Single 2-Input Exclusive−OR Gate

General Description

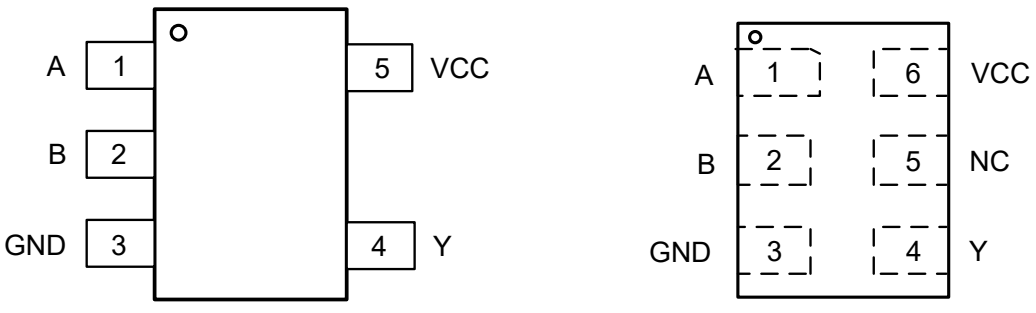
This device contains four independent 2-input XOR gates operating from a 2V to 6V supply.
Each gate performs the Boolean function Y = A ⊕ B in positive logic.

Features

- Buffered inputs
- Wide operating voltage range: 2V to 6V
- Source/Sink 2mA at 4.5V
- Over−Voltage Tolerant Inputs
- These Devices are Pb−Free and are RoHS Compliant
- ESD Protection Complies with JESD22 Standard
  -- HBM: ±4000V Pass (JEDEC JS-001)
  -- CDM: ±1000V Pass (JEDEC JS-002)
  Latch-up Performance Exceeds ±100mA per JEDEC JESD78F
- Part No. and Package Information

Part No.	Package	Packing Option	MSL
ET74HC1G86	SC70-5 (1.3mm × 2.1mm)	Tape and Reel, 3K/Reel	Level 1
ET74HC1G86T	SOT23-5 (1.6mm × 2.9mm)	Tape and Reel, 3K/Reel	Level 3
ET74HC1G86Y	DFN6 (1.0mm × 1.5mm)	Tape and Reel, 3K/Reel	Level 1

Pin Configuration



SC70-5/SOT23-5 DFN6

TOP VIEW

Figure1. Pin Configuration

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

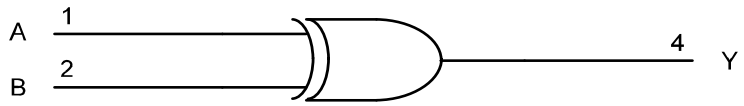


Figure2. Logic Symbol

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(VCC Pin)		-0.5 to 7.0	V
V_I	DC Input Voltage[1]		$-0.5 \le V_I \le +7.0$	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.

Note1： I_O absolute maximum rating must be observed.

Note2： HBM tested per JEDEC JS-001;

Note3： CDM tested per JEDEC JS-002;

Note4： Latch Up Current Maximum Rating tested per JEDEC JESD78F.

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		440	
P_D	SC70-5	Power Dissipation in Still Air at 85°C	215	mW
	SOT23-5		260	
	DFN6		150	

Recommended Operating Conditions

Symbol	Parameter	Min	Max	Unit
V_{CC}	DC Supply Voltage Operating	2	6	V
V_{IN}	DC Input Voltage	0	6	V
V_{OUT}	DC Output Voltage (High or Low State)	0	6	V
T_A	Operating Temperature Range	-40	125	°C

