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.

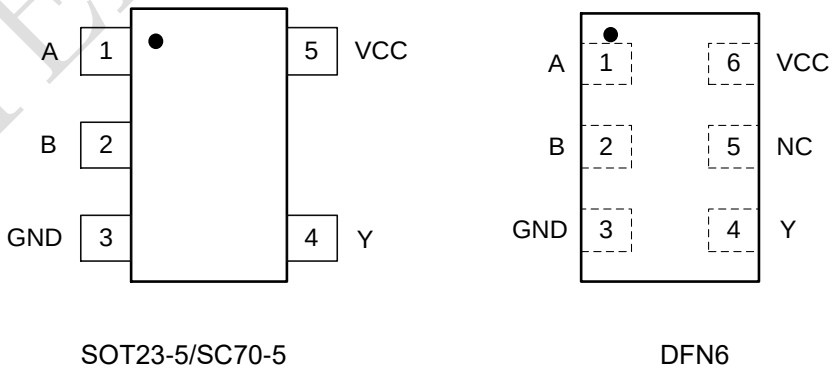
Features

- Operating Range: 4.5 V to 5.5 V
- Maximum tpd of 7.1 ns at 5 V
- Low Power Consumption: Maximum I_{CC} of 10 μA
- ±8 mA Output Drive at 5 V
- Inputs are TTL-Voltage Compatible
- 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

Device Information

Part No.	Package	MSL
ETQ74AHCT1G08	SC70-5 (1.3mm×2.1mm)	3
ETQ74AHCT1G08T	SOT23-5 (1.6mm×2.9mm)	3
ETQ74AHCT1G08Y	DFN6 (1.0mm×1.5mm)	1

Pin Configuration



SOT23-5/SC70-5 DFN6

Figure1. Top View

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

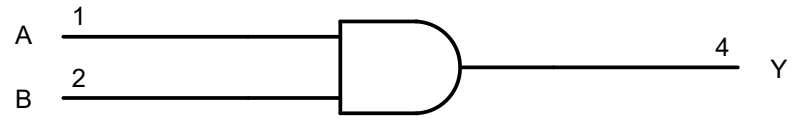


Figure2. Logic Symbol

Functional 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 7.0	V
V_I	DC Input Voltage (1)		−0.5 ≤ V_I ≤+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		−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(EIA/JESD22-A114);

Note3: CDM tested per AEC-Q100-011(EIA/JESD22-C101);

Note4: Latch up Current Maximum Rating tested per AEC-Q100-004(EIA/JESD78E);

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(1.0×1.5)		440	
$R_{\theta JB}$	SC70-5	Thermal Characteristics, Thermal Resistance, Junction-to-board	75	°C/W
	SOT23-5		65	
	DFN6(1.0×1.5)		270	

Recommended Operating Conditions

Symbol	Parameter	Min	Max	Unit
V_{CC}	Supply Voltage	4.5	5.5	V
V_{IH}	High-level Input Voltage	2		V
V_{IL}	Low-level Input Voltage		0.8	V
V_I	Input Voltage	0	5.5	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
Δt/Δv	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_{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_{IN} = 5.5V or GND	0 to 5.5			±0.1		±1	μA
I_{CC}	Supply Current	V_{IN} = V_{CC} or GND, I_O = 0	5.5			1.0		10	μA
ΔI_{CC} [(5)]	Change in Supply Current	One input at 3.4 V, Other Inputs at V_{CC} or GND	5.5			1.35		1.5	mA
C_I	Input Capacitance	V_{IN} = 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}.

