Single 2−input AND Gate

General Description

The ET74AUP1G08 is a single 2−input AND Gate operating from a 0.8V to 3.6V supply. This device is fabricated with advanced CMOS technology to achieve ultra-high speed with high output drive.

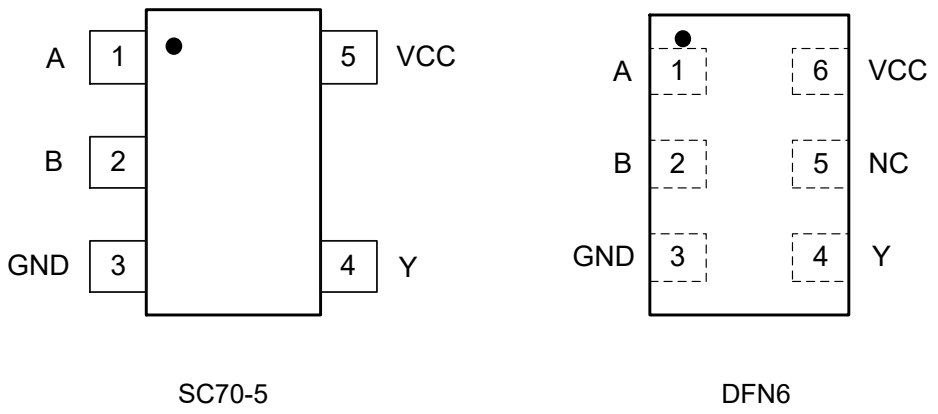
Features

- Designed for 0.8V to 3.6V VCC Operation
- Low static power consumption; I_{CC} = 0.7μA (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
- Packages are SC70-5 or small DFN6
- MSL1 (DFN6) , MSL3(SC70-5)

Device Information

Part No.	Package	Size
ET74AUP1G08	SC70-5	1.3mm×2.1mm
ET74AUP1G08Y	DFN6	1.0mm×1.5mm
ET74AUP1G08N	DFN6	1.0mm×1.0mm

Pin Configuration



SC70-5 DFN6

Figure1. Top View

Pin Function

Pin No.		Pin Name	Function
SC70-5	DFN6		
1	1	A	Input A
2	2	B	Input B
3	3	GND	Ground
4	4	Y	Output
/	5	NC	No Connect
5	6	VCC	Supply Voltage

Block Diagram

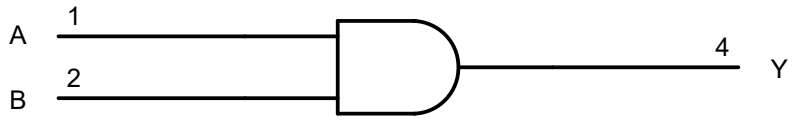


Figure2. Logic Symbol

Functional Description

Function Table

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

Absolute Maximum Ratings

Symbol	Parameter		Value	Unit
V_{CC}	DC Supply Voltage		-0.5 to 4.6	V
V_I	DC Input Voltage (1)		-0.5 ≤V_I ≤+4.6	V
V_O	DC Output Voltage Output in Higher or Low State		-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 this 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. IO absolute maximum rating must be observed.

Note2. Tested to EIA/JESD22−A114−A.

Note3. Tested to JESD22−C101−A.

Note4. 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
	DFN6(1×1.5)		440	
	DFN6(1×1)		440	
$R_{\theta JB}$	SC70-5	Thermal Characteristics, Thermal Resistance, Junction-to-board	75	°C/W
	DFN6(1×1.5)		270	
	DFN6(1×1)		285	
P_D	SC70-5	Power Dissipation in Still Air at 85°C	215	mW
	DFN6(1×1.5)		260	
	DFN6(1×1)		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 to 3.6V	0	20	ns/V

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 ≤ 125°C		Unit
				Min	Typ	Max	Min	Max	
V_{IH}	High−Level Input Voltage		0.8	0.75Vcc			0.75Vcc		V
			0.9 to 1.95	0.7Vcc			0.7Vcc		
			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			0.25Vcc		0.25Vcc	V
			0.9 to 1.95			0.3Vcc		0.3Vcc	
			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	Vcc−0.1			Vcc−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}=3.6V or V_{OUT}=3.6V	0			±0.2		±0.5	uA
I_{CC}	Quiescent Supply Current	V_{IN} = 3.6V or GND	3.6			±0.2		±0.7	uA

