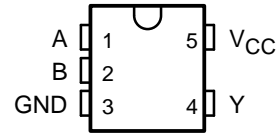


SN74AHC1G86 SINGLE 2-INPUT EXCLUSIVE-OR GATE

SCLS323A – MARCH 1996 – REVISED MAY 1996

- Operating Range: 2-V to 5.5-V V_{CC}
- EPIC™ (Enhanced-Performance Implanted CMOS) Process
- Packaged in Plastic Small-Outline Transistor Package

DBV PACKAGE
(TOP VIEW)



description

The SN74AHC1G86 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.

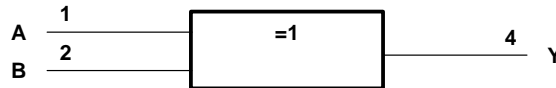
A common application is as a true/complement element. If one of the inputs is low, the other input is reproduced in true form at the output. If one of the inputs is high, the signal on the other input is reproduced inverted at the output.

The SN74AHC1G86 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.



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**TEXAS
INSTRUMENTS**

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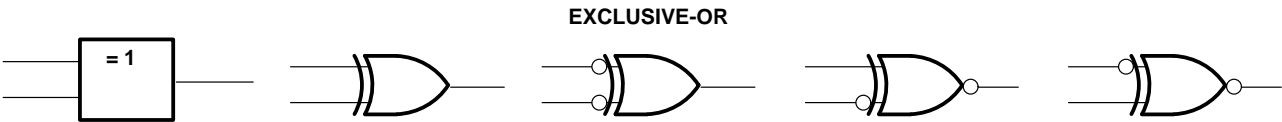
PRODUCT PREVIEW

SN74AHC1G86
SINGLE 2-INPUT EXCLUSIVE-OR GATE

SCLS323A – MARCH 1996 – REVISED MAY 1996

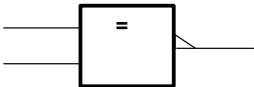
exclusive-OR logic

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 SN74AHC1G86 gate in positive logic; negation may be shown at any two ports.

LOGIC-IDENTITY ELEMENT



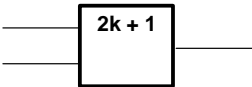
The output is active (low) if all inputs stand at the same logic level (i.e., $A = B$).

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} ($V_I < 0$)	–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.

SN74AHC1G86

SINGLE 2-INPUT EXCLUSIVE-OR GATE

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recommended operating conditions (see Note 3)

			MIN	MAX	UNIT
V_{CC}	Supply voltage		2	5.5	V
V_{IH}	High-level input voltage	$V_{CC} = 2\text{ V}$	1.5		V
		$V_{CC} = 3\text{ V}$	2.1		
		$V_{CC} = 5.5\text{ V}$	3.85		
V_{IL}	Low-level input voltage	$V_{CC} = 2\text{ V}$		0.5	V
		$V_{CC} = 3\text{ V}$		0.9	
		$V_{CC} = 5.5\text{ V}$		1.65	
V_I	Input voltage		0	5.5	V
V_O	Output voltage		0	V_{CC}	V
I_{OH}	High-level output current	$V_{CC} = 2\text{ V}$		-50	μA
		$V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$		-4	mA
		$V_{CC} = 5\text{ V} \pm 0.5\text{ V}$		-8	
I_{OL}	Low-level output current	$V_{CC} = 2\text{ V}$		50	μA
		$V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$		4	mA
		$V_{CC} = 5\text{ V} \pm 0.5\text{ V}$		8	
$\Delta t/\Delta v$	Input transition rise or fall rate	$V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$		100	ns/V
		$V_{CC} = 5\text{ V} \pm 0.5\text{ V}$		20	
T_A	Operating free-air temperature		-40	85	$^{\circ}\text{C}$

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

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

PARAMETER	TEST CONDITIONS	V_{CC}	$T_A = 25^{\circ}\text{C}$			MIN	MAX	UNIT
			MIN	TYP	MAX			
V_{OH}	$I_{OH} = -50\text{ }\mu\text{A}$	2 V	1.9	2		1.9		V
		3 V	2.9	3		2.9		
		4.5 V	4.4	4.5		4.4		
	$I_{OH} = -4\text{ mA}$	3 V	2.58			2.48		
	$I_{OH} = -8\text{ mA}$	4.5 V	3.94			3.8		
V_{OL}	$I_{OL} = 50\text{ }\mu\text{A}$	2 V				0.1	0.1	V
		3 V				0.1	0.1	
		4.5 V				0.1	0.1	
	$I_{OL} = 4\text{ mA}$	3 V				0.36	0.44	
	$I_{OL} = 8\text{ mA}$	4.5 V				0.36	0.44	
I_I	A or B inputs	$V_I = V_{CC}$ 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
C_i	$V_I = V_{CC}$ or GND	5 V		4	10		10	pF

