

### GENERAL DESCRIPTION

The 74AHC1G08Q is a single 2-input AND gate with high-speed CMOS inputs. The supply voltage can range from 2.0V to 5.5V.

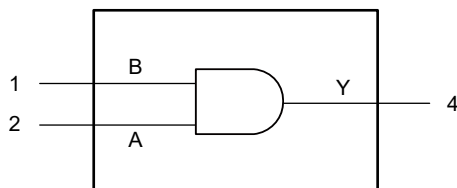
The 74AHC1G08Q is AEC-Q100 qualified (Automotive Electronics Council Standard Q100 Grade 1) and the use of this device is suitable for automotive applications.

The device is available in Green SC70-5 and SOT-23-5 packages. It operates over an ambient temperature range of -40°C to +125°C.

### FEATURES

- **AEC-Q100 (Grade 1) Qualified for Automotive Applications**  
 $T_A = -40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- **Wide Operating Voltage Range: 2.0V to 5.5V**
- **Over-Voltage Tolerant Inputs up to 5.5V**
- **Low Power Dissipation**
- **High Noise Immunity**
- **All Inputs with Schmitt-Trigger Action**
- **-40°C to +125°C Operating Temperature Range**
- **Available in Green SC70-5 and SOT-23-5 Packages**

### LOGIC SYMBOL

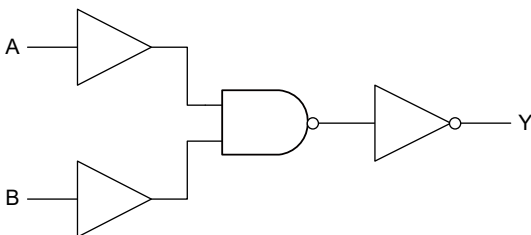


### FUNCTION TABLE

INPUTS		OUTPUT
A	B	Y
L	L	L
L	H	L
H	L	L
H	H	H

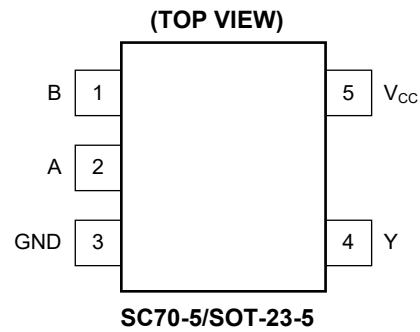
H = High Voltage Level  
 L = Low Voltage Level

### LOGIC DIAGRAM





## PIN CONFIGURATIONS



## PIN DESCRIPTION

PIN	NAME	FUNCTION
1	B	Data Input.
2	A	Data Input.
3	GND	Ground.
4	Y	Data Output.
5	V <sub>CC</sub>	Supply Voltage.

**ELECTRICAL CHARACTERISTICS**(Full = -40°C to +125°C, all typical values are measured at  $T_A = +25^\circ\text{C}$ , unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS				
High-Level Input Voltage	$V_{IH}$	$V_{CC} = 2.0\text{V}$	+25°C	1.1			V				
			Full	1.5							
		$V_{CC} = 3.0\text{V}$	+25°C	1.5			V				
			Full	2.1							
		$V_{CC} = 5.5\text{V}$	+25°C	2.7			V				
			Full	3.85							
Low-Level Input Voltage	$V_{IL}$	$V_{CC} = 2.0\text{V}$	+25°C			0.8	V				
			Full			0.5					
		$V_{CC} = 3.0\text{V}$	+25°C			1.1	V				
			Full			0.9					
		$V_{CC} = 5.5\text{V}$	+25°C			2.0	V				
			Full			1.65					
High-Level Output Voltage	$V_{OH}$	$V_I = V_{IH} \text{ or } V_{IL}$	$I_o = -50\mu\text{A}, V_{CC} = 2.0\text{V}$	+25°C	1.95	1.99		V			
				Full	1.90						
			$I_o = -50\mu\text{A}, V_{CC} = 3.0\text{V}$	+25°C	2.95	2.99		V			
				Full	2.90						
			$I_o = -50\mu\text{A}, V_{CC} = 4.5\text{V}$	+25°C	4.45	4.49		V			
				Full	4.40						
			$I_o = -4.0\text{mA}, V_{CC} = 3.0\text{V}$	+25°C	2.70	2.82		V			
				Full	2.60						
			$I_o = -8.0\text{mA}, V_{CC} = 4.5\text{V}$	+25°C	4.10	4.24		V			
				Full	4.00						
			Low-Level Output Voltage	$V_{OL}$	$V_I = V_{IH} \text{ or } V_{IL}$	$I_o = 50\mu\text{A}, V_{CC} = 2.0\text{V}$	+25°C		0.01	0.05	V
							Full			0.10	
$I_o = 50\mu\text{A}, V_{CC} = 3.0\text{V}$	+25°C					0.01	0.05	V			
	Full						0.10				
$I_o = 50\mu\text{A}, V_{CC} = 4.5\text{V}$	+25°C					0.01	0.05	V			
	Full						0.10				
$I_o = 4.0\text{mA}, V_{CC} = 3.0\text{V}$	+25°C					0.15	0.26	V			
	Full						0.36				
$I_o = 8.0\text{mA}, V_{CC} = 4.5\text{V}$	+25°C					0.26	0.36	V			
	Full						0.55				
Input Leakage Current	$I_I$	$V_I = 5.5\text{V or GND}, V_{CC} = 0\text{V to } 5.5\text{V}$				Full			2	$\mu\text{A}$	
Supply Current	$I_{CC}$	$V_I = V_{CC} \text{ or } \text{GND}, I_o = 0\text{A}; V_{CC} = 5.5\text{V}$				Full			2	$\mu\text{A}$	
Input Capacitance	$C_i$		+25°C		3.8		pF				

