



### DESCRIPTION

The AL1G08 is single 2-input positive-AND gate, designed for 1.65V to 5.5V V<sub>CC</sub> operation.

The AL1G08 performs the Boolean function  $Y=A \cdot B$  or  $Y=\overline{A} + \overline{B}$  in positive logic. The device is fully specified for partial-power-down applications using I<sub>off</sub>. The I<sub>off</sub> circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.

The AL1G08 is available in Green SOT-25 and SC70-5 packages.

### FEATURES

- Operating Voltage Range:1.65V to 5.5V
- Low Power Consumption:1μA (Max)
- Operating Temperature Range:  
-40°C to +125°C
- Inputs Accept Voltage to 5.5V
- High Output Drive: ±24mA at V<sub>CC</sub>=3.0V

### APPLICATION

- Active Noise Elimination
- Bar Code Scanner
- Blood Pressure Monitor
- CPAP Machine
- Fingerprint identification
- Network attached storage (NAS)

### ORDERING INFORMATION

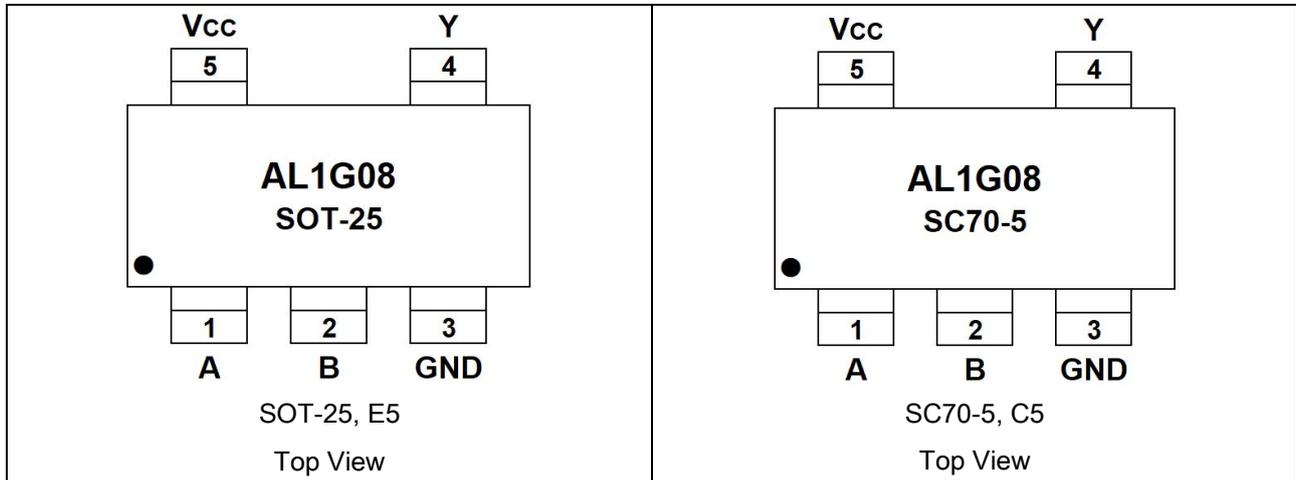
Package Type	Part Number	
SOT-25 SPQ: 3,000pcs/Reel	E5	AL1G08E5R
		AL1G08E5VR
SC70-5 SPQ: 3,000pcs/Reel	C5	AL1G08C5R
		AL1G08C5VR
Note	V: Halogen free Package R: Tape & Reel	
AiT provides all RoHS products		

### FUNCTIONAL BLOCK DIAGRAM





**PIN DESCRIPTION**



Pin #		Symbol	I/O	Function
SOT-25	SC70-5			
1	1	A	I	Input
2	2	B	I	Input
3	3	GND	P	Ground
4	4	Y	O	Output
5	5	V <sub>cc</sub>	P	Power Pin

