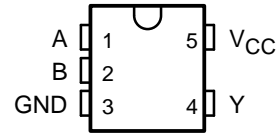


SN74AHCT1G86 SINGLE 2-INPUT EXCLUSIVE-OR GATE

SCLS324B – MARCH 1996 – REVISED NOVEMBER 1996

- Inputs Are TTL-Voltage Compatible
- **EPIC™** (Enhanced-Performance Implanted CMOS) Process
- Packaged in Plastic Small-Outline Transistor Package

DBV PACKAGE
(TOP VIEW)



description

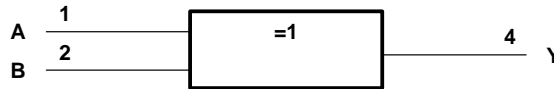
The SN74AHCT1G86 is a single 2-input exclusive-OR gate. The device performs the Boolean function $Y = A \oplus B$ or $Y = \overline{A}B + A\overline{B}$ in positive logic.

The SN74AHCT1G86 is characterized for operation from -40°C to 85°C .

FUNCTION TABLE

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

logic symbol†



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

PRODUCT PREVIEW



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

EPIC is a trademark of Texas Instruments Incorporated.

PRODUCT PREVIEW information concerns products in the formative or design phase of development. Characteristic data and other specifications are design goals. Texas Instruments reserves the right to change or discontinue these products without notice.

**TEXAS
INSTRUMENTS**

POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

Copyright © 1996, Texas Instruments Incorporated

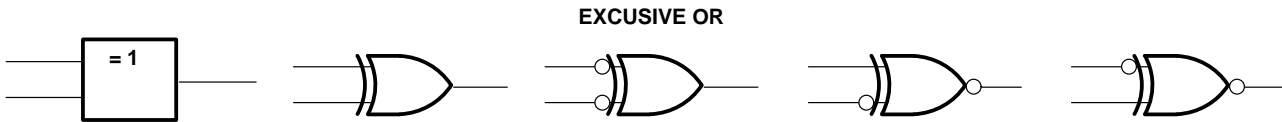
SN74AHCT1G86

SINGLE 2-INPUT EXCLUSIVE-OR GATE

SCLS324B – MARCH 1996 – REVISED NOVEMBER 1996

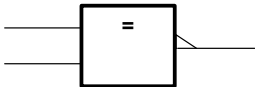
exclusive-OR logic

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



These are five equivalent exclusive-OR symbols valid for an SN74AHCT1G86 gate in positive logic; negation may be shown at any two ports.

LOGIC-IDENTITY ELEMENT



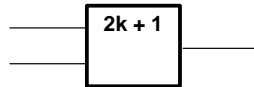
The output is active (low) if all inputs stand at the same logic level (i.e., $A = B$).

EVEN-PARITY ELEMENT



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 range, V_{CC}	–0.5 V to 7 V
Input voltage range, V_I (see Note 1)	–0.5 V to 7 V
Output voltage range, V_O (see Note 1)	–0.5 V to $V_{CC} + 0.5$ V
Input clamp current, I_{IK} ($V_I < 0$ or $V_I > V_{CC}$)	– 20 mA
Output clamp current, I_{OK} ($V_O < 0$ or $V_O > V_{CC}$)	– 20 mA
Continuous output current, I_O ($V_O = 0$ to V_{CC})	± 25 mA
Continuous current through V_{CC} or GND	± 50 mA
Maximum power dissipation at $T_A = 55^\circ\text{C}$ (in still air) (see Note 2)	0.2 W
Storage temperature range, T_{stg}	–65°C to 150°C

[†] Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

- NOTES: 1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.
2. The maximum package power dissipation is calculated using a junction temperature of 150°C and a board trace length of 25 millimeters.

recommended operating conditions (see Note 3)

	MIN	MAX	UNIT
V_{CC} Supply voltage	4.5	5.5	V
V_{IH} High-level input voltage	2		V
V_{IL} Low-level input voltage		0.8	V
V_I Input voltage	0	5.5	V
V_O Output voltage	0	V_{CC}	V
I_{OH} High-level output current		–8	mA
I_{OL} Low-level output current		8	mA
$\Delta t/\Delta v$ Input transition rise or fall rate		20	ns/V
T_A Operating free-air temperature	– 40	85	°C

NOTE 3: Unused inputs must be held high or low to prevent them from floating.

