

TYPES SN54136, SN54LS136, SN74136, SN74LS136 QUADRUPLE 2-INPUT EXCLUSIVE-OR GATES WITH OPEN-COLLECTOR OUTPUTS

DECEMBER 1972—REVISED DECEMBER 1983

FUNCTION TABLE

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

H = high level, L = low level

logic diagram (each gate)

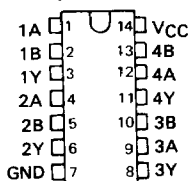


positive logic

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

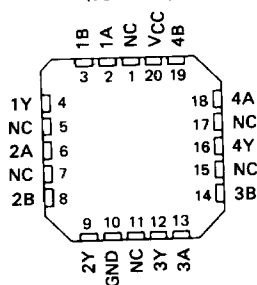
SN54136, SN54LS136 ... J OR W PACKAGE
SN74136 ... J OR N PACKAGE
SN74LS136 ... D, J OR N PACKAGE

(TOP VIEW)



SN54LS136 ... FK PACKAGE
SN74LS136 ... FN PACKAGE

(TOP VIEW)

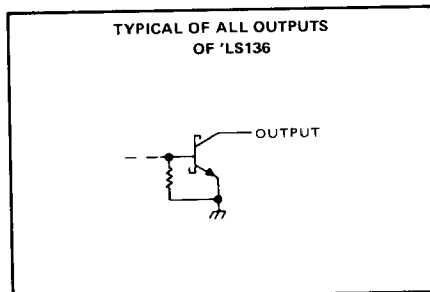
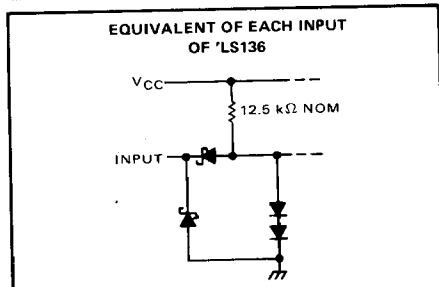
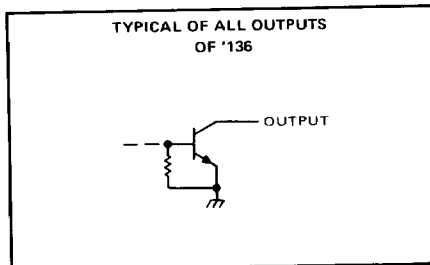
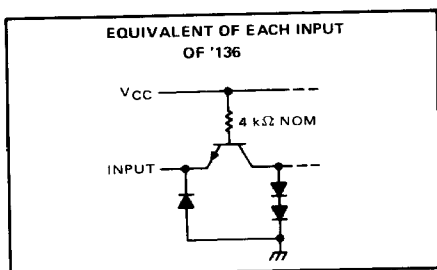


NC - No internal connection

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schematics of inputs and outputs

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Resistor values shown are nominal.

TYPES SN54136, SN74136 QUADRUPLE 2-INPUT EXCLUSIVE-OR GATES WITH OPEN-COLLECTOR 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: SN54136	-55°C to 125°C
SN74136	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

	SN54136			SN74136			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 voltage, V_{OH}	5.5			5.5			V
Low-level output current, I_{OL}	16			16			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	$V_{CC} = \text{MIN}, I_I = -8 \text{ mA}$			-1.5	V
I_{OH} High-level output current	$V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = 0.8 \text{ V}, V_{OH} = 5.5 \text{ V}$			250	µA
V_{OL} Low-level output voltage	$V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = 0.8 \text{ V}, I_{OL} = 16 \text{ mA}$		0.2	0.4	V
I_I Input current at maximum input voltage	$V_{CC} = \text{MAX}, V_I = 5.5 \text{ V}$			1	mA
I_{IH} High-level input current	$V_{CC} = \text{MAX}, V_I = 2.4 \text{ V}$			40	µA
I_{IL} Low-level input current	$V_{CC} = \text{MAX}, V_I = 0.4 \text{ V}$			-1.6	mA
I_{CC} Supply current, high-level output	$V_{CC} = \text{MAX}$, See Note 2				mA
		SN54136	30	43	
		SN74136	30	50	

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable device type.

