

General Description

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

Features

- Operating Range of 4.5V to 5.5V
- Max t_{pd} of 8ns at 5V
- Low Power Consumption, 10 μ A Maximum I_{cc}
- 8mA Output Drive at 5V
- Inputs Are TTL-Voltage Compatible
- Packages are SC70-5, SOT23-5 or small DFN6
- MSL3(SC70-5, SOT23-5, DFN6(1*1.5))

Pin Configuration

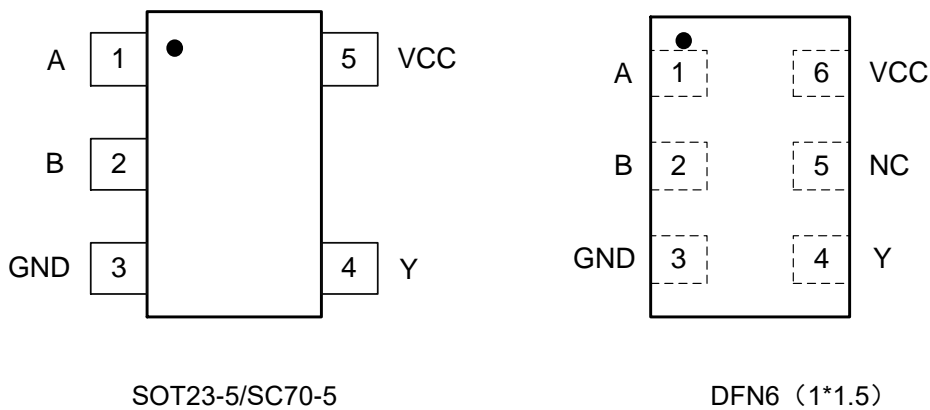


Figure1. Top View

Pin Function

SC70-5/ SOT23-5

Pin No.	Pin Name	Function
1	A	Input A
2	B	Input B
3	GND	Ground
4	Y	Output
5	VCC	Supply Voltage

DFN6

Pin No.	Pin Name	Function
1	A	Input A
2	B	Input B
3	GND	Ground
4	Y	Output
5	NC	No connect
6	VCC	Supply Voltage

Block Diagram

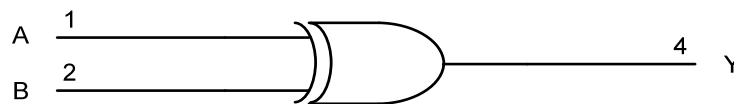


Figure2. Logic Symbol

Functional Description

Function Table

Input		Output
A	B	Y
L	L	L
L	H	H
H	L	H
H	H	L

Absolute Maximum Ratings

Symbol	Parameter	Value	Unit	
V _{CC}	DC Supply Voltage	-0.5 to 7.0	V	
V _I	DC Input Voltage ⁽¹⁾	-0.5 ≤ V _I ≤ +7.0	V	
V _O	DC Output Voltage Output in Higher or Low State	-0.5 to V _{CC} + 0.5	V	
I _{IK}	DC Input Diode Current V _I < GND	-20	mA	
I _{OK}	DC Output Diode Current V _O < GND, V _O > V _{CC}	±20	mA	
I _O	DC Output Sink Current	±25	mA	
I _{CC}	DC Supply Current per Supply Pin	±50	mA	
I _{GND}	DC Ground Current per Supply Pin	±50	mA	
T _{STG}	Storage Temperature Range	-65 to 150	°C	
T _L	Lead Temperature, 1 mm from Case for 10 Seconds	260	°C	
T _J	Junction Temperature Under Bias	150	°C	
V _{ESD}	ESD Classification	Human Body Model ⁽²⁾	±4000	V
		Charged Device Model ⁽³⁾	±1000	
I _{LU}	Latch up Current Above V _{CC} and GND at 125°C ⁽⁴⁾	±100	mA	

Thermal Characteristics

Symbol	Package	Ratings	Value	Unit
R _{θJA}	SC70-5	Thermal Characteristics, Thermal Resistance, Junction-to-Air	300	°C/W
	SOT23-5		250	
	DFN6(1.0×1.5)		440	
P _D	SC70-5	Power Dissipation in Still Air at 85°C	215	mW
	SOT23-5		260	
	DFN6(1.0×1.5)		150	

Recommended Operating Conditions

Symbol	Parameter	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
t/v	Input Transition Rise and Fall Rate		20	ns/V
T _A	Operating Temperature Range	-40	125	°C

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied.