**FUNCTION TABLE**

Input		Output
A	B	Y
H	H	H
L	H	L
H	L	L
L	L	L

Y=A•B

H=High Voltage Level

L=Low Voltage Level



## ABSOLUTE MAXIMUM RATINGS

$T_A = +25^\circ\text{C}$ , unless otherwise noted. <sup>(1)</sup>

$V_{CC}$ , Supply Voltage Range		-0.5V ~ +6.5V
$V_I$ , Input Voltage Range <sup>(1)</sup>		-0.5V ~ +6.5V
$V_O$ , Voltage range applied to any output in the high-impedance or power-off state <sup>(1)</sup>		-0.5V ~ +6.5V
$V_O$ , Voltage range applied to any output in the high or low state <sup>(1)(2)</sup>		-0.5V ~ $V_{CC}+0.5V$
$I_{IK}$ , Input Clamp Current	$V_I < 0$	-50mA
$I_{OK}$ , Output Clamp Current	$V_O < 0$	-50mA
$I_O$ , Continuous Output Current		$\pm 50\text{mA}$
Continuous Current Through $V_{CC}$ or GND		$\pm 100\text{mA}$
$T_J$ , Junction Temperature		$-65^\circ\text{C} \sim +150^\circ\text{C}$
$T_{STG}$ , Storage Temperature		$-65^\circ\text{C} \sim +150^\circ\text{C}$
<b>ESD Ratings</b>		
$V_{(ESD)}$ , Electrostatic Discharge	Human-Body Model (HBM)	$\pm 8000\text{V}$
	Machine Model (MM)	$\pm 500\text{V}$
<b>Thermal Information</b>		
$R_{\theta JA}$ , Junction-to-Ambient Thermal Resistance	SOT-25	$273.8^\circ\text{C/W}$
	SC70-5	$214.7^\circ\text{C/W}$
$R_{\theta JC(top)}$ , Junction-to-Case(Top) Thermal Resistance	SOT-25	$126.8^\circ\text{C/W}$
	SC70-5	$127.1^\circ\text{C/W}$
$R_{\theta JB}$ , Junction-to-Board Thermal Resistance	SOT-25	$85.9^\circ\text{C/W}$
	SC70-5	$60.0^\circ\text{C/W}$
$\Psi_{JT}$ , Junction-to-Top Characterization Parameter	SOT-25	$10.9^\circ\text{C/W}$
	SC70-5	$33.4^\circ\text{C/W}$
$\Psi_{JB}$ , Junction-to-Board Characterization Parameter	SOT-25	$84.9^\circ\text{C/W}$
	SC70-5	$59.8^\circ\text{C/W}$

Stresses above may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated in the Electrical Characteristics are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

(1) The input and output negative-voltage ratings may be exceeded if the input and output current ratings are observed.

(2) The value of  $V_{CC}$  is provided in the Recommended Operating Conditions table.

**RECOMMENDED OPERATING CONDITIONS**T<sub>A</sub> = +25°C, unless otherwise noted. <sup>(1)</sup>

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply Voltage	V <sub>CC</sub>	Operating	1.65	-	5.5	V
		Data retention only	1.5	-	5.5	
High-Level Input Voltage	V <sub>IH</sub>	V <sub>CC</sub> =1.65V to 1.95V	0.65xV <sub>CC</sub>	-	-	V
		V <sub>CC</sub> =2.3V to 2.7V	1.7	-	-	
		V <sub>CC</sub> =3.0V to 3.6V	2.2	-	-	
		V <sub>CC</sub> =4.5V to 5.5V	0.7xV <sub>CC</sub>	-	-	
Low-Level Input Voltage	V <sub>IL</sub>	V <sub>CC</sub> =1.65V to 1.95V	-	-	0.15xV <sub>CC</sub>	V
		V <sub>CC</sub> =2.3V to 2.7V	-	-	0.3	
		V <sub>CC</sub> =3.0V to 3.6V	-	-	0.4	
		V <sub>CC</sub> =4.5V to 5.5V	-	-	0.15xV <sub>CC</sub>	
Input Voltage	V <sub>I</sub>	-	0	-	5.5	V
Output Voltage	V <sub>O</sub>	-	0	-	V <sub>CC</sub>	V
Input Transition Rise or Fall	t <sub>r</sub> , t <sub>f</sub>	V <sub>CC</sub> =1.8V±0.15V, 2.5V±0.2V	-	-	20	ns/V
		V <sub>CC</sub> =3.3V±0.3V	-	-	10	
		V <sub>CC</sub> =5.0V±0.5V	-	-	5	
Operating Temperature	T <sub>A</sub>	-	-40	-	+125	°C

