

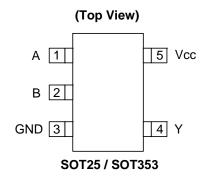
SINGLE 2 INPUT EXCLUSIVE-OR GATE

Description

The 74AHC1G86 is a single 2-input positive exclusive-OR gate with a standard push-pull output. The device is designed for operation with a power supply range of 2.0V to 5.5V. The gate performs the positive Boolean function:

$$Y = A \oplus B$$
 or $Y = \overline{A}B + A\overline{B}$

Pin Assignments



Features

- Supply Voltage Range from 2.0V to 5.5V
- ± 8 mA Output Drive at 5.0V
- CMOS low power consumption
- Schmitt Trigger Action at All Inputs Make the Circuit Tolerant for Slower Input Rise and Fall Time.
- ESD Protection per JESD 22
 - o Exceeds 200-V Machine Model (A115-A)
 - Exceeds 2000-V Human Body Model (A114-A)
 - Exceeds 1000-V Charged Device Model (C101C)
- Latch-Up Exceeds 100mA per JESD 78, Class II
- SOT25 and SOT353: Assembled with "Green" Molding Compound (no Br, Sb)
- Lead Free Finish / RoHS Compliant (Note 1)

Applications

- General Purpose Logic
- Wide array of products such as:
 - PCs, networking, notebooks, netbooks, PDAs
 - o Computer peripherals, hard drives, CD/DVD ROM
 - \circ $\;$ TV, DVD, DVR, set top box
 - o Personal Navigation / GPS
 - o MP3 players ,Cameras, Video Recorders

Notes: 1. EU Directive 2002/95/EC (RoHS). All applicable RoHS exemptions applied. Please visit our website at http://www.diodes.com/products/lead_free.html.

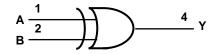


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Pin Descriptions

Pin Name	Pin NO.	Description			
A	1	Data Input			
В	2	Data Input			
GND	3	Ground			
Y	4	Data Output			
V _{CC}	5	Supply Voltage			

Logic Diagram



Function Table

Inp	Output	
Α	В	Y
Н	Н	L
L	Н	Н
Н	L	Н
L	L	L



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Absolute Maximum Ratings (Note 2)

Symbol	Description	Rating	Unit
ESD HBM	Human Body Model ESD Protection	2	KV
ESD CDM	Charged Device Model ESD Protection	1	KV
ESD MM	Machine Model ESD Protection	200	V
V _{CC}	Supply Voltage Range	-0.5 to 6.5	V
VI	Input Voltage Range	-0.5 to 6.5	V
Vo	Voltage applied to output in high or low state	-0.5 to V _{CC} +0.5	V
I _{IK}	Input Clamp Current VI<0	-20	mA
Ι _{ΟΚ}	Output Clamp Current ($V_O < 0$ or $V_O > V_{CC}$)	±20	mA
Ι _Ο	Continuous output current ($V_O = 0$ to V_{CC})	±25	mA
I _{CC}	Continuous current through V _{CC}	50	mA
I _{GND}	Continuous current through GND	-50	mA
TJ	Operating Junction Temperature	-40 to 150	°C
T _{STG}	Storage Temperature	-65 to 150	°C

Notes: 2. Stresses beyond the absolute maximum may result in immediate failure or reduced reliability. These are stress values and device operation should be within recommend values.

Recommended Operating Conditions (Note 3)

