

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:

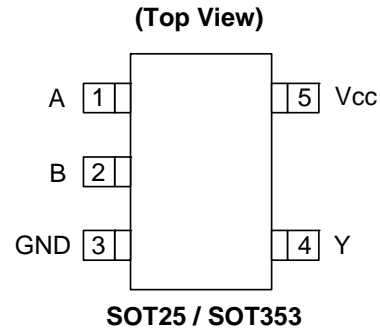
$$Y = A \oplus B \text{ or } Y = \overline{A}B + A\overline{B}$$

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
 - 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)

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.

Pin Assignments



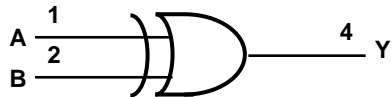
Applications

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

Pin Descriptions

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

Logic Diagram



Function Table

Inputs		Output
A	B	Y
H	H	L
L	H	H
H	L	H
L	L	L

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
V_I	Input Voltage Range	-0.5 to 6.5	V
V_O	Voltage applied to output in high or low state	-0.5 to $V_{CC} + 0.5$	V
I_{IK}	Input Clamp Current $V_I < 0$	-20	mA
I_{OK}	Output Clamp Current ($V_O < 0$ or $V_O > V_{CC}$)	± 20	mA
I_O	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
T_J	Operating Junction Temperature	-40 to 150	$^{\circ}C$
T_{STG}	Storage Temperature	-65 to 150	$^{\circ}C$

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_{IH}	High-level Input Voltage	$V_{CC} = 2V$	1.5	V
		$V_{CC} = 3V$	2.1	
		$V_{CC} = 5.5V$	3.85	
V_{IL}	Low-level input voltage	$V_{CC} = 2V$	0.5	V
		$V_{CC} = 3V$	0.9	
		$V_{CC} = 5.5V$	1.65	
V_I	Input Voltage	0	5.5	V
V_O	Output Voltage	0	V_{CC}	V
I_{OH}	High-level output current	$V_{CC} = 2V$	-50	μA
		$V_{CC} = 3.3V \pm 0.3V$	-4	mA
		$V_{CC} = 5V \pm 0.5V$	-8	
I_{OL}	Low-level output current	$V_{CC} = 2V$	50	μA
		$V_{CC} = 5V \pm 0.5V$	4	mA
		$V_{CC} = 3V$	8	
$\Delta t/\Delta V$	Input transition rise or fall rate	$V_{CC} = 3.3V \pm 0.3V$	100	ns/V
		$V_{CC} = 5V \pm 0.5V$	20	
T_A	Operating free-air temperature	-40	125	$^{\circ}C$

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

Electrical Characteristics

Symbol	Parameter	Test Conditions	V _{CC}	25°C			-40°C to 85°C		-40°C to 125°C		Unit
				Min	Typ.	Max	Min	Max	Min	Max	
V _{OH}	High Level Output Voltage	I _{OH} = -50μA	2V	1.9	2		1.9		1.9		V
			3V	2.9	3		2.9		2.9		
			4.5V	4.4	4.5		4.4		4.4		
		I _{OH} = -4mA	3V	2.58			2.48		2.40		
		I _{OH} = -8mA	4.5V	3.94			3.8		3.70		
V _{OL}	Low Level Output Voltage	I _{OL} = 50μA	2V			0.1		0.1		0.1	V
			3V			0.1		0.1		0.1	
			4.5V			0.1		0.1		0.1	
		I _{OL} = 4mA	3V			0.36		0.44		0.55	
		I _{OL} = 8mA	4.5V			0.36		0.44		0.55	
I _I	Input Current	V _I = 5.5 V or GND	0 to 5.5V			± 0.1		± 1		± 2	μA
I _{CC}	Supply Current	V _I = 5.5V or GND I _O =0	5.5V			1		10		40	μA
C _i	Input Capacitance	V _I = V _{CC} – or GND	5.5V		2.0	10		10		10	pF
θ _{JA}	Thermal Resistance Junction-to-Ambient	SOT25	(Note 4)		195						°C/W
		SOT353		430							
θ _{JC}	Thermal Resistance Junction-to-Case	SOT25	(Note 4)		58						°C/W
		SOT353		155							

