

Single Inverter

General Description

The ET74AUP1G04 is a high performance single inverter operating from 0.8V to 3.6V supply. This device is fabricated with advanced CMOS technology to achieve ultra-high speed with high output drive.

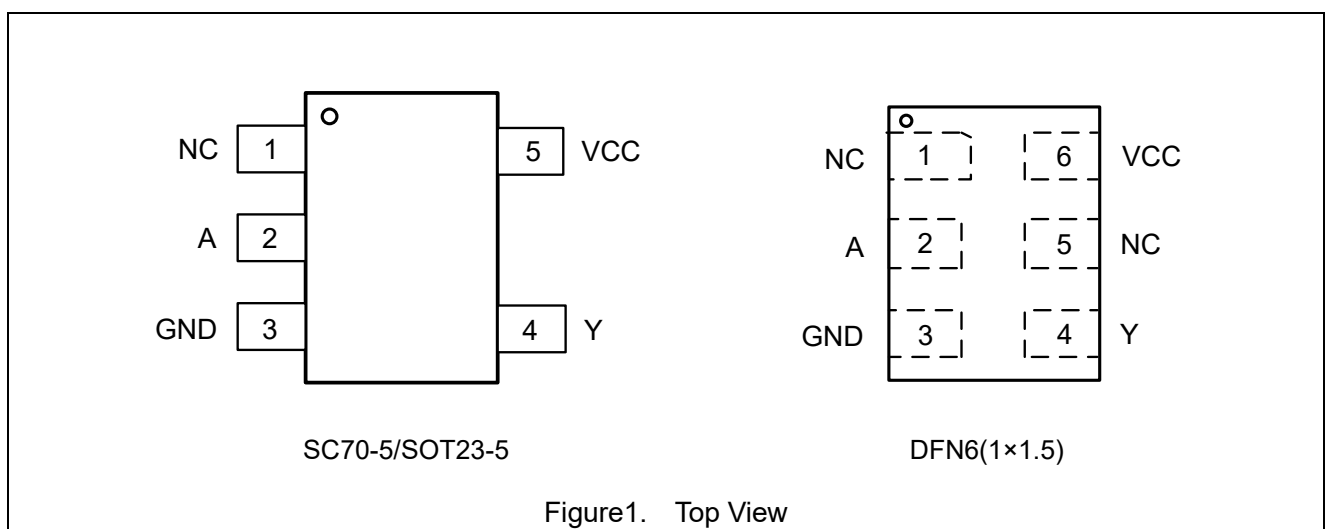
Features

- Designed for 0.8V to 3.6V V_{CC} Operation
- Low static power consumption; $I_{CC} = 0.7\mu A$ (maximum)
- 4mA Balanced Output Sink and Source Capability
- Near Zero Static Supply Current Substantially Reduces System Power Requirements
- These Devices are Pb-Free and are RoHS Compliant
- Tiny SC70-5, SOT23-5 and DFN6(1.0×1.5) Packages
- MSL1 (DFN6) , MSL3(SC70-5,SOT23-5)

Device Information

Part No.	Package	Size
ET74AUP1G04	SC70-5	1.3mm×2.1mm
ET74AUP1G04T	SOT23-5	1.6mm×2.9mm
ET74AUP1G04Y	DFN6	1.0mm×1.5mm

Pin Configuration



ET74AUP1G04

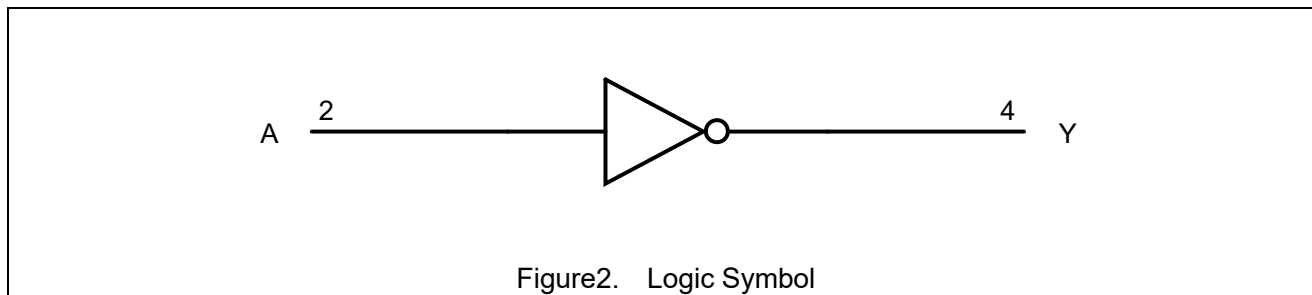
Pin Function (SC70-5/ SOT23-5)

