Single 2-Input AND Gate

General Description

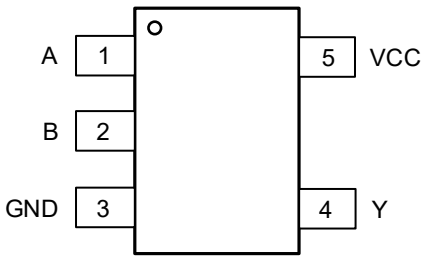
The ETQ74AHCT1G08 device is a single 2-input positive-AND gate. The device performs the Boolean function Y = A • B or Y = $\overline{A + B}$ in positive logic. Low I_{CC} current allows this device to be used in power-sensitive or battery-powered applications.

Features

- Designed for 4.5V to 5.5V V_{CC} Operation
- Over-voltage Tolerant Inputs Accept Voltages to 5.5V
- ±8mA Balanced Output Sink and Source Capability
- Near Zero Static Supply Current Substantially Reduces System Power Requirements
- These Devices are Pb-Free and RoHS Compliant
- Multiple Package Options Automotive AEC-Q100 Grade 1 Qualified
  -- Ambient Temperature Range of -40°C to 125°C
  -- ESD HBM ±4KV PASS
  -- ESD CDM ±1KV PASS
  -- Latch Up Current to ±100mA PASS
- Part No. and Package Information

Part No.	Package	Packing Option	MSL
ETQ74AHCT1G08	SC70-5 (1.3mm × 2.1mm)	Tape and Reel, 3K/Reel	1
ETQ74AHCT1G08T	SOT23-5 (1.6mm × 2.9mm)	Tape and Reel, 3K/Reel	1

Pin Configuration



SOT23-5/SC70-5

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

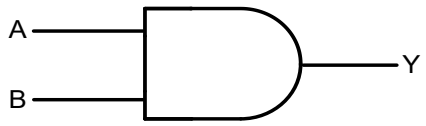


Figure2. Logic Symbol

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 6.5	V
V_I	DC Input Voltage (1)		-0.5 ≤ V_I ≤ 6.5	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		-20	mA
I_{OK}	DC Output Diode Current, V_O < GND, V_O > V_{CC}		±20	mA
I_O	DC Output Sink Current		±25	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, 1 mm from Case for 10 Seconds		260	°C
T_J	Junction Temperature Under Bias		150	°C
V_{ESD}	ESD Classification	Human Body Model (2)	±4000	V
		Charged Device Model (3)	±1000	
I_{LU}	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 AEC-Q100-002(JEDEC JS-001);

Note3: CDM tested per AEC-Q100-011(JEDEC JS-002);

Note4: Latch up Current Maximum Rating tested per AEC-Q100-004(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	°C/W
	SOT23-5		65	

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
$\Delta t/\Delta v$	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

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

AC Electrical Characteristics

$t_r = t_f$ = 3ns, $R_1 = R_L$ = 1kΩ; Over recommended operating free-air temperature range, V_{CC} = 5V ± 0.5V (unless otherwise noted)

Symbol	Parameter	Condition	T_A = 25°C			-40°C ≤ T_A ≤ 85°C		-40°C ≤ T_A ≤ 125°C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
t_{PLH}	Propagation Delay	C_L = 15pF		5	6.2	1	7.1	1	7.5	ns
t_{PHL}		C_L = 15pF		5	6.2	1	7.1	1	7.5	ns
t_{PLH}		C_L = 50pF		5.5	7.9	1	9	1	10	ns
t_{PHL}		C_L = 50pF		5.5	7.9	1	9	1	10	ns

Capacitance Characteristics

V_{CC} = 5V, T_A = 25°C

Symbol	Parameter	Condition	Typ	Unit
C_{IN}	Input Capacitance	V_{CC} = 5.5V, V_I = 0V or V_{CC}	4	pF
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.

