

# SN74ALS137, SN74AS137, SN54ALS137 3-LINE TO 8-LINE DECODERS/DEMULTIPLEXERS WITH ADDRESS LATCHES

D2861, APRIL 1982 - REVISED MAY 1988

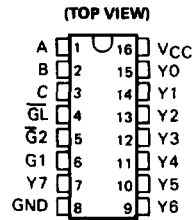
- Combines Decoder and 3-Bit Address Latch
- Incorporates 2 Output Enables to Simplify Cascading
- Package Options Include Plastic "Small Outline" Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs
- Dependable Texas Instruments Quality and Reliability

### description

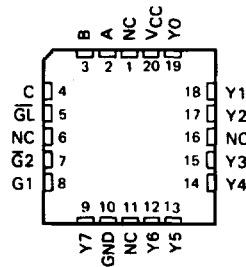
The 'ALS137 is a three-line to eight-line decoder/demultiplexer with latches on the three address inputs. When the latch-enable input ( $\overline{GL}$ ) is low, the 'ALS137 acts as a decoder/demultiplexer. When  $\overline{GL}$  goes from low to high, the address present at the select inputs (A, B, 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 outputs independently of the select or latch-enable inputs. All of the outputs are forced high if G1 is low or  $\overline{G2}$  is high. The 'ALS137 is ideally suited for implementing glitch-free decoders in strobed (stored-address) applications in bus-oriented systems.

The SN54ALS137 is characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74ALS137 and SN74AS137 are characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

SN54ALS137 ... J PACKAGE  
SN74ALS137, SN74AS137 ... D OR N PACKAGE

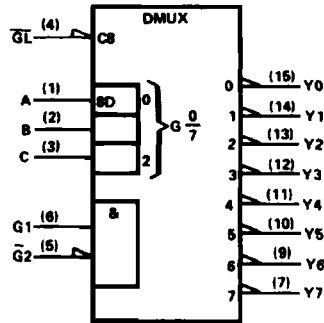
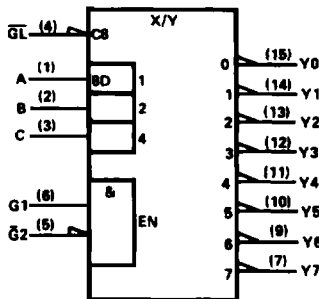


SN54ALS137 ... FK PACKAGE  
(TOP VIEW)



NC - No internal connection

### logic symbols (alternatives)<sup>†</sup>



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

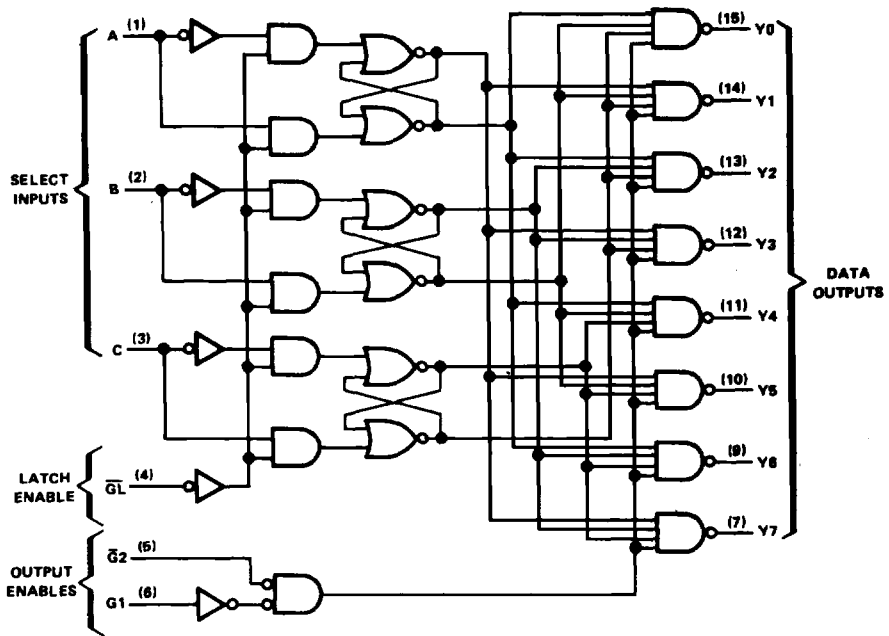
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**SN74ALS137, SN74AS137, SN54ALS137**  
**3-LINE TO 8-LINE DECODERS/DEMULTIPLEXERS WITH ADDRESS LATCHES**

logic diagram (positive logic)



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

FUNCTION TABLE

ENABLE			SELECT			OUTPUTS							
GL	G1	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	L	H	H	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							

## SN74ALS137, SN74AS137, SN54ALS137 3-LINE TO 8-LINE DECODERS/DEMULTIPLEXERS WITH ADDRESS LATCHES

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

Supply voltage, $V_{CC}$ .....	7 V
Input voltage .....	7 V
Operating free-air temperature range: SN54ALS137 .....	-55°C to 125°C
SN74ALS137, SN74AS137 .....	0°C to 70°C
Storage temperature .....	-65°C to 150°C

		SN54ALS137			SN74ALS137			UNIT		
		MIN	NOM	MAX	MIN	NOM	MAX			
$V_{CC}$	Supply voltage	4.5	5	5.5	4.5	5	5.5	V		
$V_{IH}$	High-level input voltage	2			2			V		
$V_{IL}$	Low-level input voltage				0.8			V		
$I_{OH}$	High-level output current				-0.4			mA		
$I_{OL}$	Low-level output current				8			mA		
$t_w$	Pulse duration, $\overline{GL}$ low	15			10			ns		
$t_{su}$	Setup time at A, B, and C before $\overline{GL}$	15			10			ns		
$t_h$	Hold time at A, B, and C after $\overline{GL}$	5			5			ns		
$T_A$	Operating free-air temperature	-55			125			0	70	°C

