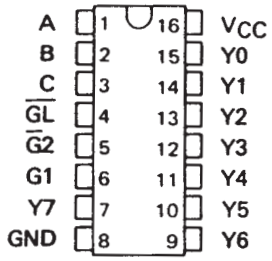
SN54LS137, SN74LS137
3-LINE TO 8-LINE DECODERS/DEMULTIPLEXERS WITH ADDRESS LATCHES

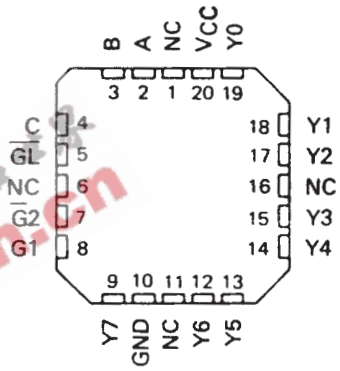
SDLS132 – JUNE 1978 – REVISED MARCH 1988

- **Combines Decoder and 3-Bit Address Latch**
- **Incorporates 2 Enable Inputs to Simplify Cascading**
- **Low Power Dissipation . . . 65 mW Typ**

SN54LS137 . . . J OR W PACKAGE
SN74LS137 . . . D OR N PACKAGE
(TOP VIEW)



SN54LS137 . . .FK PACKAGE
(TOP VIEW)