Waveform and Test Circuit

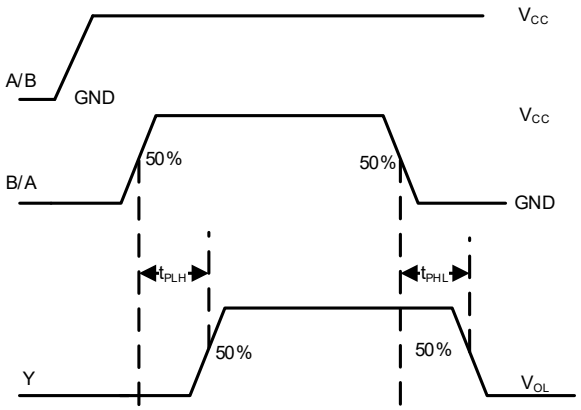
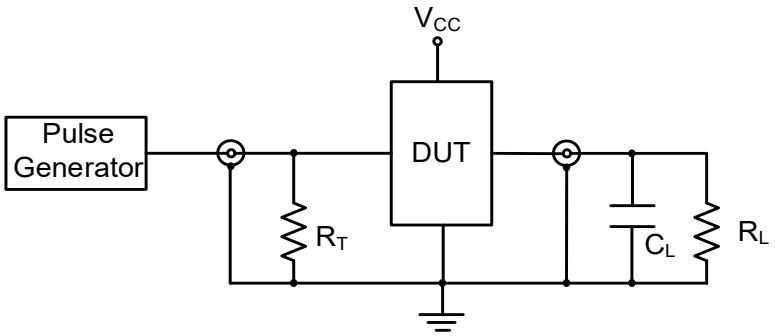


