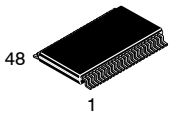
Low-Voltage 16-Bit Buffer/Line Driver with 3.6 V Tolerant Inputs and Outputs

74ALVC16244



TSSOP48 12.5x6.1
CASE 948BQ

General Description

The ALVC16244 contains sixteen non−inverting buffers with 3−STATE outputs to be employed as a memory and address driver, clock driver, or bus oriented transmitter/receiver. The device is nibble (4−bit) controlled. Each nibble has separate 3−STATE control inputs which can be shorted together for full 16−bit operation.

The 74ALVC16244 is designed for low voltage (1.65 V to 3.6 V) V_{CC} applications with I/O capability up to 3.6 V.

The 74ALVC16244 is fabricated with an advanced CMOS technology to achieve high speed operation while maintaining low CMOS power dissipation.

Features

- 1.65 V − 3.6 V V_{CC} Supply Operation
- 3.6 V Tolerant Inputs and Outputs
- t_{PD}
  - 3.0 ns max for 3.0 V to 3.6 V V_{CC}
  - 3.5 ns max for 2.3 V to 2.7 V V_{CC}
  - 6.0 ns max for 1.65 V to 1.95 V V_{CC}
- Power−off High Impedance Inputs and Outputs
- Supports Live Insertion and Withdrawal*
- Uses Patented Noise/EMI Reduction Circuitry
- Latch−up conforms to JEDEC JED98
- ESD Performance:
  - Human Body Model >2000 V
  - Machine Model >200 V
- These are Pb−Free Devices

*To ensure the high−impedance state during power up or power down, $\overline{OE}$ should be tied to V_{CC} through a pull−up resistor; the minimum value of the resistor is determined by the current−sourcing capability of the driver.

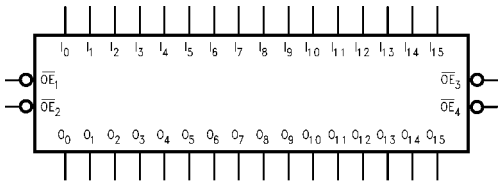


Figure 1. Logic Symbol

MARKING DIAGRAM

A	= Assembly Location
WL	= Wafer Lot
YY	= Year
WW	= Work Week

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

Connection Diagram

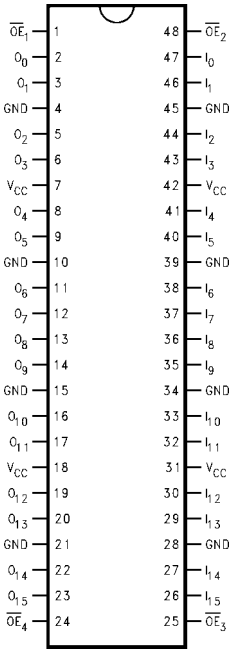


Figure 2. Pin Assignment for TSSOP

PIN DESCRIPTION

Pin Names	Description
$\overline{OE}_n$	Output Enable Input (Active LOW)
I_0–I_{15}	Inputs
O_0–O_{15}	Outputs
NC	No Connect

TRUTH TABLE

Inputs		Outputs
$\overline{OE}_1$	I_0–I_3	O_0–O_3
L	L	L
L	H	H
H	X	Z

$\overline{OE}_3$	I_8–I_{11}	O_8–O_{11}
L	L	L
L	H	H
H	X	Z

$\overline{OE}_2$	I_4–I_7	O_4–O_7
L	L	L
L	H	H
H	X	Z

$\overline{OE}_4$	I_{12}–I_{15}	O_{12}–O_{15}
L	L	L
L	H	H
H	X	Z

H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial (HIGH or LOW, inputs may not float)
Z = High Impedance

Functional Description

The 74ALVC16244 contains sixteen non−inverting buffers with 3−STATE outputs. The device is nibble (4 bits) controlled with each nibble functioning identically, but independent of each other. The control pins may be shorted together to obtain full 16−bit operation. The 3−STATE outputs are controlled by an Output Enable ($\overline{OE}_n$) input. When $\overline{OE}_n$ is LOW, the outputs are in the 2−state mode. When $\overline{OE}_n$ is HIGH, the standard outputs are in the high impedance mode but this does not interfere with entering new data into the inputs.

