SN5437, SN54LS37, SN54S37, SN7437, SN74LS37, SN74S37
QUADRUPLE 2-INPUT POSITIVE-NAND BUFFERS

DECEMBER 1983—REVISED MARCH 1988

- **Package Options Include Plastic "Small Outline" Packages, Ceramic Chip Carriers and Flat Packages, and Plastic and Ceramic DIPs**
- **Dependable Texas Instruments Quality and Reliability**

description

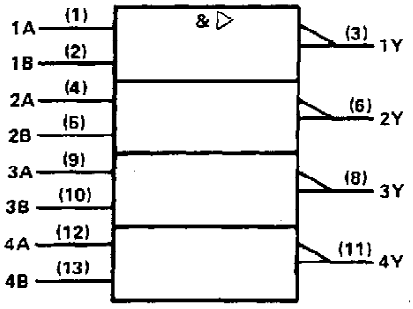
These devices contain four independent 2-input NAND buffer gates.

The SN5437, SN54LS37 and SN54S37 are characterized for operation over the full military range of −55°C to 125°C. The SN7437, SN74LS37 and SN74S37 are characterized for operation from 0°C to 70°C.

FUNCTION TABLE (each gate)

INPUTS		OUTPUT
A	B	Y
H	H	L
L	X	H
X	L	H

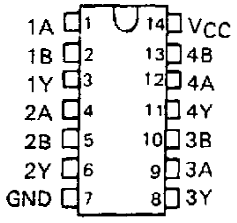
logic symbol†



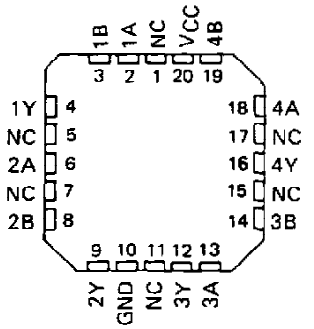
† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

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

SN5437, SN54LS37, SN54S37 . . . J OR W PACKAGE
SN7437 . . . N PACKAGE
SN74LS37, SN74S37 . . . D OR N PACKAGE
(TOP VIEW)

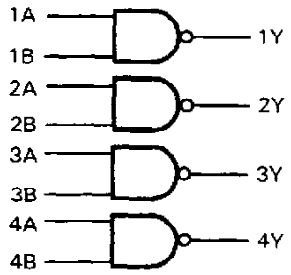


SN54LS37, SN54S37 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

logic diagram

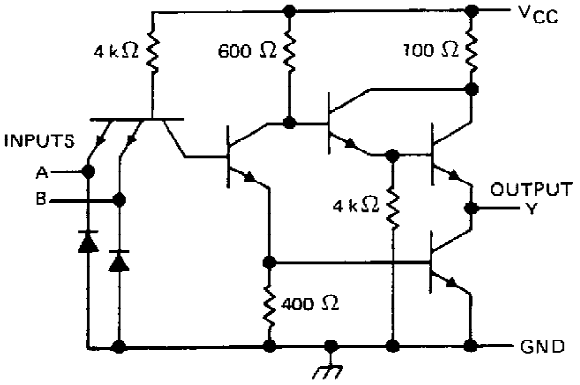


positive logic

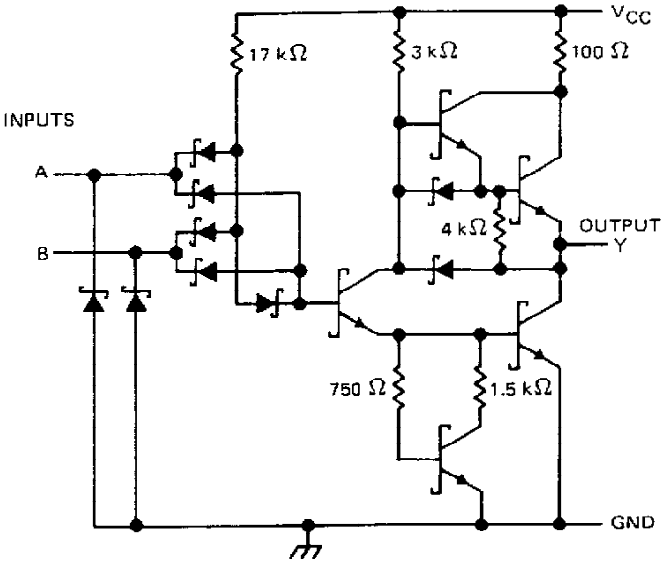
$$Y = \overline{A \cdot B} \text{ or } Y = \overline{A} + \overline{B}$$

schematics (each gate)

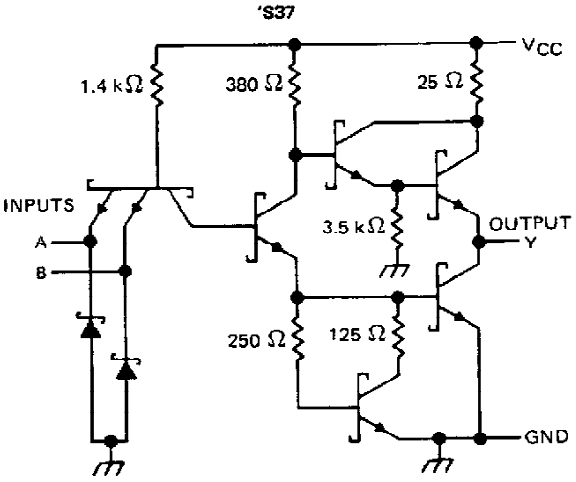
'37



'LS37



'S37



Resistor values shown are nominal.