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

NOTE 2: I_{CC} is measured with one input of each gate at 4.5 V, the other inputs grounded, and the outputs open.

switching characteristics, $V_{CC} = 5 \text{ V}, T_A = 25^\circ \text{C}$

PARAMETER*	FROM (INPUT)	TEST CONDITIONS		MIN	TYP	MAX	UNIT
t_{PLH}	A or B	Other input low	$C_L = 15 \text{ pF}, R_L = 400 \Omega,$ See Note 3		12	18	ns
t_{PHL}				39	50		
t_{PLH}	A or B	Other input high	See Note 3		14	22	ns
t_{PHL}				42	55		

* t_{PLH} = propagation delay time, low to high level output

* t_{PHL} = propagation delay time, high to low level output

NOTE 3: See General Information Section for load circuits and voltage waveforms.

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TYPES SN54LS136, SN74LS136 QUADRUPLE 2-INPUT EXCLUSIVE-OR GATES WITH OPEN-COLLECTOR OUTPUTS

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

Supply voltage, V_{CC} (see Note 1)	7 V
Input voltage	7 V
Operating free-air temperature range: SN54LS136	-55°C to 125°C
SN74LS136	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

	SN54LS136			SN74LS136			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 voltage, V_{OH}	5.5			5.5			V
Low-level output current, I_{OL}	4			8			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 [†]	SN54LS136			SN74LS136			UNIT
		MIN	TYP [‡]	MAX	MIN	TYP [‡]	MAX	
V_{IH} High-level input voltage		2			2			V
V_{IL} Low-level input voltage				0.7			0.8	V
V_{IK} Input clamp voltage	$V_{CC} = \text{MIN}, I_I = -18 \text{ mA}$			-1.5			-1.5	V
I_{OH} High-level output current	$V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = V_{IL \text{ max}}, V_{OH} = 5.5 \text{ V}$			100			100	μA
V_{OL} Low-level output voltage	$V_{CC} = \text{MIN}, I_{OL} = 4 \text{ mA}$	0.25	0.4		0.25	0.4		V
	$V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = V_{IL \text{ max}}, I_{OL} = 8 \text{ mA}$				0.35	0.5		
I_I Input current at maximum input voltage	$V_{CC} = \text{MAX}, V_I = 7 \text{ V}$		0.2				0.2	mA
I_{IH} High-level input current	$V_{CC} = \text{MAX}, V_I = 2.7 \text{ V}$		40				40	μA
I_{IL} Low-level input current	$V_{CC} = \text{MAX}, V_I = 0.4 \text{ V}$			-0.8			-0.8	mA
I_{CC} Supply current	$V_{CC} = \text{MAX}, \text{ See Note 2}$	6.1	10		6.1	10		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 $V_{CC} = 5 \text{ V}, T_A = 25^\circ \text{C}$.

NOTE 2: I_{CC} is measured with one input of each gate at 4.5 V, the other inputs grounded, and the outputs open.

switching characteristics, $V_{CC} = 5 \text{ V}, T_A = 25^\circ \text{C}$

PARAMETER [†]	FROM (INPUT)	TEST CONDITIONS		MIN	TYP	MAX	UNIT
t_{PLH}	A or B	Other input low	$C_L = 15 \text{ pF}, R_L = 2 \text{ k}\Omega, \text{ (See Note 3)}$		18	30	ns
t_{PHL}					18	30	
t_{PLH}	A or B	Other input high			18	30	ns
t_{PHL}					18	30	

[†] t_{PLH} = propagation delay time, low-to-high-level output

t_{PHL} = propagation delay time, high-to-low-level output

NOTE 3: See General Information Section for load circuits and voltage waveforms.

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