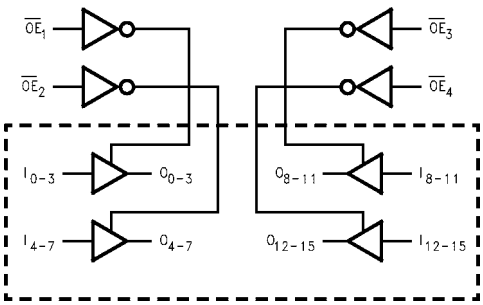


Figure 3. Logic Diagram

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Supply Voltage	V_{CC}	−0.5 to +4.6	V
DC Input Voltage	V_I	−0.5 to +4.6	V
Output Voltage (Note 1)	V_O	−0.5 to V_{CC} + 0.5	V
DC Input Diode Current, V_I < 0 V	I_{IK}	−50	mA
DC Output Diode Current, V_O < 0 V	I_{OK}	−50	mA
DC Output Source/Sink Current	I_{OH}/I_{OL}	±50	mA
DC V_{CC} or GND Current per Supply Pin	I_{CC} or GND	±100	mA
Storage Temperature Range	T_{STG}	−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.
1. I_O Absolute Maximum Rating must be observed, limited to 4.6 V.

RECOMMENDED OPERATING CONDITIONS (Note 2)

Symbol	Parameter	Min	Max	Unit
V_{CC}	Power Supply Operating 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	10	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.
2. Floating or unused control inputs must be held HIGH or LOW.

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	V_{CC} (V)	Min	Max	Units
V_{IH}	HIGH Level Input Voltage		1.65 – 1.95 2.3 – 2.7 2.7 – 3.6	0.65 x V_{CC} 1.7 2.0		V
V_{IL}	LOW Level Input Voltage		1.65 – 1.95 2.3 – 2.7 2.7 – 3.6		0.35 x V_{CC} 0.7 0.8	V
V_{OH}	HIGH Level Output Voltage	I_{OH} = −100 μA	1.65 – 3.6	V_{CC} – 0.2		V
		I_{OH} = −4 mA	1.65	1.2		
		I_{OH} = −6 mA	2.3	2.0		
		I_{OH} = −12 mA	2.3 2.7 3.0	1.7 2.2 2.4		
		I_{OH} = −24 mA	3.0	2		
V_{OL}	LOW Level Output Voltage	I_{OL} = 100 μA	1.65 – 3.6		0.2	V
		I_{OL} = 4 mA	1.65		0.45	
		I_{OL} = 6 mA	2.3		0.4	
		I_{OL} = 12 mA	2.3 2.7		0.7 0.4	
		I_{OL} = 24 mA	3.0		0.55	
I_I	Input Leakage Current	0 ≤ V_I ≤ 3.6 V	3.6		±5.0	μA
I_{OZ}	3−STATE Output Leakage	0 ≤ V_O ≤ 3.6 V	3.6		±10	μA
I_{CC}	Quiescent Supply Current	V_I = V_{CC} or GND, I_O = 0	3.6		40	μA
ΔI_{CC}	Increase in I_{CC} per Input	V_{IH} = V_{CC} – 0.6 V	3 – 3.6		750	μA

AC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	$T_A = -40°C$ to $+85°C$, $R_L = 500\ \Omega$								Units
		$C_L = 50$ pF				$C_L = 30$ pF				
		$V_{CC} = 3.3$ V ±0.3 V		$V_{CC} = 2.7$ V		$V_{CC} = 2.5$ V ±0.2 V		$V_{CC} = 1.8$ V ±0.15 V		
		Min	Max	Min	Max	Min	Max	Min	Max	
t_{PHL}, t_{PLH}	Propagation Delay	1.3	3	1.5	3.5	1.0	3.0	1.5	6.0	ns
t_{PZL}, t_{PZH}	Output Enable Time	1.3	4.0	1.5	4.6	1.0	4.1	1.5	8.2	ns
t_{PLZ}, t_{PHZ}	Output Disable Time	1.3	4.0	1.5	4.3	1.0	3.8	1.5	6.8	ns

