

Single 2-input Exclusive-OR Gate

General Description

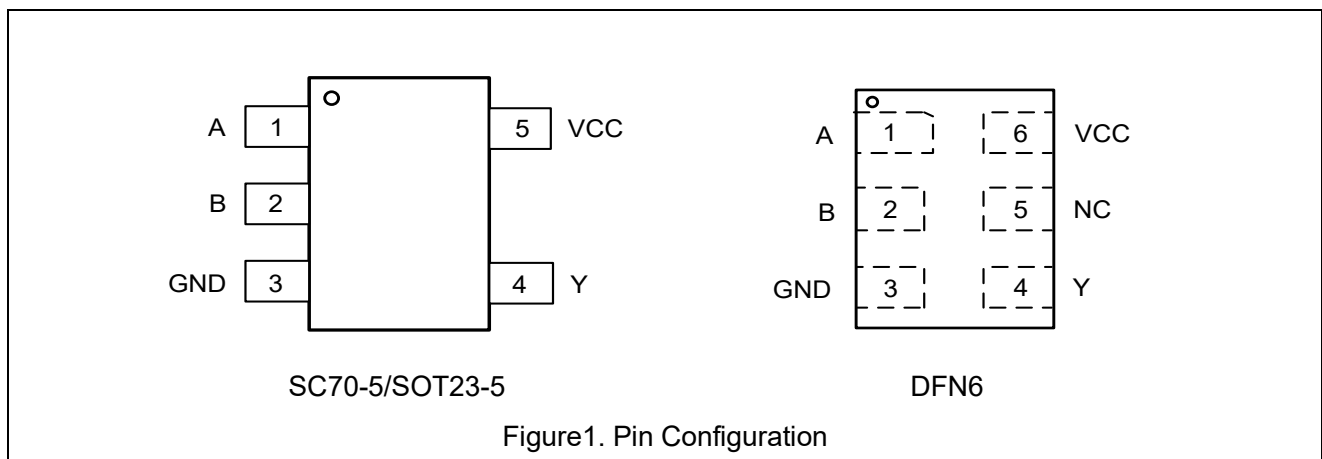
This device contains four independent 2-input XOR gates operating from a 0.8V to 3.6V supply. Each gate performs the Boolean function $Y = A \oplus B$ in positive logic.

Features

- Designed for 0.8V to 3.6V V_{CC} Operation
- Over-Voltage Tolerant Inputs Accept Voltages to 3.6V
- $\pm 4\text{mA}$ Balanced Output Sink and Source Capability
- Near Zero Static Supply Current Substantially Reduces System Power Requirements
- These Devices are Pb-Free and RoHS Compliant
- ESD Protection Complies with JESD22 Standard
 - HBM: $\pm 4000\text{V}$ Pass (JEDEC JS-001)
 - CDM: $\pm 1000\text{V}$ Pass (JEDEC JS-002)
- Latch-up Performance Exceeds $\pm 100\text{mA}$ per JEDEC JESD78F
- Part No. and Package Information

Part No.	Package	Packing Option	MSL
ET74AUP1G86	SC70-5 (1.3mm $\times$ 2.1mm)	Tape and Reel, 3K/Reel	1
ET74AUP1G86T	SOT23-5 (1.6mm $\times$ 2.9mm)	Tape and Reel, 3K/Reel	3
ET74AUP1G86Y	DFN6 (1.0mm $\times$ 1.5mm)	Tape and Reel, 3K/Reel	1

Pin Configuration



ET74AUP1G86

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

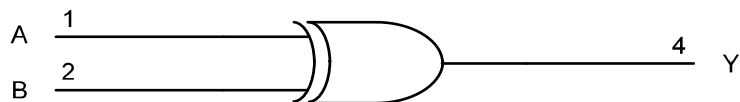


Figure2. Logic Symbol

Functional Table

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

ET74AUP1G86

Absolute Maximum Ratings

Symbol	Parameter		Value	Unit
V _{CC}	DC Supply Voltage		-0.5 to 4.6	V
V _I	DC Input Voltage		-0.5 ≤ V _I ≤ 4.6	V
V _O	DC Output Voltage Output in Higher or Low State ⁽¹⁾		-0.5 to 4.6	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		±20	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, 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 85°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 _{θJA}	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		0.8	3.6	V
V _I	DC Input Voltage		0	V _{CC}	V
V _O	DC Output Voltage (High or Low State)		0	V _{CC}	V
T _A	Operating Temperature Range		-40	85	°C
t _r , t _f	Input Rise and Fall Time	V _{CC} = 0.8V to 3.6V	0	20	ns/V

