

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

SDAS203B – APRIL 1982 – REVISED DECEMBER 1994

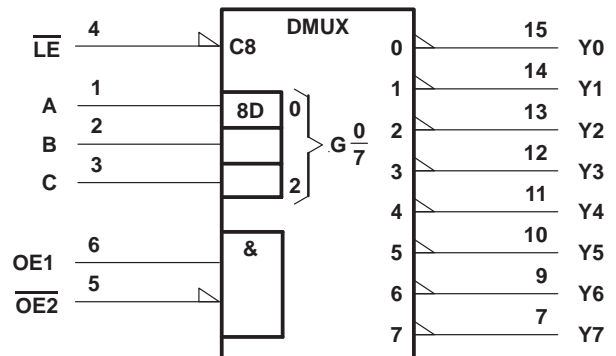
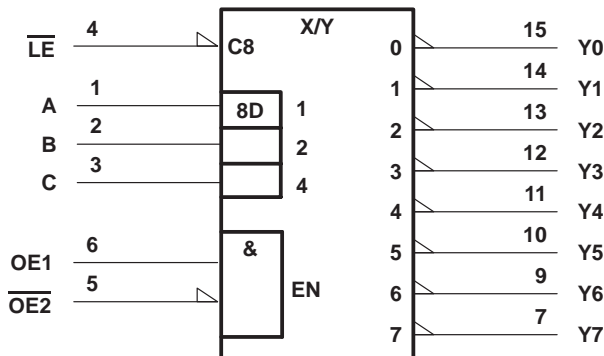
- Combines Decoder and 3-Bit Address Latch
- Incorporates Two Output Enables to Simplify Cascading
- Package Options Include Plastic Small-Outline (D) Packages, Ceramic Chip Carriers (FK), and Standard Plastic (N) and Ceramic (J) 300-mil DIPs

description

The SN54ALS137, SN74ALS137A, and 'AS137 are 3-line to 8-line decoders/demultiplexers with latches on the three address inputs. When the latch-enable (\overline{LE}) input is low, the SN54ALS137, SN74ALS137A, and 'AS137 act as a decoder/demultiplexer. When \overline{LE} goes from low to high, the address present at the select (A, B, and C) inputs is stored in the latches. Further address changes are ignored as long as \overline{LE} remains high. The output-enable (OE1 and $\overline{OE2}$) inputs control the outputs independently of the select or latch-enable inputs. All of the outputs are forced high if OE1 is low or $\overline{OE2}$ is high. The SN54ALS137, SN74ALS137A, and 'AS137 are ideally suited for implementing glitch-free decoders in strobed (stored-address) applications in bus-oriented systems.

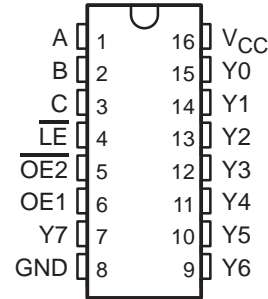
The SN54ALS137 and SN54AS137 are characterized for operation over the full military temperature range of -55°C to 125°C . The SN74ALS137A and SN74AS137 are characterized for operation from 0°C to 70°C .

logic symbols (alternatives)†

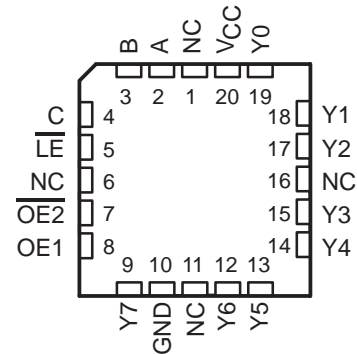


† These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12. Pin numbers shown are for the D, J, and N packages.

SN54ALS137, SN54AS137 . . . J PACKAGE
SN74ALS137A, SN74AS137 . . . D OR N PACKAGE
(TOP VIEW)

