

# Low Voltage Quad 2-Input AND Gate with 3.6 V Tolerant Inputs and Outputs

## 74ALVC08

### General Description

The ALVC08 contains four 2-input AND gates. This product is designed for low voltage (1.65 V to 3.6 V)  $V_{CC}$  applications with I/O compatibility up to 3.6 V.

The ALVC08 is fabricated with an advanced CMOS technology to achieve high-speed operation while maintaining low CMOS power dissipation.

### Features

- 1.65 V to 3.6 V  $V_{CC}$  Supply Operation
- 3.6 V Tolerant Inputs and Outputs
- $t_{PD}$ 
  - ♦ 2.9 ns Max for 3.0 V to 3.6 V  $V_{CC}$
  - ♦ 3.2 ns Max for 2.3 V to 2.7 V  $V_{CC}$
  - ♦ 5.3 ns Max for 1.65 V to 1.95 V  $V_{CC}$
- Power-off High Impedance Inputs and Outputs
- Uses Quiet Series Noise/EMI Reduction Circuitry
- Latchup Conforms to JEDEC JED78
- ESD Performance:
  - ♦ Human Body Model > 2000 V
  - ♦ Machine Model > 250 V
- These Devices are Pb-Free and Halide Free

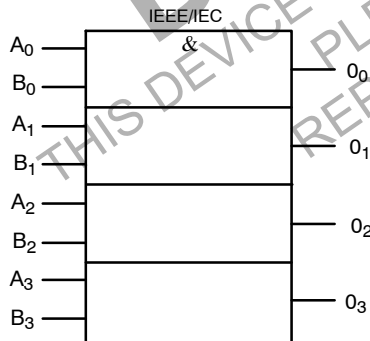
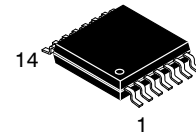


Figure 1. Logic Diagram

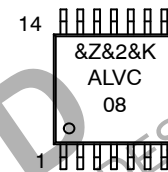
### PIN DESCRIPTION

Pin	Description
$A_n, B_n$	Inputs
$O_n$	Outputs



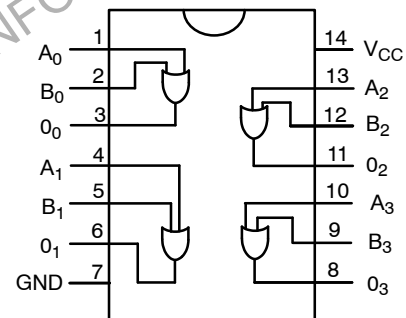
TSSOP-14 WB  
CASE 948G

### MARKING DIAGRAM



&Z = Assembly Location  
 &2 = 2-Digit Date Code (Year & Week)  
 &K = Lot Run Traceability Code  
 ALVC08 = Specific Device Code

### CONNECTION DIAGRAM



### ORDERING INFORMATION

Device	Package	Shipping†
74ALVC08MTCX	TSSOP-14 (Pb-Free)	2500 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, [BRD8011/D](http://www.onsemi.com/BRD8011/D).

**ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Value	Unit
$V_{CC}$	Supply Voltage	-0.5 to + 4.6	V
$V_I$	DC Input Voltage	-0.5 to + 4.6	V
$V_O$	Output Voltage (Note 1)	-0.5 to $V_{CC} + 0.5$	V
$I_{IK}$	DC Input Diode Current $V_I < 0$ V	-50	mA
$I_{OK}$	DC Output Diode Current $V_O < 0$ V	-50	mA
$I_{OH}/I_{OL}$	DC Output Source / Sink Current	$\pm 50$	mA
$I_{CC}$ or $I_{GND}$	DC $V_{CC}$ or Ground Current per Output Pin	$\pm 100$	mA
$T_{STG}$	Storage Temperature	-65 to +150	°C

Stresses exceeding those listed in the Maximum Ratings 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.

**RECOMMENDED OPERATING CONDITIONS** (Note 2)

Symbol	Parameter	Min	Max	Unit
$V_{CC}$	Supply Voltage	1.65	3.6	V
$V_I$	Input Voltage	0	$V_{CC}$	V
$V_O$	Output Voltage	0	$V_{CC}$	V
$T_A$	Free Air Operating Temperature	-40	+85	°C
$\Delta t / \Delta V$	Input Edge Rate, $V_{IN} = 0.8$ V to 2.0 V, $V_{CC} = 3.0$ V	0	5	ns/V

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

1.  $I_O$  Absolute Maximum Rating must be observed, limited to 4.6 V.
2. Floating or unused control inputs must be held HIGH or LOW.

## DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	V <sub>CC</sub> (V)	Min	Max	Unit
V <sub>IH</sub>	HIGH Level Input Voltage		1.65 – 1.95	0.65 x V <sub>CC</sub>	–	V
			2.3 –2.7	1.7	–	
			2.7 – 3.6	2.0	–	
V <sub>IL</sub>	LOW Level Input Voltage		1.65 – 1.95	–	0.35 x V <sub>CC</sub>	V
			2.3 –2.7	–	0.7	
			2.7 – 3.6	–	0.8	
V <sub>OH</sub>	HIGH Level Output Voltage	I <sub>OH</sub> = –100 μA	1.65 – 3.6	V <sub>CC</sub> – 0.2	–	V
		I <sub>OH</sub> = –4 mA	1.65	1.2	–	
		I <sub>OH</sub> = –6 mA	2.3	2.0	–	
		I <sub>OH</sub> = –12 mA	2.3	1.7	–	
			2.7	2.2		
			3.0	2.4		
I <sub>OH</sub> = –24 mA	3.0	2	–			
V <sub>OL</sub>	LOW Level Output Voltage	I <sub>OL</sub> = 100 μA	1.65 – 3.6	–	0.2	V
		I <sub>OL</sub> = 4 mA	1.65	–	0.45	
		I <sub>OL</sub> = 6 mA	2.3	–	0.4	
		I <sub>OL</sub> = 12 mA	2.3	–	0.7	
			2.7	–	0.4	
		I <sub>OL</sub> = 24 mA	3.0	–	0.55	
I <sub>I</sub>	Input Leakage Current	0 ≤ V <sub>I</sub> ≤ 3.6 V	3.6	–	±5.0	μA
I <sub>CC</sub>	Quiescent Supply Current	V <sub>I</sub> = V <sub>CC</sub> or GND, I <sub>O</sub> = 0	3.6	–	40	μA
ΔI <sub>CC</sub>	Increase in I <sub>CC</sub> per Input	V <sub>IH</sub> = V <sub>CC</sub> – 0.6 V	3 – 3.6	–	750	μA

## AC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	T <sub>A</sub> = –40°C to +85°C, R <sub>L</sub> = 500 Ω								Unit
		C <sub>L</sub> = 50 pF				C <sub>L</sub> = 30 pF				
		V <sub>CC</sub> = 3.3 V ±0.3 V		V <sub>CC</sub> = 2.7 V		V <sub>CC</sub> = 2.5 V ±0.2 V		V <sub>CC</sub> = 1.8 V ±0.15 V		
		Min.	Max.	Min.	Max	Min	Max	Min	Max	
t <sub>PHL</sub> , t <sub>PLH</sub>	Propagation Delay	1.2	2.9	–	3.0	1.0	3.2	1.2	5.3	ns

## CAPACITANCE

Symbol	Parameter	Conditions	T <sub>A</sub> = +25°C		Unit
			V <sub>CC</sub>	Typ	
C <sub>IN</sub>	Input Capacitance	V <sub>I</sub> = 0 V or V <sub>CC</sub>	3.3	4.5	pF
C <sub>PD</sub>	Power Dissipation Capacitance	f = 10 MHz, C <sub>L</sub> = 50 pF	3.3	26	pF
			2.5	25	
			1.8	24	

