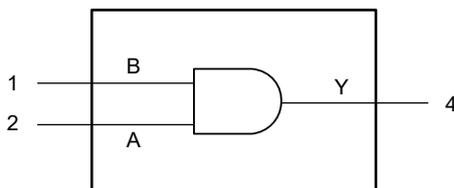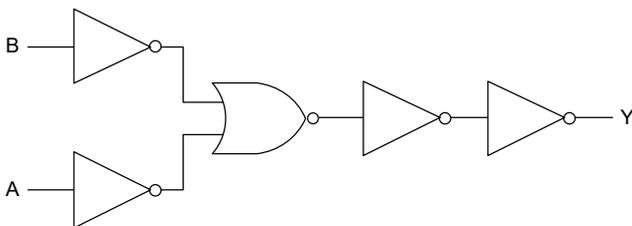## GENERAL DESCRIPTION

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.
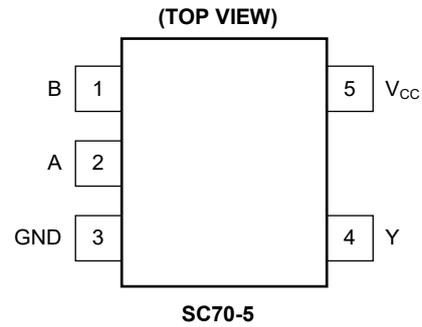
FEATURES

- **AEC-Q100 (Grade 1) Qualified for Automotive Applications**
  T_A = -40℃ to +125℃
- **Wide Operating Voltage Range: 2.0V to 5.5V**
- **Overvoltage Tolerant Inputs to 5.5V**
- **All Inputs with a Schmitt-Trigger Action**
- **Input Level: CMOS Level**
- **Low Power Dissipation**
- **High Noise Immunity**
- **-40℃ to +125℃ Operating Temperature Range**
- **Available in a Green SC70-5 Package**

LOGIC SYMBOL

LOGIC DIAGRAM

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

PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
74AHC1G08Q	SC70-5	-40℃ to +125℃	74AHC1G08QC5G/TR	MC6XX	Tape and Reel, 3000

MARKING INFORMATION

NOTE: XX = Date Code.

YYY X X

└── Date Code - Week
└── Date Code - Year
└── Serial Number

Green (RoHS & HSF): SG Micro Corp defines "Green" to mean Pb-Free (RoHS compatible) and free of halogen substances. If you have additional comments or questions, please contact your SGMICRO representative directly.

ABSOLUTE MAXIMUM RATINGS [1]

Supply Voltage Range, V_{CC} .... -0.5V to 7.0V
Input Voltage Range, V_I [2] .... -0.5V to 7.0V
Input Clamp Current, I_{IK} (V_I < -0.5V) .... -20mA
Output Clamp Current, I_{OK} (V_O < -0.5V or V_O > V_{CC} + 0.5V)
.... ±20mA
Output Current, I_O (-0.5V < V_O < V_{CC} + 0.5V) .... ±25mA
Supply Current, I_{CC} 75mA
Ground Current, I_{GND} .... -75mA
Junction Temperature [3] .... +150℃
Storage Temperature Range .... -65℃ to +150℃
Lead Temperature (Soldering, 10s) .... +260℃
ESD Susceptibility
HBM 8000V
CDM 1000V

RECOMMENDED OPERATING CONDITIONS

Supply Voltage Range, V_{CC} .... 2.0V to 5.5V
Input Voltage Range, V_I .... 0V to 5.5V
Output Voltage Range, V_O .... 0V to V_{CC}
Input Transition Rise and Fall Rate, Δt/ΔV
  V_{CC} = 3.3V ± 0.3V .... 100ns/V (MAX)
  V_{CC} = 5.0V ± 0.5V .... 20ns/V (MAX)
Operating Temperature Range .... -40℃ to +125℃

OVERSTRESS CAUTION

1. Stresses beyond those listed in Absolute Maximum Ratings may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect reliability. Functional operation of the device at any conditions beyond those indicated in the Recommended Operating Conditions section is not implied.

2. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

3. The performance capability of a high-performance integrated circuit in conjunction with its thermal environment can create junction temperatures which are detrimental to reliability.

ESD SENSITIVITY CAUTION

This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because even small parametric changes could cause the device not to meet the published specifications.

DISCLAIMER

SG Micro Corp reserves the right to make any change in circuit design, or specifications without prior notice.