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		2.0	1.5			1.5		V
			4.5	3.15			3.15		
			6.0	4.2			4.2		
V_{IL}	Low−Level Input Voltage		2.0			0.5		0.5	V
			4.5			1.35		1.35	
			6.0			1.8		1.8	
V_{OH}	High−Level Output Voltage	I_{OH} = -20uA	2 to 6	V_{CC} -0.1	V_{CC}		V_{CC} - 0.1		V
		I_{OH} = -2mA	4.5	4.13	4.32		3.7		
		I_{OH} = -2.6mA	6.0	5.63	5.81		5.2		
V_{OL}	Low−Level Output Voltage	I_{OL} = 20uA	2 to 6		0.0	0.1		0.1	V
		I_{OL} = 2mA	4.5		0.15	0.33		0.4	
		I_{OL} = 2.6mA	6.0		0.16	0.33		0.4	
I_{IN}	Input Leakage Current	V_{IN} = 6V or GND	0 to 6		±0.1			±1.0	μA
I_{OFF}	Power Off Leakage Current	V_{IN} = 6V or V_{OUT} = 6V	0			1		10	μA
I_{CC}	Quiescent Supply Current	V_{IN} = 6V or GND	6			1		10	μA

AC Electrical Characteristics

$t_r = t_f$ = 5ns

Symbol	Parameter	Condition	V_{CC}(V)	T_A = 25°C			-40°C ≤ T_A ≤ 125°C		Unit
				Min	Typ	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation Delay (Figure3 and4)	C_L= 50pF	2.0		31	121		141	ns
		C_L= 50pF	4.5		11	25		29	
		C_L= 15pF	5.0		9				
		C_L= 50pF	6.0		10	22		25	

Capacitance Characteristics

Symbol	Parameter	Condition	Typ	Unit
C_{IN}	Input Capacitance	V_{CC} = 6V, V_I = 0V or V_{CC}	5	pF
C_{PD}	Power Dissipation Capacitance (5)	10MHz, V_{CC} = 3.3V, V_I = 0V or V_{CC}	21	pF
		10MHz, V_{CC} = 6V, V_I = 0V or V_{CC}	21	

Note5: C_{PD} is used to determine the dynamic power dissipation (P_D in μW).

$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o)$ where:

f_i = input frequency in MHz;

f_o = output frequency in MHz;

C_L = output load capacitance in pF;

V_{CC} = supply voltage in V;

N = number of inputs switching;

$\Sigma(C_L \times V_{CC}^2 \times f_o)$ = sum of outputs.

