Single 2-Input AND Gate

General Description

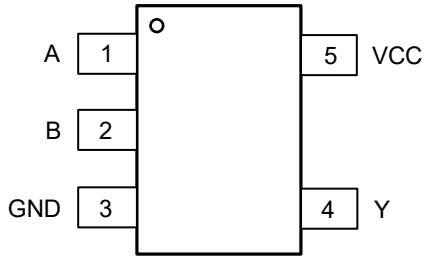
The ET74AHCT1G08 device is a single 2-input positive-AND gate. The device performs the Boolean function Y = A • B or Y = $\overline{A + B}$ in positive logic. Low I_{CC} current allows this device to be used in power-sensitive or battery-powered applications.

Features

- Operating Range: 4.5V to 5.5V
- Maximum t_{pd} of 10ns at 5V
- Low Power Consumption: Maximum I_{CC} of 10μA
- ±8mA Balanced Output Sink and Source Capability
- Inputs are TTL Voltage Compatible
- 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
ET74AHCT1G08	SC70-5 (1.3mm × 2.1mm)	Tape and Reel, 3K/Reel	3
ET74AHCT1G08T	SOT23-5 (1.6mm × 2.9mm)	Tape and Reel, 3K/Reel	3

Pin Configuration



SC70-5/SOT23-5

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

Block Diagram

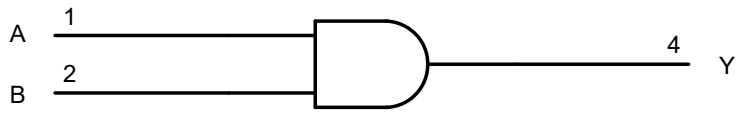


Figure2. Logic Symbol

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 (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 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: 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	
$R_{\theta JB}$	SC70-5	Thermal Characteristics, Thermal Resistance, Junction-to-board	75	mW
	SOT23-5		65	
P_D	SC70-5	Power Dissipation in Still Air at 85°C	215	
	SOT23-5		260	

Recommended Operating Conditions

Symbol	Parameter	Min	Max	Unit
V_{CC}	Supply Voltage	4.5	5.5	V
V_I	Input Voltage	0	V_{CC}	V
V_O	Output Voltage	0	V_{CC}	V
I_{OH}	High-level Output Current		-8	mA
I_{OL}	Low-level Output Current		8	mA
$\Delta t/\Delta V$	Input Transition Rise and Fall Rate		20	ns/V
T_A	Operating Temperature Range	-40	125	°C

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		4.5	2			2		V
			5.5	2			2		
V_{IL}	Low-Level Input Voltage		4.5			0.8		0.8	V
			5.5			0.8		0.8	
V_{OH}	High-Level Output Voltage	I_{OH} = -50μA	4.5	4.4	4.5		4.4		V
		I_{OH} = -8mA	4.5	3.94			3.8		
V_{OL}	Low-Level Output Voltage	I_{OL} = 50μA	4.5			0.1		0.1	V
		I_{OL} = 8mA	4.5			0.36		0.44	
I_I	Input Current	V_I = 5.5V or GND	0~5.5			±0.1		±1	μA
I_{CC}	Supply Current	V_I = V_{CC} or GND, I_O = 0mA	5.5			1.0		10	μA
ΔI_{CC} [(5)]	Change In Supply Current	One Input at 3.4V, Other Inputs at V_{CC} or GND	5.5			1.35		1.5	mA
C_{IN}	Input Capacitance	V_I = V_{CC} or GND	5		4	10			pF

Note5: This is the increase in supply current for each input at one of the specified TTL voltage levels, rather than 0 V or V_{CC}.

AC Electrical Characteristics

$t_r = t_f$ = 3ns; Over recommended operating free-air temperature range, V_{CC} = 5V ± 0.5V (unless otherwise noted) (see Figure3)

Symbol	Parameter	Condition	T_A = 25°C			-40°C ≤ T_A ≤ 125°C		Unit
			Min	Typ	Max	Min	Max	
t_{PLH}	Propagation Delay	C_L = 15pF		7	10	1.0	12	ns
t_{PHL}		C_L = 50pF		8.5	12	1.0	14	ns

Capacitance Characteristics

V_{CC} = 5V, T_A = 25°C

Symbol	Parameter	Condition	Typ	Unit
C_{PD}	Power Dissipation Capacitance (6)	No Load, f = 1MHz	18	pF

Note6. 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;