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 (Input)	TO (OUTPUT)		25°C			-40°C to 85°C		-40°C to 125°C		Unit
				Min	Typ.	Max	Min	Max	Min	Max	
t _{pd}	A or B	Y	C _L =15pF	0.6	4.0	11.0	0.6	13.0	0.6	14.0	ns
			C _L =50pF	0.6	5.8	14.5	0.6	16.5	0.6	18.5	ns

V_{CC} = 5V ± 0.5V (see Figure 1)

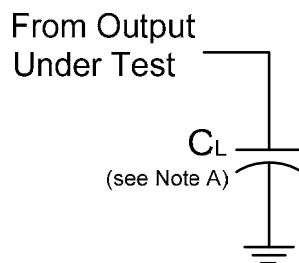
Parameter	From (Input)	TO (OUTPUT)		25°C			-40°C to 85°C		-40°C to 125°C		Unit
				Min	Typ.	Max	Min	Max	Min	Max	
t _{pd}	A or B	Y	C _L =15pF	0.6	3.4	6.8	0.6	8.0	0.6	8.5	ns
			C _L =50pF	0.6	4.9	8.8	0.6	10.0	0.6	11.5	ns

Operating Characteristics

$T_A = 25\text{ }^\circ\text{C}$

Parameter	Test Conditions	$V_{CC} = 5\text{ V}$	Unit
		Typ.	
C_{pd}	$f = 1\text{ MHz}$ No Load	12	pF

Parameter Measurement Information



V_{CC}	Inputs		V_M	C_L
	V_I	t_r/t_f		
$3.3\text{V}\pm 0.3\text{V}$	V_{CC}	$\leq 3\text{ns}$	$V_{CC}/2$	15pF
$5\text{V}\pm 0.5\text{V}$	V_{CC}	$\leq 3\text{ns}$	$V_{CC}/2$	15pF
$3.3\text{V}\pm 0.3\text{V}$	V_{CC}	$\leq 3\text{ns}$	$V_{CC}/2$	50pF
$5\text{V}\pm 0.5\text{V}$	V_{CC}	$\leq 3\text{ns}$	$V_{CC}/2$	50pF

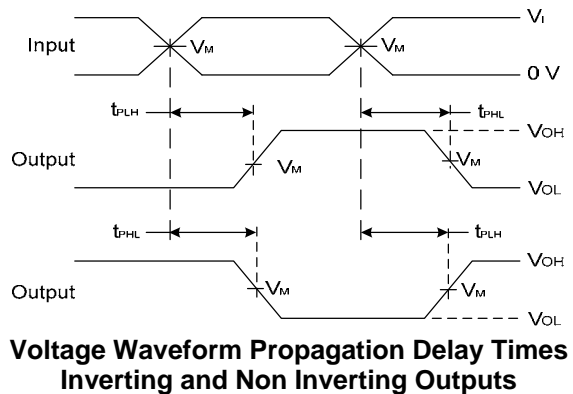
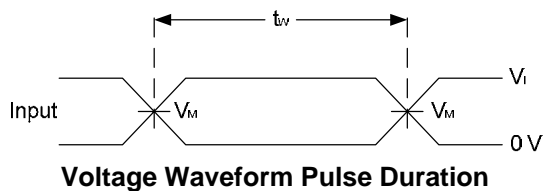
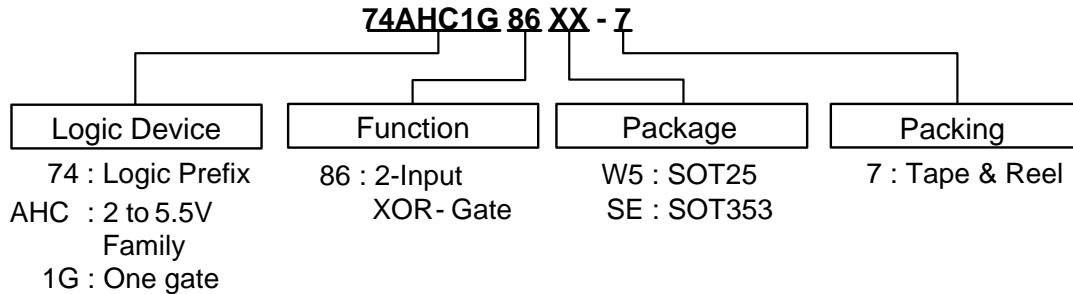


