

Single 2-input Exclusive-OR Gate

General Description

This device contains four independent 2-input XOR gates operating from a 1.65 to 5.5 V supply. Each gate performs the Boolean function $Y = A \oplus B$ in positive logic.

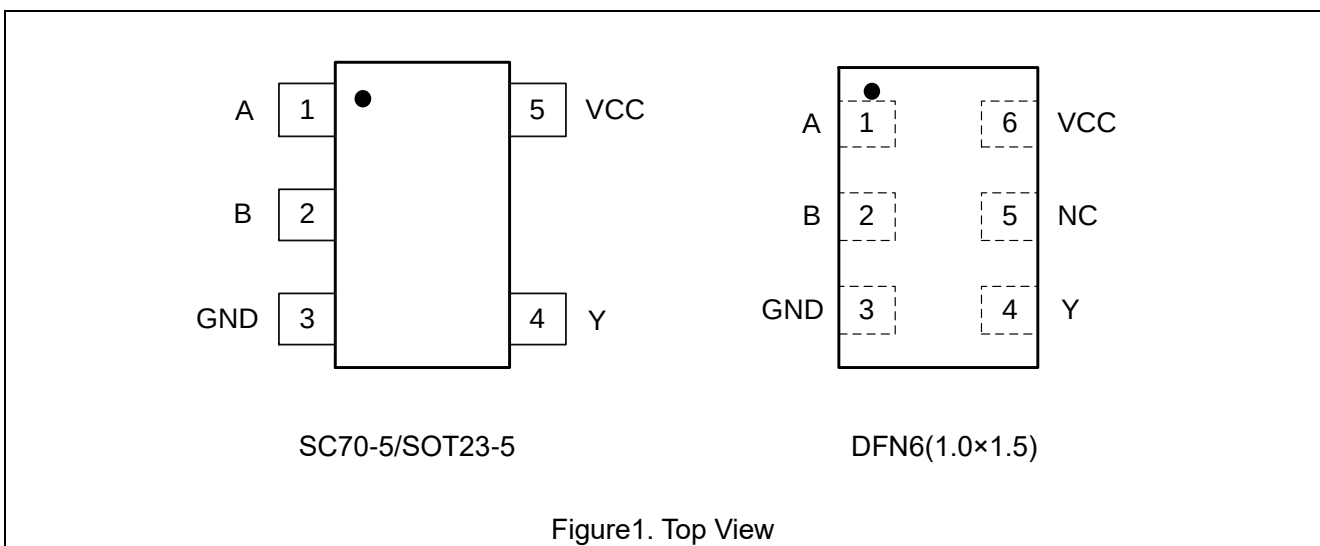
Features

- Buffered inputs
- Wide operating voltage range: 1.65 V to 5.5 V
- Source/Sink 24mA at 3.0V
- Over-Voltage Tolerant Inputs
- These Devices are Pb-Free and are RoHS Compliant

Device Information

Part No.	Package	Packing Option	MSL
ET74LVC1G86	SC70-5 (1.3mm×2.1mm)	Tape and Reel, 3K	1
ET74LVC1G86T	SOT23-5 (1.6mm×2.9mm)	Tape and Reel, 3K	3
ET74LVC1G86Y	DFN6 (1.0mm×1.5mm)	Tape and Reel, 3K	1

Pin Configuration



ET74LVC1G86

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

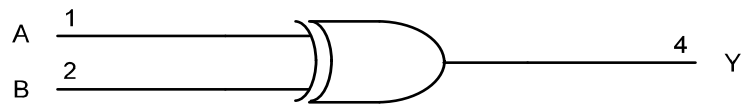


Figure2. Logic Symbol

Functional Description

Function Table

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

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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	−50	mA
I _{OK}	DC Output Diode Current	V _O < GND, V _O > V _{CC}	±50	mA
I _O	DC Output Sink Current		±50	mA
I _{CC}	DC Supply Current per Supply Pin		±100	mA
I _{GND}	DC Ground Current per Supply Pin		±100	mA
T _{STG}	Storage Temperature Range		−65 to 150	°C
T _L	Lead Temperature, Soldering 10 Seconds		260	°C
T _J	Max Junction Temperature		150	°C
V _{ESD}	ESD Classification	Human Body Model ⁽²⁾	±4000	V
		Charged Device Model ⁽³⁾	±1000	
I _{LU}	Max Latch up Current Above V _{CC} and GND at 125°C ⁽⁴⁾		±100	mA

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

Notes:

1. IO absolute maximum rating must be observed.
2. Tested to EIA/JESD22-A114-A
3. Tested to JESD22-C101-A.
4. Tested to EIA/JESD78.