Figure3. Switching Waveform

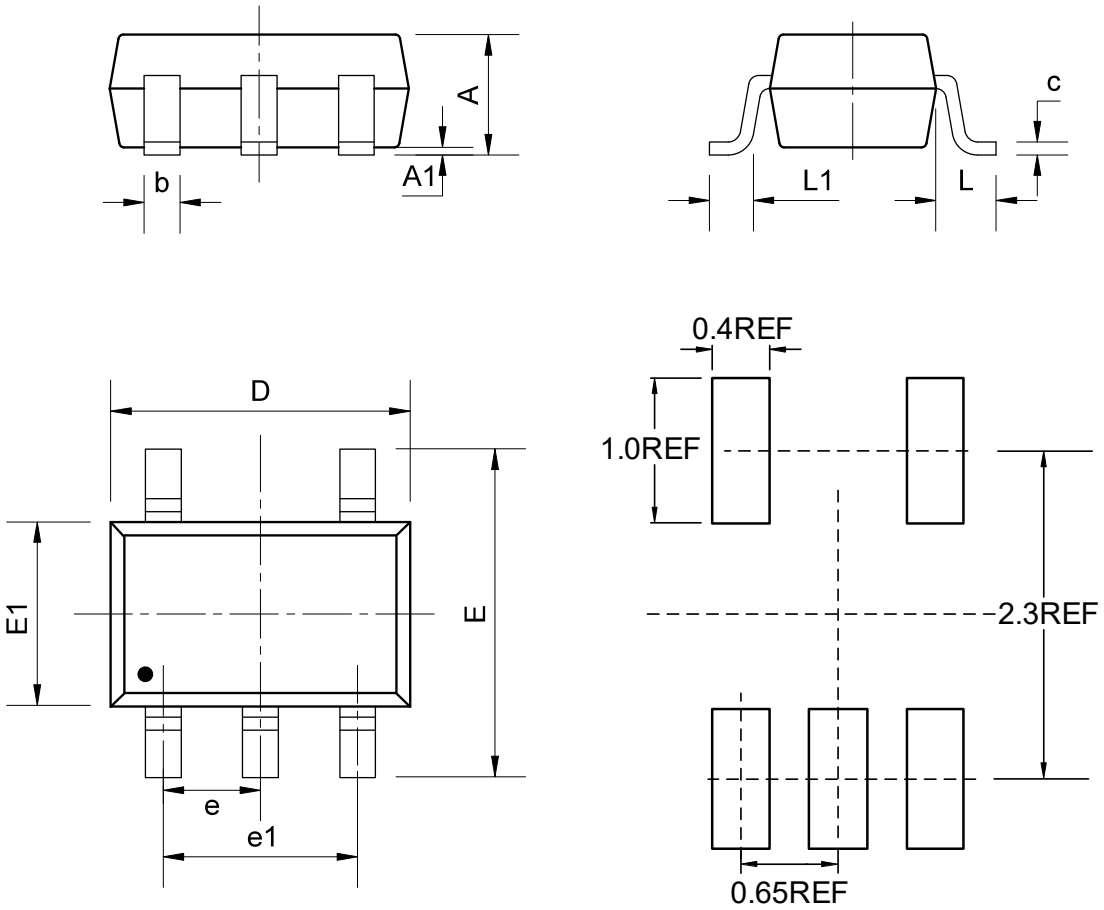


R_T = 50Ω (Typ)

Figure4. Test Circuit

Package Dimension

SC70-5 (1.3mm × 2.1mm)

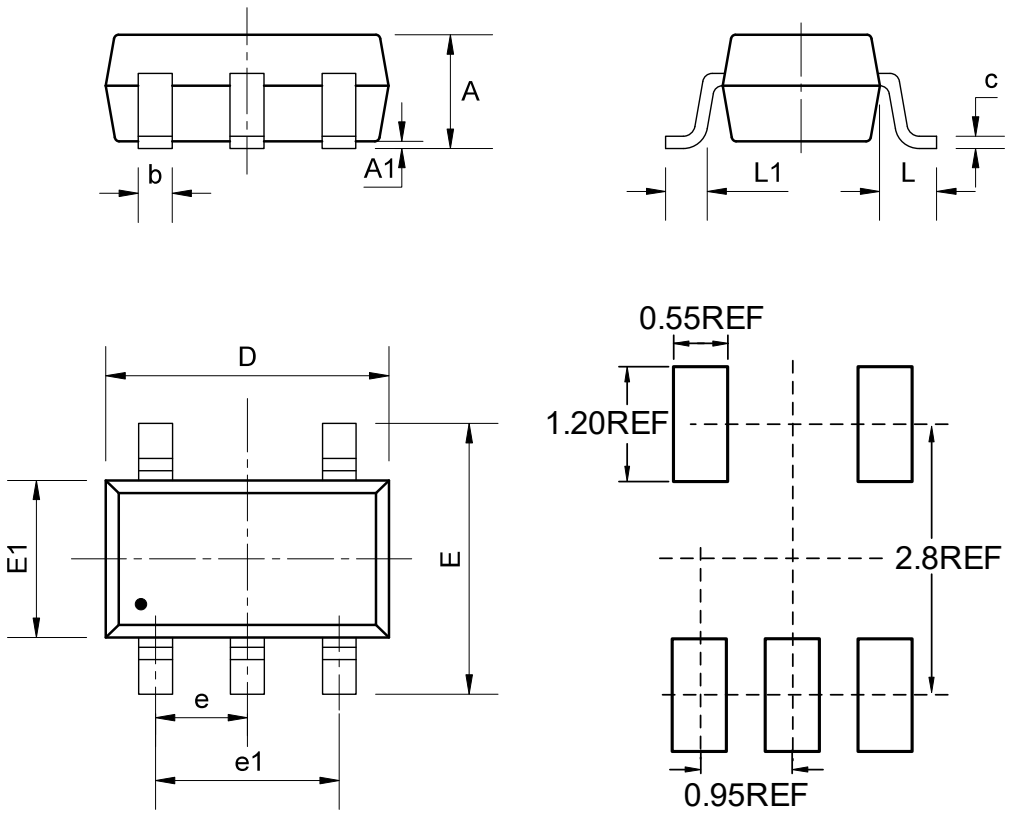


COMMON DIMENSIONS

(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)