ET74AUP1G86

Electrical Characteristics

DC Electrical Characteristics

Symbol	Parameter	Condition	V _{CC} (V)	T _A = 25°C			-40°C ≤ T _A ≤ 85°C		Unit
				Min	Typ	Max	Min	Max	
V _{IH}	High-Level Input Voltage		0.8V	0.75V _{CC}			0.75V _{CC}		V
			0.9~1.95	0.7V _{CC}			0.7V _{CC}		
			2.3~2.7	1.6			1.6		
			3.0~3.6	2.0			2.0		
V _{IL}	Low-Level Input Voltage		0.8			0.25V _{CC}		0.25V _{CC}	V
			0.9~1.95			0.3V _{CC}		0.3V _{CC}	
			2.3~2.7			0.7		0.7	
			3.0~3.6			0.9		0.9	
V _{OH}	High-Level Output Voltage	I _{OH} = -20uA	0.8~3.6	V _{CC} - 0.1			V _{CC} - 0.1		V
		I _{OH} = -1.1mA	1.1	0.82	1.02		0.77		
		I _{OH} = -1.7mA	1.4	1.11	1.32		1.03		
		I _{OH} = -1.9mA	1.65	1.32	1.58		1.30		
		I _{OH} = -2.3mA	2.3	2.05	2.24		1.97		
		I _{OH} = -3.1mA		1.9	2.22		1.85		
		I _{OH} = -2.7mA	3.0	2.72	2.95		2.67		
		I _{OH} = -4.0mA		2.6	2.92		2.55		
V _{OL}	Low-Level Output Voltage	I _{OL} = 20uA	0.8~3.6			0.1		0.1	V
		I _{OL} = 1.1mA	1.1		0.11	0.33		0.33	
		I _{OL} = 1.7mA	1.4		0.12	0.31		0.37	
		I _{OL} = 1.9mA	1.65		0.11	0.31		0.35	
		I _{OL} = 2.3mA	2.3		0.14	0.31		0.33	
		I _{OL} = 3.1mA			0.19	0.44		0.45	
		I _{OL} = 2.7mA	3.0		0.11	0.31		0.33	
		I _{OL} = 4.0mA			0.16	0.44		0.45	
I _{IN}	Input Leakage Current	V _I = V _{CC} or GND	0~3.6			±0.1		±0.2	uA
I _{OFF}	Power Off Leakage Current	V _I = 3.6 V or V _O = 3.6 V	0			±0.2		±0.5	uA
I _{CC}	Quiescent Supply Current	V _I = 3.6V or GND	3.6			±0.2		±0.7	uA

ET74AUP1G86

AC Electrical Characteristics

$t_r = t_f = 3\text{ns}$

Symbol	Parameter	Condition	$V_{CC}(\text{V})$	$T_A = 25^\circ\text{C}$			$-40^\circ\text{C} \leq T_A \leq 85^\circ\text{C}$		Unit
				Min	Typ	Max	Min	Max	
t_{PHL} t_{PLH}	Propagation Delay (Figure 3 & 4)	$C_L = 15\text{pF}^{(5)}$	0.8	15.3	32.5	106	13.8	259	ns
			1.2	5.8	8.9	16.3	5.3	16.3	
			1.5	4.0	5.6	10.1	3.5	10.9	
			1.8	3.1	4.2	7.8	2.6	8.6	
			2.5	2.1	2.8	5.8	1.8	6.4	
			3.3	1.7	2.2	4.9	1.4	5.4	
		$C_L = 30\text{pF}^{(5)}$	0.8	18.3	37.5	130	16.6	323	ns
			1.2	7.0	10.7	19.3	6.4	19.3	
			1.5	4.8	6.9	12.0	4.2	12.9	
			1.8	3.7	5.1	9.2	3.2	10.2	
			2.5	2.6	3.5	6.7	2.2	7.5	
			3.3	2.0	2.2	5.6	1.7	6.3	

Note5: C_L includes probe and jig capacitance.