**AC ELECTRICAL CHARACTERISTICS**T<sub>A</sub> = +25°C, unless otherwise noted. <sup>(1)</sup>

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Propagation Delay	t <sub>pd</sub>	V <sub>CC</sub> =1.8V±0.15V	C <sub>L</sub> =30pF, R <sub>L</sub> =1kΩ	-	11.6	-	ns
		V <sub>CC</sub> =2.5V±0.2V	C <sub>L</sub> =30pF, R <sub>L</sub> =500Ω	-	6.6	-	
		V <sub>CC</sub> =3.3V±0.3V	C <sub>L</sub> =50pF, R <sub>L</sub> =500Ω	-	5.4	-	
		V <sub>CC</sub> =5V±0.5V	C <sub>L</sub> =50pF, R <sub>L</sub> =500Ω	-	4.3	-	
Input Capacitance	C <sub>i</sub>	V <sub>CC</sub> =0V	-	-	4	-	pF
Power Dissipation Capacitance	C <sub>pd</sub>	V <sub>CC</sub> =3.3V	f=10MHz	-	26	-	pF
		V <sub>CC</sub> =5.0V		-	31	-	



## DC ELECTRICAL CHARACTERISTICS

T<sub>A</sub> = +25°C, unless otherwise noted. <sup>(1)</sup>

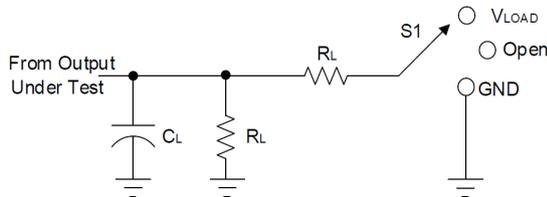
Parameter		Conditions		Min.	Typ.	Max.	Unit
V <sub>OH</sub> T <sub>A</sub> =-40°C to +125°C			I <sub>OH</sub> = -100μA, V <sub>CC</sub> =1.65V to 5.5V	V <sub>CC</sub> - 0.1	-	-	V
			I <sub>OH</sub> =-4mA, V <sub>CC</sub> =1.65V	1.2	-	-	
			I <sub>OH</sub> =-8mA, V <sub>CC</sub> =2.3V	1.9	-	-	
			I <sub>OH</sub> =-16mA, V <sub>CC</sub> =3V	2.4	-	-	
			I <sub>OH</sub> =-24mA, V <sub>CC</sub> =3V	2.3	-	-	
			I <sub>OH</sub> =-32mA, V <sub>CC</sub> =4.5V	3.8	-	-	
V <sub>OL</sub> T <sub>A</sub> =-40°C to +125°C			I <sub>OL</sub> =100μA, V <sub>CC</sub> =1.65V to 5.5V	-	-	0.1	V
			I <sub>OL</sub> =4mA, V <sub>CC</sub> =1.65V	-	-	0.45	
			I <sub>OL</sub> =8mA, V <sub>CC</sub> =2.3V	-	-	0.3	
			I <sub>OL</sub> =16mA, V <sub>CC</sub> =3V	-	-	0.4	
			I <sub>OL</sub> =24mA, V <sub>CC</sub> =3V	-	-	0.55	
			I <sub>OL</sub> =32mA, V <sub>CC</sub> =4.5V	-	-	0.55	
I <sub>I</sub>	A or B inputs	V <sub>I</sub> =5.5V or GND V <sub>CC</sub> = 0V to 5.5V	T <sub>A</sub> =+25°C	-	±0.1	±1	μA
				T <sub>A</sub> =-40°C to +125°C	-	-	
I <sub>off</sub>	V <sub>I</sub> or V <sub>O</sub> =5.5V V <sub>CC</sub> =0V		T <sub>A</sub> =+25°C	-	±0.1	±1	μA
			T <sub>A</sub> =-40°C to +125°C	-	-	±10	
I <sub>CC</sub>	V <sub>I</sub> =5.5V or GND, I <sub>O</sub> =0, V <sub>CC</sub> =1.65V to 5.5V		T <sub>A</sub> =+25°C	-	0.1	1	μA
			T <sub>A</sub> =-40°C to +125°C	-	-	10	
ΔI <sub>CC</sub> T <sub>A</sub> =-40°C to +125°C	One input at V <sub>CC</sub> - 0.6V, Other inputs at V <sub>CC</sub> or GND V <sub>CC</sub> =3V to 5.5V			-	-	500	μA