PIN CONFIGURATION

(TOP VIEW)

SC70-5

PIN DESCRIPTION

PIN	NAME	FUNCTION
1	B	Data Input.
2	A	Data Input.
3	GND	Ground (0V).
4	Y	Data Output.
5	V_{CC}	Supply Voltage.

ELECTRICAL CHARACTERISTICS

(Full = -40℃ to +125℃, all typical values are measured at T_A = +25℃, unless otherwise noted.)

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

DYNAMIC CHARACTERISTICS

(For test circuit, see Figure 1, for waveforms see Figure 2. GND = 0V; $t_R = t_F \leq 3.0$ns. Typical values are measured at V_{CC} = 3.3V and V_{CC} = 5.0V, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		TEMP	MIN [1]	TYP	MAX [1]	UNITS
Propagation Delay [2]	t_{PD}	A and B to Y, V_{CC} = 3.0V to 3.6V	C_L = 15pF	Full	0.5	4.0	12.0	ns
			C_L = 50pF	Full	0.5	7.2	16.0	ns
		A and B to Y, V_{CC} = 4.5V to 5.5V	C_L = 15pF	Full	0.1	3.3	8.0	ns
			C_L = 50pF	Full	0.1	5.1	10.5	ns
Power Dissipation Capacitance [3]	C_{PD}	Per buffer, C_L = 50pF, f_i = 1MHz, V_I = GND to V_{CC}		+25℃		11.2		pF

NOTES:

1. Specified by design and characterization, not production tested.

2. t_{PD} is the same as t_{PLH} and t_{PHL}.

3. 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 Volts.

   N = Number of inputs switching.

   $\Sigma(C_L \times V_{CC}^2 \times f_o)$ = Sum of outputs.

TEST CIRCUIT
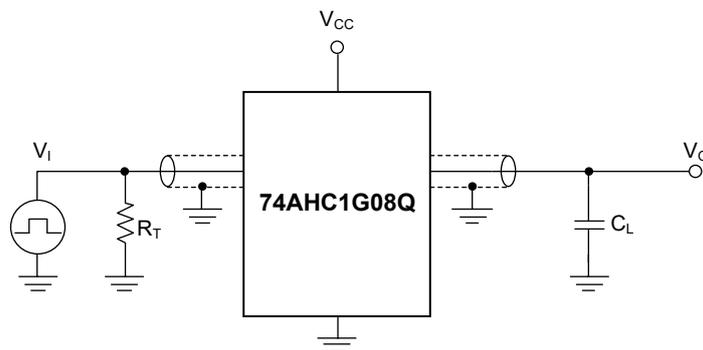
Test conditions are given in Dynamic Characteristics.

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. Load Circuitry for Switching Times

WAVEFORMS
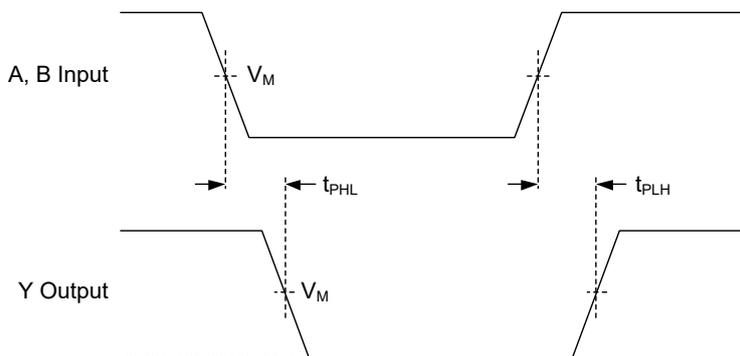
Test conditions are given in Dynamic Characteristics.

Measurement points are given in Table 1.

Logic levels: V_{OL} and V_{OH} are typical output voltage levels that occur with the output load.

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

Table 1. Measurement Points

INPUT		OUTPUT
V_I	V_M	V_M
GND to V_{CC}	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$

REVISION HISTORY

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

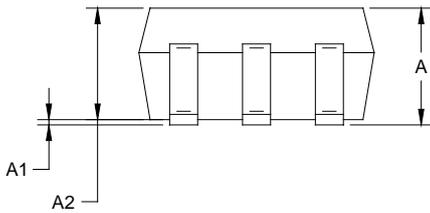| **Changes from Original (JUNE 2022) to REV.A**	**Page**
Changed from product preview to production data .... All	