AC Electrical Characteristics

$t_r = t_f$ = 2.5ns

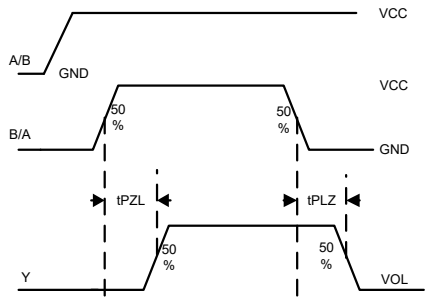
Symbol	Parameter	Condition	V_{CC}(V)	T_A = 25°C			−40°C ≤ T_A ≤125°C		Unit
				Min	Typ	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation Delay (Figure3 And 4)	C_L= 5pF(5)	0.8	13.2	29	90.1	11.9	220	ns
			1.2	5.0	7.6	14.3	4.6	14.4	
			1.5	3.4	4.8	8.9	3	9.6	
			1.8	2. 7	3.6	6.9	2.3	7.6	
			2.5	1.9	2.4	5.1	1.6	5.6	
			3.3	1.5	1.9	4.4	1.3	4.8	
		C_L= 10pF(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= 15pF(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= 30pF(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		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: $I_{CC(OPR)}=C_{PD}\times V_{CC}\times fin+I_{CC}\times C_{PD}$ is used to determine the no−load dynamic power consumption; $P_D=C_{PD}\times V_{CC}^2\times fin+I_{CC}\times V_{CC}\times Fig.$



PROPAGATION DELAYS

tR = tF = 2.5 ns, 10% to 90%;

f = 1 MHz; tW = 500 ns

Figure 3. Switching Waveforms

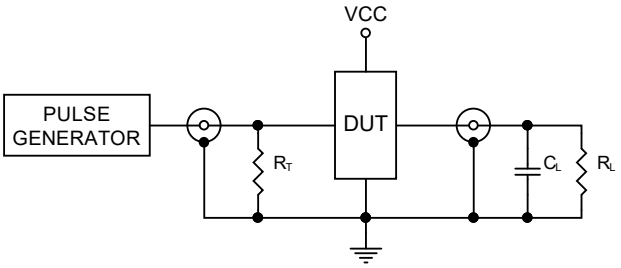
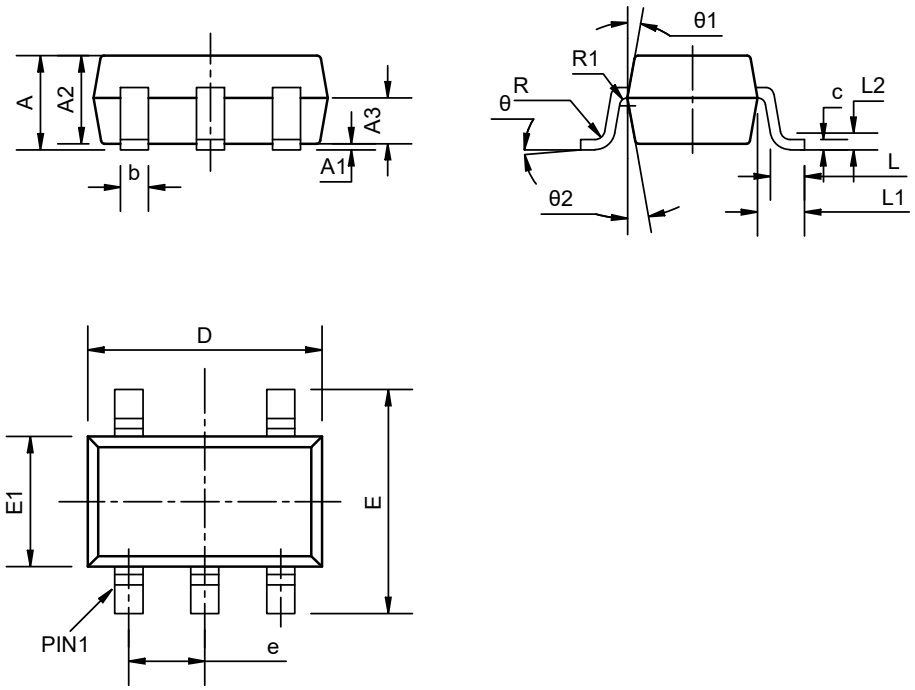


Figure4. Test Circuit RT=50Ω (typ)