Symbol		Parameter	Min	Max	Unit
V _{CC}	Operating Voltage		2	5.5	V
		$V_{CC} = 2V$	1.5		
VIH	High-level Input Voltage	$V_{CC} = 3V$	2.1		V
		$V_{CC} = 5.5V$	3.85		
		$V_{CC} = 2V$		0.5	
VIL	Low-level input voltage	$V_{CC} = 3V$		0.9	V
		$V_{CC} = 5.5V$		1.65	
VI	Input Voltage		0	5.5	V
Vo	Output Voltage		0	V _{CC}	V
		$V_{CC} = 2V$		-50	uA
I _{OH}	High-level output current	$V_{CC} = 3.3 V \pm 0.3 V$		-4	mA
		$V_{CC} = 5V \pm 0.5V$		-8	ША
		$V_{CC} = 2V$		50	uA
I _{OL}	Low-level output current	$V_{CC} = 5V \pm 0.5V$		4	mA
		$V_{CC} = 3V$		8	MA
Δt/ΔV	Input transition rise or fall	$V_{CC} = 3.3V \pm 0.3V$		100	ns/V
Δι/Δν	rate	$V_{CC} = 5V \pm 0.5V$		20	ns/v
T _A	Operating free-air temperature		-40	125	°C

Notes: 3. Unused inputs should be held at V_{CC} or Ground.



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Electrical Characteristics

		T			25⁰C		-40ºC t	o 85⁰C	-40°C to	o 125⁰C	
Symbol	Parameter	Test Conditions	V _{CC}	Min	Тур.	Max	Min	Max	Min	Max	Unit
		2V	1.9	2		1.9		1.9			
	High Level	I _{OH} = -50µА	3V	2.9	3		2.9		2.9		
V _{OH}	Output		4.5V	4.4	4.5		4.4		4.4		V
	Voltage	I _{OH} = -4mA	3V	2.58			2.48		2.40		
		I _{OH} = -8mA	4.5V	3.94			3.8		3.70		
			2V			0.1		0.1		0.1	
	Low Level	Ι _{ΟL} = 50μΑ	3V			0.1		0.1		0.1	
V _{OL}	Output		4.5V			0.1		0.1		0.1	V
	Voltage	$I_{OL} = 4mA$	3V			0.36		0.44		0.55	
		$I_{OL} = 8mA$	4.5V			0.36		0.44		0.55	
Ц	Input Current	$V_I = 5.5 V \text{ or GND}$	0 to 5.5V			± 0.1		± 1		±2	μA
I _{CC}	Supply Current	$V_1 = 5.5V \text{ or GND}$ $I_0=0$	5.5V			1		10		40	μA
Ci	Input Capacitance	$V_I = V_{CC} - or GND$	5.5V		2.0	10		10		10	pF
θ _{JA}	Thermal Resistance	SOT25	(Note 4)		195						°C/W
UJA	Junction-to- Ambient	SOT353	(1006 4)		430						0/11
	Thermal Resistance	SOT25			58						
θ _{JC}	Junction-to- Case	SOT353	(Note 4)		155						°C/W

Note: 4. Test conditions for SOT25, and SOT353: Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout

Switching Characteristics

V_{CC} = 3.3V ± 0.3 (see Figure 1)

Parameter	From	то			25⁰C		-40ºC t	o 85⁰C	-40ºC to	o 125⁰C	Unit
Farameter	er (Input) (OUTPUT	(OUTPUT)		Min	Тур.	Max	Min	Max	Min	Max	Unit
	A or B	V	C _L =15pF	0.6	4.0	11.0	0.6	13.0	0.6	14.0	ns
t _{pd}	AUB	ř	C _L =50pF	0.6	5.8	14.5	0.6	16.5	0.6	18.5	ns

$V_{CC} = 5V \pm 0.5V$ (see Figure 1)

Parameter	From	то			25⁰C		-40ºC t	o 85⁰C	-40°C to	o 125⁰C	Unit
Parameter	(Input)	(OUTPUT)		Min	Тур.	Max	Min	Max	Min	Max	Unit
	A or B	V	C _L =15pF	0.6	3.4	6.8	0.6	8.0	0.6	8.5	ns
٩d	AUP	ř	C _L =50pF	0.6	4.9	8.8	0.6	10.0	0.6	11.5	ns



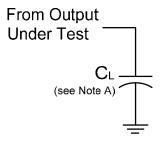
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Operating Characteristics

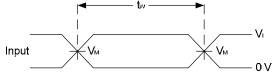
T_A = 25 °C

	Parameter	Test Conditions	V _{CC} = 5 V Typ.	Unit
C _{pd}	Power dissipation capacitance	f = 1 MHz No Load	12	pF

