



DESCRIPTION

The AL4G08 quadruple 2-input positive-AND gate is designed for 1.65V to 5.5V V_{CC} operation.

The AL4G08 device performs the Boolean function $Y=A \cdot B$ or $Y=\overline{A+B}$ in positive logic. The device is fully specified for partial-power-down applications using I_{off}. The I_{off} circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.

It operates over an ambient temperature range of -40°C to +125°C.

The AL4G08 is available in SOP14 and TSSOP14 packages.

ORDERING INFORMATION

Package Type	Part Number	
SOP14 SPQ: 4,000pcs/Reel	M14	AL4G08M14R
		AL4G08M14VR
TSSOP14 SPQ: 4,000pcs/Reel	TMX14	AL4G08TMX14R
		AL4G08TMX14VR
Note	V: Halogen free Package R: Tape & Reel	
AiT provides all RoHS products		

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_{CC}=3.0V
- Available in SOP14 and TSSOP14 packages

APPLICATION

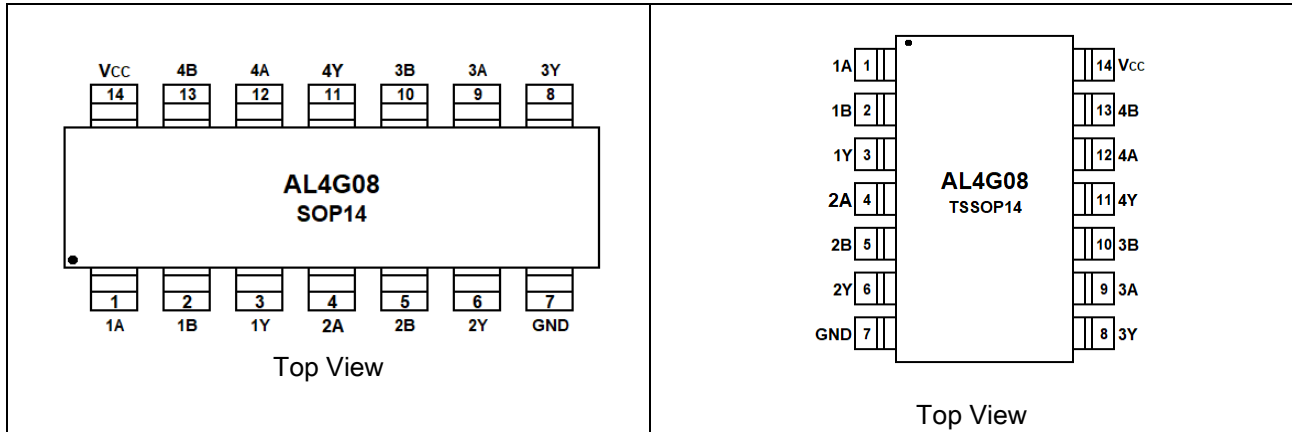
- ATCA Solutions
- Active Noise Cancellation (ANC)
- Barcode Scanner
- Blood Pressure Monitor
- CPAP Machine
- Cable Solutions
- DLP 3D Machin Vision, Hyperspectral Imaging, Optical Networking, and Spectroscopy
- E-books, Embedded PC
- Field Transmitter: Temperature or Pressure Sensor
- Fingerprint Biometrics
- HVAC: Heating, Ventilating, Air Conditioning
- TB: High-Definition (HDTV), LCD, and Digital Video Communication System
- Wireless Data Access Card, Headset, Keyboard, Mouse and LAN Card
- X-ray: Baggage Scanner, Medical, and Dental CPAP Machine
- Fingerprint identification
- IP Phone: Wired and Wireless
- Network attached storage (NAS)
- Private Branch Exchange (PBX)

LOGIC SYMBOL





PIN DESCRIPTION



Pin #		Symbol	I/O	Function
SOP14	TSSOP14			
1	1	1A	I	Channel 1 logic input
2	2	1B	I	Channel 1 logic input
3	3	1Y	O	Logic level output1
4	4	2A	I	Channel 2 logic input
5	5	2B	I	Channel 2 logic input
6	6	2Y	O	Logic level output 2
7	7	GND	-	Ground
8	8	3Y	O	Logic level output 3
9	9	3A	I	Channel 3 logic input
10	10	3B	I	Channel 3 logic input
11	11	4Y	O	Logic level output 4
12	12	4A	I	Channel 4 logic input
13	13	4B	I	Channel 4 logic input
14	14	V _{CC}	-	Power Supply