AC Test Circuit

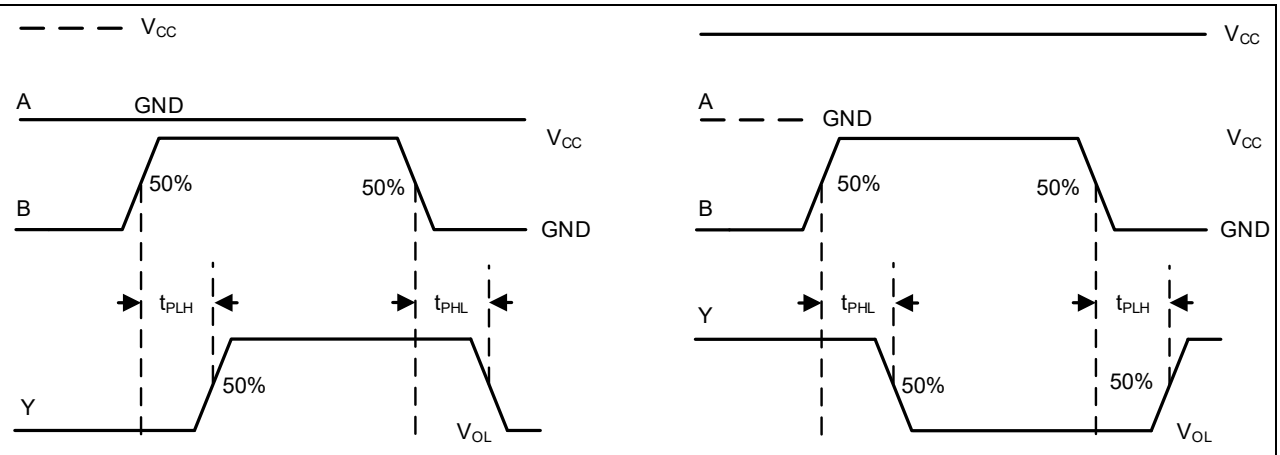


Figure3. Switching Waveform

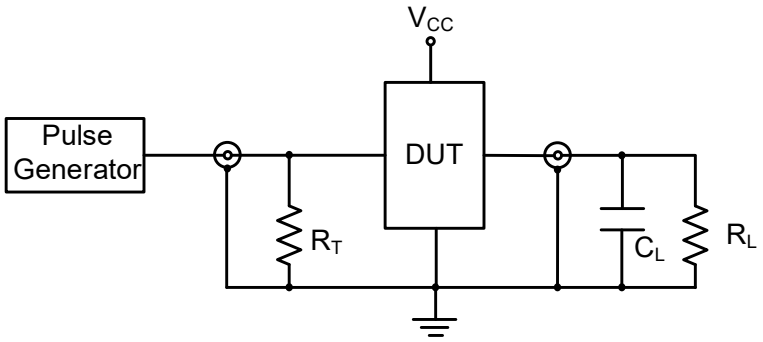
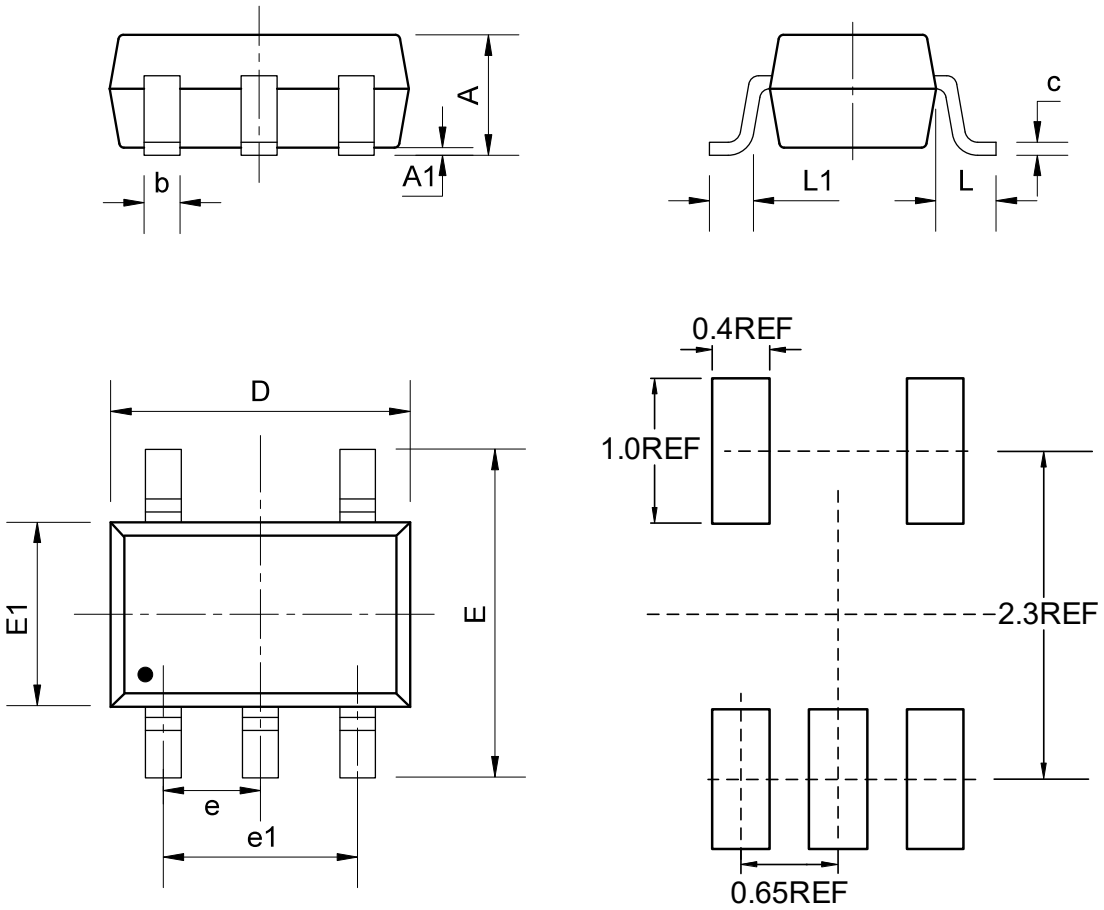