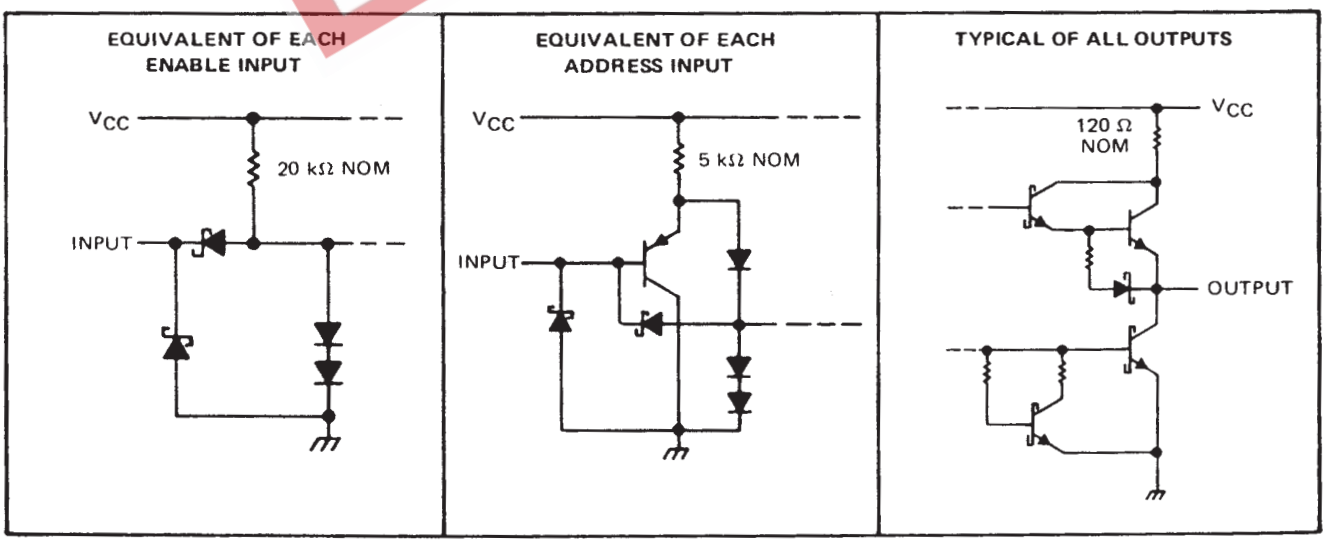


NC - No internal connection

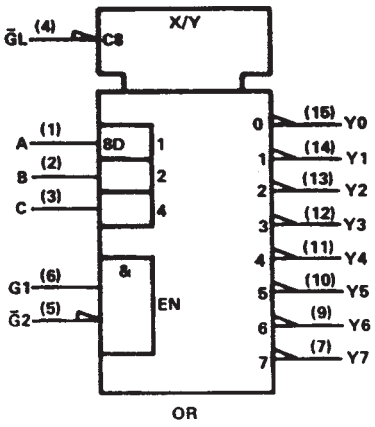
description

The 'LS137 is a three-line to eight-line decoder/demultiplexer with latches on the three address inputs. When the latch-enable input ($\overline{GL}$) is low, the 'LS137 acts as a decoder/demultiplexer. When $\overline{GL}$ goes from low to high, the address present at the select inputs (A, B, and C) is stored in the latches. Further address changes are ignored as long as $\overline{GL}$ remains high. The output enable controls, G1 and $\overline{G2}$, control the state of the outputs independently of the select or latch-enable inputs. All of the outputs are high unless G1 is high and $\overline{G2}$ is low. The 'LS137 is ideally suited for implementing glitch-free decoders in strobed (stored-address) applications in bus-oriented systems.

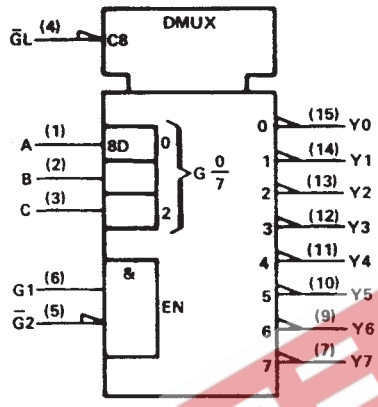
schematics of inputs and outputs



logic symbols†



OR



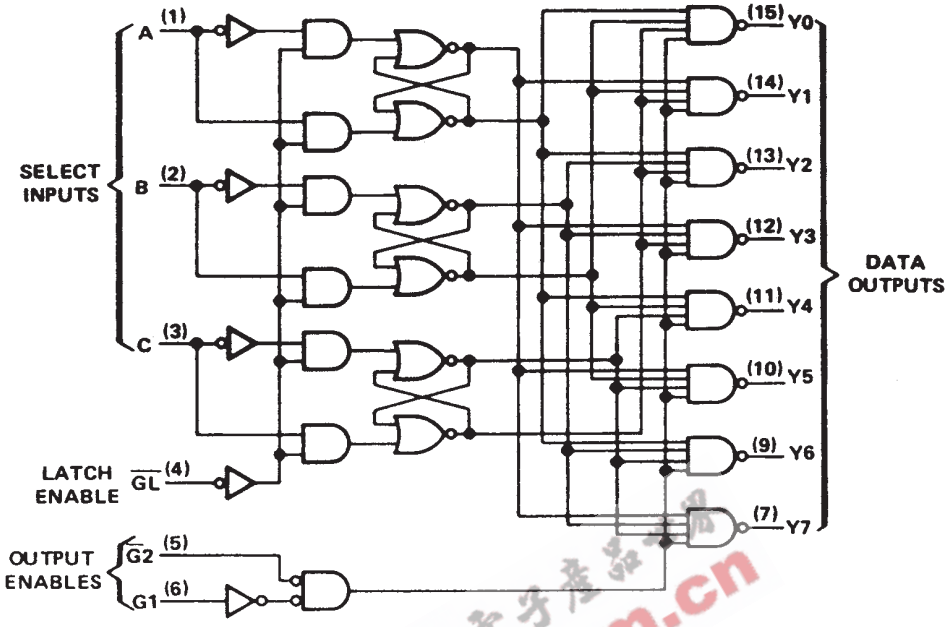
†These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.
Pin numbers shown are for D, J, N, and W packages.