**DYNAMIC CHARACTERISTICS**

(See Figure 1 for test circuit, see Figure 2 for waveforms. Full = -40°C to +125°C, all typical values are measured at T<sub>A</sub> = +25°C, V<sub>CC</sub> = 3.3V and V<sub>CC</sub> = 5.0V, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN <sup>(1)</sup>	TYP	MAX <sup>(1)</sup>	UNITS	
Propagation Delay <sup>(2)</sup>	t <sub>PD</sub>	A and B to Y, V <sub>CC</sub> = 3.0V to 3.6V	C <sub>L</sub> = 15pF	Full	0.5	4.0	12.0	ns
			C <sub>L</sub> = 50pF	Full	0.5	7.2	16.0	ns
		A and B to Y, V <sub>CC</sub> = 4.5V to 5.5V	C <sub>L</sub> = 15pF	Full	0.1	3.3	8.0	ns
			C <sub>L</sub> = 50pF	Full	0.1	5.1	10.5	ns
Power Dissipation Capacitance <sup>(3)</sup>	C <sub>PD</sub>	Per buffer, C <sub>L</sub> = 50pF, f <sub>i</sub> = 1MHz, V <sub>I</sub> = GND to V <sub>CC</sub>	+25°C		11.2		pF	

## NOTES:

- Specified by design and characterization; not production tested.
- t<sub>PD</sub> is the same as t<sub>PLH</sub> and t<sub>PHL</sub>.
- C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> 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<sub>i</sub> = Input frequency in MHz.

f<sub>o</sub> = Output frequency in MHz.

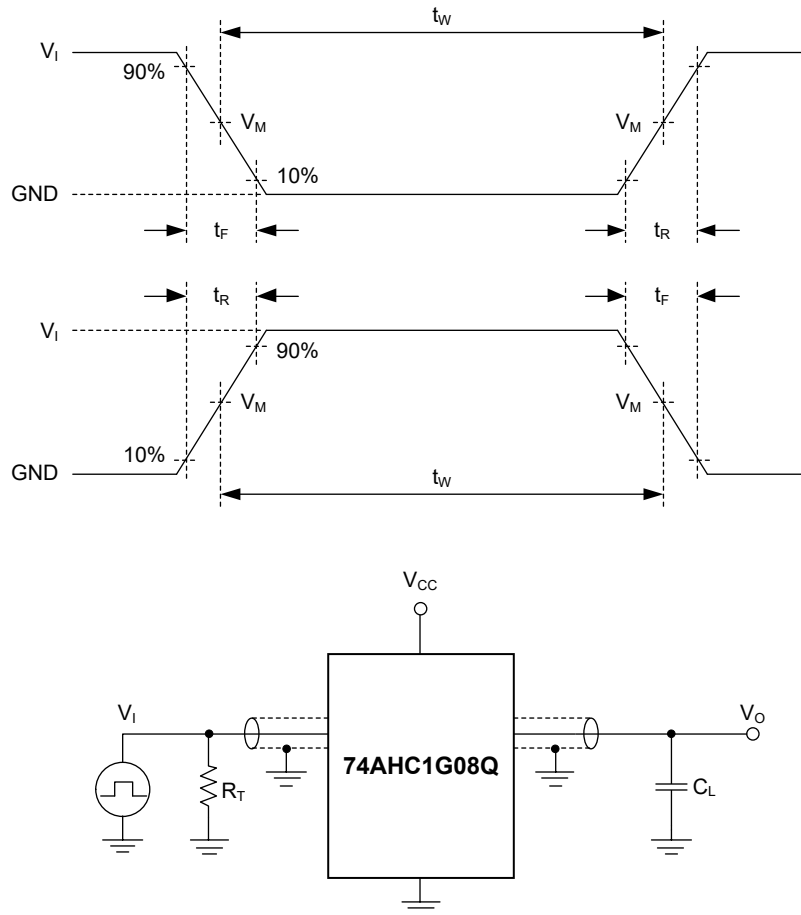
C<sub>L</sub> = Output load capacitance in pF.