Figure4. Test Circuit

Package Dimension

SC70-5 (1.3mm × 2.1mm)

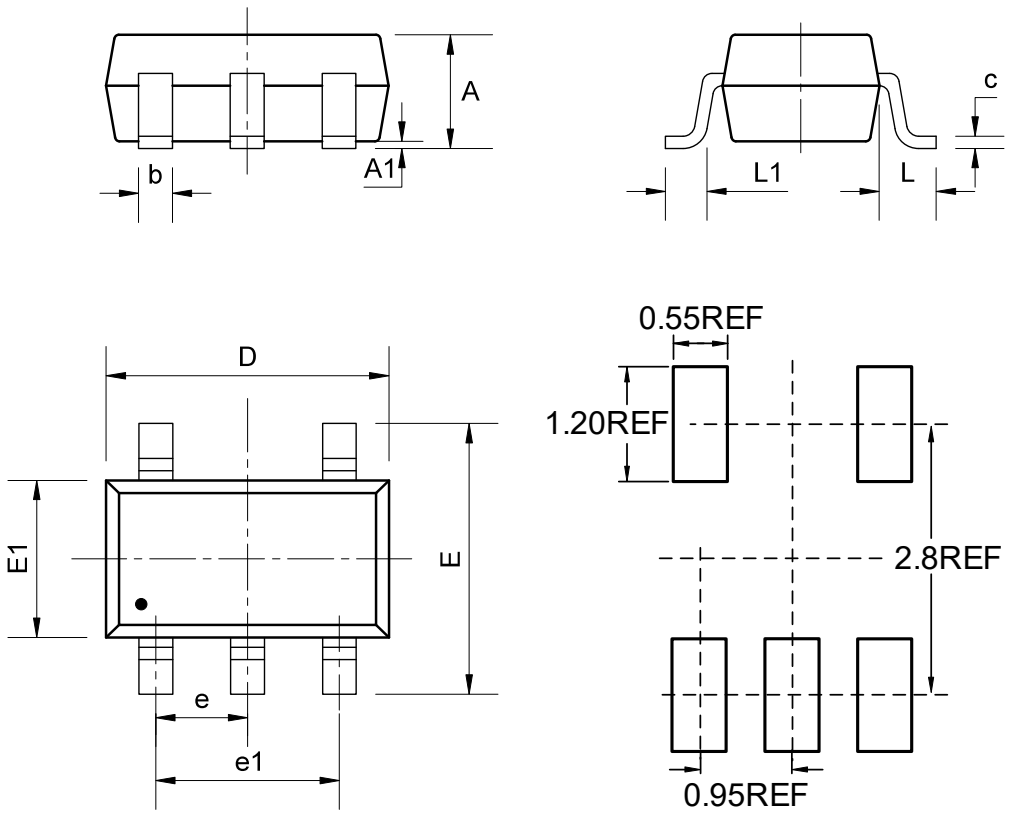


COMMON DIMENSIONS

(Unit: mm)

SYMBOL	MIN	NOM	MAX
A	-	-	1.10
A1	0.00	-	0.15
b	0.15	-	0.35
c	0.08	-	0.20
D	2.00	2.10	2.30
e	0.65BSC		
e1	1.30BSC		
E	2.15	2.30	2.50
E1	1.15	1.30	1.45
L	0.50REF		
L1	0.33REF		