FUNCTION TABLE

INPUTS						OUTPUTS							
ENABLE			SELECT										
$\overline{GL}$	G1	$\overline{G2}$	C	B	A	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7
X	X	H	X	X	X	H	H	H	H	H	H	H	H
X	L	X	X	X	X	H	H	H	H	H	H	H	H
L	H	L	L	L	L	L	H	H	H	H	H	H	H
L	H	L	L	L	H	H	L	H	H	H	H	H	H
L	H	L	L	H	L	H	H	L	H	H	H	H	H
L	H	L	L	H	H	H	H	H	L	H	H	H	H
L	H	L	H	L	L	H	H	H	H	L	H	H	H
L	H	L	H	L	H	H	H	H	H	H	L	H	H
L	H	L	H	H	L	H	H	H	H	H	H	L	H
L	H	L	H	H	H	H	H	H	H	H	H	H	L
H	H	L	X	X	X	Output corresponding to stored address, L; all others, H							

H = high level, L = low level, X = irrelevant

logic diagram (positive logic)



Pin numbers shown are for D, J, N, and W packages.

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

Supply voltage, V_{CC} (See Note 1) . . . . . 7 V
Input voltage . . . . . 7 V
Operating free-air temperature range: SN54LS137 . . . . . −55°C to 125°C
SN74LS137 . . . . . 0°C to 70°C
Storage temperature range . . . . . −65°C to 150°C

NOTE 1: Voltage values are with respect to network ground terminal.

recommended operating conditions

	SN54LS137			SN74LS137			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}			–400			–400	μA
Low-level output current, I_{OL}			4			8	mA
Width of enabling pulse at $\overline{G1}$, t_w	15			15			ns
Setup time at A, B, and C inputs, t_{su}	10			10			ns
Hold time at A, B, and C inputs, t_h	10			10			ns
Operating free-air temperature, T_A	–55		125	0		70	°C

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

PARAMETER		TEST CONDITIONS†		SN54LS137			SN74LS137			UNIT
				MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IH}	High-level input voltage			2			2			V
V_{IL}	Low-level input voltage					0.7			0.8	V
V_{IK}	Input clamp voltage	V_{CC} = MIN, I_I = –18 mA				–1.5			–1.5	V
V_{OH}	High-level output voltage	V_{CC} = MIN, V_{IH} = 2 V, V_{IL} = V_{IL} max, I_{OH} = –400 μA		2.5	3.5		2.7	3.5		V
V_{OL}	Low-level output voltage	V_{CC} = MIN, V_{IH} = 2 V, V_{IL} = V_{IL} max	I_{OL} = 4 mA		0.25	0.4		0.25	0.4	V
			I_{OL} = 8 mA					0.35	0.5	
I_I	Input current at maximum input voltage	V_{CC} = MAX, V_I = 7 V				0.1			0.1	mA
I_{IH}	High-level input current	V_{CC} = MAX, V_I = 2.7 V				20			20	μA
I_{IL}	Low-level input current	V_{CC} = MAX, V_I = 0.4 V	Enable			–0.4			–0.4	mA
			A, B, C			–0.2			–0.2	
I_{OS}	Short-circuit output current§	V_{CC} = MAX		–20		–100	–20		–100	mA
I_{CC}	Supply current	V_{CC} = MAX, See Note 2			11	18		11	18	mA

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.
‡ All typical values are at V_{CC} = 5 V, T_A = 25°C.
§ Not more than one output should be shorted at a time, and duration of the short-circuit should not exceed one second.
NOTE 2: I_{CC} is tested with all inputs grounded and all outputs open.

switching characteristics, V_{CC} = 5 V, T_A = 25°C, see note 3

PARAMETER¶	FROM (INPUT)	TO (OUTPUT)	LEVELS OF DELAY	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH}	A, B, C	Y	2	C_L = 15 pF, R_L = 2 kΩ, See Note 3		11	17	ns
t_{PHL}			4			25	38	
t_{PLH}	A, B, C	Y	3			16	24	ns
t_{PHL}			3			19	29	
t_{PLH}	Enable $\overline{G2}$	Y	2			13	21	ns
t_{PHL}			2			16	27	
t_{PLH}	Enable G1	Y	3			14	21	ns
t_{PHL}			3			18	27	
t_{PLH}	Enable $\overline{G1}$	Y	3			18	27	ns
t_{PHL}			4			25	38	

¶ t_{PLH} = propagation delay time, low-to-high-level output.
t_{PHL} = propagation delay time, high-to-low-level output.
NOTE 3: Load circuits and voltage waveforms are shown in Section 1.

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