V<sub>CC</sub> = Supply voltage in Volts.

N = Number of inputs switching.

Σ(C<sub>L</sub> × V<sub>CC</sub><sup>2</sup> × f<sub>o</sub>) = Sum of outputs.

TEST CIRCUIT



Test conditions are given in Table 1.

Definitions for test circuit:

$C_L$ : Load capacitance (includes jig and probe).

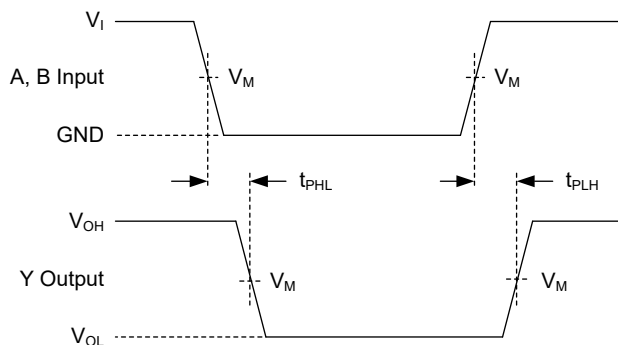
$R_T$ : Termination resistance (equals to output impedance  $Z_O$  of the pulse generator).

Figure 1. Test Circuit for Measuring Switching Times

Table 1. Test Conditions

SUPPLY VOLTAGE	INPUT		LOAD	TEST
$V_{CC}$	$V_I$	$t_R, t_F$	$C_L$	
2.0V to 5.5V	$V_{CC}$	$\leq 3.0\text{ns}$	15pF, 50pF	$t_{PHL}, t_{PLH}$

WAVEFORMS



Test conditions are given in Table 1.  
 Measurement points are given in Table 2.  
 $V_{OL}$  and  $V_{OH}$  are typical output voltage levels that occur with the output load.

Figure 2. Input (A, B) to Output (Y) Propagation Delays

Table 2. Measurement Points

SUPPLY VOLTAGE	INPUT		OUTPUT
$V_{CC}$	$V_I$	$V_M^{(1)}$	$V_M$
2.0V to 5.5V	$V_{CC}$	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$

NOTE:  
 1. The measurement points should be  $V_{IH}$  or  $V_{IL}$  when the input rising or falling time exceeds 3.0ns.

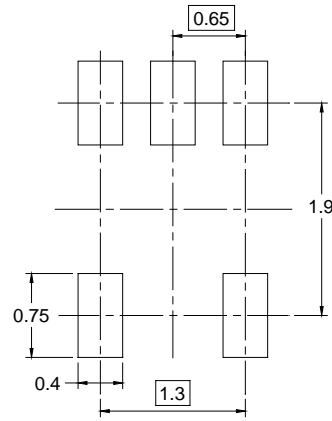
REVISION HISTORY

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

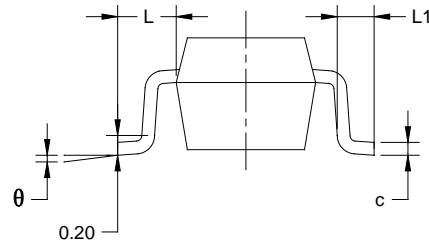
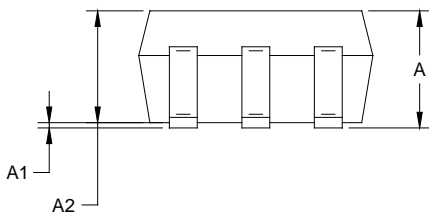
DECEMBER 2023 – REV.A to REV.A.1	Page
Added SOT-23-5 package .....	All
Changes from Original (JUNE 2022) to REV.A	Page
Changed from product preview to production data .....	All