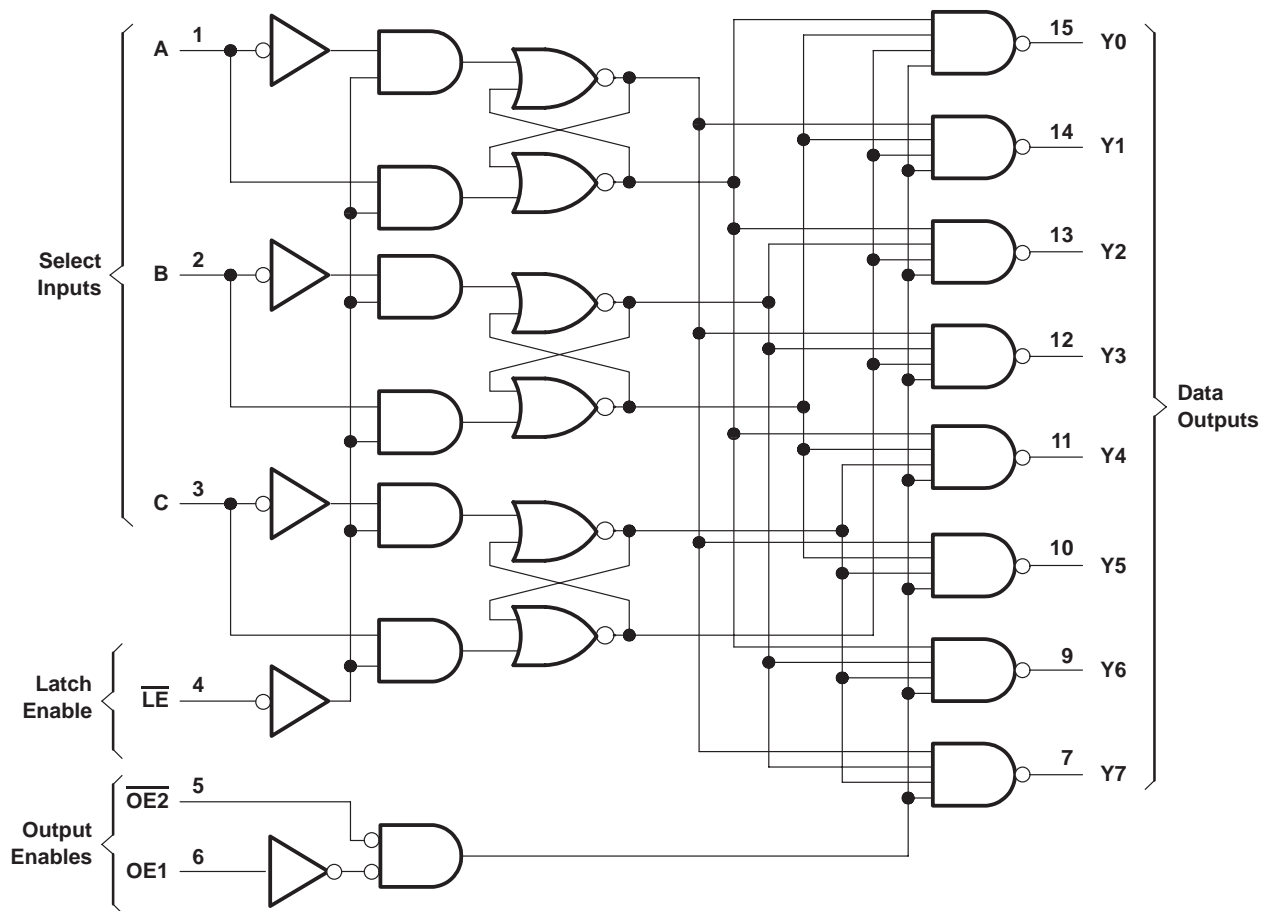


SN54ALS137, SN54AS137 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

logic diagram (positive logic)



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

FUNCTION TABLE

INPUTS			OUTPUTS												
ENABLE		SELECT													
\overline{LE}	OE1	$\overline{OE2}$	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	L	H	H	H	H	H	L	H	H		
L	H	L	H	L	H	H	H	H	H	H	H	L	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	Outputs corresponding to stored address, L; all others, H									

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

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

Supply voltage, V_{CC}	7 V
Input voltage, V_I	7 V
Operating free-air temperature range, T_A : SN54ALS137	–55°C to 125°C
SN74ALS137A	0°C to 70°C
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.