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

Supply voltage, V_{CC} (see Note 1) . . . . . 7 V
Input voltage: '37, 'S37 . . . . . 5.5 V
'LS37 . . . . . 7 V
Operating free-air temperature: SN54' . . . . . −55°C to 125°C
SN74' . . . . . 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

		SN5437			SN7437			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5	5.5	4.75	5	5.25	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			−1.2			−1.2	mA
I_{OL}	Low-level output current			48			48	mA
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 †			SN5437			SN7437			UNIT
				MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IK}	V_{CC} = MIN,	I_I = −12 mA				−1.5			−1.5	V
V_{OH}	V_{CC} = MIN,	V_{IL} = 0.8 V,	I_{OH} = −1.2 mA	2.4	3.3		2.4	3.3		V
V_{OL}	V_{CC} = MIN,	V_{IH} = 2 V,	I_{OL} = 48 mA		0.2	0.4		0.2	0.4	V
I_I	V_{CC} = MAX,	V_I = 5.5 V				1			1	mA
I_{IH}	V_{CC} = MAX,	V_I = 2.4 V				40			40	μA
I_{IL}	V_{CC} = MAX,	V_I = 0.4 V				−1.6			−1.6	mA
I_{OS}§	V_{CC} = MAX			−20		−70	−18		−70	mA
I_{CCH}	V_{CC} = MAX,	V_I = 0 V			9	15.5		9	15.5	mA
I_{CCL}	V_{CC} = MAX,	V_I = 4.5 V			34	54		34	54	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 the duration of the short circuit should not exceed one second.

switching characteristics, V_{CC} = 5 V, T_A = 25°C (see note 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS		MIN	TYP	MAX	UNIT
t_{PLH}	A or B	Y	R_L = 133 Ω,	C_L = 45 pF		13	22	ns
t_{PHL}						8	15	ns

NOTE 2: Load circuits and voltage waveforms are shown in Section 1.

recommended operating conditions

		SN54LS37			SN74LS37			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5	5.5	4.75	5	5.25	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			−1.2			−1.2	mA
I_{OL}	Low-level output current			12			24	mA
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 †			SN54LS37			SN74LS37			UNIT
				MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IK}	V_{CC} = MIN,	I_I = −18 mA				−1.5			−1.5	V
V_{OH}	V_{CC} = MIN,	V_{IL} = MAX,	I_{OH} = −1.2 mA	2.5	3.4		2.7	3.4		V
V_{OL}	V_{CC} = MIN,	V_{IH} = 2 V,	I_{OL} = 12 mA		0.25	0.4		0.25	0.4	V
	V_{CC} = MIN,	V_{IH} = 2 V,	I_{OL} = 24 mA					0.35	0.5	
I_I	V_{CC} = MAX,	V_I = 7 V				0.1			0.1	mA
I_{IH}	V_{CC} = MAX,	V_I = 2.7 V				20			20	μA
I_{IL}	V_{CC} = MAX,	V_I = 0.4 V				−0.4			−0.4	mA
I_{OS}§	V_{CC} = MAX			−30		−130	−30		−130	mA
I_{CCH}	V_{CC} = MAX,	V_I = 0 V			0.9	2		0.9	2	mA
I_{CCL}	V_{CC} = MAX,	V_I = 4.5 V			6	12		6	12	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 the duration of the short-circuit should not exceed one second.

switching characteristics, V_{CC} = 5 V, T_A = 25°C (see note 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS		MIN	TYP	MAX	UNIT
t_{PLH}	A or B	Y	R_L = 667 Ω,	C_L = 45 pF		12	24	ns
t_{PHL}						12	24	ns

NOTE 2: Load circuits and voltage waveforms are shown in Section 1.

recommended operating conditions

		SN54S37			SN74S37			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5	5.5	4.75	5	5.25	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			−3			−3	mA
I_{OL}	Low-level output current			60			60	mA
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 †			SN54S37			SN74S37			UNIT
				MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IK}	V_{CC} = MIN,	I_I = −18 mA				−1.2			−1.2	V
V_{OH}	V_{CC} = MIN,	V_{IL} = 0.8 V,	I_{OH} = −3 mA	2.5	3.4		2.7	3.4		V
V_{OL}	V_{CC} = MIN,	V_{IH} = 2 V,	I_{OL} = 60 mA			0.5			0.5	V
I_I	V_{CC} = MAX,	V_I = 5.5 V				1			1	mA
I_{IH}	V_{CC} = MAX,	V_I = 2.7 V				0.1			0.1	mA
I_{IL}	V_{CC} = MAX,	V_I = 0.5 V				−4			−4	mA
I_{OS}§	V_{CC} = MAX			−50		−225	−50		−225	mA
I_{CCH}	V_{CC} = MAX,	V_I = 0 V			20	36		20	36	mA
I_{CCL}	V_{CC} = MAX,	V_I = 4.5			46	80		46	80	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 the duration of the short circuit should not exceed 100 milliseconds.

switching characteristics, V_{CC} = 5 V, T_A = 25°C (see note 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS		MIN	TYP	MAX	UNIT
t_{PLH}	A or B	Y	R_L = 93 Ω,	C_L = 50 pF		4	6.5	ns
t_{PHL}						4	6.5	ns
t_{PLH}			R_L = 93 Ω,	C_L = 150 pF		6		ns
t_{PHL}						6		ns

NOTE 2: Load circuits and voltage waveforms are shown in Section 1.

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