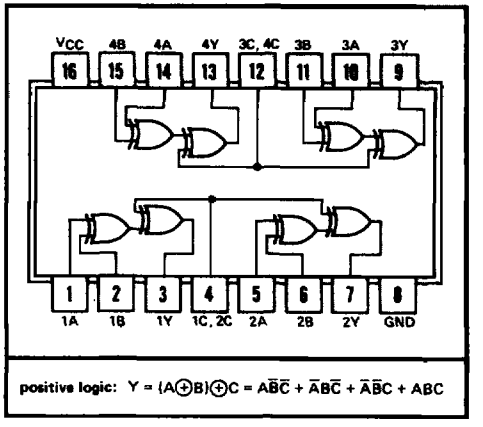
TYPES SN54S135, SN74S135
QUADRUPLE EXCLUSIVE-OR/NOR GATES

BULLETIN NO. DL-S 7211826, DECEMBER 1972

- 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)

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



positive logic: $Y = (A \oplus B) \oplus C = A\overline{B}\overline{C} + \overline{A}\overline{B}C + \overline{A}B\overline{C} + ABC$

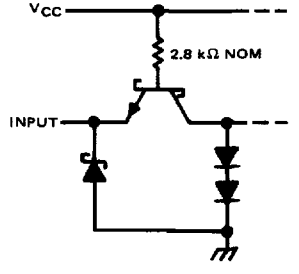
FUNCTION TABLE

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

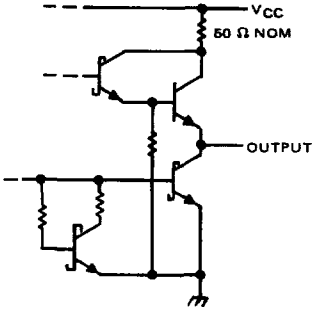
H = high level, L = low level

schematics of inputs and outputs

EQUIVALENT OF EACH INPUT



TYPICAL OF ALL OUTPUTS



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	11	
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	

¶t_{PLH} ≡ propagation delay time, low-to-high-level output
t_{PHL} ≡ propagation delay time, high-to-low-level output
NOTE 3: Load circuit and voltage waveforms are shown on page 3-10.