- **Package Options include Plastic "Small Outline" Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs**
- **Dependable Texas Instruments Quality and Reliability**

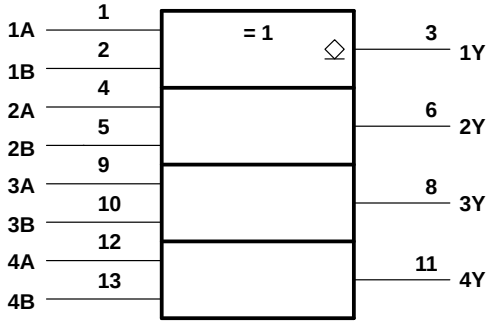
description

These devices contain four independent Exclusive-OR gates with open-collector outputs. They perform the Boolean functions $Y = A \oplus B = \overline{A}B + A\overline{B}$ in positive logic.

A common application is a true/complement element. If one of the inputs is low, the other input will be reproduced in true form at the output. If one of the inputs is high, the signal on the other input will be reproduced inverted at the output.

The SN54ALS136 and SN54AS136 are characterized for operation over the full military temperature range of –55°C to 125°C. The SN74ALS136 and SN74AS136 are characterized for operation from 0°C to 70°C.

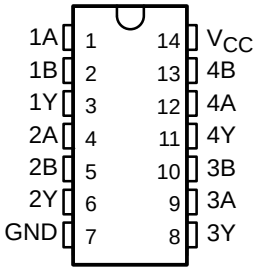
logic symbol†



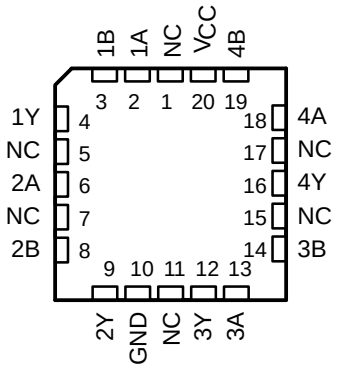
† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

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

SN54ALS136, SN54AS136 . . . J PACKAGE
SN74ALS136, SN74AS136 . . . D OR N PACKAGE
(TOP VIEW)



SN54ALS136, SN54AS136 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

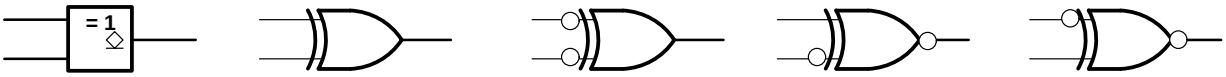
FUNCTION TABLE
(each gate)

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

exclusive-OR logic

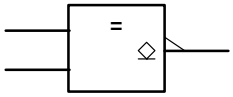
An Exclusive-OR gate has many applications, some of which can be represented better by alternative logic symbols.

EXCLUSIVE-OR



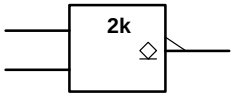
These are five equivalent Exclusive-OR symbols valid for an ’ALS136 gate in positive logic; negation may be shown at any two ports.

LOGIC IDENTITY ELEMENT



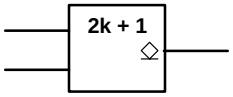
The output is active (low) if all inputs stand at the same logic level (i.e., A=B).

EVEN-PARITY



The output is active (low) if an even number of inputs (i.e., 0 or 2) are active.

ODD-PARITY ELEMENT



The output is active (high if an odd number of inputs (i.e., only 1 of the 2) are active.