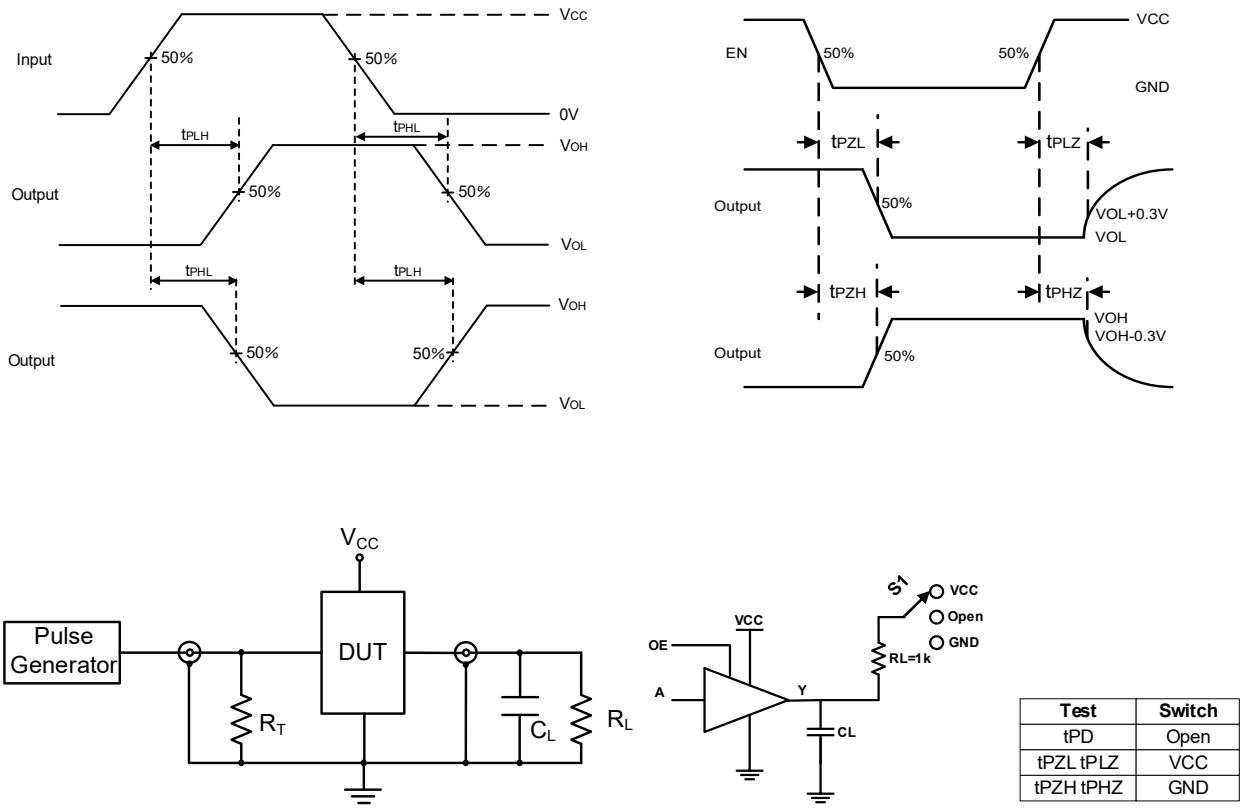
C_L = output load capacitance in pF;

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



Test	Switch
tPD	Open
tPZL tPLZ	VCC
tPZH tPHZ	GND

C_L includes probe and jig capacitance

All input pulses are supplied by generators having the following characteristics:

PRR ≤ 1MHz, Z_O = 50Ω, t_r ≤ 3ns, t_f ≤ 3ns.