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	

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Recommended Operating Conditions

Symbol	Parameter		Min	Max	Unit
V _{CC}	DC Supply Voltage Operating		1.65	5.5	V
	Date Retention		1.5	5.5	
V _{IN}	DC Input Voltage		0	5.5	V
V _{OUT}	DC Output Voltage (High or Low State)		0	5.5	V
T _A	Operating Temperature Range		-40	85	°C
t _r ,t _f	Input Rise and Fall Time	V _{CC} = 2.5 V ± 0.2 V	0	20	ns/V
		V _{CC} = 3.0 V ± 0.3 V	0	10	
		V _{CC} = 5.0 V ± 0.5 V	0	5	

Electrical Characteristics

DC Electrical Characteristics

Symbol	Parameter	Condition	V _{CC} (V)	T _A = 25 °C			-40°C ≤ T _A ≤ 125°C		Unit
				Min	Typ	Max	Min	Max	
V _{IH}	High-Level Input Voltage		1.65-1.95 2.3-5.5	0.75V _{CC} 0.7V _{CC}			0.75V _{CC} 0.7V _{CC}		V
V _{IL}	Low-Level Input Voltage		1.65-1.95 2.3-5.5			0.25V _{CC} 0.3V _{CC}		0.25V _{CC} 0.3V _{CC}	V
V _{OH}	High-Level Output Voltage	I _{OH} = -100uA	1.65-5.5	V _{CC} -0.1	V _{CC}		V _{CC} -0.1		V
		I _{OH} = -3mA	1.65	1.29	1.4		1.29		
		I _{OH} = -8mA	2.3	1.9	2.1		1.9		
		I _{OH} = -12mA	2.7	2.2	2.4		2.2		
		I _{OH} = -16mA	3.0	2.4	2.7		2.4		
		I _{OH} = -24mA	3.0	2.3	2.5		2.3		
		I _{OH} = -32mA	4.5	3.8	4.0		3.8		
V _{OL}	Low-Level Output Voltage	I _{OH} = 100uA	1.65-5.5		0.0	0.1		0.1	V
		I _{OL} = 3mA	1.65		0.08	0.24		0.24	
		I _{OL} = 8mA	2.3		0.20	0.3		0.3	
		I _{OL} = 12mA	2.7		0.22	0.4		0.4	
		I _{OL} = 16mA	3.0		0.28	0.4		0.4	
		I _{OL} = 24mA	3.0		0.38	0.55		0.55	
		I _{OL} = 32mA	4.5		0.42	0.55		0.55	
I _{IN}	Input Leakage Current	V _{IN} = 5.5V or GND	0-5.5			±0.1		±1.0	uA

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I_{OFF}	Power Off Leakage Current	$V_{IN} = 5.5V$ or $V_{OUT} = 5.5V$	0			1		10	uA
I_{CC}	Quiescent Supply Current	$V_{IN} = 5.5V$ or GND	5.5			1		10	uA

AC Electrical Characteristics

$t_r = t_f = 2.5ns$

Symbol	Parameter	Condition	$V_{CC}(V)$	$T_A = 25^\circ C$			$-40^\circ C \leq T_A \leq 125^\circ C$		Unit
				Min	Typ	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation Delay (Fig3 and Fig4)	$R_L = 1M\Omega$ $C_L = 15pF$	1.65	2.0	10.1	12.9	2.0	13.9	ns
			1.8	2.0	9.1	11.6	2.0	12.4	
		$R_L = 1M\Omega$ $C_L = 15pF$	2.5	0.2	6.0	7.7	0.8	8.2	
		$R_L = 1M\Omega$ $C_L = 15pF$	3.3	0.8	5.0	6.5	0.5	7.0	
		$R_L = 500\Omega$ $C_L = 50pF$		1.2	5.6	7.1	1.5	7.6	
		$R_L = 1M\Omega$ $C_L = 15pF$	5.0	0.5	4.4	5.6	0.5	6.1	
		$R_L = 500\Omega$ $C_L = 50pF$		0.8	4.8	6.1	0.8	6.6	