PACKAGE OUTLINE DIMENSIONS

SC70-5



RECOMMENDED LAND PATTERN (Unit: mm)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.800	1.100	0.031	0.043
A1	0.000	0.100	0.000	0.004
A2	0.800	1.000	0.031	0.039
b	0.150	0.350	0.006	0.014
c	0.080	0.220	0.003	0.009
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.65 TYP		0.026 TYP	
e1	1.300 BSC		0.051 BSC	
L	0.525 REF		0.021 REF	
L1	0.260	0.460	0.010	0.018
$\theta$	0°	8°	0°	8°

NOTES:

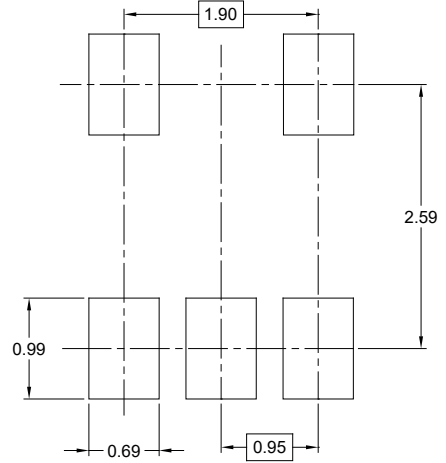
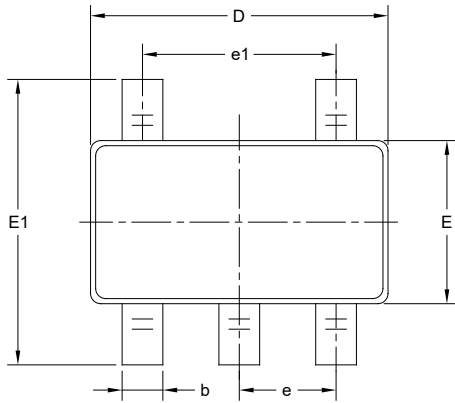
1. Body dimensions do not include mold flash or protrusion.
2. This drawing is subject to change without notice.



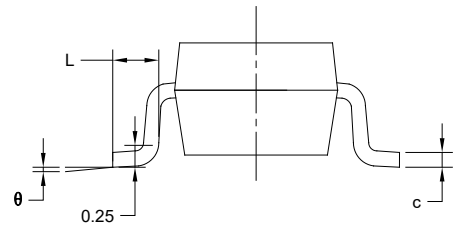
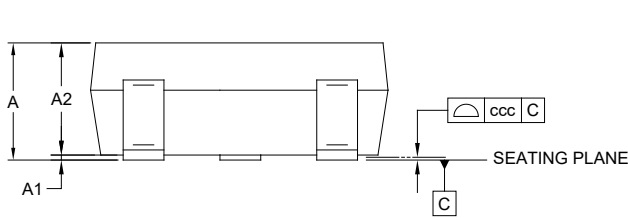
# PACKAGE INFORMATION

## PACKAGE OUTLINE DIMENSIONS

### SOT-23-5



RECOMMENDED LAND PATTERN (Unit: mm)



Symbol	Dimensions In Millimeters		
	MIN	MOD	MAX
A	-	-	1.450
A1	0.000	-	0.150
A2	0.900	-	1.300
b	0.300	-	0.500
c	0.080	-	0.220
D	2.750	-	3.050
E	1.450	-	1.750
E1	2.600	-	3.000
e	0.950 BSC		
e1	1.900 BSC		
L	0.300	-	0.600
$\theta$	0°	-	8°
ccc	0.100		

NOTES:

1. This drawing is subject to change without notice.
2. The dimensions do not include mold flashes, protrusions or gate burrs.
3. Reference JEDEC MO-178.

# PACKAGE INFORMATION

## TAPE AND REEL INFORMATION

### REEL DIMENSIONS



### TAPE DIMENSIONS



NOTE: The picture is only for reference. Please make the object as the standard.

### KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
SC70-5	7"	9.5	2.25	2.55	1.20	4.0	4.0	2.0	8.0	Q3
SOT-23-5	7"	9.5	3.20	3.20	1.40	4.0	4.0	2.0	8.0	Q3

DD0001

# PACKAGE INFORMATION

## CARTON BOX DIMENSIONS



NOTE: The picture is only for reference. Please make the object as the standard.

## KEY PARAMETER LIST OF CARTON BOX

Reel Type	Length (mm)	Width (mm)	Height (mm)	Pizza/Carton
7" (Option)	368	227	224	8
7"	442	410	224	18

DD0002