Package Dimension

SC70-5

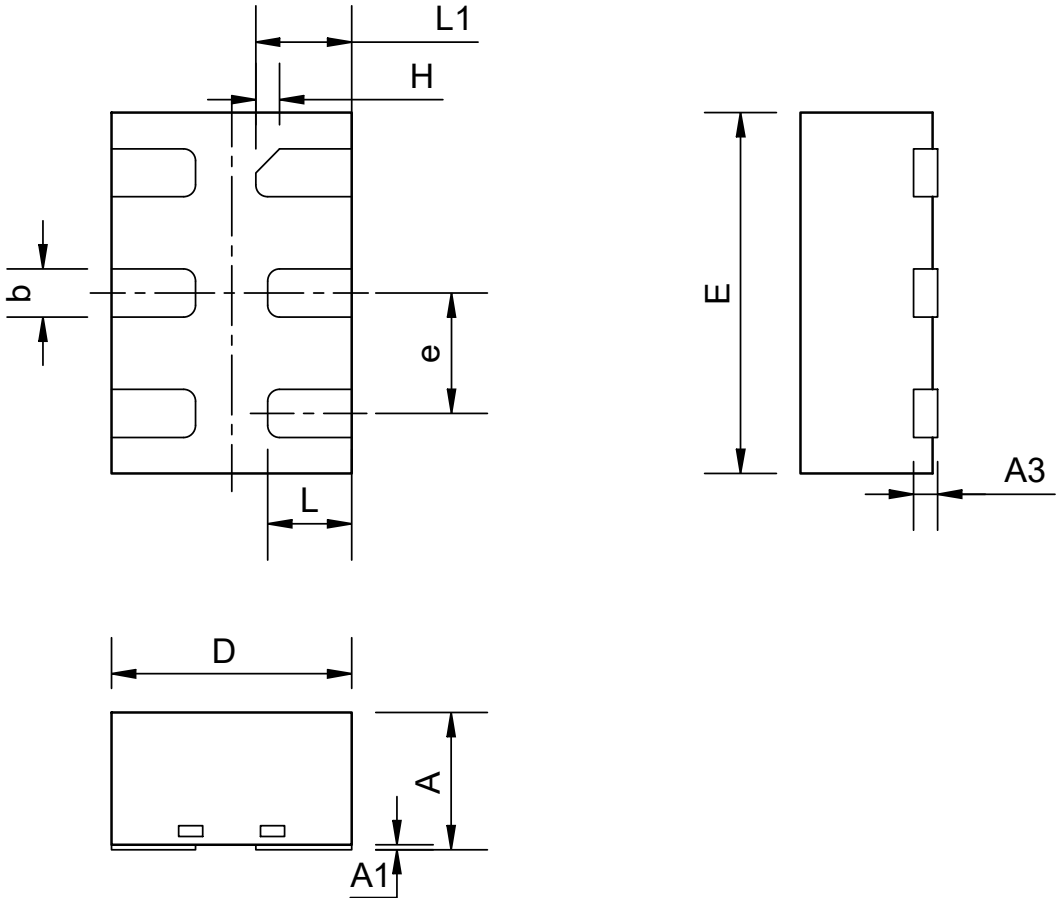


COMMON DIMENSIONS

(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.85	--	1.05
A1	0	--	0.10
A2	0.80	0.90	1.00
A3	0.47	0.52	0.57
b	0.23	--	0.33
c	0.12	--	0.18
D	2.02	2.07	2.12
E	2.20	2.30	2.40
E1	1.25	1.30	1.35
e	0.60	0.65	0.70
L	0.28	0.33	0.38
L1	0.50REF		
L2	0.15BSC		
R	0.10	--	--
R1	0.10	--	0.25
θ	0°	--	8°
θ1	6°	9°	12°
θ2	6°	9°	12°

DFN6(1.0×1.5)