Capacitance Characteristics

Symbol	Parameter	Condition	Typ	Unit
C_{IN}	Input Capacitance	$V_{CC} = 5.5V$, $V_I = 0V$ or V_{CC}	>4	pF
C_{PD}	Power Dissipation Capacitance ⁽⁶⁾	10MHz, $V_{CC} = 3.3V$, $V_I = 0V$ or V_{CC}	21	pF
		10MHz, $V_{CC} = 5.5V$, $V_I = 0V$ or V_{CC}	21	

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;
 $P_D = C_{PD} \times V_{CC}^2 \times f_{in} + I_{CC} \times V_{CC} \times Fig.$

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Waveform and Test Circuit

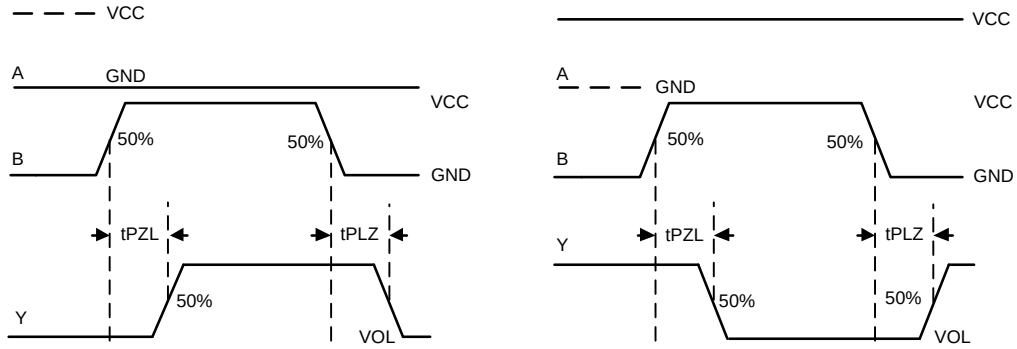


Fig3. Switching Waveform

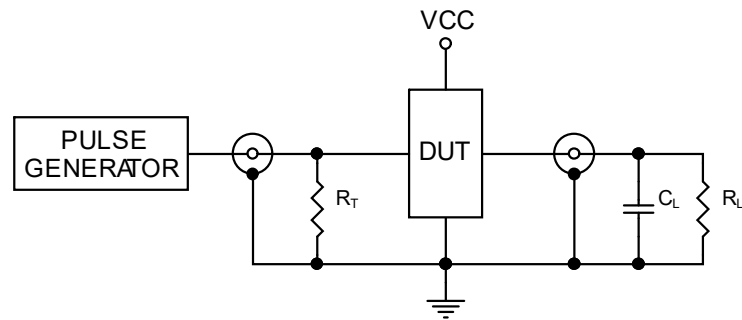
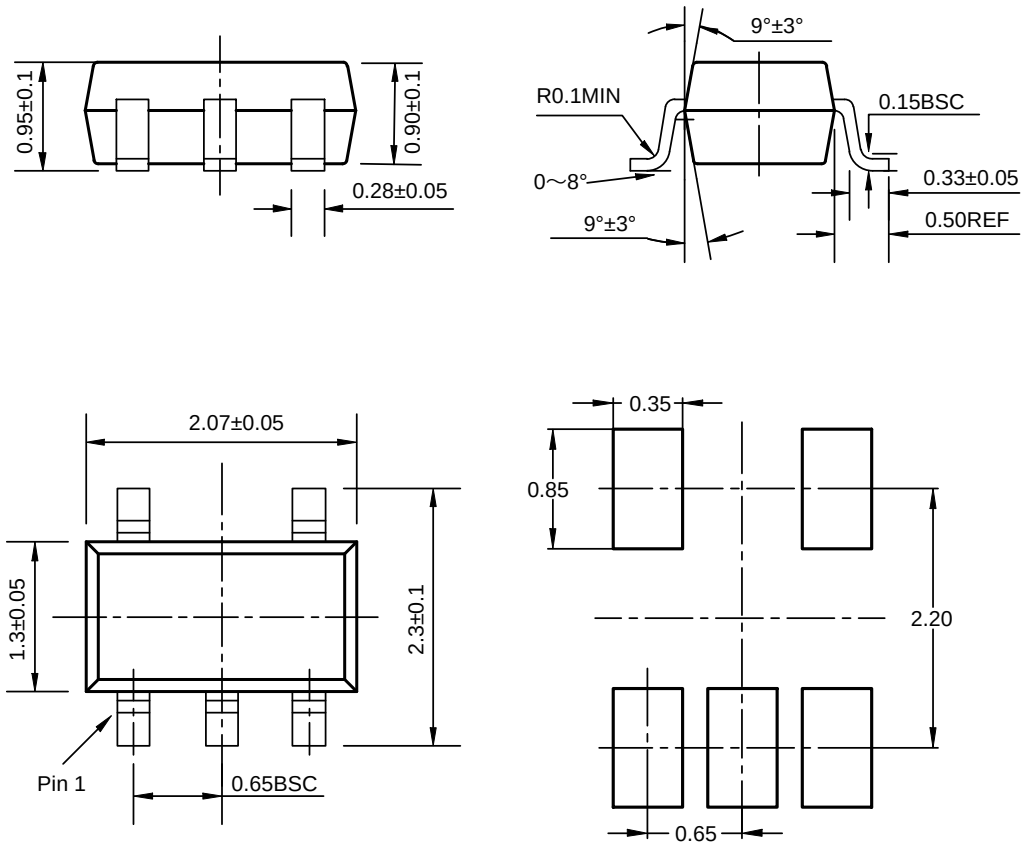