Capacitance Characteristics

Symbol	Parameter	Condition		Typ	Unit
C_{IN}	Input Capacitance	$V_{CC} = 3.6\text{V}$, $V_I = 0\text{V}$ or V_{CC}		2	pF
C_O	output capacitance	$V_{CC} = 0\text{V}$, $V_O = \text{GND}$		3	pF
C_{PD}	Power Dissipation Capacitance ⁽⁶⁾	1MHz, $V_I = 0\text{V}$ to V_{CC}	$V_{CC} = 0.8\text{V}$	7.6	pF
			$V_{CC} = 1.2\text{V}$	8.1	
			$V_{CC} = 1.5\text{V}$	8.5	
			$V_{CC} = 1.8\text{V}$	8.6	
			$V_{CC} = 2.5\text{V}$	9.0	
			$V_{CC} = 3.3\text{V}$	9.6	

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.

ET74AUP1G86

Waveform and Test Circuit

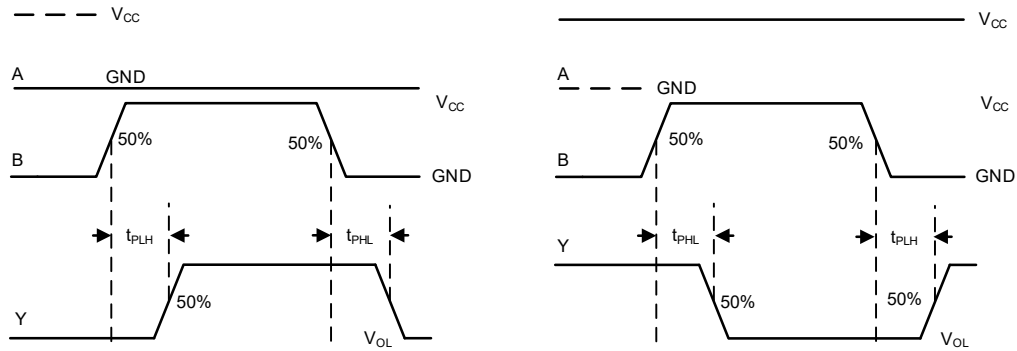


Figure3. Switching Waveform

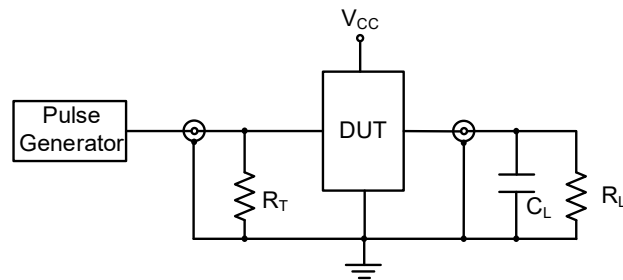
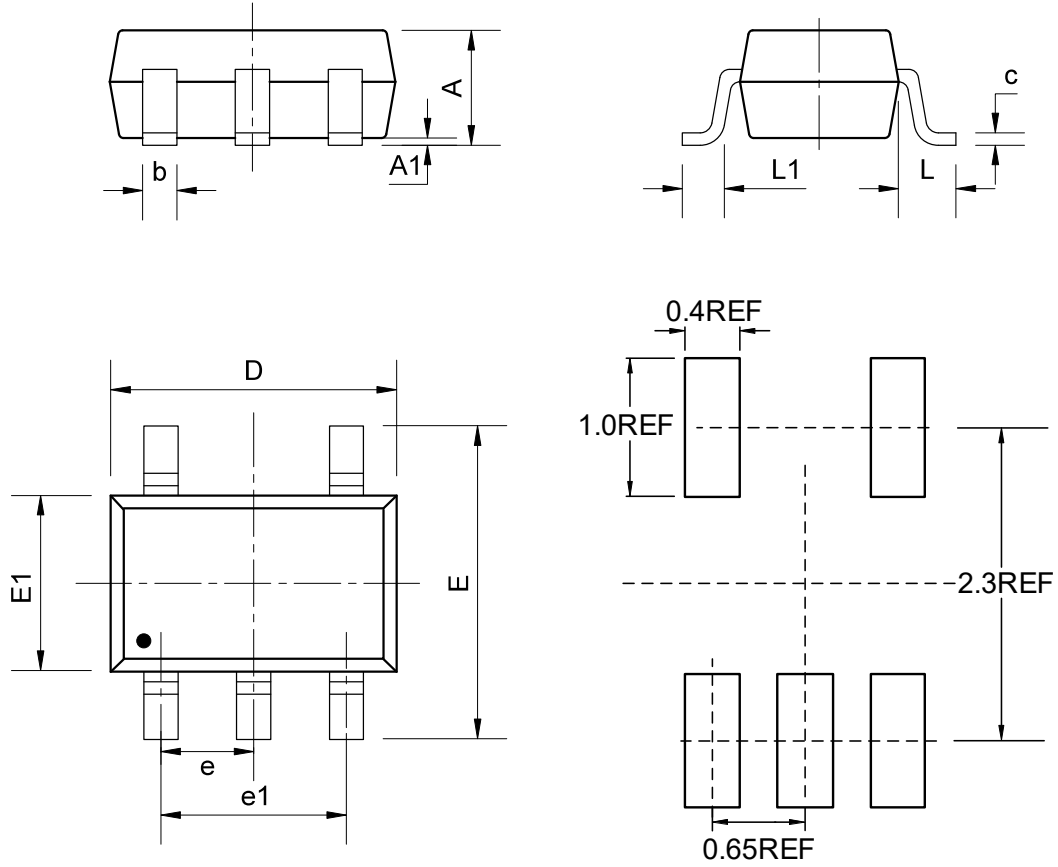


Figure4. Test Circuit

ET74AUP1G86

Package Dimension

SC70-5 (1.3mm × 2.1mm)