FUNCTION TABLE

Inputs		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

over operating free-air temperature range, unless otherwise noted^{NOTE1}

V _{CC} , Supply Voltage Range		-0.5V ~ 6.5V
V _I , Input Voltage Range		-0.5V ~ 6.5V
V _O , Voltage range applied to any output in the high-impedance or power-off state ^{NOTE1}		-0.5V ~ 6.5V
V _O , Voltage range applied to any output in the high or low state ^{NOTE1, 2}		-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		±50mA
Continuous Current Through V _{CC} or GND		±100mA
T _J , Junction Temperature		150°C
T _{STG} , Storage Temperature		-65°C ~ 150°C
ESD Ratings		
V _(ESD) , Electrostatic Discharge	Human-body model (HBM)	±8000V
	Machine model (MM)	±500V

Stress beyond above listed "Absolute Maximum Ratings" may lead permanent damage to the device. These are stress ratings only and operations of the device at these or any other conditions beyond those indicated in the operational sections of the specifications are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

NOTE1: The input and output negative-voltage ratings may be exceeded if the input and output current ratings are observed.

NOTE2: The value of V_{CC} is provided in the Recommended Operating Conditions table.



RECOMMENDED OPERATING CONDITIONS

T_A = +25°C, unless otherwise noted.^{NOTE3}

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply Voltage	V _{CC}	Operating	1.65	-	5.5	V
		Data retention only	1.5	-	5.5	
High-Level Input Voltage	V _{IH}	V _{CC} =1.65V to 1.95V	0.65xV _{CC}	-	-	V
		V _{CC} =2.3V to 2.7V	1.7	-	-	
		V _{CC} =3V to 3.6V	2.2	-	-	
		V _{CC} =4.5V to 5.5V	0.7xV _{CC}	-	-	
Low-Level Input Voltage	V _{IL}	V _{CC} =1.65V to 1.95V		-	0.15xV _{CC}	V
		V _{CC} =2.3V to 2.7V		-	0.3	
		V _{CC} =3V to 3.6V		-	0.4	
		V _{CC} =4.5V to 5.5V		-	0.15xV _{CC}	
Input Voltage	V _I		0	-	5.5	V
Output Voltage	V _O		0	-	V _{CC}	V
Input Transition Rise or Fall	t _r , t _f	V _{CC} =1.8V±0.15V, 2.5V±0.2V	-	-	20	ns/V
		V _{CC} =3.3V±0.3V	-	-	10	
		V _{CC} =5V±0.5V	-	-	5	
Operating Temperature	T _A		-40	-	+125	°C



DC ELECTRICAL CHARACTERISTICS

T_A = +25°C, unless otherwise noted.^{NOTE3}

Parameter		Conditions	Temp	Min.	Typ.	Max.	Unit
V _{OH}	I _{OH} =-100μA, V _{CC} =1.65V to 5.5V		-40°C to +125°C	V _{CC} -0.1	-	-	V
	I _{OH} =-4mA, V _{CC} =1.65V			1.2	-	-	
	I _{OH} =-8mA, V _{CC} =2.3V			1.9	-	-	
	I _{OH} =-16mA, V _{CC} =3V			2.4	-	-	
	I _{OH} =-24mA, V _{CC} =3V			2.3	-	-	
	I _{OH} =-32mA, V _{CC} =4.5V			3.8	-	-	
V _{OL}	I _{OL} =100μA, V _{CC} =1.65V to 5.5V		-40°C to +125°C	-	-	0.1	V
	I _{OL} =4mA, V _{CC} =1.65V			-	-	0.45	
	I _{OL} =8mA, V _{CC} =2.3V			-	-	0.3	
	I _{OL} =16mA, V _{CC} =3V			-	-	0.4	
	I _{OL} =24mA, V _{CC} =3V			-	-	0.55	
	I _{OL} =32mA, V _{CC} =4.5V			-	-	0.55	
I _I	A or B inputs	V _I = 5.5V or GND, V _{CC} =0V to 5.5V	+25°C	-	±0.1	±1	μA
			-40°C to +125°C	-	-	±5	
I _{off}	V _I or V _O = 5.5V, V _{CC} =0		+25°C	-	±0.1	±1	μA
			-40°C to +125°C	-	-	±10	
I _{CC}	V _I =5.5V or GND, I _o =0, V _{CC} =1.65V to 5.5V		+25°C	-	0.1	1	μA
			-40°C to +125°C	-	-	10	
ΔI _{CC}	One input at V _{CC} -0.6V, Other inputs at V _{CC} or GND, V _{CC} =3V to 5.5V		-40°C to +125°C	-	-	500	μA

