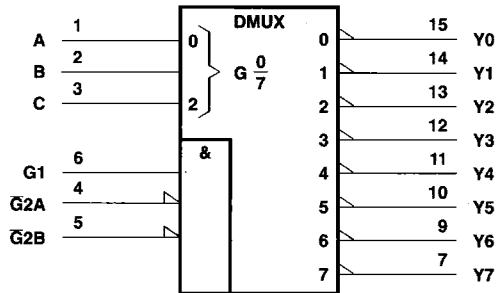
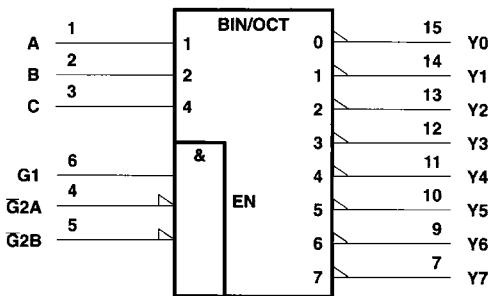
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FUNCTION TABLE

ENABLE INPUTS			SELECT INPUTS			OUTPUTS							
G1	G2A	G2B	C	B	A	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7
X	H	X	X	X	X	H	H	H	H	H	H	H	H
X	X	H	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	L	H	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

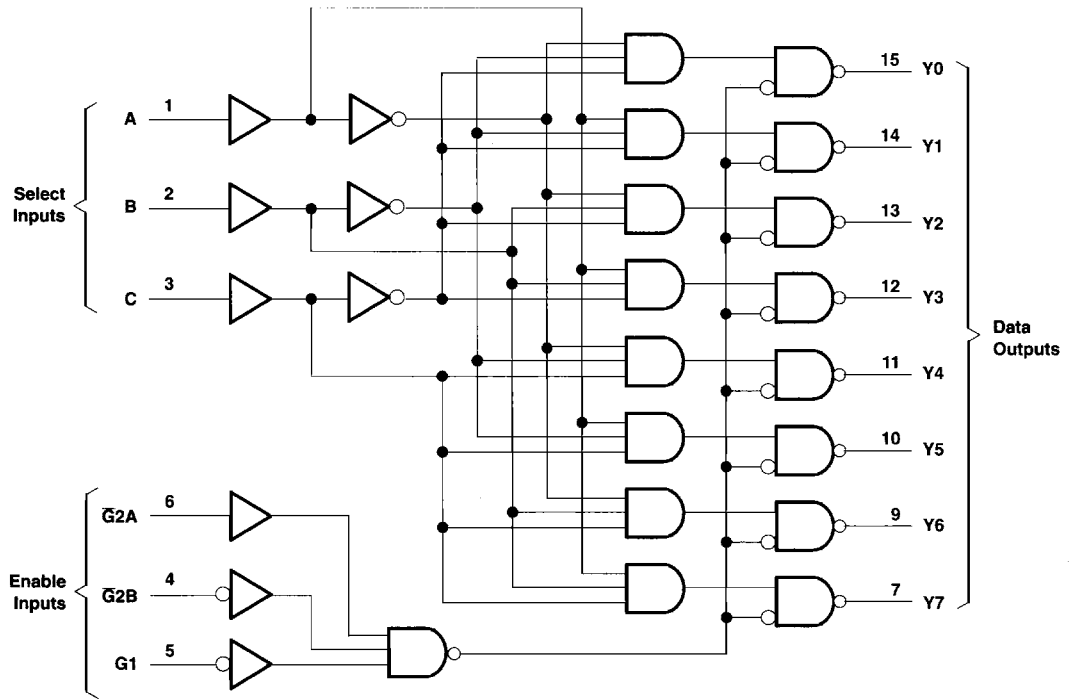
logic symbols (alternatives)†



† These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

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logic diagram (positive logic)



absolute maximum ratings over operating free-air temperature range (unless otherwise noted)[†]

Supply voltage range, V_{CC}	-0.5 V to 4.6 V
Input voltage range, V_I (see Note 1)	-0.5 V to $V_{CC} + 0.5$ V
Output voltage range, V_O (see Notes 1 and 2)	-0.5 V to $V_{CC} + 0.5$ V
Input clamp current, I_{IK} ($V_I < 0$ or $V_I > V_{CC}$)	± 20 mA
Output clamp current, I_{OK} ($V_O < 0$ or $V_O > V_{CC}$)	± 50 mA
Continuous output current, I_O ($V_O = 0$ to V_{CC})	± 25 mA
Continuous current through V_{CC} or GND pins	± 50 mA
Maximum power dissipation at $T_A = 55^\circ\text{C}$ (in still air):	
D package	0.7 W
DB package	0.4 W
PW package	0.4 W
Storage temperature range	-65°C to 150°C

[†] Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTES: 1. The input and output voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
2. This value is limited to 4.6 V maximum.

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recommended operating conditions (see Note 3)

		MIN	NOM	MAX	UNIT	
V _{CC}	Supply voltage	2.7	3.3	3.6	V	
V _{IH}	High-level input voltage	V _{CC} = 2.7 V to 3.6 V		2	V	
V _{IL}	Low-level input voltage	V _{CC} = 2.7 V to 3.6 V		0.8	V	
V _I	Input voltage	0	V _{CC}		V	
V _O	Output voltage	0	V _{CC}		V	
I _{OH}	High-level output current				-6	mA
I _{OL}	Low-level output current				6	mA
Δt/Δv	Input transition rise or fall rate	0	100		ns/V	
T _A	Operating free-air temperature	-40	85		°C	

NOTE 3: Unused or floating inputs must be held high or low.

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST CONDITIONS	V _{CC} [†]	MIN	TYP	MAX	UNIT
V _{IK}	I _I = -18 mA	2.7 V				V
V _{OH}	I _{OH} = -100 μA	MIN to MAX	V _{CC} -0.2			V
	I _{OH} = -6 mA	3 V	2.4			
V _{OL}	I _{OL} = 100 μA	MIN to MAX			0.2	V
	I _{OL} = 6 mA	3 V			0.4	
I _I	V _I = V _{CC} or GND	3.6 V			±1	μA
I _{OZ}	V _O = V _{CC} or GND	3.6 V			±5	μA
I _{CC}	V _I = V _{CC} or GND, I _O = 0	3.6 V			20	μA
ΔI _{CC}	V _{CC} = 3 V to 3.6 V, Other inputs at V _{CC} or GND, One input at V _{CC} - 0.6 V,				500	μA
C _i	V _I = V _{CC} or GND	3.3 V	TBD			pF
C _o	V _O = V _{CC} or GND	3.3 V	TBD			pF

[†] For conditions shown as MIN or MAX, use the appropriate values under recommended operating conditions.

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