SN74AHCT1G86

SINGLE 2-INPUT EXCLUSIVE-OR GATE

SCLS324B – MARCH 1996 – REVISED NOVEMBER 1996

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST CONDITIONS	V _{CC}	T _A = 25°C			MIN	MAX	UNIT
			MIN	TYP	MAX			
V _{OH}	I _{OH} = – 50 µA	4.5 V	4.4	4.5		4.4		V
	I _{OH} = – 8 mA		3.94			3.8		
V _{OL}	I _{OL} = 50 µA	4.5 V			0.1		0.1	V
	I _{OL} = 8 mA				0.36		0.44	
I _I	V _I = V _{CC} or GND	5.5 V			± 0.1		± 1	µA
I _{CC}	V _I = V _{CC} or GND, I _O = 0	5.5 V			2		20	µA
ΔI _{CC} [†]	One input at 3.4 V, Other inputs at V _{CC} or GND	5.5 V			1.35		1.5	mA
C _i	V _I = V _{CC} or GND	5 V		4	10		10	pF

[†] This is the increase in supply current for each input at one of the specified TTL voltage levels rather than 0 V or V_{CC}.

switching characteristics over recommended operating free-air temperature range,
V_{CC} = 5 V ± 0.5 V (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	T _A = 25°C			MIN	MAX	UNIT
				MIN	TYP	MAX			
t _{PLH}	A or B	Y	C _L = 15 pF		5	6.9	1	8	ns
t _{PHL}					5	6.9	1	8	
t _{PLH}	A or B	Y	C _L = 50 pF		5.5	7.9	1	9	ns
t _{PHL}					5.5	7.9	1	9	

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

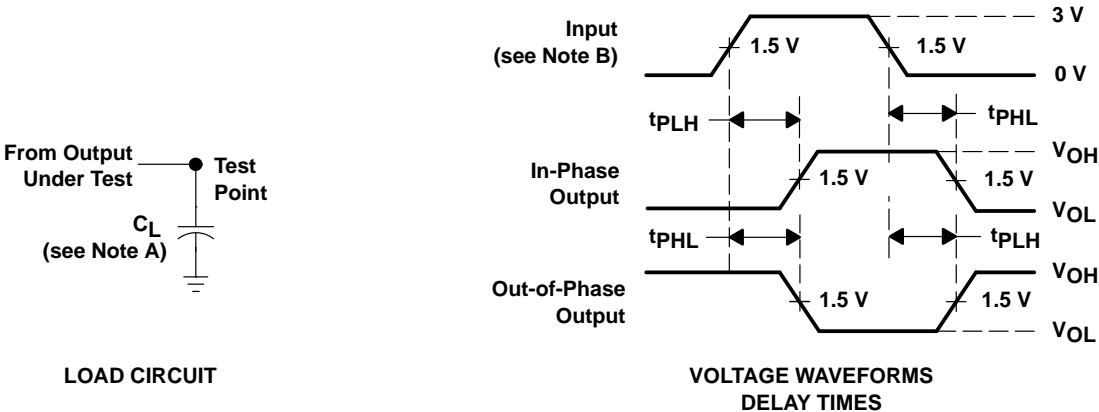
PARAMETER		TEST CONDITIONS	TYP	UNIT
C _{pd}	Power dissipation capacitance	No load, f = 1 MHz	18	pF

PRODUCT PREVIEW

SN74AHCT1G86
SINGLE 2-INPUT EXCLUSIVE-OR GATE

SCLS324B – MARCH 1996 – REVISED NOVEMBER 1996

PARAMETER MEASUREMENT INFORMATION



- NOTES: A. C_L includes probe and jig capacitance.
B. All input pulses are supplied by generators having the following characteristics: $PRR \leq 1 \text{ MHz}$, $Z_O = 50 \Omega$, $t_r = 3 \text{ ns}$, $t_f = 3 \text{ ns}$.
C. The output is measured with one input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms

IMPORTANT NOTICE

Texas Instruments (TI) reserves the right to make changes to its products or to discontinue any semiconductor product or service without notice, and advises its customers to obtain the latest version of relevant information to verify, before placing orders, that the information being relied on is current.

TI warrants performance of its semiconductor products and related software 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, INTENDED, AUTHORIZED, OR WARRANTED TO BE SUITABLE FOR USE IN LIFE-SUPPORT APPLICATIONS, DEVICES OR SYSTEMS OR OTHER CRITICAL APPLICATIONS.

Inclusion of TI products in such applications is understood to be fully at the risk of the customer. Use of TI products in such applications requires the written approval of an appropriate TI officer. Questions concerning potential risk applications should be directed to TI through a local SC sales office.

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

TI assumes no liability for applications assistance, customer product design, software performance, or infringement of patents or services described herein. Nor does TI 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.