SN54S135, SN74S135
QUADRUPLE EXCLUSIVE-OR/NOR GATES

SDLS204

DECEMBER 1972—REVISED MARCH 1988

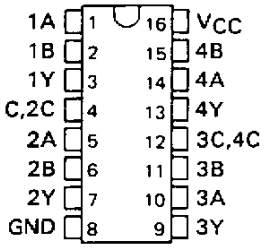
- Fully Compatible with Most TTL and TTL MSI Circuits
- Fully Schottky Clamping Reduces Delay Times . . . 8 ns Typical
- Can Operate as Exclusive-OR Gate (C Input Low) or as Exclusive-NOR Gate (C Input High)

FUNCTION TABLE

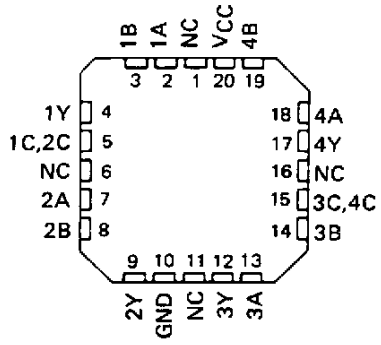
INPUTS			OUTPUT
A	B	C	Y
L	L	L	L
L	H	L	H
H	L	L	H
H	H	L	L
L	L	H	H
L	H	H	L
H	L	H	L
H	H	H	H

H = high level, L = low level

SN54S135 . . . J OR W PACKAGE
SN74S135 . . . D OR N PACKAGE
(TOP VIEW)

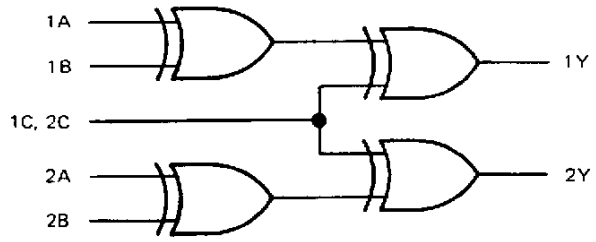


SN54S135 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

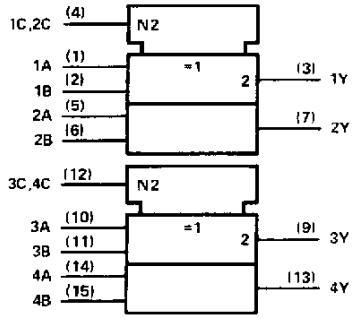
logic diagram (one half)



positive logic

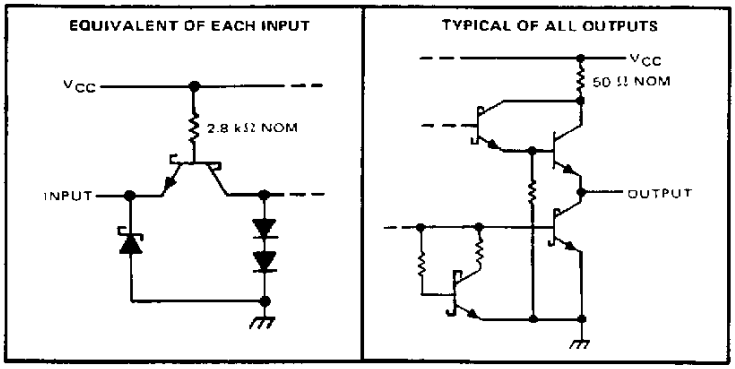
$$Y = A \oplus B \oplus C = A\bar{B}\bar{C} + \bar{A}B\bar{C} + \bar{A}\bar{B}C + ABC$$

logic symbol†



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

schematics of inputs and outputs



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 . . . . . 5.5 V
Operating free-air temperature range: SN54S135 . . . . . −55°C to 125°C
SN74S135 . . . . . 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

	SN54S135			SN74S135			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}			−1			−1	mA
Low-level output current, I_{OL}			20			20	mA
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†		MIN	TYP‡	MAX	UNIT
V_{IH}	High-level input voltage			2			V
V_{IL}	Low-level input voltage					0.8	V
V_{IK}	Input clamp voltage	V_{CC} = MIN, I_I = −18 mA				−1.2	V
V_{OH}	High-level output voltage	V_{CC} = MIN, V_{IH} = 2 V, V_{IL} = 0.8 V, I_{OH} = −1 mA	SN54S'	2.5	3.4		V
			SN74S'	2.7	3.4		
V_{OL}	Low-level output voltage	V_{CC} = MIN, V_{IH} = 2 V, V_{IL} = 0.8 V, I_{OL} = 20 mA				0.5	V
I_I	Input current at maximum input voltage	V_{CC} = MAX, V_I = 5.5 V				1	mA
I_{IH}	High-level input current	V_{CC} = MAX, V_I = 2.7 V				50	μA
I_{IL}	Low-level input current	V_{CC} = MAX, V_I = 0.5 V				−2	mA
I_{OS}	Short-circuit output current§	V_{CC} = MAX		−40		−100	mA
I_{CC}	Supply current	V_{CC} = MAX, See Note 2			65	99	mA

†For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable type.
‡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 measured with the inputs grounded and the outputs open.

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

PARAMETER	FROM (INPUT)	TEST CONDITIONS		MIN	TYP	MAX	UNIT
t_{PLH}	A or B	B or A = L, C = L	C_L = 15 pF, R_L = 280 Ω, See Note 3		8.5	13	ns
t_{PHL}					11	15	
t_{PLH}	A or B	B or A = H, C = L			8	12	ns
t_{PHL}					9	13.5	
t_{PLH}	A or B	B or A = L, C = H			10	15	ns
t_{PHL}					6.5	10	
t_{PLH}	A or B	B or A = H, C = H			8.5	12	ns
t_{PHL}					7	13	
t_{PLH}	C	A = B			8	12	ns
t_{PHL}					9.5	14.5	
t_{PLH}	C	A ≠ B			7.5	11.5	ns
t_{PHL}					8	12	

NOTE 3: Load circuits and voltage waveforms are shown in Section 1.

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