(1) All unused inputs of the device must be held at V<sub>CC</sub> or GND to ensure proper device operation.



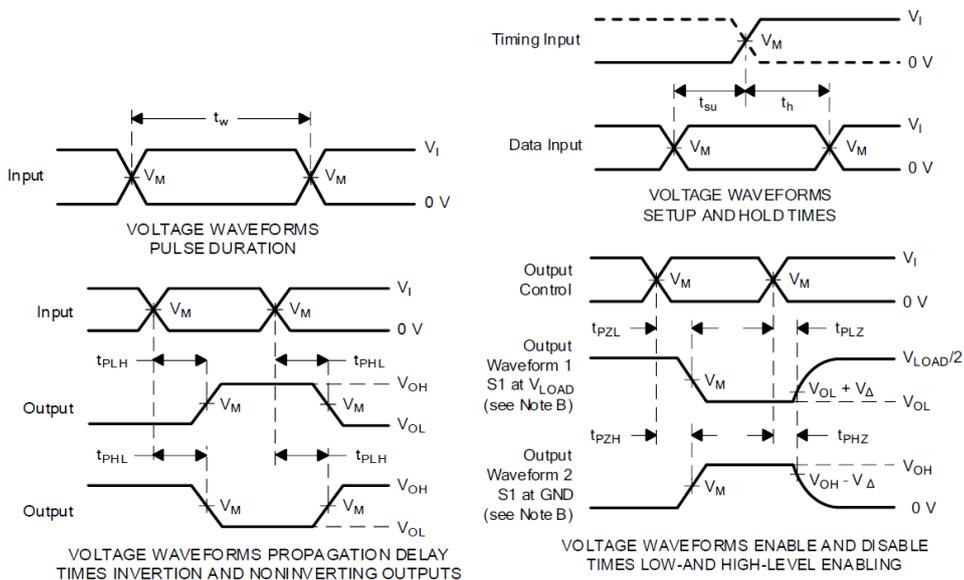
**DETAILED INFORMATION**

**Parameter Measurement Information**



TEST	S1
$t_{PLH} / t_{PHL}$	Open
$t_{PLZ} / t_{PZL}$	$V_{LOAD}$
$t_{PHZ} / t_{PZH}$	GND

$V_{CC}$	Inputs		$V_M$	$V_{LOAD}$	$C_L$		$R_L$		$V_{\Delta}$
	$V_I$	$t_r/t_f$							
$1.8V \pm 0.15V$	$V_{CC}$	$\leq 2ns$	$V_{CC}/2$	$2 \times V_{CC}$	15pF	30pF	1M $\Omega$	1k $\Omega$	0.15V
$2.5V \pm 0.2V$	$V_{CC}$	$\leq 2ns$	$V_{CC}/2$	$2 \times V_{CC}$	15pF	30pF	1M $\Omega$	500 $\Omega$	0.15V
$3.3V \pm 0.3V$	3V	$\leq 2.5ns$	1.5V	6V	15pF	50pF	1M $\Omega$	500 $\Omega$	0.3V
$5V \pm 0.5V$	$V_{CC}$	$\leq 2.5ns$	$V_{CC}/2$	$2 \times V_{CC}$	15pF	50pF	1M $\Omega$	500 $\Omega$	0.3V