Figure 1. Load Circuit and Voltage Waveforms

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

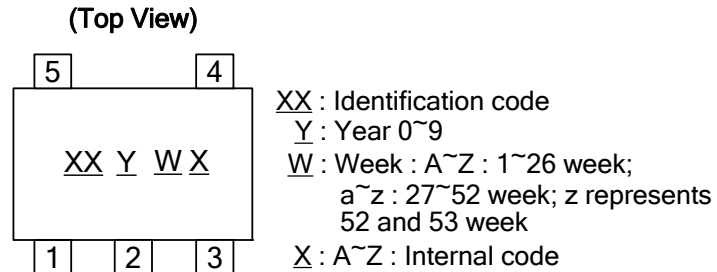
Ordering Information



Device	Package Code	Packaging (Note 5)	7" Tape and Reel	
			Quantity	Part Number Suffix
74AHC1G86W5-7	W5	SOT25	3000/Tape & Reel	-7
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

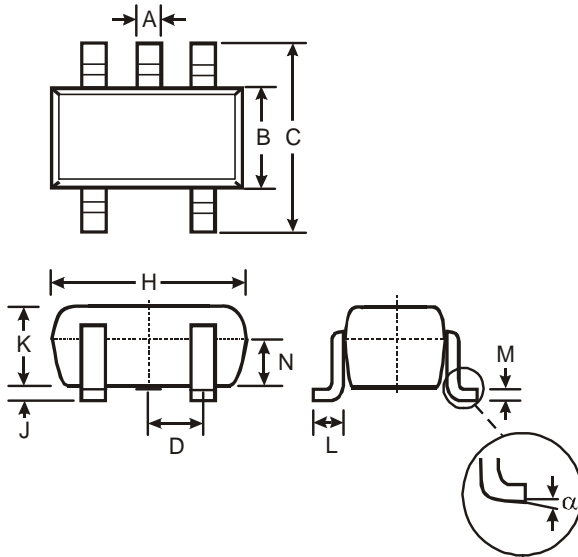


Part Number	Package	Identification Code
74AHC1G86W5	SOT25	YX
74AHC1G86SE	SOT353	YX

NEW PRODUCT

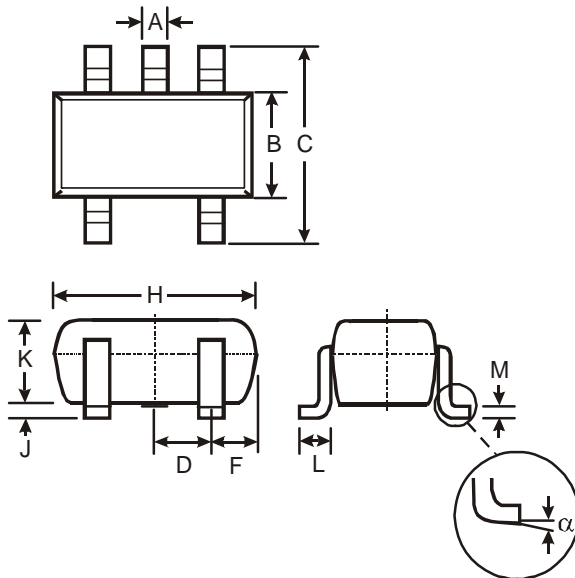
Package Outline Dimensions (All Dimensions in mm)

(1) Package Type: SOT25



SOT25			
Dim	Min	Max	Typ
A	0.35	0.50	0.38
B	1.50	1.70	1.60
C	2.70	3.00	2.80
D	—	—	0.95
H	2.90	3.10	3.00
J	0.013	0.10	0.05
K	1.00	1.30	1.10
L	0.35	0.55	0.40
M	0.10	0.20	0.15
N	0.70	0.80	0.75
α	0°	8°	—
All Dimensions in mm			

(2) Package Type: SOT353



SOT353		
Dim	Min	Max
A	0.10	0.30
B	1.15	1.35
C	2.00	2.20
D	0.65 Typ	
F	0.40	0.45
H	1.80	2.20
J	0	0.10
K	0.90	1.00
L	0.25	0.40
M	0.10	0.22
α	0°	8°
All Dimensions in mm		

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