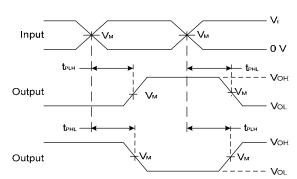
Parameter Measurement Information



V	In	puts	V	^
Vcc	VI	t _r /t _f	V _M	CL
3.3V±0.3V	V _{CC}	≤3ns	V _{CC} /2	15pF
5V±0.5V	V _{CC}	≤3ns	V _{CC} /2	15pF
3.3V±0.3V	V _{CC}	≤3ns	V _{CC} /2	50pF
5V±0.5V	V _{CC}	≤3ns	V _{CC} /2	50pF



Voltage Waveform Pulse Duration



Voltage Waveform Propagation Delay Times Inverting and Non Inverting Outputs

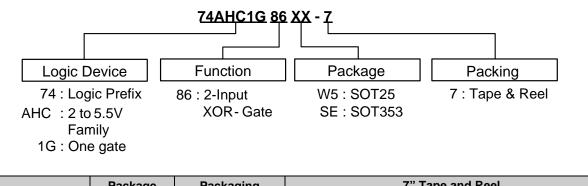
Figure 1. Load Circuit and Voltage Waveforms

- Notes: A. Includes test lead and test apparatus capacitance.
 - B. All pulses are supplied at pulse repetition rate \leq 1 MHz.
 - C. Inputs are measured separately one transition per measurement.
 - D. t_{PLH} and t_{PHL} are the same as $t_{\mathsf{PD.}}$



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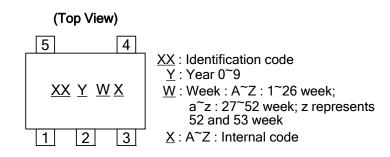
Ordering Information



	Davias	Package	Packaging	7" Tape a	and Reel
	Device	Code	(Note 5)	Quantity	Part Number Suffix
Pb ,	74AHC1G86W5-7	W5	SOT25	3000/Tape & Reel	-7
Pb ,	74AHC1G86SE-7	SE	SOT353	3000/Tape & Reel	-7

Notes: 5. Pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at http://www.diodes.com/datasheets/ap02001.pdf.

Marking Information



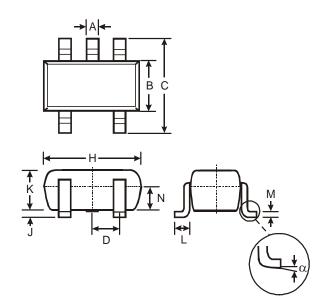
Part Number	Package	Identification Code
74AHC1G86W5	SOT25	YX
74AHC1G86SE	SOT353	ΥX



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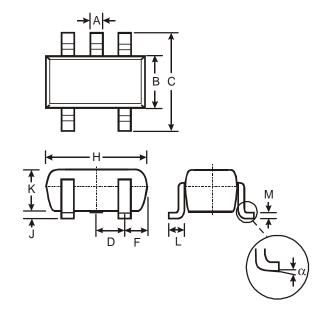
Package Outline Dimensions (All Dimensions in mm)

(1) Package Type: SOT25



	SOT25							
Dim Min Max T								
Α	0.35	0.50	0.38					
В	1.50	1.70	1.60					
С	2.70	3.00	2.80					
D			0.95					
Н	2.90	3.10	3.00					
J	0.013	0.10	0.05					
Κ	1.00	1.30	1.10					
L	0.35	0.55	0.40					
Μ	0.10	0.20	0.15					
Ν	0.70	0.80	0.75					
α	0°	8°						
All D	imens	ions i	in mm					

(2) Package Type: SOT353



SOT353		
Dim	Min	Max
Α	0.10	0.30
В	1.15	1.35
С	2.00	2.20
D	0.65 Тур	
F	0.40	0.45
Н	1.80	2.20
J	0	0.10
κ	0.90	1.00
L	0.25	0.40
Μ	0.10	0.22
α	0°	8°
All Dimensions in mm		



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