PRODUCT PREVIEW



SN74AHC1G86 SINGLE 2-INPUT EXCLUSIVE-OR GATE

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switching characteristics over recommended operating free-air temperature range,
 $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$ (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	OUTPUT CAPACITANCE	$T_A = 25^\circ\text{C}$			MIN	MAX	UNIT
				MIN	TYP	MAX			
t_{PLH}	A or B	Y	$C_L = 15\text{ pF}$	7	11		1	13	ns
t_{PHL}				7	11		1	13	
t_{PLH}	A or B	Y	$C_L = 50\text{ pF}$	9.5	14.5		1	16.5	ns
t_{PHL}				9.5	14.5		1	16.5	

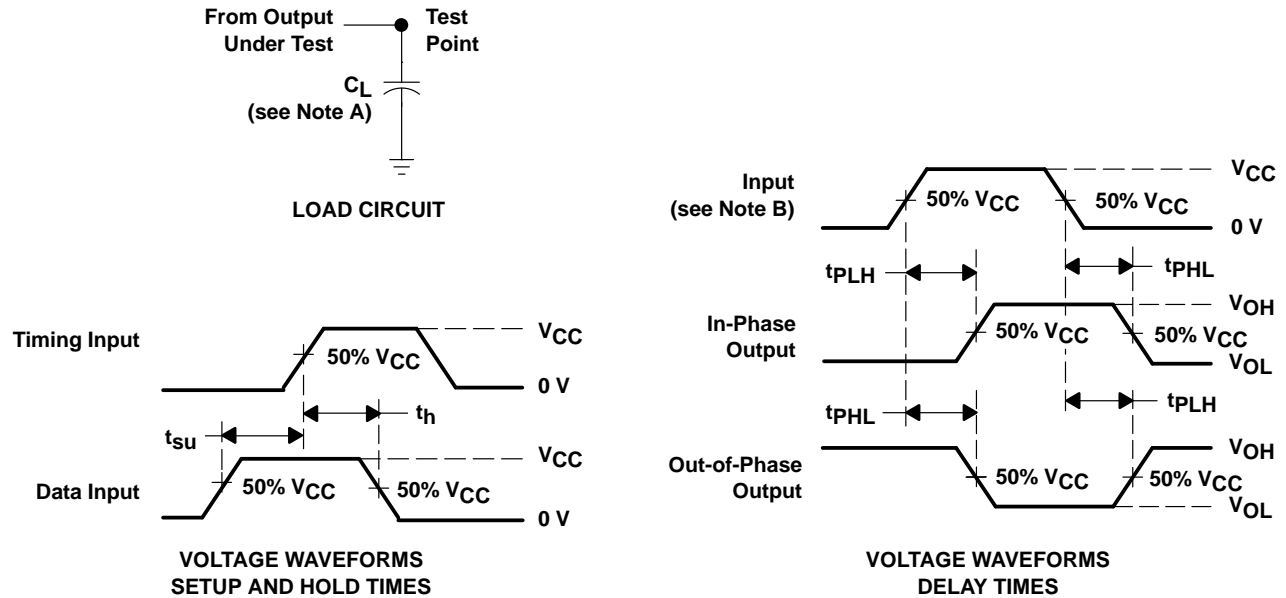
switching characteristics over recommended operating free-air temperature range,
 $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$ (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	OUTPUT CAPACITANCE	$T_A = 25^\circ\text{C}$			MIN	MAX	UNIT
				MIN	TYP	MAX			
t_{PLH}	A or B	Y	$C_L = 15\text{ pF}$	4.8	6.8		1	8	ns
t_{PHL}				4.8	6.8		1	8	
t_{PLH}	A or B	Y	$C_L = 50\text{ pF}$	6.3	8.8		1	10	ns
t_{PHL}				6.3	8.8		1	10	

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

PARAMETER		TEST CONDITIONS	TYP	UNIT
C_{pd}	Power dissipation capacitance	No load, $f = 1\text{ MHz}$	18	pF

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

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