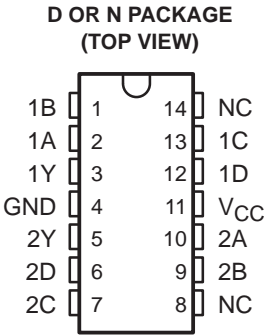


74AC11013

DUAL 4-INPUT POSITIVE-NAND SCHMITT TRIGGER

SCAS112 – MARCH 1990 – REVISED APRIL 1993

- Operation From Very Slow Edges
- Improved Line-Receiving Characteristics
- High Noise Immunity
- Flow-Through Architecture Optimizes PCB Layout
- Center-Pin V_{CC} and GND Configurations Minimize High-Speed Switching Noise
- EPIC™ (Enhanced-Performance Implanted CMOS) 1- μ m Process
- 500-mA Typical Latch-Up Immunity at 125°C
- Package Options Include Plastic Small-Outline Packages and Standard Plastic 300-mil DIPs



description

Each circuit functions as a 4-input NAND gate, but because of the Schmitt action, it has different input threshold levels for positive-going (V_{T+}) and negative-going (V_{T-}) signals.

The 74AC11013 is characterized for operation from -40°C to 85°C .

FUNCTION TABLE

INPUTS				OUTPUT
A	B	C	D	Y
H	H	H	H	L
L	X	X	X	H
X	L	X	X	H
X	X	L	X	H
X	X	X	L	H

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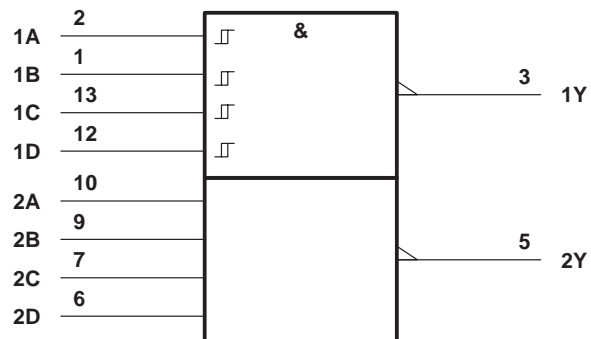


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DUAL 4-INPUT POSITIVE-NAND SCHMITT TRIGGER

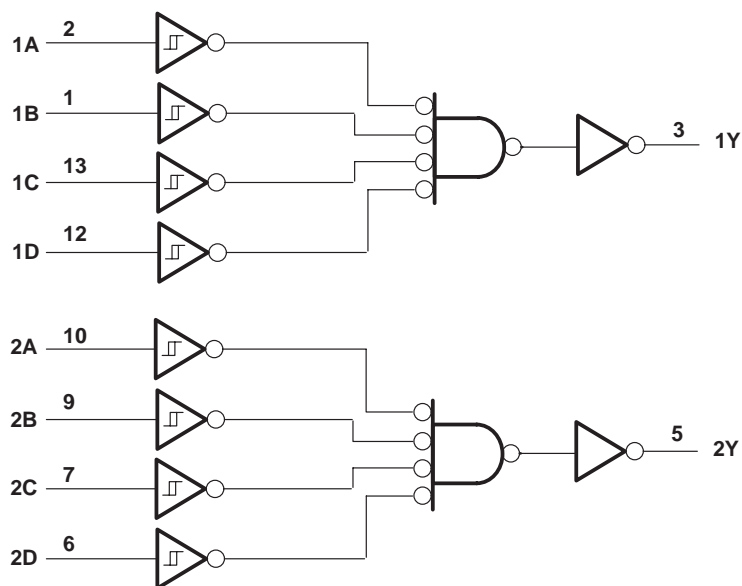
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logic symbol†



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

logic diagram (positive logic)



74AC11013

DUAL 4-INPUT POSITIVE-NAND SCHMITT TRIGGER

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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 $V_{CC} + 0.5$ 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 $V_O > V_{CC}$)	±50 mA
Continuous output current, I_O ($V_O = 0$ to V_{CC})	±50 mA
Continuous current through V_{CC} or GND pins	±100 mA
Storage temperature range	–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.

NOTE 1: The input and output voltage ratings may be exceeded if the input and output clamp-current ratings are observed.

recommended operating conditions

		MIN	NOM	MAX	UNIT
V_{CC}	Supply voltage	3	5	5.5	V
V_{IH}	High-level input voltage	$V_{CC} = 3$ V	2.2		V
		$V_{CC} = 4.5$ V	3.2		
		$V_{CC} = 5.5$ V	3.9		
V_{IL}	Low-level input voltage	$V_{CC} = 3$ V		0.5	V
		$V_{CC} = 4.5$ V		0.9	
		$V_{CC} = 5.5$ V		1.1	
V_I	Input voltage	0		V_{CC}	V
V_O	Output voltage	0		V_{CC}	V
I_{OH}	High-level output current	$V_{CC} = 3$ V		–4	mA
		$V_{CC} = 4.5$ V		–24	
		$V_{CC} = 5.5$ V		–24	
I_{OL}	Low-level output current	$V_{CC} = 3$ V		12	mA
		$V_{CC} = 4.5$ V		24	
		$V_{CC} = 5.5$ V		24	
$\Delta t/\Delta v$	Input transition rise or fall rate	0		10	ns/V
T_A	Operating free-air temperature	–40		85	°C