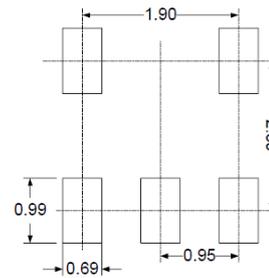
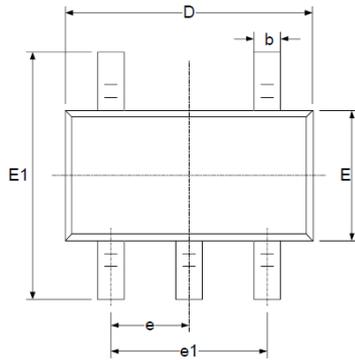
**Figure 1. Load Circuit and Voltage Waveforms**

- (A)  $C_L$  includes probe and jig capacitance.
- (B) Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control.  
Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.
- (C) All input pulses are supplied by generators having the following characteristics:  $PRR \leq 10 \text{ MHz}$ ,  $Z_o = 50 \Omega$ .
- (D) The outputs are measured one at a time, with one transition per measurement.
- (E)  $t_{PLZ}$  and  $t_{PHZ}$  are the same as  $t_{dis}$ .
- (F)  $t_{PZL}$  and  $t_{PZH}$  are the same as  $t_{en}$ .
- (G)  $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{pd}$ .
- (H) All parameters and waveforms are not applicable to all devices.

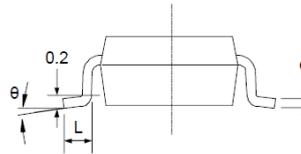
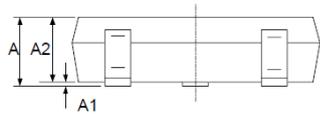


## PACKAGE INFORMATION

Dimension in SOT-25 (Unit: mm)



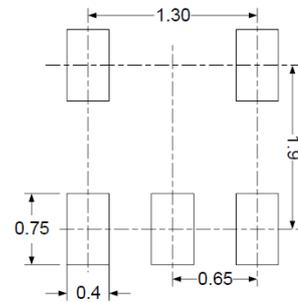
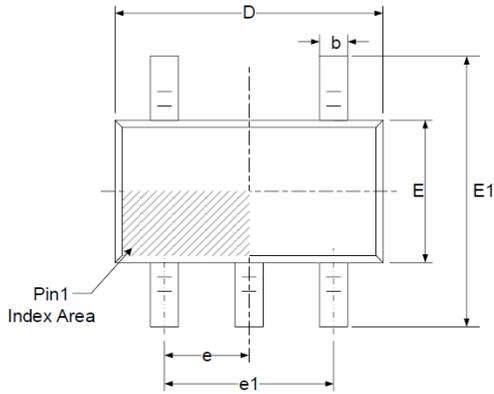
**RECOMMENDED LAND PATTERN**



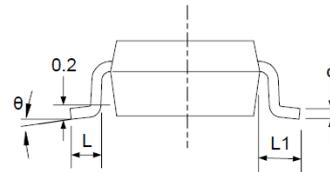
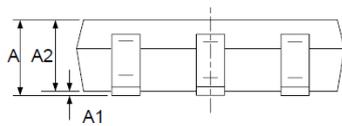
Symbol	Millimeters	
	Min	Max
A	1.050	1.250
A1	0.000	0.100
A2	1.050	1.150
b	0.300	0.500
c	0.100	0.200
D	2.820	3.020
E	1.500	1.700
E1	2.650	2.950
e	0.950 BSC	
e1	1.800	2.000
L	0.300	0.600
$\theta$	0°	8°



Dimension in SC70-5 (Unit: mm)



**RECOMMENDED LAND PATTERN**



Symbol	Millimeters	
	Min	Max
A	0.900	1.100
A1	0.000	0.100
A2	0.900	1.000
b	0.150	0.350
c	0.080	0.150
D	2.000	2.200
E	1.150	1.350
E1	2.150	2.450
e	0.650 BSC	
e1	1.300 BSC	
L	0.260	0.460
L1	0.525	
θ	0°	8°



## IMPORTANT NOTICE

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