SOT23-5 (1.6mm × 2.9mm)

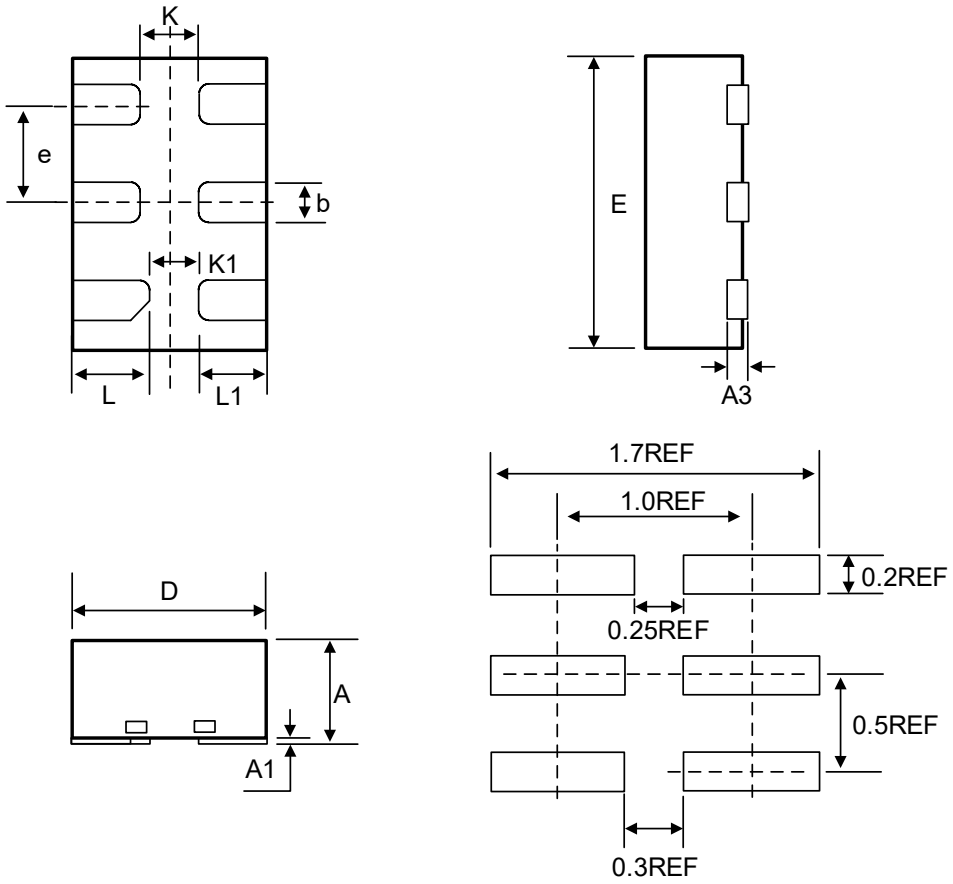


COMMON DIMENSIONS

(Unit: mm)

SYMBOL	MIN	NOM	MAX
A	-	-	1.25
A1	0.00	-	0.15
b	0.36	-	0.50
c	0.12	-	0.20
D	2.75	2.9	3.05
e	0.90	0.95	1.00
e1	1.80	1.90	2.00
E	2.60	2.80	3.00
E1	1.45	1.6	1.75
L	0.60REF		
L1	0.30	0.45	0.60

DFN6 (1.0mm × 1.5mm)



COMMON DIMENSIONS

(Unit: mm)

SYMBOL	MIN	NOM	MAX
A	0.50	--	0.60
A1	0.00	0.02	0.05
A3		0.10REF	
b	0.15	0.20	0.25
D	0.90	1.00	1.10
E	1.40	1.50	1.60
e		0.50BSC	
K		0.30REF	
K1		0.25REF	
L	0.35	0.40	0.45
L1	0.30	0.35	0.40

Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
1.0	2025-09-05	Official Version	Wang anran	Yang xiaoxu	Liu jiaying