recommended operating conditions

	SN54ALS137			SN74ALS137A			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			0.7			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{LE} low	15			10			ns
t_{su} Setup time at A, B, and C before $\overline{LE}\uparrow$	15			10			ns
t_h Hold time at A, B, and C after $\overline{LE}\uparrow$	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			SN74ALS137A			UNIT
		MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IK}	$V_{CC} = 4.5\text{ V}$, $I_I = -18\text{ mA}$			–1.5			–1.5	V
V_{OH}	$V_{CC} = 4.5\text{ V to } 5.5\text{ V}$, $I_{OH} = -0.4\text{ mA}$	$V_{CC} - 2$			$V_{CC} - 2$			V
V_{OL}	$V_{CC} = 4.5\text{ V}$		0.25	0.4		0.25	0.4	V
		$I_{OL} = 4\text{ mA}$				0.35	0.5	
I_I	$V_{CC} = 5.5\text{ V}$, $V_I = 7\text{ V}$			0.1			0.1	mA
I_{IH}	$V_{CC} = 5.5\text{ V}$, $V_I = 2.7\text{ V}$			20			20	μA
I_{IL}	$V_{CC} = 5.5\text{ V}$, $V_I = 0.4\text{ V}$			–0.1			–0.1	mA
I_{O}^{\S}	$V_{CC} = 5.5\text{ V}$, $V_O = 2.25\text{ V}$	–30		–112	–30		–112	mA
I_{CC}	$V_{CC} = 5.5\text{ V}$		5	11		5	11	mA

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

§ 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 Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 4.5\text{ V to }5.5\text{ V}$, $C_L = 50\text{ pF}$, $R_L = 500\ \Omega$, $T_A = \text{MIN to MAX}^\dagger$				UNIT
			SN54ALS137		SN74ALS137A		
			MIN	MAX	MIN	MAX	
t_{PLH}	A, B, C	Y	5	25	5	20	ns
t_{PHL}			6	25	6	20	
t_{PLH}	$\overline{OE2}$	Y	4	15	3	12	ns
t_{PHL}			5	18	4	15	
t_{PLH}	OE1	Y	5	21	4	17	ns
t_{PHL}			5	19	4	15	
t_{PLH}	\overline{LE}	Y	7	27	6	22	sn
t_{PHL}			7	25	7	20	

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

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

Supply voltage, V_{CC} 7 V

Input voltage, V_I 7 V

Operating free-air temperature range, T_A : SN54AS137 -55°C to 125°C

SN74AS137 0°C to 70°C

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.

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{LE} low	5			6.5			ns
t_{su}	Setup time at A, B, and C before \overline{LE}^\uparrow	4.5			4			ns
t_h	Hold time at A, B, and C after \overline{LE}^\uparrow	1			1			ns
T_A	Operating free-air temperature	-55		125	0		70	$^\circ\text{C}$

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

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

PARAMETER	TEST CONDITIONS	SN54AS137		SN74AS137		UNIT	
		MIN	TYP†	MAX	MIN		TYP†
V_{IK}	$V_{CC} = 4.5\text{ V}$, $I_I = -18\text{ mA}$			-1.2		-1.2	V
V_{OH}	$V_{CC} = 4.5\text{ V to } 5.5\text{ V}$, $I_{OH} = -2\text{ mA}$	$V_{CC}-2$			$V_{CC}-2$		V
V_{OL}	$V_{CC} = 4.5\text{ V}$, $I_{OL} = 20\text{ mA}$		0.35	0.5		0.35 0.5	V
I_I	$V_{CC} = 5.5\text{ V}$, $V_I = 7\text{ V}$			0.1		0.1	mA
I_{IH}	$V_{CC} = 5.5\text{ V}$, $V_I = 2.7\text{ V}$			20		20	μA
I_{IL}	$V_{CC} = 5.5\text{ V}$, $V_I = 0.4\text{ V}$			-0.5		-1	mA
$I_{O\ddagger}$	$V_{CC} = 5.5\text{ V}$, $V_O = 2.25\text{ V}$	-30		-112	-30	-112	mA
I_{CC}	$V_{CC} = 5.5\text{ V}$		15	24		15 24	mA

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

‡ 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 Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 4.5\text{ V to } 5.5\text{ V}$, $C_L = 50\text{ pF}$, $R_L = 500\ \Omega$, $T_A = \text{MIN to MAX}\S$				UNIT
			SN54AS137		SN74AS137		
			MIN	MAX	MIN	MAX	
t_{PLH}	A, B, C	Y	2	14	2	12.5	ns
t_{PHL}			2	14	2	12.5	
t_{PLH}	$\overline{OE2}$	Y	2	9	2	8	ns
t_{PHL}			2	9	2	8.5	
t_{PLH}	OE1	Y	2	11	2	10	ns
t_{PHL}			2	10	2	9	
t_{PLH}	\overline{LE}	Y	2	14.5	3	13.5	ns
t_{PHL}			2	15	3	14	

§ For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

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