CAPACITANCE

Symbol	Parameter		Conditions	$T_A = +25°C$		Units
				V_{CC}	Typical	
C_{IN}	Input Capacitance		$V_I = 0$ V or V_{CC}	3.3	6	pF
C_{OUT}	Output Capacitance		$V_I = 0$ V or V_{CC}	3.3	7	pF
C_{PD}	Power Dissipation Capacitance	Outputs Enabled	f = 10 MHz, $C_L = 0$ pF	3.3	20	pF
				2.5	20	

AC Loading and Waveforms

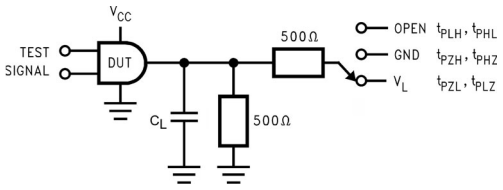


Figure 4. AC Test Circuit

Values for Figure 4

Test	Switch
t_{PLH}, t_{PHL}	Open
t_{PZL}, t_{PLZ}	V_L
t_{PZH}, t_{PHZ}	GND

VARIABLE MATRIX

(Input Characteristics: f = 1 MHz; $t_r = t_f$ = 2 ns; Z_0 = 50 Ω)

Symbol	V_{CC}			
	3.3 V ±0.3 V	**2.7 V**	**2.5 V ±0.2 V**	**1.8 V ±0.15 V**
V_{mi}	1.5 V	1.5 V	V_{CC} / 2	V_{CC} / 2
V_{mo}	1.5 V	1.5 V	V_{CC} / 2	V_{CC} / 2
V_X	V_{OL} + 0.3 V	V_{OL} + 0.3 V	V_{OL} + 0.15 V	V_{OL} + 0.15 V
V_Y	V_{OH} − 0.3 V	V_{OH} − 0.3 V	V_{OH} − 0.15 V	V_{OH} − 0.15 V
V_L	6 V	6 V	V_{CC} * 2	V_{CC} * 2