PACKAGE OUTLINE DIMENSIONS

SC70-5
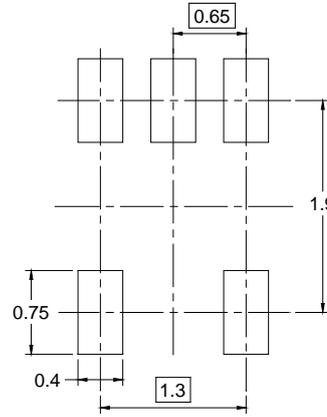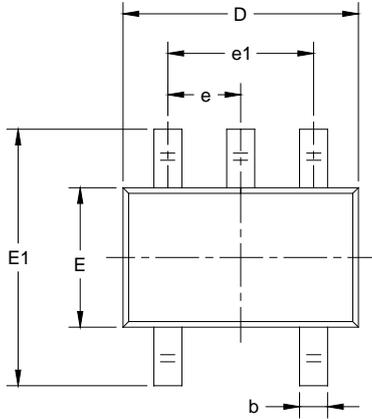
RECOMMENDED LAND PATTERN (Unit: mm)
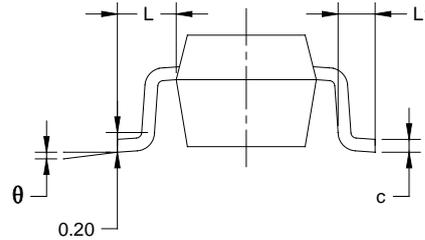
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	**MAX**	**MIN**	**MAX**
A	0.800	1.100	0.031	0.043
A1	0.000	0.100	0.000	0.004
A2	0.800	1.000	0.031	0.039
b	0.150	0.350	0.006	0.014
c	0.080	0.220	0.003	0.009
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.65 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
θ	0°	8°	0°	8°

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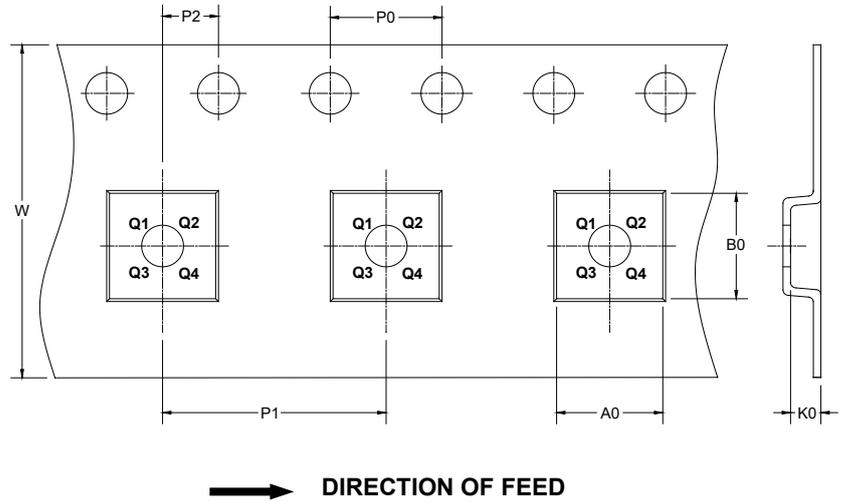2. This drawing is subject to change without notice.

TAPE AND REEL INFORMATION

REEL DIMENSIONS

Reel Diameter

Reel Width (W1)

TAPE DIMENSIONS

DIRECTION OF FEED

NOTE: The picture is only for reference. Please make the object as the standard.
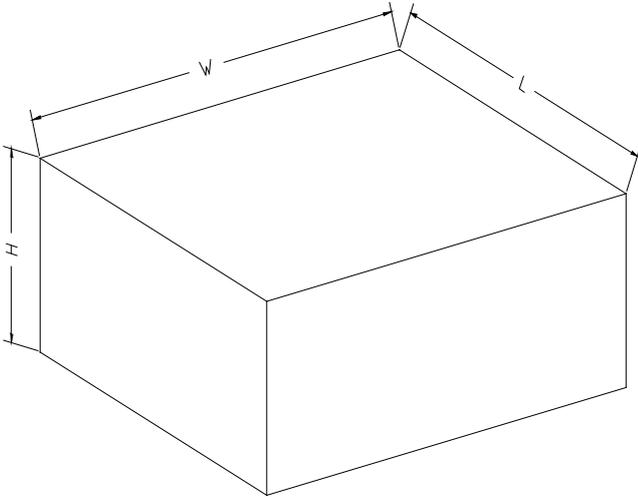
KEY PARAMETER LIST OF TAPE AND REEL

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

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