Switching Characteristics

Over recommended operating free-air temperature range, V_{CC} = 5V±0.5V (unless otherwise noted)

(see Figure 3)

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

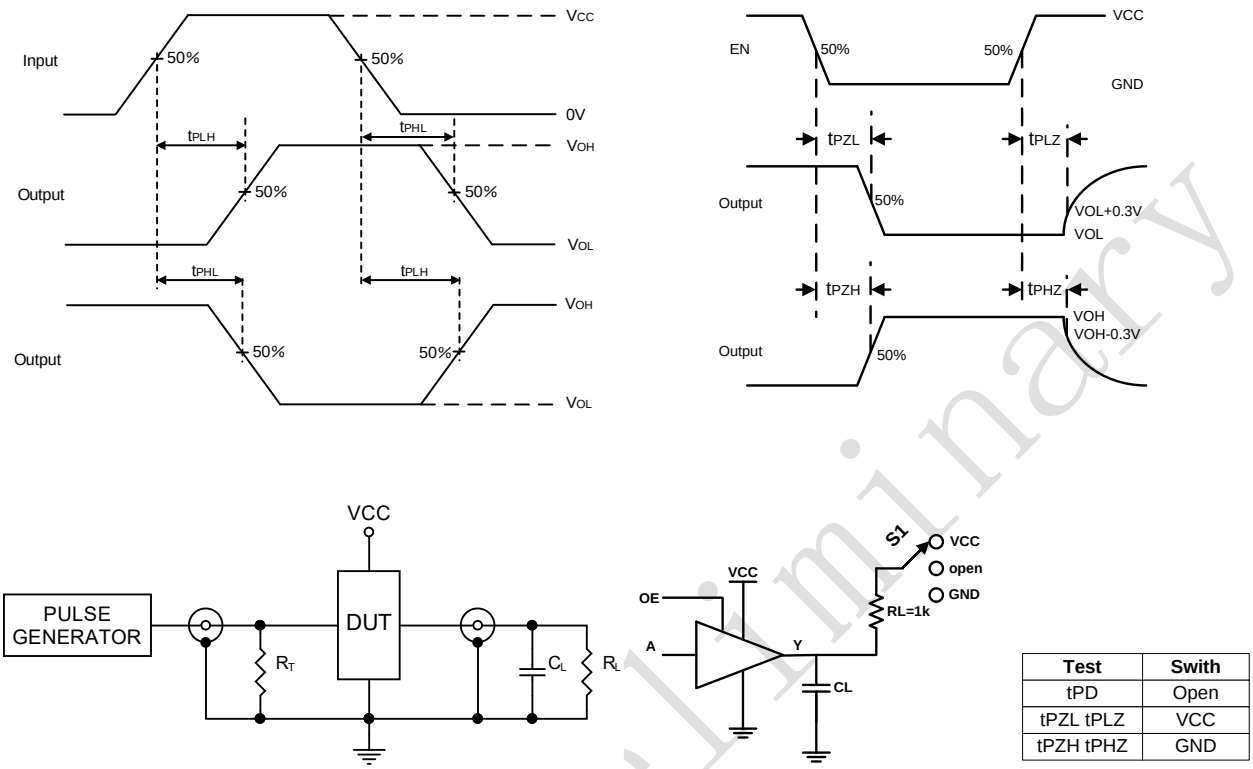
Operating Characteristics

V_{CC} = 5 V, T_A = 25°C

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

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.

Waveform and Test Circuit



Test	Swith
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 ≤ 3 ns.