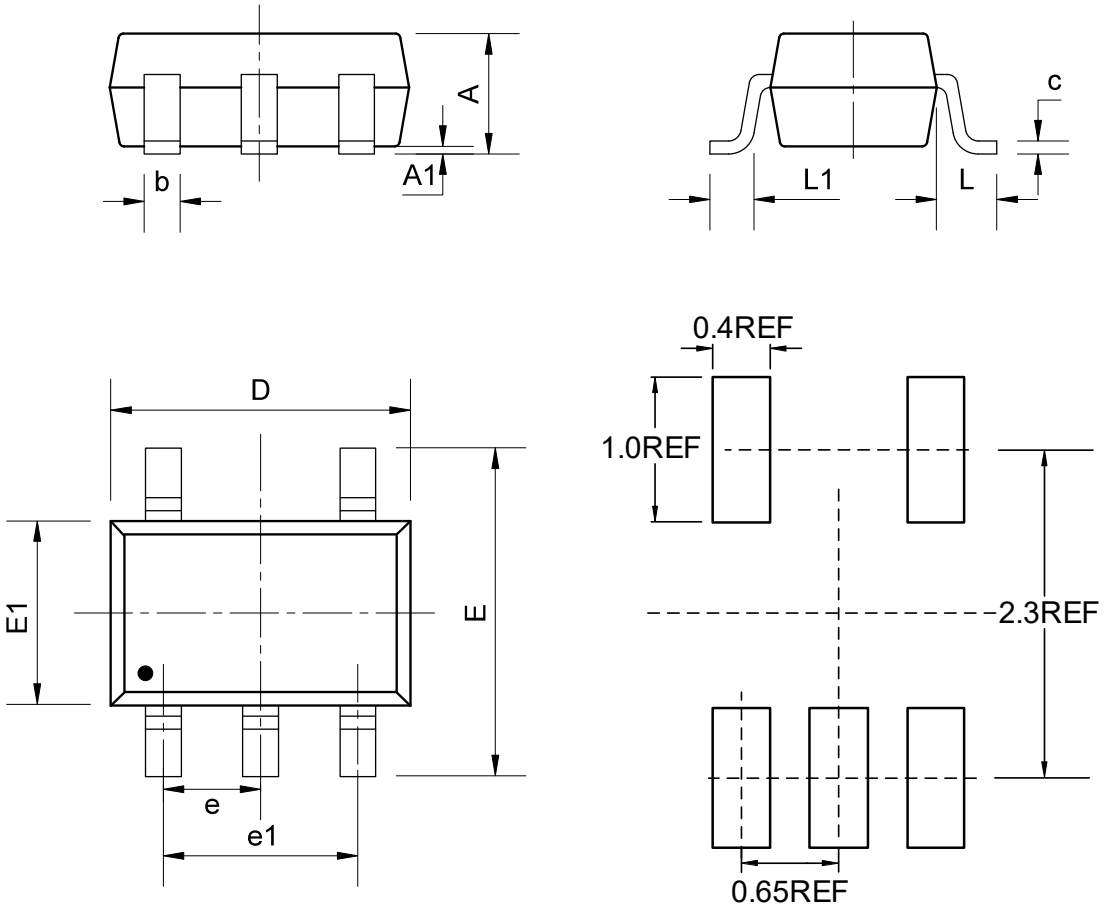
The outputs are measured one at a time with one input transition per measurement.

All parameters and waveforms are not applicable to all devices.

Figure3. Load Circuit and Voltage Waveforms

Package Dimension

SC70-5 (1.3mm × 2.1mm)