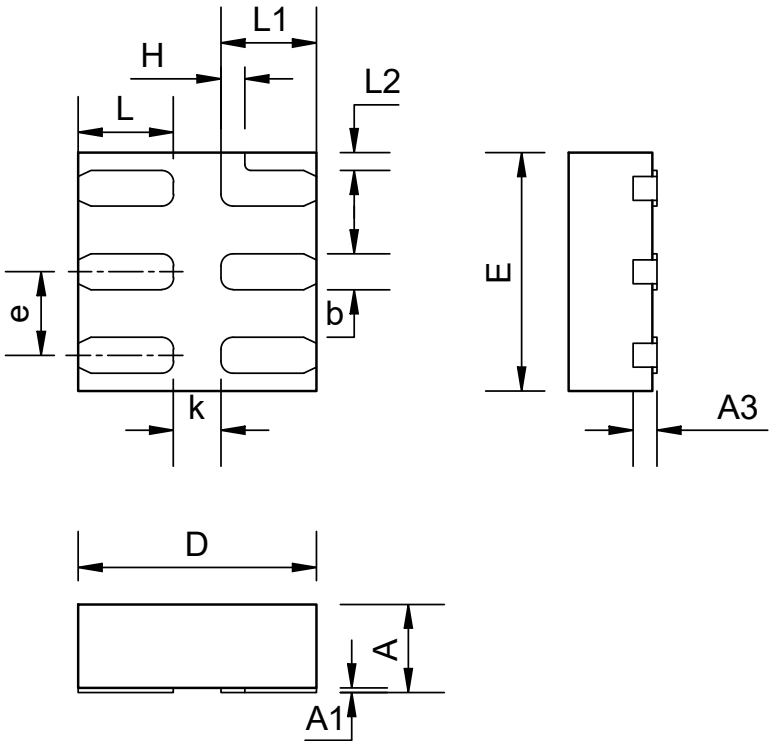


COMMON DIMENSIONS

(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.50	--	0.60
A1	0	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	0.40	0.50	0.60
H		0.10REF	
L	0.30	0.35	0.40
L1	0.35	0.40	0.45

DFN6(1×1)

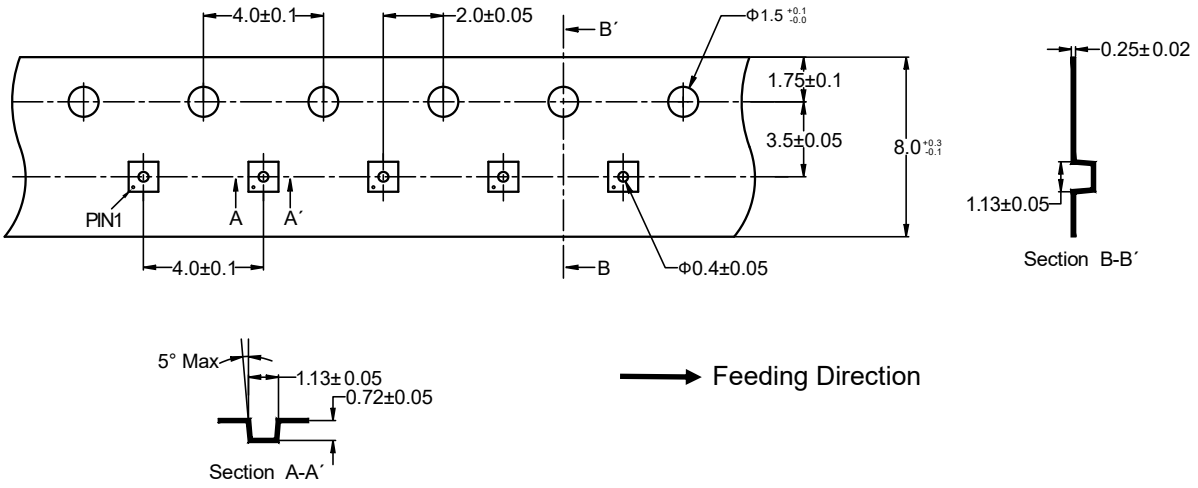


COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.34	0.37	0.40
A1	0	0.02	0.05
A3		0.10REF	
b	0.10	0.15	0.20
D	0.95	1.00	1.05
E	0.95	1.00	1.05
e	0.30	0.35	0.40
H		0.10REF	
K	0.15	--	--
L	0.35	0.40	0.45
L1	0.35	0.40	0.45
L2		0.075REF	

Tape Information

DFN6 (1×1)



Unit: mm

Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
1.0	2022-04-18	Initial Version	Shi LiangJun	Shi LiangJun	Liu Jia Ying
1.1	2022-09-08	Update Typeset	Shibo	Shi LiangJun	Liu Jia Ying
1.2	2022-10-14	Update format and Thermal Characteristics	Wuhan	Shi LiangJun	Liu Jia Ying
1.3	2023-11-29	Update ESD/ Tape picture	Shibo	Shibo	Liujy