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

DFN6

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

Block Diagram



Functional Description

Function Table

Input A	Output Y
L	H
H	L

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Absolute Maximum Ratings

Symbol	Parameter		Value	Unit
V_{CC}	DC Supply Voltage		-0.5 to 4.6	V
V_I	DC Input Voltage		$-0.5 \leq V_I \leq +4.6$	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 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
$R_{\theta JA}$	SC70-5	Thermal Characteristics, Thermal Resistance, Junction-to-Air	300	°C/W
	SOT23-5		250	
	DFN6(1×1.5)		440	
P_D	SC70-5	Power Dissipation in Still Air at 85°C	215	mW
	SOT23-5		260	
	DFN6(1×1.5)		150	

Recommended Operating Conditions

Symbol	Parameter		Min	Max	Unit
V_{CC}	DC Supply Voltage Operating		0.8	3.6	V
V_{IN}	DC Input Voltage		0	3.6	V
V_{OUT}	DC Output Voltage (High or Low State)		0	3.6	V
T_A	Operating Temperature Range		-40	85	°C
t_r, t_f	Input Rise and Fall Time	$V_{CC} = 0.8V \text{ to } 3.6V$	0	20	ns/V

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

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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		0.8	0.75V _{CC}			0.75V _{CC}		V
			0.9 to 1.95	0.7V _{CC}			0.7V _{CC}		
			2.3 to 2.7	1.6			1.6		
			3.0 to 3.6	2.0			2.0		
V _{IL}	Low-Level Input Voltage		0.8			0.25V _{CC}		0.25V _{CC}	V
			0.9 to 1.95			0.3V _{CC}		0.3V _{CC}	
			2.3 to 2.7			0.7		0.7	
			3.0 to 3.6			0.9		0.9	
V _{OH}	High-Level Output Voltage	I _{OH} =-20uA	0.8 to 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 to 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 _{IN} = V _{CC} or GND	0 to 3.6			±0.1		±0.2	uA
I _{OFF}	Power Off Leakage Current	V _{IN} = 3.6 V or V _{OUT} = 3.6 V	0			±0.2		±0.5	uA
I _{CC}	Quiescent Supply Current	V _{IN} = 3.6V or GND	3.6			±0.2		±0.7	uA

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

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AC Electrical Characteristics

$t_r = t_f = 2.5\text{ns}$

Symbol	Parameter	Condition	V _{CC} (V)	T _A = 25°C			-40°C ≤ T _A ≤ 85°C		Unit
				Min	Typ	Max	Min	Max	
t _{PHL} t _{PLH}	Propagation Delay (Figure3 And 4)	C _L = 5 pF ⁽⁵⁾	0.8	13.2	29	90.1	11.9	220	ns
			1.2	5.0	7.6	14.3	4.6	14.4	
			1.5	3.4	4.8	8.9	3	9.6	
			1.8	2.7	3.6	6.9	2.3	7.6	
			2.5	1.9	2.4	5.1	1.6	5.6	
			3.3	1.5	1.9	4.4	1.3	4.8	
		C _L = 10 pF ⁽⁵⁾	0.8	14.3	31.3	97.9	12.8	239	ns
			1.2	5.4	8.3	15.3	5.0	15.3	
			1.5	3.7	5.2	9.5	3.2	10.2	
			1.8	2.9	3.9	7.4	2.5	8.1	
			2.5	2.0	2.6	5.4	1.7	6.0	
			3.3	1.6	2.0	4.6	1.3	5.1	
		C _L = 15 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 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.