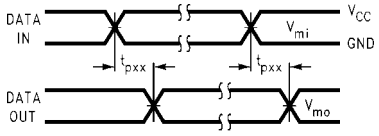


Figure 5. Waveform for Inverting and Non−Inverting Functions

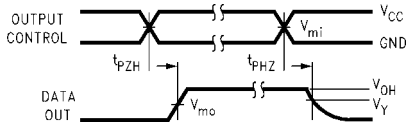


Figure 6. 3−STATE Output High Enable and Disable Times for Low Voltage Logic

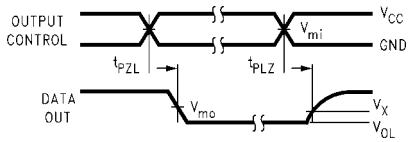


Figure 7. 3−STATE Output Low Enable and Disable Times for Low Voltage Logic

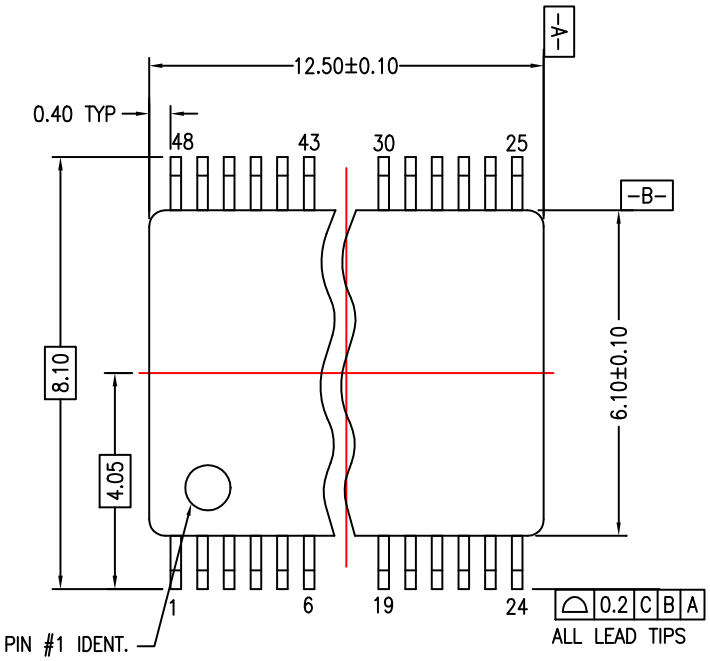
ORDERING INFORMATION

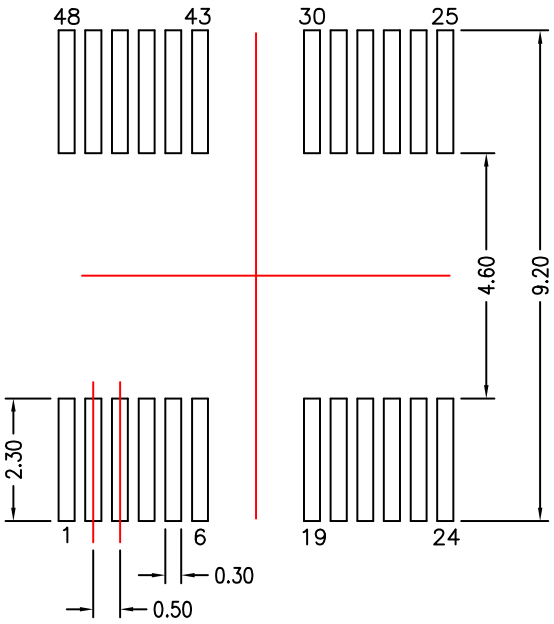
Device	Package	Shipping†
74ALVC16244MTDX	TSSOP48 12.5x6.1 (Pb−Free)	1000 Units / Tape & Reel

†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.

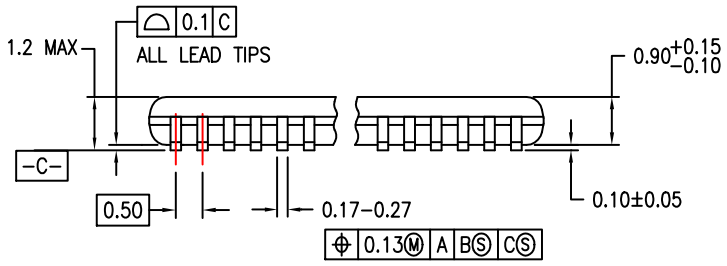
TSSOP48 12.5x6.1
CASE 948BQ
ISSUE O

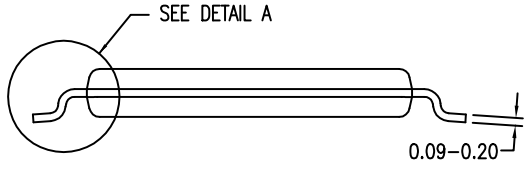
DATE 30 SEP 2016

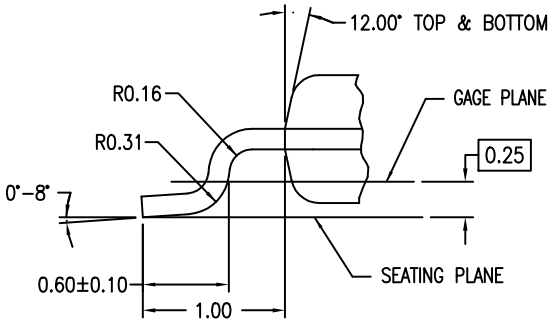




LAND PATTERN RECOMMENDATION







DETAIL A

DIMENSIONS ARE IN MILLIMETERS

NOTES:

A. CONFORMS TO JEDEC REGISTRATION MO-153, VARIATION ED, DATE 4/97.
B. DIMENSIONS ARE IN MILLIMETERS.
C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
D. DIMENSIONS AND TOLERANCES PER ANSI Y14.5M, 1982.

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