Electrical Characteristics
DC Electrical Characteristics

Symbol	Parameter	Condition	V _{CC} (V)	T _A =25°C			-40°C ≤ T _A ≤ 85°C		-40°C ≤ T _A ≤ 125°C		Unit
				Min	Typ	Max	Min	Max	Min	Max	
V _{OH}	High-Level Output Voltage	I _{OH} = -50μA	4.5	4.4	4.5		4.4		4.4		V
		I _{OH} = -8mA	4.5	3.94			3.8		3.8		
V _{OL}	Low-Level Output Voltage	I _{OL} = 50μA	4.5			0.1		0.1		0.1	V
		I _{OL} = 8mA	4.5			0.36		0.44		0.44	
I _I	Input Current	V _{IN} = 5.5V or GND	0 to 5.5			±0.1		±1		±1	μA
I _{CC}	Supply Current	V _{IN} = V _{CC} or GND, I _O = 0	5.5			1		10		10	μA
ΔI _{CC} ⁽⁵⁾	Change in Supply Current	One input at 3.4 V, Other Inputs at V _{CC} or GND	5.5			1.35		1.5		1.5	mA
C _I	Input Capacitance	V _{IN} = V _{CC} or GND	5		3	10		10		10	pF

Note5: 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, $V_{CC} = 5V \pm 0.5V$ (unless otherwise noted)

(see Figure 3)

Symbol	Parameter	Condition	$T_A = 25^\circ\text{C}$			$-40^\circ\text{C} \leq T_A \leq 85^\circ\text{C}$		$-40^\circ\text{C} \leq T_A \leq 125^\circ\text{C}$		Unit
			Min	Typ	Max	Min	Max	Min	Max	
t_{PLH}	Propagation Delay	$C_L = 15\text{pF}$		2.5	6.2	1	8	1	9	ns
t_{PHL}		$C_L = 15\text{pF}$		5.5	6.2	1	8	1	9	ns
t_{PLH}		$C_L = 50\text{pF}$		2.5	7.9	1	9	1	10	ns
t_{PHL}		$C_L = 50\text{pF}$		6.0	8.3	1	9	1	10	ns

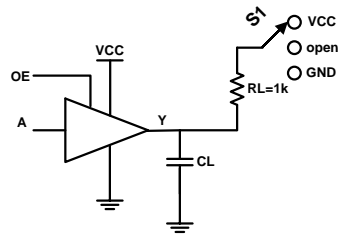
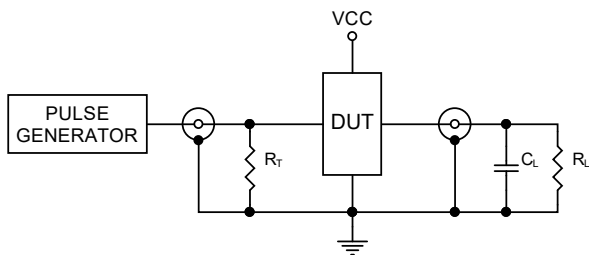
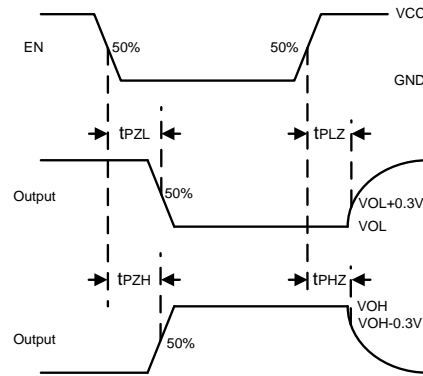
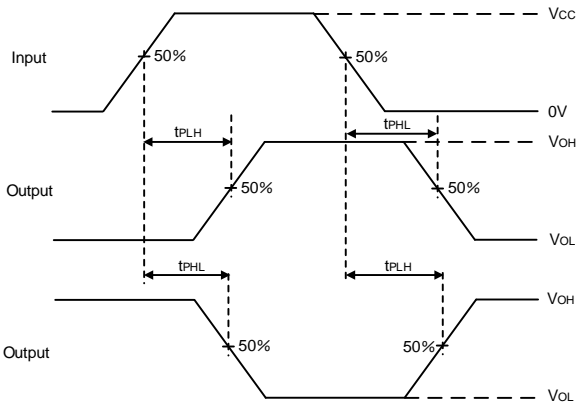
Operating Characteristics

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

Symbol	Parameter	Condition	Typ	Unit
C_{PD}	Power Dissipation Capacitance ⁽⁶⁾	No load, $f = 1\text{ MHz}$	13	pF

Note6: C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load. Average operating current can be obtained by the equation: $I_{CC(OPR)} = C_{PD} \times V_{CC} \times f_{in} + I_{CC} \times C_{PD}$ is used to determine the no-load dynamic power consumption; $P_D = C_{PD} \times V_{CC}^2 \times f_{in} + I_{CC} \times V_{CC} \times f_{in}$.

Waveform and Test Circuit



Test	Swith
tPD	Open
tPZL tPLZ	VCC
tPZH tPHZ	GND

CL includes probe and jig capacitance

All input pulses are supplied by generators having the following characteristics: PRR ≤ 1MHz, Zo=50Ω, tr ≤ 3ns, tf ≤ 3ns.

The outputs are measured one at a time with one input transition per measurement.

All parameters and waveforms are not applicable to all devices.

Figure3. Load Circuit and Voltage Waveforms

Package Dimension

SC70-5

SOT23-5

DFN6(1.0×1.5)

Ordering information

Order code	Marking code	Package	Baseqty	Deliverymode
UMW SN74AHCT1G86DBVR	B86G U	SOT23-5	3000	Tape and reel
UMW SN74AHCT1G86DCKR	BHJ U	SC70-5	3000	Tape and reel
UMW SN74AHCT1G86DRYR	—	DFN6 (1*1.5)	5000	Tape and reel

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