AC ELECTRICAL CHARACTERISTICS

T_A = +25°C, unless otherwise noted.^{NOTE3}

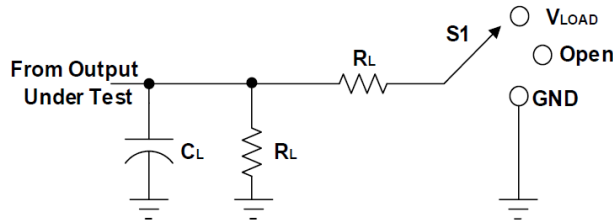
Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Propagation Delay	t _{pd}	V _{CC} =1.8V±0.15V	C _L =30pF, R _L =1kΩ	-	11.2	-	ns
		V _{CC} =2.5V±0.2V	C _L =30pF, R _L =500Ω	-	6.5	-	
		V _{CC} =3.3V±0.3V	C _L =50pF, R _L =500Ω	-	5.4	-	
		V _{CC} =5V±0.5V	C _L =50pF, R _L =500Ω	-	4.3	-	
Input Capacitance	C _i	V _{CC} =0V		-	4	-	pF
Power dissipation capacitance	C _{pd}	V _{CC} =3.3V	f=10MHz	-	26	-	pF
		V _{CC} =5V		-	31	-	

NOTE3: All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation.



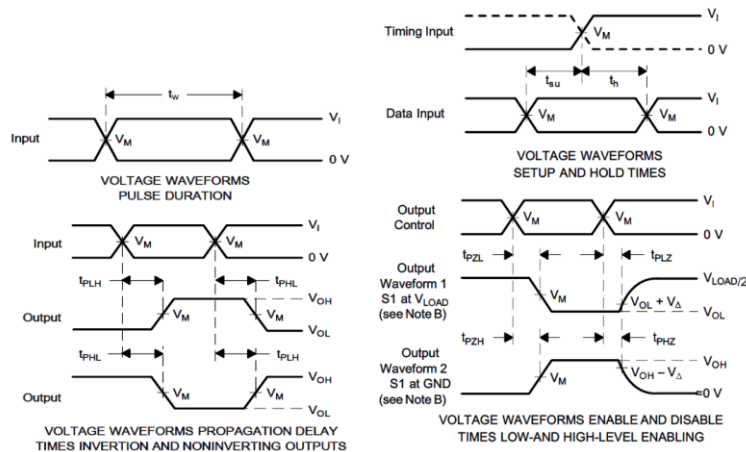
DETAILED INFORMATION

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_{Δ}
	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 Ω	1k Ω	0.15V
$2.5V \pm 0.2V$	V_{CC}	$\leq 2ns$	$V_{CC}/2$	$2 \times V_{CC}$	15pF	30pF	1M Ω	500 Ω	0.15V
$3.3V \pm 0.3V$	3V	$\leq 2.5ns$	1.5V	6V	15pF	50pF	1M Ω	500 Ω	0.3V
$5V \pm 0.5V$	V_{CC}	$\leq 2.5ns$	$V_{CC}/2$	$2 \times V_{CC}$	15pF	50pF	1M Ω	500 Ω	0.3V



NOTE A: C_L includes probe and jig capacitance.

NOTE 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.

NOTE C: All input pulses are supplied by generators having the following characteristics: $PRR \leq 10$ MHz, $Z_o = 50\Omega$.

NOTE D: The outputs are measured one at a time, with one transition per measurement.

NOTE E: t_{PLZ} and t_{PHZ} are the same as t_{dis} .

NOTE F: t_{PZL} and t_{PZH} are the same as t_{en} .

NOTE G: t_{PLH} and t_{PHL} are the same as t_{pd} .