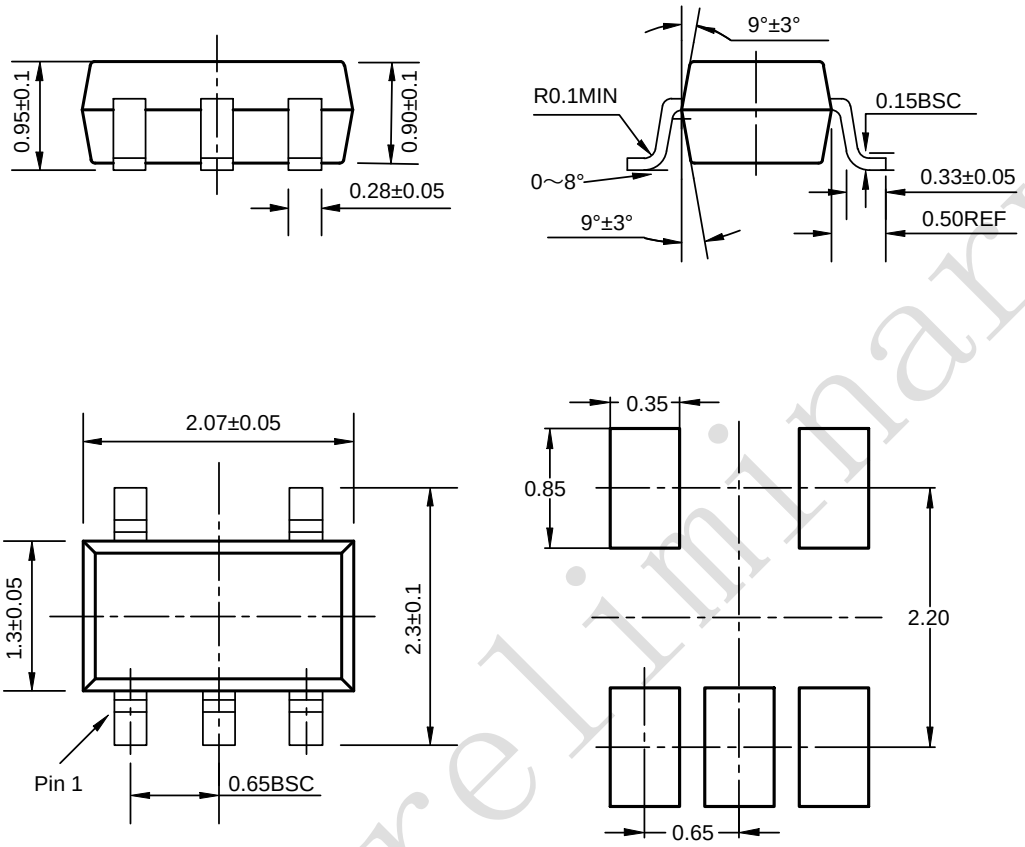
The outputs are measured one at a time with one input transition per measurement.

All parameters and waveforms are not applicable to all devices.