Fig4. Test Circuit

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Package Dimension

SC70-5

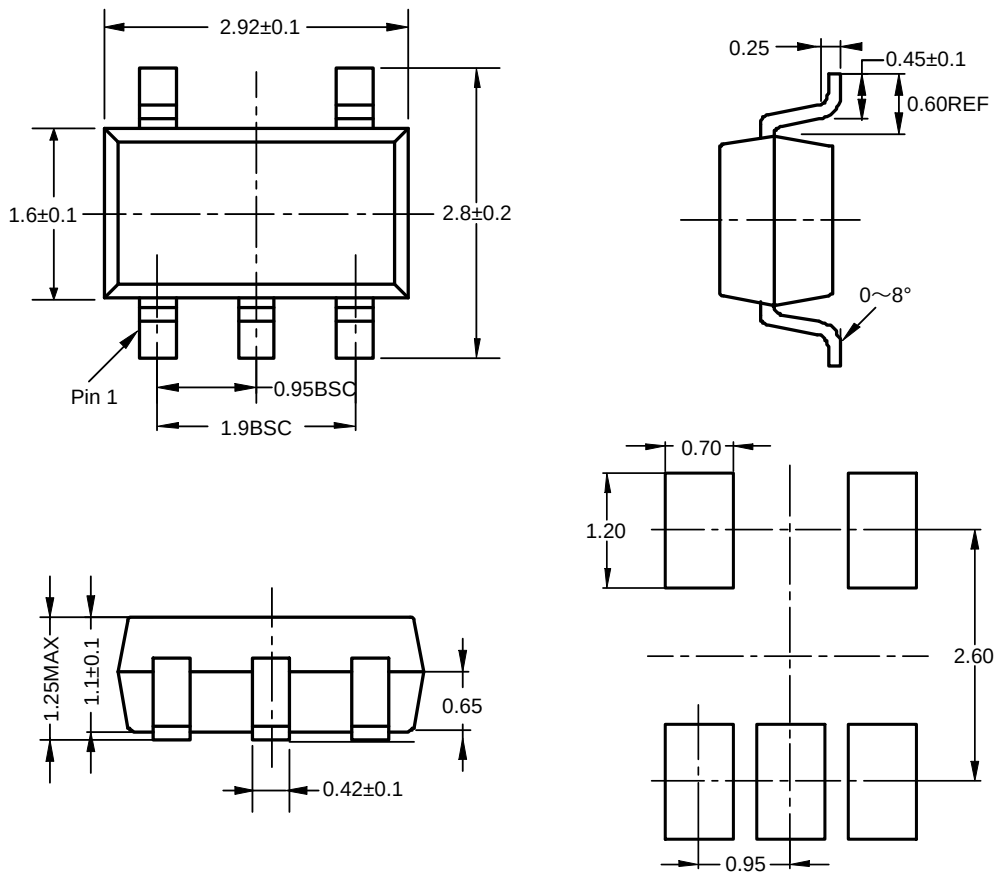


Recommended Land Pattern

Unit: mm

ET74LVC1G86

SOT23-5

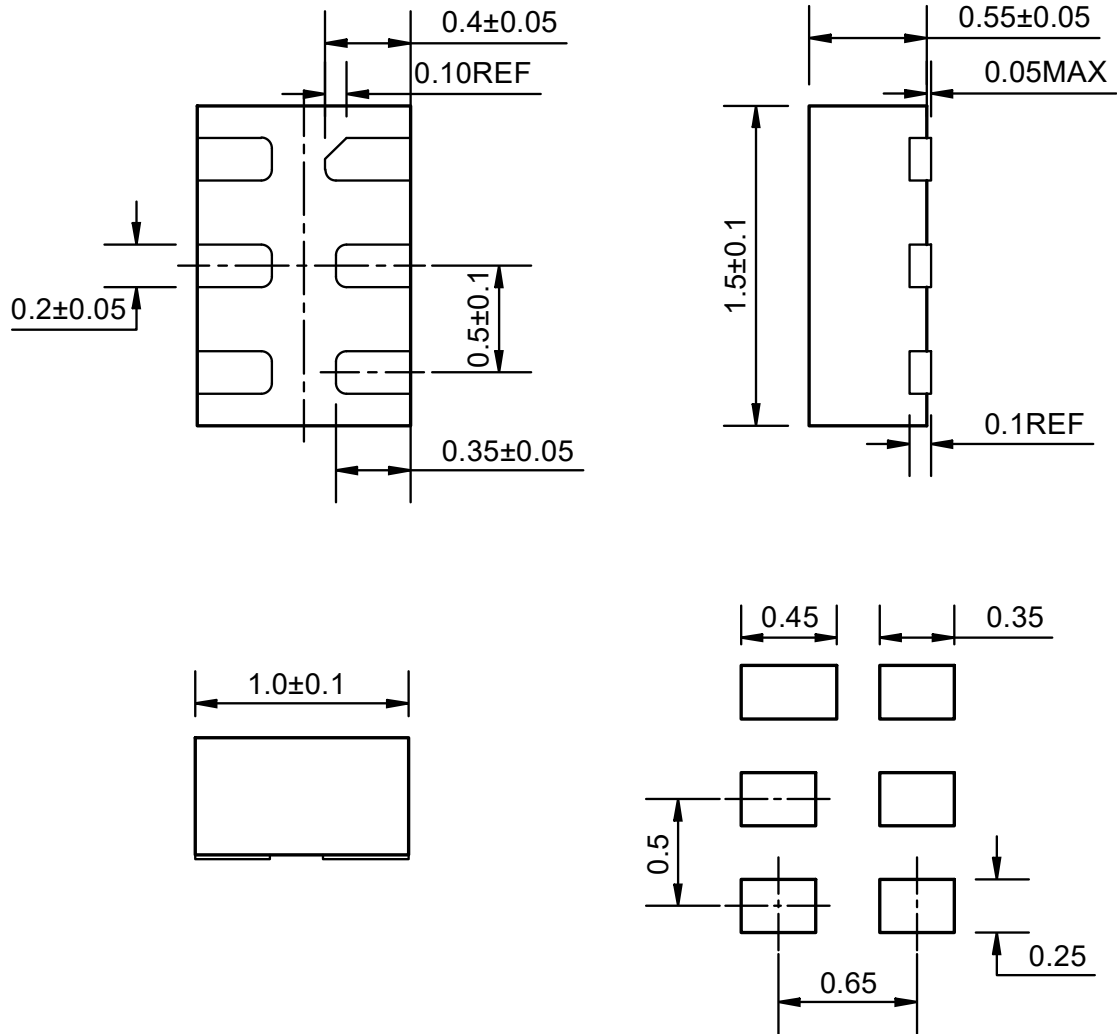


Recommended Land Pattern

Unit: mm

ET74LVC1G86

DFN6 (1.0×1.5)



Recommended Land Pattern

Unit: mm

ET74LVC1G86

Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
1.0	2017-07-17	Original Version	Ma Yong jian	Ma Yong jian	Liu Jia Ying
1.1	2019-07-18	Update AC Table and Device Information	Ma Yong jian	Ma Yong jian	Liu Jia Ying
1.2	2022-10-14	Update format and Thermal Characteristics	Shibo	Shibo	Liu Jia Ying
1.3	2023-11-29	Update Typeset /ESD/package picture	Shibo	Shibo	Liu jy
1.4	2025-05-30	Add Packing Option	Yang xiaoxu	Yang xiaoxu	Liu jiaying