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

Supply voltage, V_{CC} . . . . . 7 V
Input voltage . . . . . 7 V
Off-state output voltage . . . . . 7 V
Operating free-air temperature range: SN54ALS136 . . . . . –55°C to 125°C
SN74ALS136 . . . . . 0°C to 70°C
Storage temperature range . . . . . –65°C to 150°C

recommended operating conditions

		SN54ALS136			SN74ALS136			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
V_{OH}	High-level output current			5.5			5.5	V
I_{OL}	Low-level output current			4			8	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		SN54ALS136			SN74ALS136			UNIT
			MIN	TYP†	MAX	MIN	TYP†	MAX	
V_{IK}	V_{CC} = 4.5 V,	I_I = –18 mA			–1.5			–1.5	V
I_{OH}	V_{CC} = 4.5 V,	V_{OH} = 5.5 V			0.1			0.1	mA
V_{OL}	V_{CC} = 4.5 V,	I_{OL} = 4 mA		0.25	0.4		0.25	0.4	V
	V_{CC} = 4.5 V,	I_{OL} = 8 mA					0.35	0.5	
I_I	V_{CC} = 5.5 V,	V_I = 7 V			0.1			0.1	mA
I_{IH}	V_{CC} = 5.5 V,	V_I = 2.7 V			20			20	µA
I_{IL}	V_{CC} = 5.5 V,	V_I = 0.4 V			–0.1			–0.1	mA
I_{CC}	V_{CC} = 5.5 V	All inputs at 4.5 V		3.9	5.9		3.9	5.9	mA

† All typical values are at V_{CC} = 5, T_A = 25°C.

switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 4.5 V to 5.5 V, C_L = 50 pF, R_L = 2 kΩ, T_A = MIN to MAX				UNIT
			SN54ALS136		SN74ALS136		
			MIN	MAX	MIN	MAX	
t_{PLH}	A or B	Y	20	55	20	50	ns
t_{PHL}	(other input low)		3	18	3	15	
t_{PLH}	A or B	Y	20	55	20	50	ns
t_{PHL}	(other input low)		3	18	3	15	

NOTE 1: Load circuit and voltage waveforms are shown in Section 1 of the ALS/AS Logic Data Book, 1986.

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

Supply voltage, V_{CC} . . . . . 7 V
Input voltage . . . . . 7 V
Off-state output voltage . . . . . 7 V
Operating free-air temperature range: SN54AS136 . . . . . –55°C to 125°C
SN74AS136 . . . . . 0°C to 70°C
Storage temperature range . . . . . 65°C to 150°C

recommended operating conditions

		SN54AS136			SN74ALS136			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
V_{OH}	High-level output current			5.5			5.5	V
I_{OL}	Low-level output current			20			20	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			SN54AS136			SN74AS136			UNIT
				MIN	TYP†	MAX	MIN	TYP†	MAX	
V_{IK}	V_{CC} = 4.5 V,	I_I = –18 mA				–1.5			–1.5	V
I_{OH}	V_{CC} = 4.5 V,	V_{OH} = 5.5 V				2			0.1	mA
V_{OL}	V_{CC} = 4.5 V,	I_{OL} = 4 mA			0.35	0.5		0.25	0.4	V
I_I	V_{CC} = 5.5 V,	V_I = 7 V				0.1			0.1	mA
I_{IH}	V_{CC} = 5.5 V,	V_I = 2.7 V				20			20	µA
I_{IL}	V_{CC} = 5.5 V,	V_I = 0.4 V				–0.5			–0.5	mA
I_{CC}	V_{CC} = 5.5 V	V_{IA} = 4.5 V,	V_{IB} = 0		14	20		14	20	mA
I_{CCL}	V_{CC} = 5.5 V	V_{IA} = 4.5 V			22	31		22	31	mA

† All typical values are at V_{CC} = 5, T_A = 25°C.

switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 4.5 V to 5.5 V, C_L = 50 pF, R_L = 2 kΩ, T_A = MIN to MAX				UNIT
			SN54AS136		SN74ALS136		
			MIN	MAX	MIN	MAX	
t_{PLH}	A or B	Y	6.3	14.8	6.3	12.5	ns
t_{PHL}	(other input low)		3.3	7.9	3.3	7.1	
t_{PLH}	A or B	Y	6.3	12.4	6.3	11.4	ns
t_{PHL}	(other input low)		3.3	14.1	3.3	10.7	

NOTE 1: Load circuit and voltage waveforms are shown in Section 1 of the ALS/AS Logic Data Book, 1986.

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