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

PARAMETER	TEST CONDITIONS	SN54ALS137			SN74ALS137			UNIT
		MIN	TYP <sup>†</sup>	MAX	MIN	TYP <sup>†</sup>	MAX	
$V_{IK}$	$V_{CC} = 4.5$ V, $I_I = -18$ mA	-1.5			-1.5			V
$V_{OH}$	$V_{CC} = 4.5$ V to 5.5 V, $I_{OH} = -0.4$ mA	$V_{CC} - 2$			$V_{CC} - 2$			V
$V_{OL}$	$V_{CC} = 4.5$ V, $I_{OL} = 4$ mA	0.25 0.4			0.25 0.4			V
	$V_{CC} = 4.5$ V, $I_{OL} = 8$ mA				0.35 0.5			
$I_I$	$V_{CC} = 5.5$ V, $V_I = 7$ V	0.1			0.1			mA
$I_{IH}$	$V_{CC} = 5.5$ V, $V_I = 2.7$ V	20			20			$\mu$ A
$I_{IL}$	$V_{CC} = 5.5$ V, $V_I = 0.4$ V	-0.1			-0.1			mA
$I_{O^2}$	$V_{CC} = 5.5$ V, $V_O = 2.25$ V	-30 -112			-30 -112			mA
$I_{CC}$	$V_{CC} = 5.5$ V	5 11			5 11			mA

<sup>†</sup>All typical values are at  $V_{CC} = 5$  V,  $T_A = 25$ °C.

<sup>‡</sup>The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current,  $I_{OS}$ .

switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 4.5$ V to 5.5 V, $C_L = 50$ pF, $R_L = 500$ $\Omega$ , $T_A = \text{MIN to MAX}$				UNIT
			SN54ALS137		SN74ALS137		
			MIN	MAX	MIN	MAX	
$t_{PLH}$	A, B, C	Y	5	25	5	20	ns
$t_{PHL}$			6	25	6	20	
$t_{PLH}$	$\overline{G}2$	Y	4	15	4	12	ns
$t_{PHL}$			5	18	5	15	
$t_{PLH}$	G1	Y	5	21	5	17	ns
$t_{PHL}$			5	19	5	15	
$t_{PLH}$	$\overline{GL}$	Y	7	27	7	22	ns
$t_{PHL}$			7	25	7	20	

NOTE 1: Load circuit and voltage waveforms are shown in Section 1.

# SN74AS137

## 3-LINE TO 8-LINE DECODERS/DEMULTIPLEXERS WITH ADDRESS LATCHES

### recommended operating conditions

		SN74AS137			UNIT
		MIN	NOM	MAX	
V <sub>CC</sub>	Supply voltage	4.5	5	5.5	V
V <sub>IH</sub>	High-level input voltage	2			V
V <sub>IL</sub>	Low-level input voltage			0.8	V
I <sub>OH</sub>	High-level output current			-2	mA
I <sub>OL</sub>	Low-level output current			20	mA
t <sub>w</sub>	Pulse duration, $\overline{GL}$ low	4.5			ns
t <sub>su</sub>	Setup times at A, B, and C before $\overline{GL}$ †	4			ns
t <sub>h</sub>	Hold time at A, B, and C after $\overline{GL}$ †	1			ns
T <sub>A</sub>	Operating free-air temperature	0		70	°C

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

PARAMETER	TEST CONDITIONS	SN74AS137			UNIT
		MIN	TYP†	MAX	
V <sub>IK</sub>	V <sub>CC</sub> = 4.5 V, I <sub>I</sub> = -18 mA			-1.2	V
V <sub>OH</sub>	V <sub>CC</sub> = 4.5 V to 5.5 V, I <sub>OH</sub> = -2 mA	V <sub>CC</sub> -2			V
V <sub>OL</sub>	V <sub>CC</sub> = 4.5 V, I <sub>OL</sub> = 20 mA		0.35	0.5	V
I <sub>I</sub>	V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 7 V			0.1	mA
I <sub>IH</sub>	V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 2.7 V			20	μA
I <sub>IL</sub>	V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 0.4 V			-1	mA
I <sub>O</sub> ‡	V <sub>CC</sub> = 5.5 V, V <sub>O</sub> = 2.25 V	-30		-112	mA
I <sub>CC</sub>	V <sub>CC</sub> = 5.5 V		15	24	mA

† All typical values are at V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C.

‡ The output conditions have been chosen to produce a current that closely approximates one half on the true short-circuit output current, I<sub>OS</sub>.

### switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub> = 4.5 V to 5.5 V, C <sub>L</sub> = 50 pF, R <sub>L</sub> = 500 Ω, T <sub>A</sub> = MIN to MAX		UNIT
			SN74AS137		
			MIN	MAX	
t <sub>PLH</sub>	A, B, C	Y	2	12.5	ns
t <sub>PHL</sub>			2	12.5	
t <sub>PLH</sub>	$\overline{G2}$	Y	2	8	ns
t <sub>PHL</sub>			2	8.5	
t <sub>PLH</sub>	G1	Y	2	10	ns
t <sub>PHL</sub>			2	9	
t <sub>PLH</sub>	$\overline{GL}$	Y	3	13.5	ns
t <sub>PHL</sub>			3	14	

NOTE 1: Load circuit and voltage waveforms are shown in Section 1.