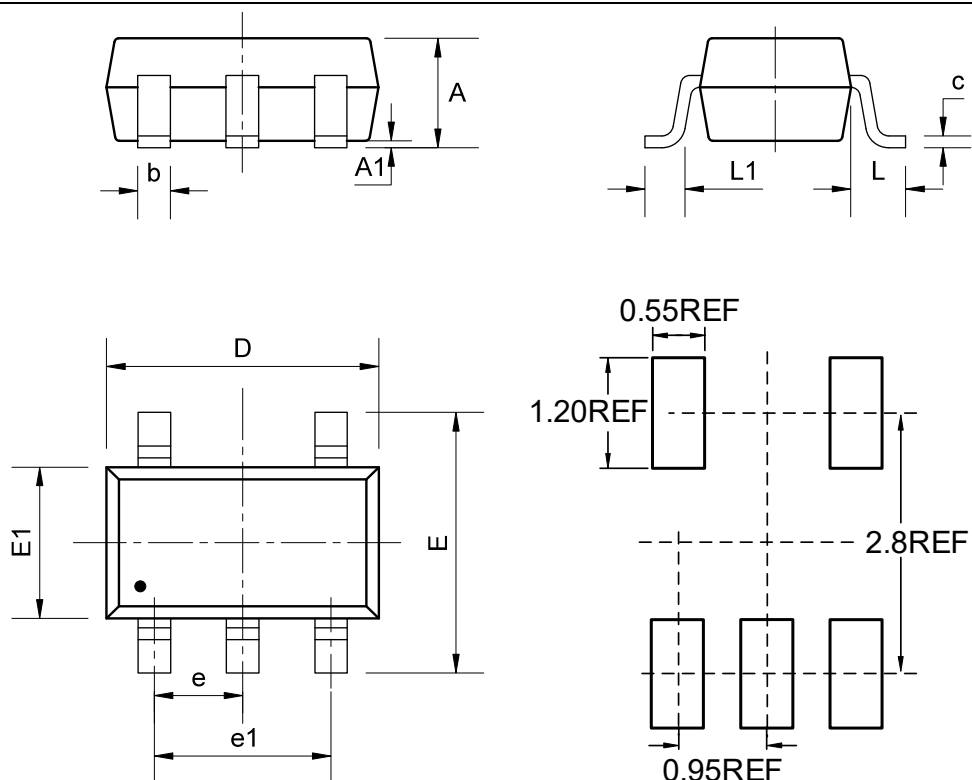
COMMON DIMENSIONS

(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		

ET74AUP1G86

SOT23-5 (1.6mm × 2.9mm)



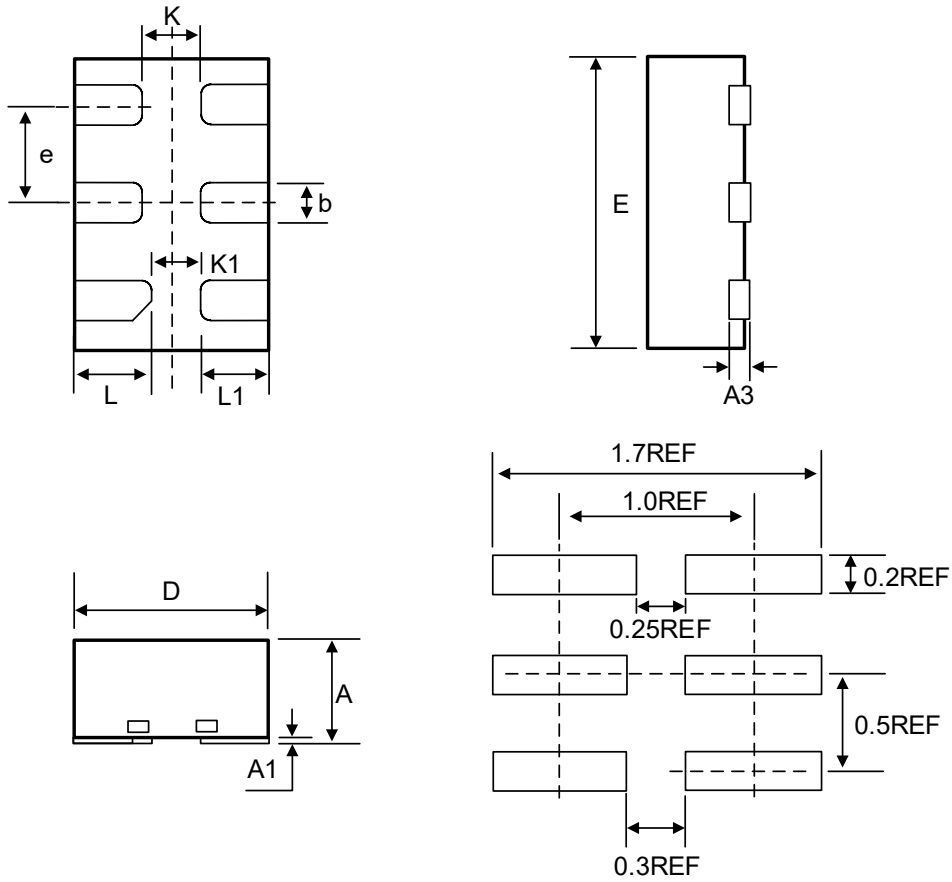
COMMON DIMENSIONS

(Unit: mm)

SYMBOL	MIN	NOM	MAX
A	-	-	1.45
A1	0.00	-	0.15
b	0.28	0.35	0.50
c	0.08	0.15	0.22
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

ET74AUP1G86

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

ET74AUP1G86

Marking Information

1U86X ● ET74AUP1G86 1U86 = Part Number X = Tracking Number	U186 XXXXX ● ET74AUP1G86T U186 = Part Number XXXXX = Tracking Number
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Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
1.0	2026-04-17	Official Version	Xu tao	Yang xiaoxu	Liu jiaying