74AC11013

DUAL 4-INPUT POSITIVE-NAND SCHMITT TRIGGER

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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 _{T+}		3 V	2.2			2.2		V
		4.5 V	3.2			3.2		
		5.5 V	3.9			3.9		
V _{T–}		3 V	0.5			0.5		V
		4.5 V	0.9			0.9		
		5.5 V	1.1			1.1		
V _{hys} (V _{T+} – V _{T–})		3 V	0.3			0.3	1.2	V
		4.5 V	0.4			0.4	1.4	
		5.5 V	0.5			0.5	1.6	
V _{OH}	I _{OH} = –50 µA	3 V	2.9			2.9		V
		4.5 V	4.4			4.4		
		5.5 V	5.4			5.4		
	I _{OH} = –4 mA	3 V	2.58			2.48		
		4.5 V	3.94			3.8		
		5.5 V	4.94			4.8		
V _{OL}	I _{OL} = 50 µA	3 V	0.1			0.1		V
		4.5 V	0.1			0.1		
		5.5 V	0.1			0.1		
	I _{OL} = 12 mA	3 V	0.36			0.44		
		4.5 V	0.36			0.44		
		5.5 V	0.36			0.44		
I _I	V _I = V _{CC} or GND	5.5 V	±0.1			±1		µA
		5.5 V	4			40		
		5.5 V	3.5					
I _{CC}	V _I = V _{CC} or GND, I _O = 0	5.5 V	4			40		µA
C _i	V _I = V _{CC} or GND	5 V	3.5					pF

† Not more than one output should be tested at a time, and the duration of the test should not exceed 10 ms.

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

PARAMETER	FROM (INPUT)	TO (OUTPUT)	T _A = 25°C			MIN	MAX	UNIT
			MIN	TYP	MAX			
t _{PLH}	A, B, C, D	Y	2.5	6.4	8.7	2.5	9.7	ns
t _{PHL}			2.3	6.5	8.7	2.3	9.9	

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

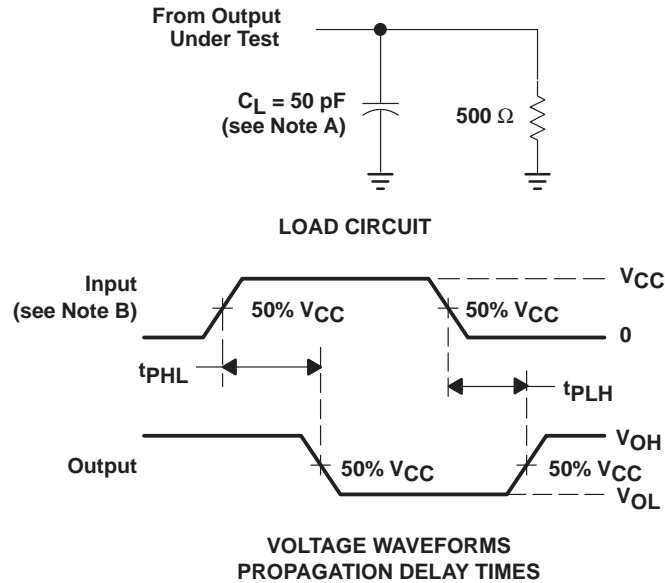
PARAMETER	FROM (INPUT)	TO (OUTPUT)	T _A = 25°C			MIN	MAX	UNIT
			MIN	TYP	MAX			
t _{PLH}	A, B, C, D	Y	2	4.2	6.4	2	7.1	ns
t _{PHL}			2	4.4	6.9	2	7.8	



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

PARAMETER	TEST CONDITIONS	TYP	UNIT
C_{pd} Power dissipation capacitance	$C_L = 50\text{ pF}$, $f = 1\text{ MHz}$	29	pF

PARAMETER MEASUREMENT INFORMATION



- NOTES: A. C_L includes probe and jig capacitance.
 B. Input pulses are supplied by generators having the following characteristics: $PRR \leq 10\text{ MHz}$, $Z_O = 50\ \Omega$, $t_r = 3\text{ ns}$, $t_f = 3\text{ ns}$.
 C. The outputs are measured one at a time with one input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
74AC11013D	OBSOLETE	SOIC	D	14		TBD	Call TI	Call TI
74AC11013N	OBSOLETE	PDIP	N	14		TBD	Call TI	Call TI
74AC11013N	OBSOLETE	PDIP	N	14		TBD	Call TI	Call TI

⁽¹⁾ The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

⁽²⁾ Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS) or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

⁽³⁾ MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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