Figure3. Load Circuit and Voltage Waveforms

Package Dimension

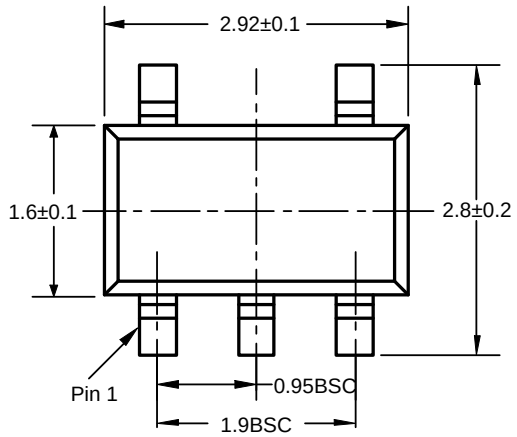
SC70-5

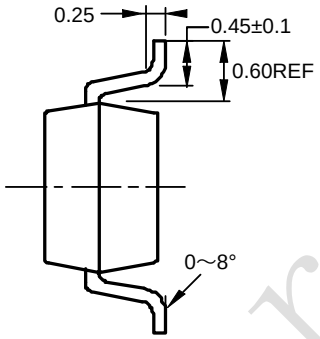


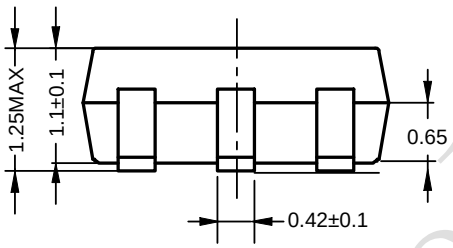
Recommended Land Pattern

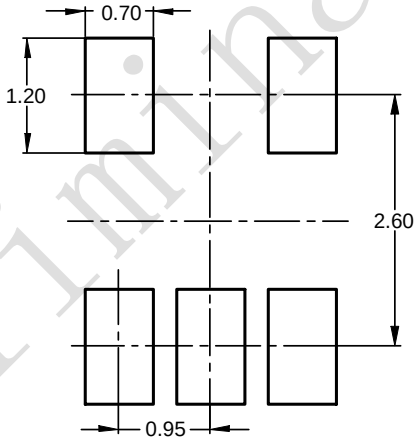
Unit: mm

SOT23-5





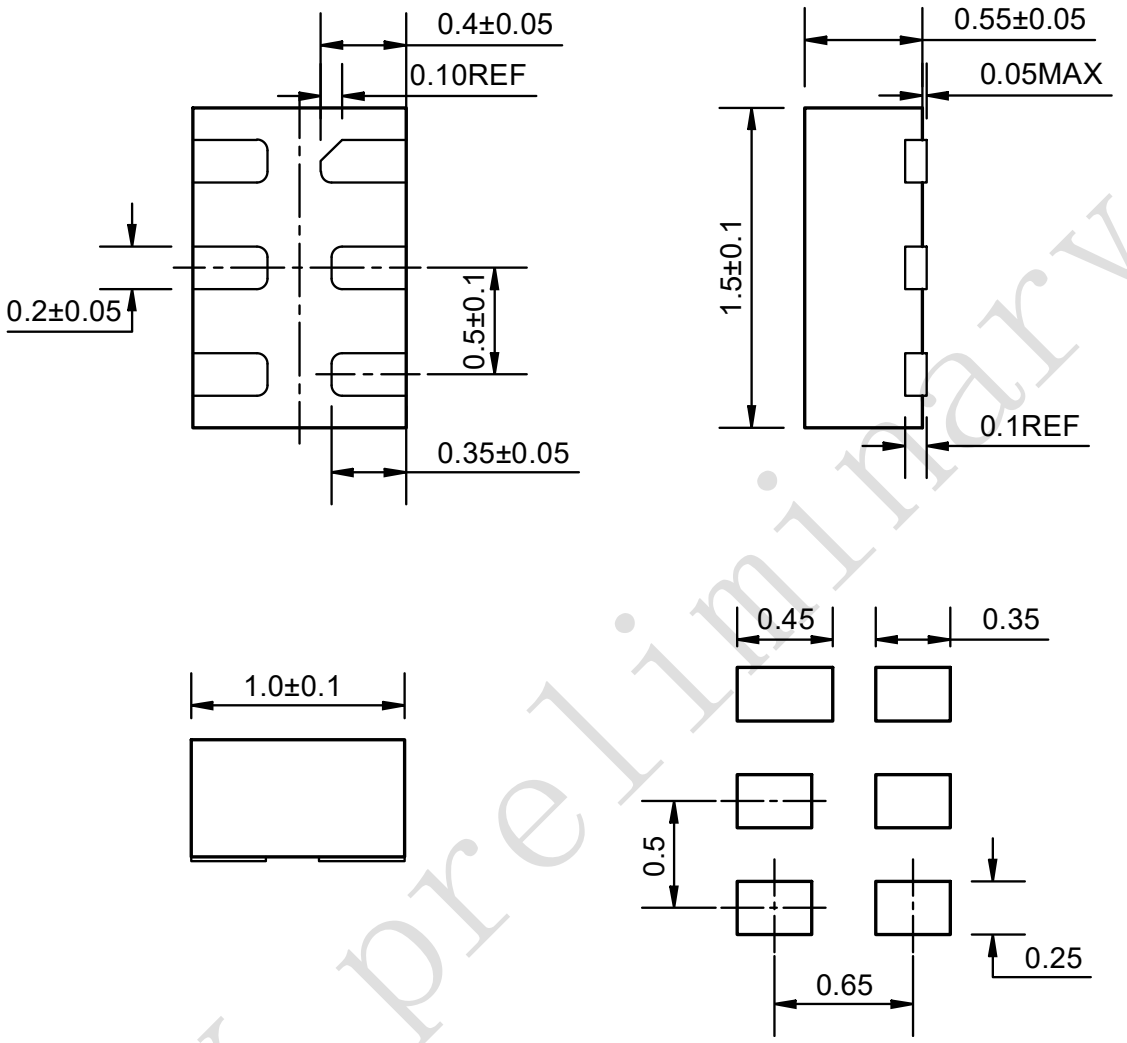




Recommended Land Pattern

Unit: mm

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
0.0	2025-05-08	Preliminary Version	Yuyifan	Yangxiaoxu	Liujy