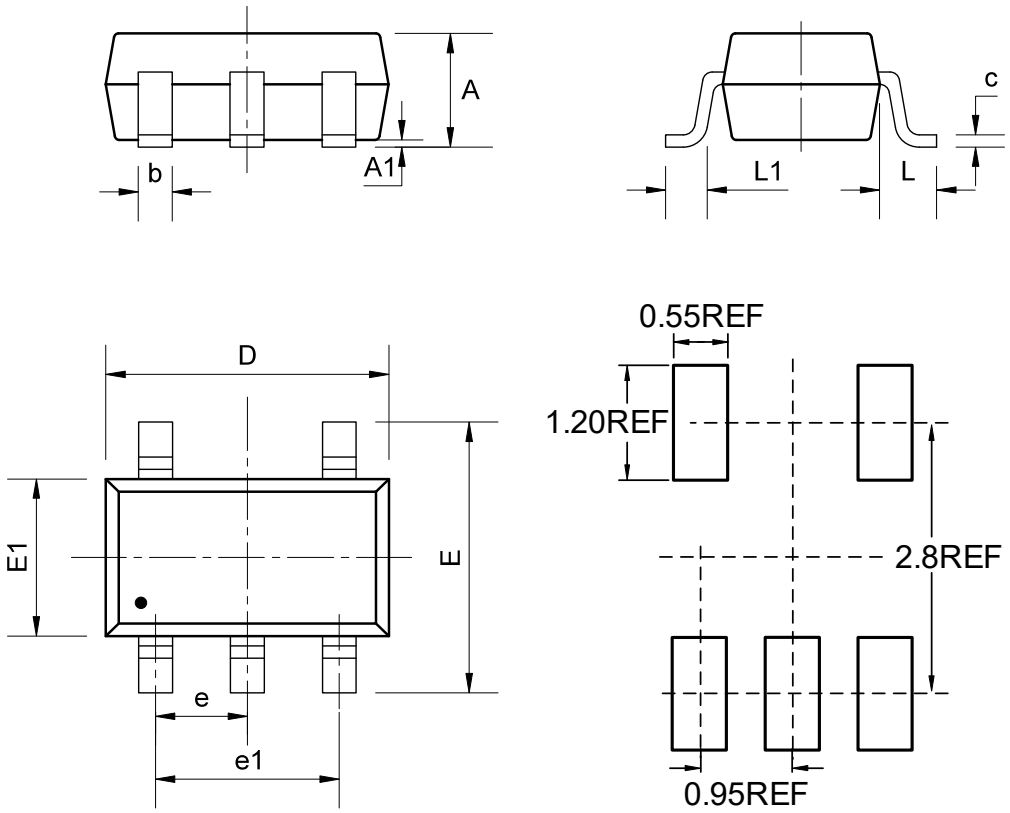


COMMON DIMENSIONS

(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)



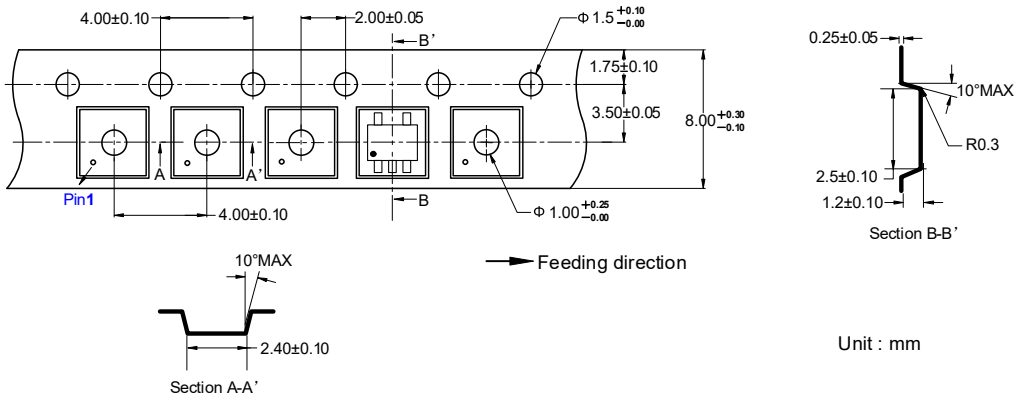
COMMON DIMENSIONS

(Unit: mm)

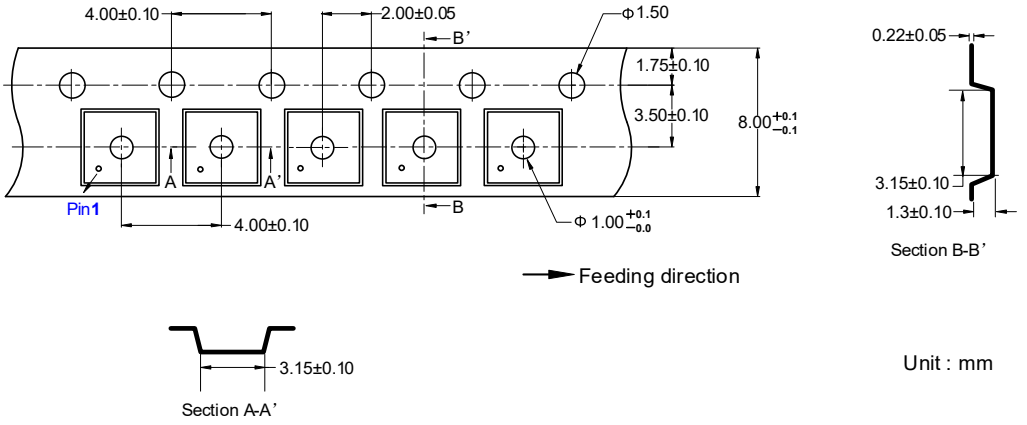
SYMBOL	MIN	NOM	MAX
A	-	-	1.45
A1	0.00	-	0.15
b	0.28	0.35	0.50
c	0.08	0.15	0.22
D	2.75	2.9	3.05
e	0.90	0.95	1.00
e1	1.80	1.90	2.00
E	2.60	2.80	3.00
E1	1.45	1.6	1.75
L	0.60REF		
L1	0.30	0.45	0.60

Tape Information

SC70-5 (1.3mm × 2.1mm)



SOT23-5 (1.6mm × 2.9mm)



Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
0.0	2025-06-18	Preliminary Version	Yang xiaoxu	Yang xiaoxu	Liu jiaying
1.0	2025-09-02	Original Version	Peng junjie	Yang xiaoxu	Liu jiaying
1.1	2025-10-28	Add Tape Information	Wang anran	Yang xiaoxu	Liu jiaying