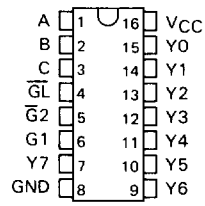
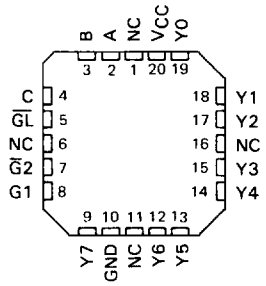
D2661, APRIL 1982 – REVISED DECEMBER 1983

- **Combines Decoder and 3-Bit Address Latch**
- **Incorporates 2 Output Enables to Simplify Cascading**
- **Package Options Include Both Plastic and Ceramic Chip Carriers in Addition to Plastic and Ceramic DIPs**
- **Dependable Texas Instruments Quality and Reliability**

SN54ALS137, SN54AS137 . . . J PACKAGE
SN74ALS137, SN74AS137 . . . N PACKAGE
(TOP VIEW)



SN54ALS137, SN54AS137 . . . FH PACKAGE
SN74ALS137, SN74AS137 . . . FN PACKAGE
(TOP VIEW)



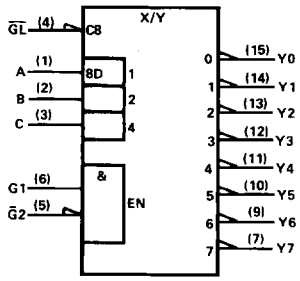
NC – No internal connection

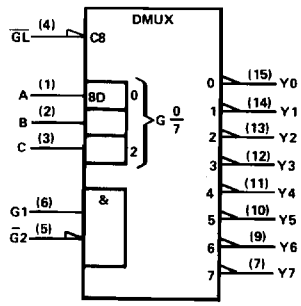
description

The 'ALS137 and 'AS137 are 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 and 'AS137 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 and 'AS137 are ideally suited for implementing glitch-free decoders in strobed (stored-address) applications in bus-oriented systems.

The SN54ALS137 and SN54AS137 are characterized for operation over the full military temperature range of −55°C to 125°C. The SN74ALS137 and SN74AS137 are characterized for operation from 0°C to 70°C.

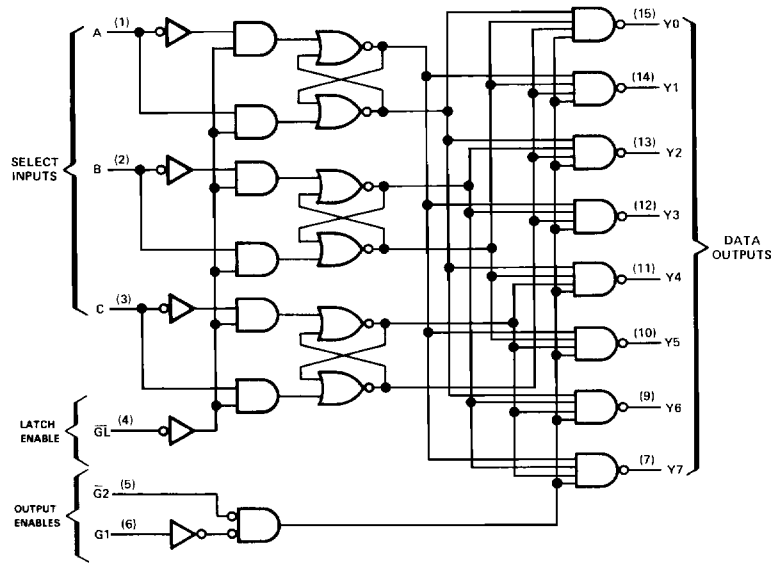
logic symbols (alternatives)





Pin numbers shown are for J and N packages.

logic diagram (positive logic)



Pin numbers shown are for J and N packages.

FUNCTION TABLE

INPUTS						OUTPUTS							
ENABLE			SELECT										
$\overline{G1}$	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							

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, SN54AS137 . . . . . −55°C to 125°C
SN74ALS137, SN74AS137 . . . . . 0°C to 70°C
Storage temperature . . . . . −65°C to 150°C

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recommended operating conditions

		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			0.8	V
I_{OH}	High-level output current			−0.4			−0.4	mA
I_{OL}	Low-level output current			4			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†	MAX	MIN	TYP†	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	μA
I_{IL}	V_{CC} = 5.5 V,	V_I = 0.4 V			−0.1			−0.1	mA
I_O‡	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

†All typical values are at V_{CC} = 5 V, T_A = 25°C.
‡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 Ω, T_A = 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}	$\overline{G2}$	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: For load circuit and voltage waveforms, see page 1-12.

recommended operating conditions

		SN54AS137			SN74AS137			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			0.8	V
I_{OH}	High-level output current			−2			−2	mA
I_{OL}	Low-level output current			20			20	mA
t_w	Pulse duration, $\overline{GL}$ low							ns
t_{su}	Setup times at A, B, and C before $\overline{GL}$↑							ns
t_h	Hold time at A, B, and C after $\overline{GL}$↑							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		SN54AS137			SN74AS137			UNIT
				MIN	TYP†	MAX	MIN	TYP†	MAX	
V_{IK}		V_{CC} = 4.5 V,	I_I = −18 mA			−1.2			−1.2	V
V_{OH}		V_{CC} = 4.5 V to 5.5 V,	I_{OH} = −2 mA	V_{CC}−2			V_{CC}−2			V
V_{OL}		V_{CC} = 4.5 V,	I_{OL} = 20 mA		0.35	0.5		0.35	0.5	V
I_I	Enable	V_{CC} = 5.5 V,	V_I = 7 V							mA
	A, B, C									
I_{IH}	Enable	V_{CC} = 5.5 V,	V_I = 2.7 V							μA
	A, B, C									
I_{IL}	Enable	V_{CC} = 5.5 V,	V_I = 0.4 V		−0.05			−0.05		mA
	A, B, C				−0.05			−0.05		
I_O‡		V_{CC} = 5.5 V,	V_O = 2.25 V	−30		−112	−30		−112	mA
I_{CC}		V_{CC} = 5.5 V			16			16		mA

†All typical values are at V_{CC} = 5 V, T_A = 25°C.
‡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 Ω, T_A = MIN to MAX						UNIT
			SN54AS137			SN74AS137			
			MIN	TYP†	MAX	MIN	TYP†	MAX	
t_{PLH}	A, B, C	Y		6.6			6.6		ns
t_{PHL}				7.1			7.1		
t_{PLH}	$\overline{G}2$	Y		5.4			5.4		ns
t_{PHL}				5.3			5.3		
t_{PLH}	G1	Y		6.2			6.2		ns
t_{PHL}				5.6			5.6		
t_{PLH}	$\overline{GL}$	Y		5.4			5.4		ns
t_{PHL}				5.3			5.3		

†All typical values are at V_{CC} 5 V, T_A = 25°C.
NOTE 1: For load circuit and voltage waveforms, see page 1-12.