

SN54ALS136, SN54AS136, SN74ALS136, SN74AS136 QUADRUPLE 2-INPUT EXCLUSIVE-OR GATES WITH OPEN-COLLECTOR OUTPUTS

SDAS162 – MARCH 1984–REVISED OCTOBER 1988

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

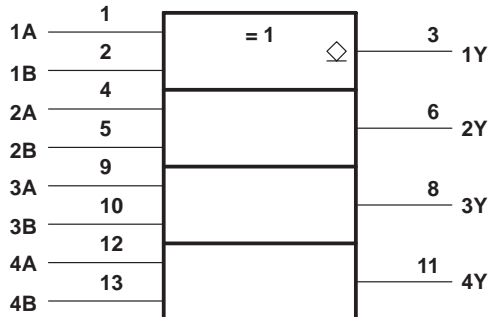
description

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.

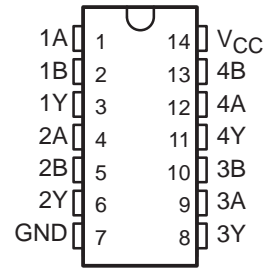
The SN54ALS136 and SN54AS136 are characterized for operation over the full military temperature range of -55°C to 125°C . The SN74ALS136 and SN74AS136 are characterized for operation from 0°C to 70°C .

logic symbol†

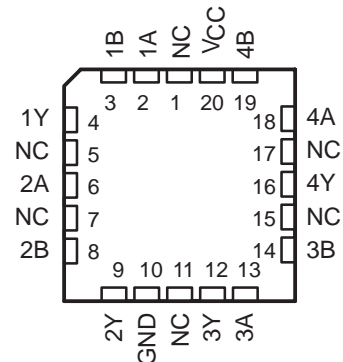


† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.
Pin numbers shown are for D, J, and N packages.

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

SN54ALS136, SN54AS136, SN74ALS136, SN74AS136 QUADRUPLE 2-INPUT EXCLUSIVE-OR GATES WITH OPEN-COLLECTOR OUTPUTS

SDAS162 – MARCH 1984–REVISED OCTOBER 1988

exclusive-OR logic

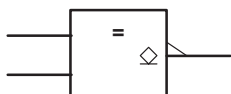
An Exclusive-OR gate has many applications, some of which can be represented better by alternative logic symbols.

EXCLUSIVE-OR



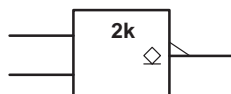
These are five equivalent Exclusive-OR symbols valid for an 'ALS136 gate in positive logic; negation may be shown at any two ports.

LOGIC IDENTITY ELEMENT



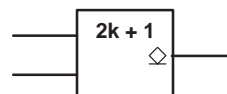
The output is active (low) if all inputs stand at the same logic level (i.e., $A=B$).

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.

SN54ALS136, SN74ALS136

QUADRUPLE 2-INPUT EXCLUSIVE-OR GATES

WITH OPEN-COLLECTOR OUTPUTS

SDAS162 – MARCH 1984–REVISED OCTOBER 1988

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 $V_{CC} = 5$, $T_A = 25^\circ\text{C}$.

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.

SN54AS136, SN74AS136

QUADRUPLE 2-INPUT EXCLUSIVE-OR GATES

WITH OPEN-COLLECTOR OUTPUTS

SDAS162 – MARCH 1984–REVISED OCTOBER 1988

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			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			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 $V_{CC} = 5$, $T_A = 25^\circ\text{C}$.

switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	VCC = 4.5 V to 5.5 V, CL = 50 pF, RL = 2 kΩ, TA = MIN to MAX				UNIT
			SN54AS136		SN74ALS136		
			MIN	MAX	MIN	MAX	
tPLH	A or B	Y	6.3	14.8	6.3	12.5	ns
tPHL	(other input low)		3.3	7.9	3.3	7.1	
tPLH	A or B	Y	6.3	12.4	6.3	11.4	ns
tPHL	(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.

IMPORTANT NOTICE

Texas Instruments and its subsidiaries (TI) reserve the right to make changes to their products or to discontinue any product or service without notice, and advise customers to obtain the latest version of relevant information to verify, before placing orders, that information being relied on is current and complete. All products are sold subject to the terms and conditions of sale supplied at the time of order acknowledgement, including those pertaining to warranty, patent infringement, and limitation of liability.

TI warrants performance of its semiconductor products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are utilized to the extent TI deems necessary to support this warranty. Specific testing of all parameters of each device is not necessarily performed, except those mandated by government requirements.

CERTAIN APPLICATIONS USING SEMICONDUCTOR PRODUCTS MAY INVOLVE POTENTIAL RISKS OF DEATH, PERSONAL INJURY, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE ("CRITICAL APPLICATIONS"). TI SEMICONDUCTOR PRODUCTS ARE NOT DESIGNED, AUTHORIZED, OR WARRANTED TO BE SUITABLE FOR USE IN LIFE-SUPPORT DEVICES OR SYSTEMS OR OTHER CRITICAL APPLICATIONS. INCLUSION OF TI PRODUCTS IN SUCH APPLICATIONS IS UNDERSTOOD TO BE FULLY AT THE CUSTOMER'S RISK.

In order to minimize risks associated with the customer's applications, adequate design and operating safeguards must be provided by the customer to minimize inherent or procedural hazards.

TI assumes no liability for applications assistance or customer product design. TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right of TI covering or relating to any combination, machine, or process in which such semiconductor products or services might be or are used. TI's publication of information regarding any third party's products or services does not constitute TI's approval, warranty or endorsement thereof.