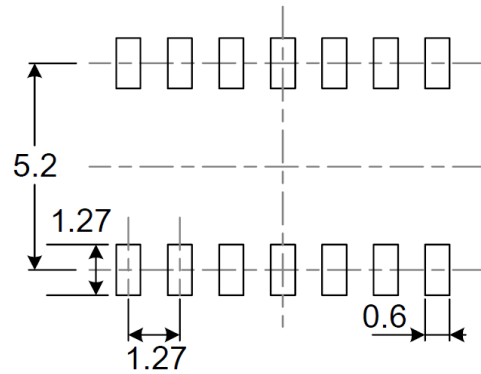
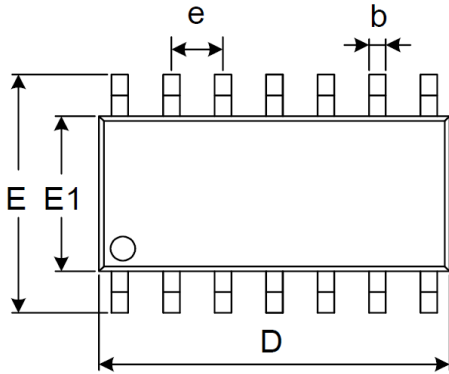
NOTE H: All parameters and waveforms are not applicable to all devices.

Figure 1. Load Circuit and Voltage Waveforms

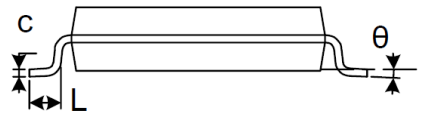
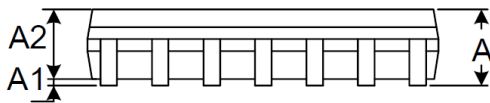


PACKAGE INFORMATION

Dimension in SOP14 (Unit: mm)



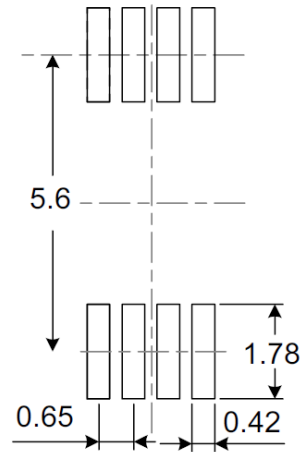
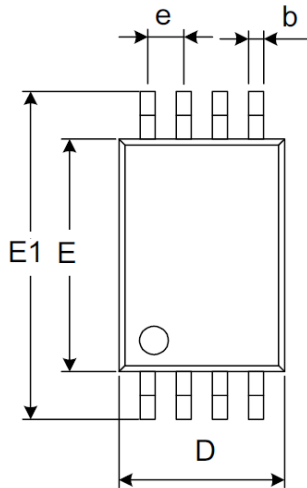
RECOMMENDED LAND PATTERN (Unit: mm)



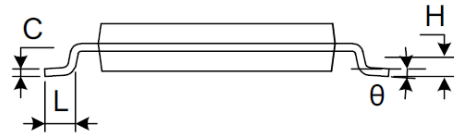
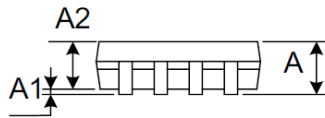
Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.310	0.510	0.012	0.020
c	0.100	0.250	0.004	0.010
D	8.450	8.850	0.333	0.348
e	1.270 BSC		0.050 BSC	
E	5.800	6.200	0.228	0.244
E1	3.800	4.000	0.150	0.157
L	0.400	1.270	0.016	0.050
theta	0°	8°	0°	8°



Dimension in TSSOP14 (Unit: mm)



RECOMMENDED LAND PATTERN (Unit: mm)



Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A	-	1.200	-	0.047
A1	0.050	0.150	0.002	0.006
A2	0.800	1.050	0.031	0.041
b	0.190	0.300	0.007	0.012
c	0.090	0.200	0.004	0.008
D	4.860	5.100	0.191	0.201
E	4.300	4.500	0.169	0.177
E1	6.250	6.550	0.246	0.258
e	0.650 BSC		0.026 BSC	
L	0.500	0.700	0.020	0.028
H	0.25 TYP		0.01 TYP	
θ	1°	7°	1°	7°



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