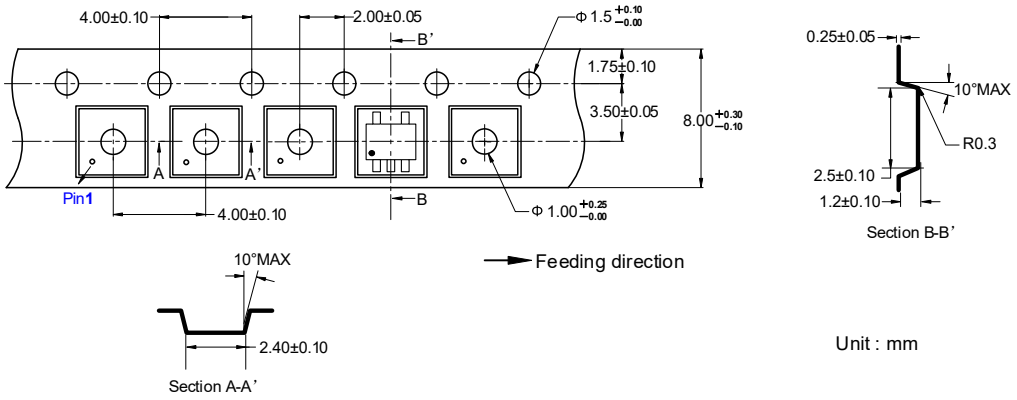
COMMON DIMENSIONS

(Unit: mm)

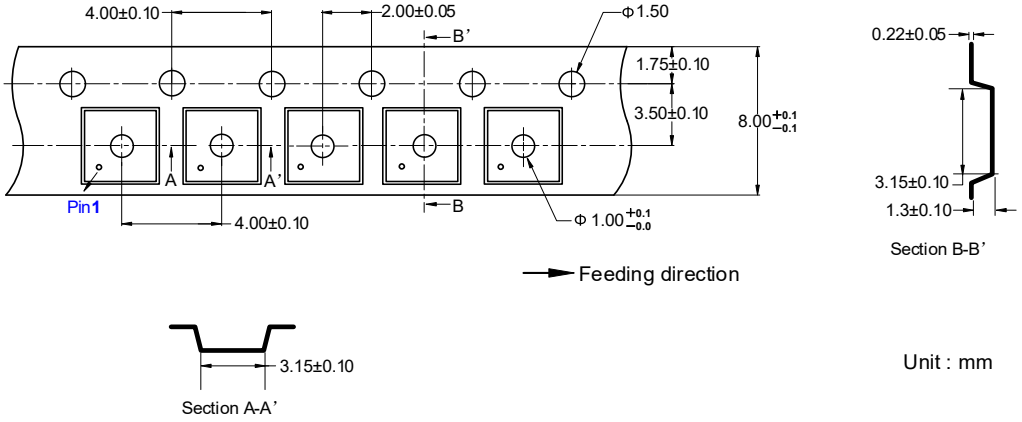
SYMBOL	MIN	NOM	MAX
A	-	-	1.45
A1	0.00	-	0.15
b	0.28	0.35	0.50
c	0.08	0.15	0.22
D	2.75	2.9	3.05
e	0.90	0.95	1.00
e1	1.80	1.90	2.00
E	2.60	2.80	3.00
E1	1.45	1.6	1.75
L	0.60REF		
L1	0.30	0.45	0.60

Tape Information

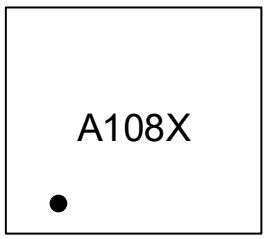
SC70-5 (1.3mm × 2.1mm)



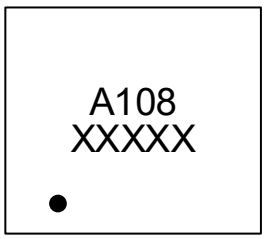
SOT23-5 (1.6mm × 2.9mm)



Marking Information



ETQ74AHCT1G08
A108 = Part Number
X = Tracking Number



ETQ74AHCT1G08T
A108 = Part Number
XXXXX = Tracking Number

Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
0.0	2025-05-08	Preliminary Version	Yu yifan	Yang xiaoxu	Liu jiaying
0.1	2025-06-07	Add Packaging Option	Yang xiaoxu	Yang xiaoxu	Liu jiaying
0.2	2025-10-15	Update Format	Wang anran	Yang xiaoxu	Liu jiaying
1.0	2026-03-25	Official Version	Wang anran	Yang xiaoxu	Liu jiaying
1.0.a	2026-04-21	Update Format	Xu tao	Yang xiaoxu	Liu jiaying