UMW®

Single 2-input Exclusive−OR Gate

General Description

The SN74AHCT1G86 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.

Features

- Operating Range of 4.5V to 5.5V
- Max t_{pd} of 8ns at 5V
- Low Power Consumption, 10µA 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

SOT23-5/SC70-5   DFN6（1*1.5）

Figure1. Top View

Single 2-input Exclusive−OR Gate
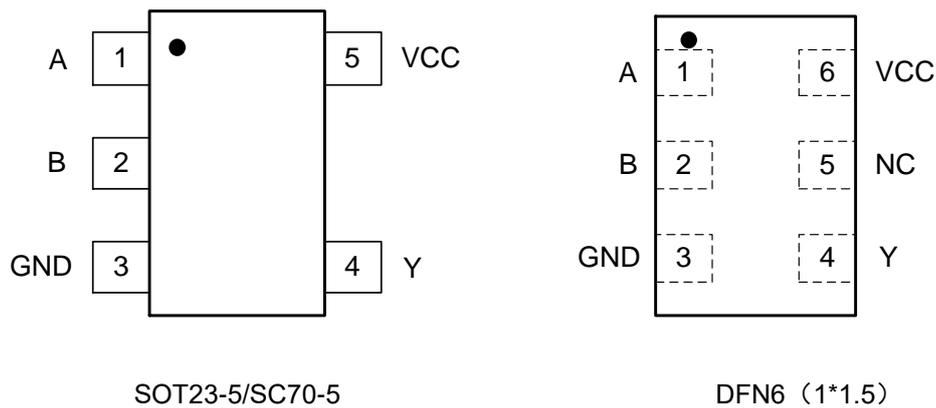
Pin Function

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
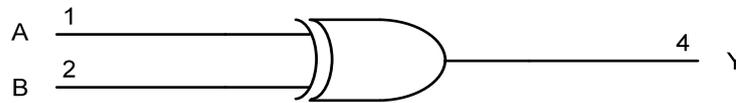
Figure2. Logic Symbol

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]	$-0.5 \leq V_I \leq +7.0$	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 $\qquad V_I <$ GND	−20	mA
I_{OK}	DC Output Diode Current $\qquad V_O <$ 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
$R_{\theta JA}$	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±0.5V (unless otherwise noted)

(see Figure 3)

Symbol	Parameter	Condition	T_A=25°C			−40°C≤T_A≤85°C		−40°C≤T_A≤125°C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
t_{PLH}		C_L= 15pF		2.5	6.2	1	8	1	9	ns
t_{PHL}	Propagation	C_L= 15pF		5.5	6.2	1	8	1	9	ns
t_{PLH}	Delay	C_L= 50pF		2.5	7.9	1	9	1	10	ns
t_{PHL}		C_L= 50pF		6.0	8.3	1	9	1	10	ns

Operating Characteristics

V_{CC} = 5V, T_A = 25°C

Symbol	Parameter	Condition	Typ	Unit
C_{PD}	Power Dissipation Capacitance [6]	No load, f = 1 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: $I_{CC(OPR)}=C_{PD}×V_{CC}×f_{in}+I_{CC}×C_{PD}$ is used to determine the no−load dynamic power consumption; $P_D=C_{PD}×V_{CC}^2 ×f_{in}+I_{CC}×V_{CC}×Fig.$

Waveform and Test Circuit
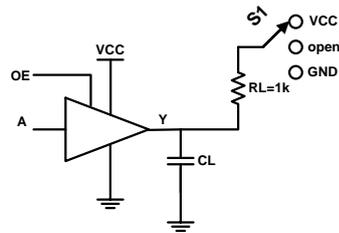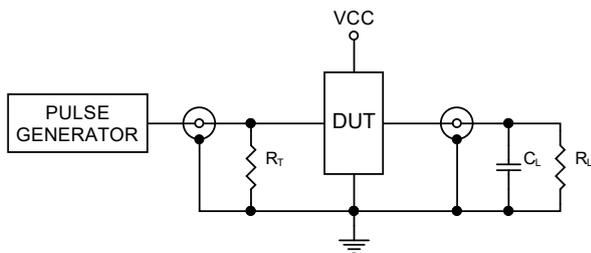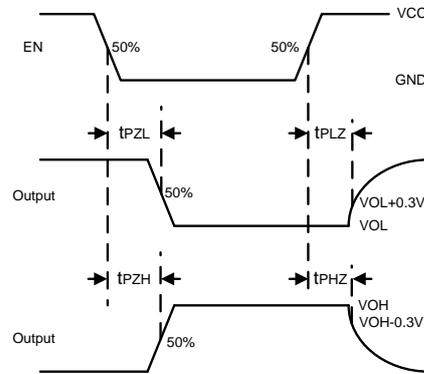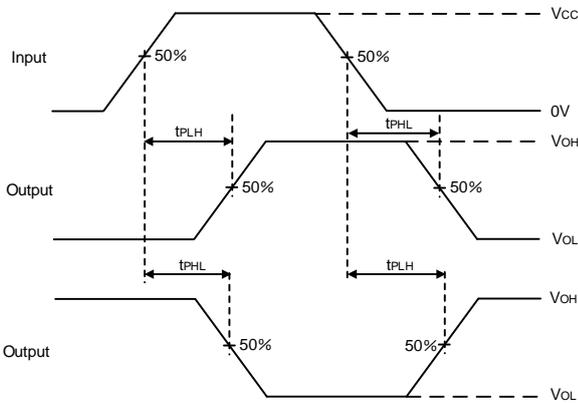
Test	Swith
tPD	Open
tPZL tPLZ	VCC
tPZH tPHZ	GND

C_L includes probe and jig capacitance

All input pulses are supplied by generators having the following characteristics:PRR ≤ 1MHz, Z_O=50Ω, t_r ≤ 3ns,t_f ≤ 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)

Orderinginformation

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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