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Capacitance Characteristics

Symbol	Parameter	Condition		Typical	Unit
C _{IN}	Input Capacitance	V _{CC} = 3.6V, V _I = 0 V or V _{CC}		2	pF
C _O	output capacitance	V _{CC} = 0V, V _{OUT} = GND		3	pF
C _{PD}	Power Dissipation Capacitance ⁽⁶⁾	1 MHz, V _I = 0 V to V _{CC}	V _{CC} = 0.8V	7.6	pF
			V _{CC} = 1.2V	8.1	
			V _{CC} = 1.5V	8.5	
			V _{CC} = 1.8V	8.6	
			V _{CC} = 2.5V	9.0	
			V _{CC} = 3.3 V	9.6	

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

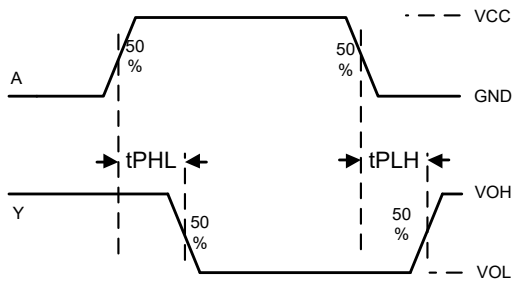


Figure 3. Switching Waveform

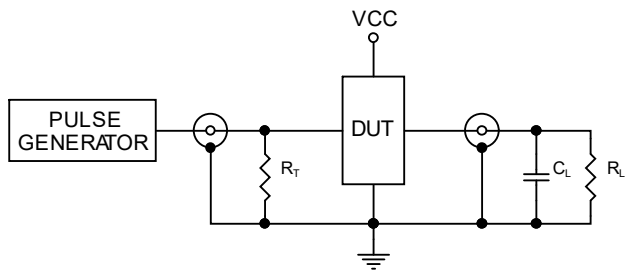
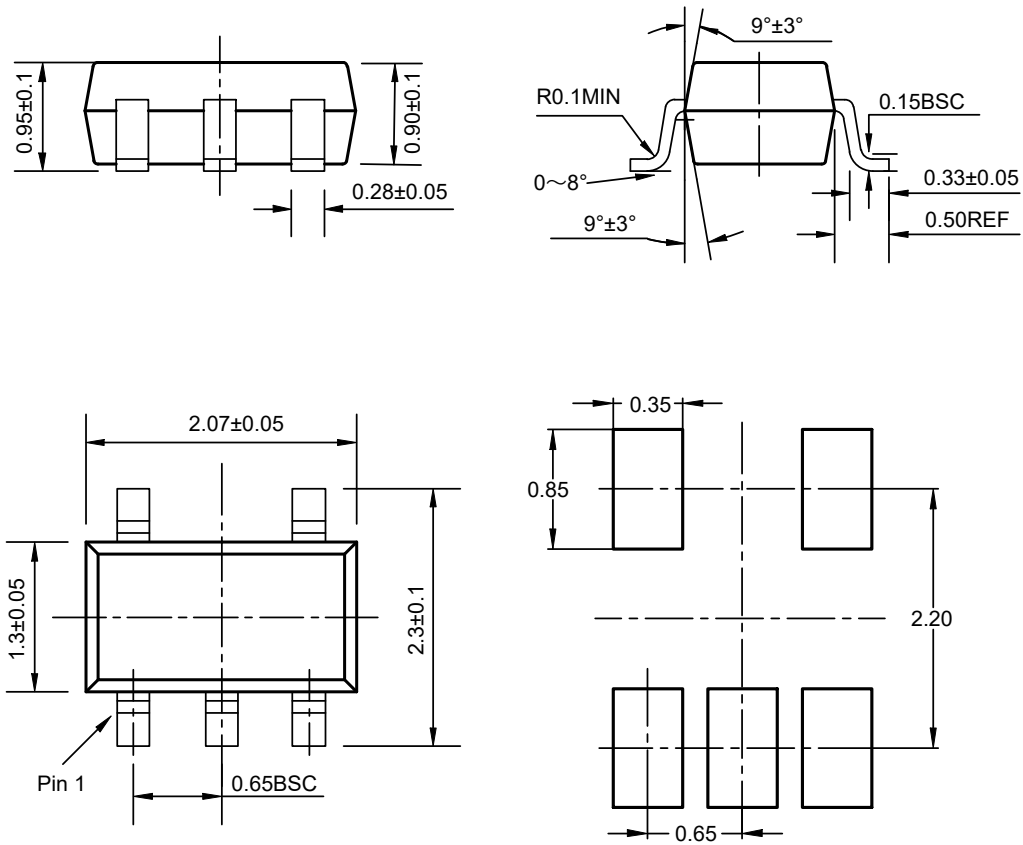