## AC LOADING AND WAVEFORMS

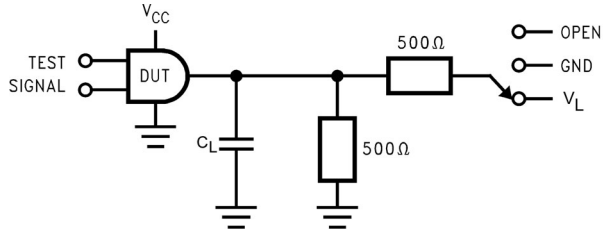


Figure 2. AC Test Circuit

Table 1. VALUES FOR FIGURE 2

Test	Switch
$t_{PLH}$ , $t_{PHL}$	Open

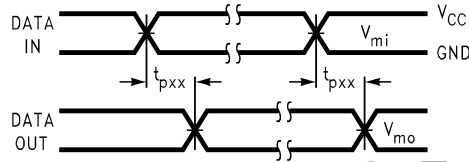


Figure 3. Waveform for Inverting and Non-Inverting Functions

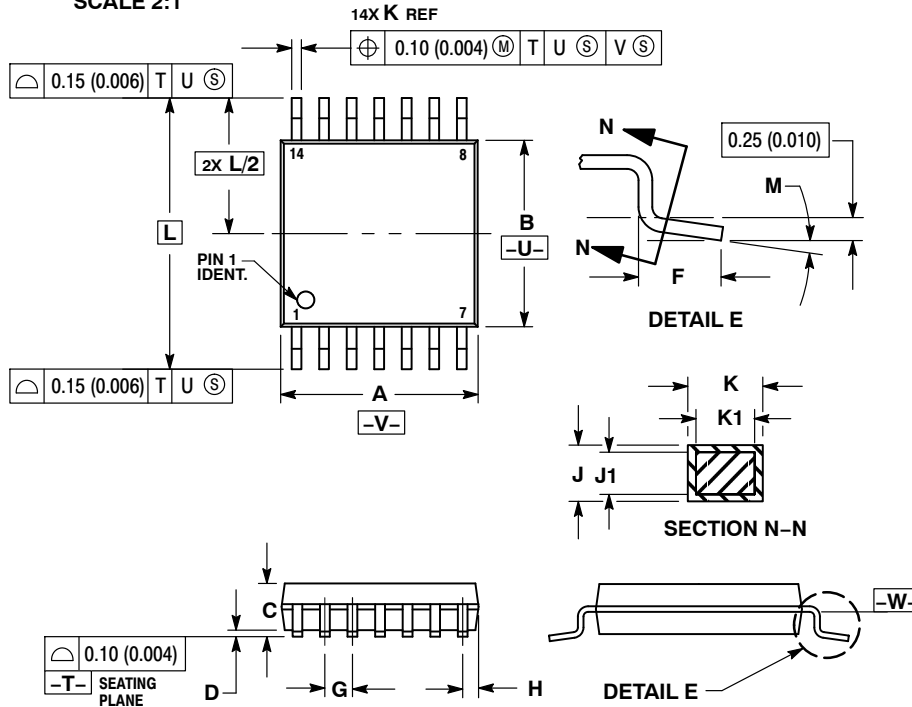
Table 2. VARIABLE MATRIX (Input Characteristics;  $f = 1 \text{ MHz}$ ,  $t_r = t_f = 2 \text{ ns}$ ,  $Z_0 = 5 \Omega$ )

Symbol	$V_{CC}$			
	$3.3 \text{ V} \pm 0.3 \text{ V}$	$2.7 \text{ V}$	$2.5 \text{ V} \pm 0.2 \text{ V}$	$1.8 \text{ V} \pm 0.15 \text{ V}$
$V_{mI}$	$1.5 \text{ V}$	$1.5 \text{ V}$	$V_{CC}/2$	$V_{CC}/2$
$V_{mO}$	$1.5 \text{ V}$	$1.5 \text{ V}$	$V_{CC}/2$	$V_{CC}/2$


**TSSOP-14 WB**  
**CASE 948G**  
**ISSUE C**

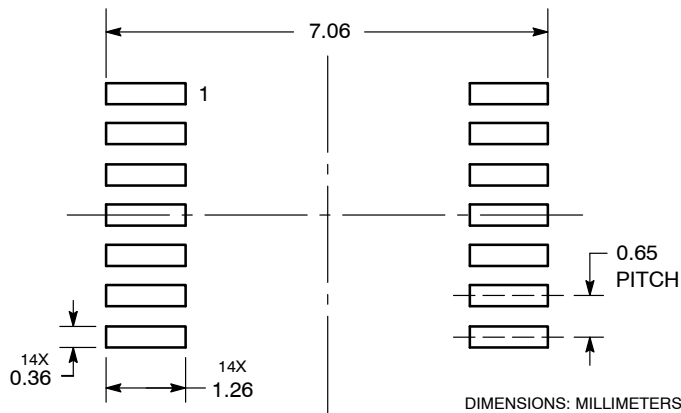
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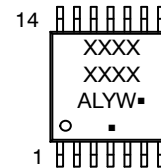

**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.
5. DIMENSION K DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE K DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
7. DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE -W-.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.90	5.10	0.193	0.200
B	4.30	4.50	0.169	0.177
C	---	1.20	---	0.047
D	0.05	0.15	0.002	0.006
F	0.50	0.75	0.020	0.030
G	0.65 BSC		0.026 BSC	
H	0.50	0.60	0.020	0.024
J	0.09	0.20	0.004	0.008
J1	0.09	0.16	0.004	0.006
K	0.19	0.30	0.007	0.012
K1	0.19	0.25	0.007	0.010
L	6.40 BSC		0.252 BSC	
M	0°	8°	0°	8°

**RECOMMENDED  
SOLDERING FOOTPRINT\***


\*For additional information on our Pb-Free strategy and soldering details, please download the **onsemi** Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

**GENERIC  
MARKING DIAGRAM\***


A = Assembly Location  
L = Wafer Lot  
Y = Year  
W = Work Week  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.

**DOCUMENT NUMBER:** 98ASH70246A

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**DESCRIPTION:** TSSOP-14 WB

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