Figure4. Test Circuit

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Package Dimension

SC70-5

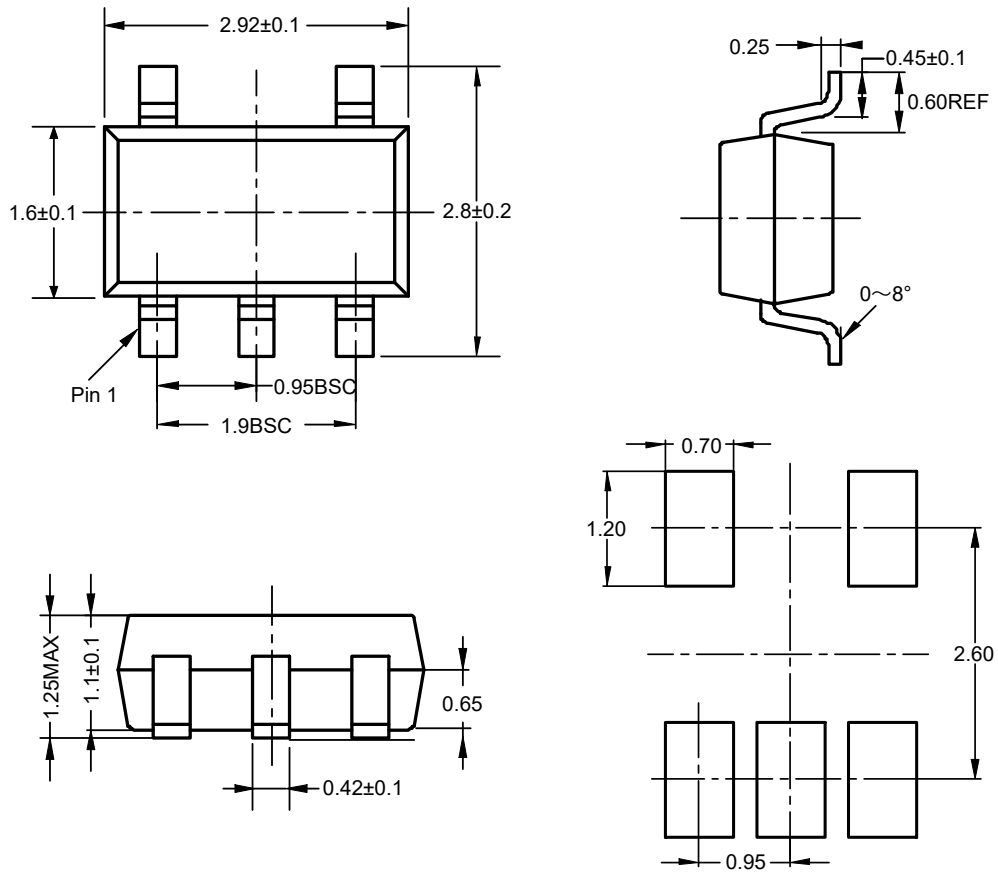


Recommended Land Pattern

Unit: mm

ET74AUP1G04

SOT23-5

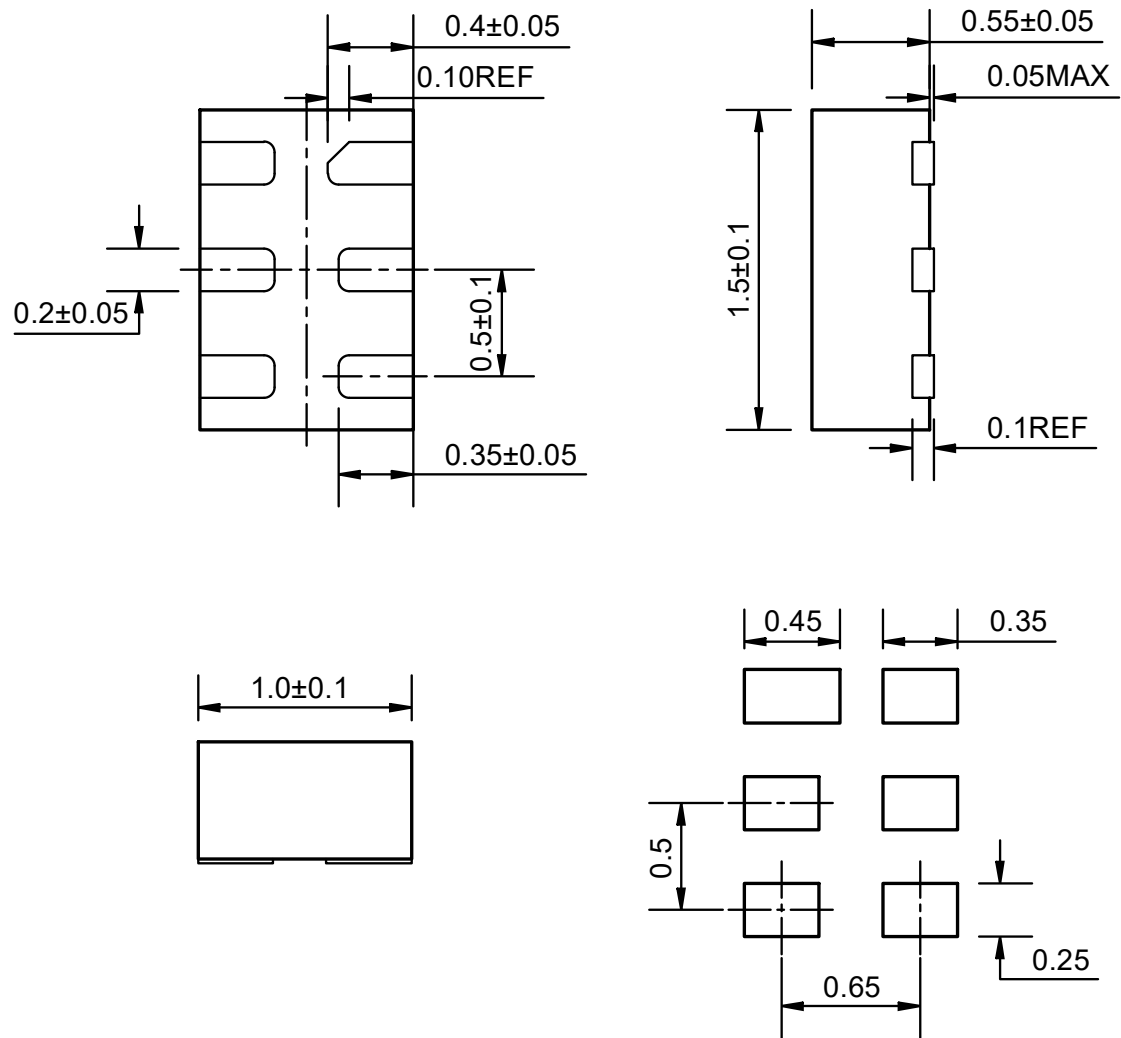


Recommended Land Pattern

Unit: mm

ET74AUP1G04

DFN6 (1.0×1.5)



Recommended Land Pattern

Unit: mm

Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
1.0	2023-12-04	Original Version	Luh Shibo	Luh	Liu Jiaying