

## 74AC16244 • 74ACT16244 16-Bit Buffer/Line Driver with 3-STATE Outputs

### General Description

The AC16244 and ACT16244 contain sixteen non-inverting buffers with 3-STATE outputs designed to be employed as a memory and address driver, clock driver, or bus oriented transmitter/receiver. The device is nibble controlled. Each nibble has separate 3-STATE control inputs which can be shorted together for full 16-bit operation.

### Features

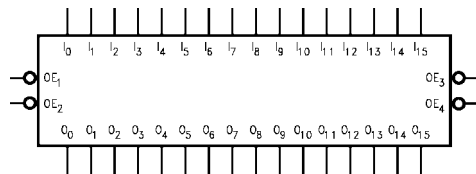
- Separate control logic for each byte and nibble
- 16-bit version of the AC244/ACT244
- Outputs source/sink 24 mA
- ACT16244 has TTL-compatible inputs

### Ordering Code:

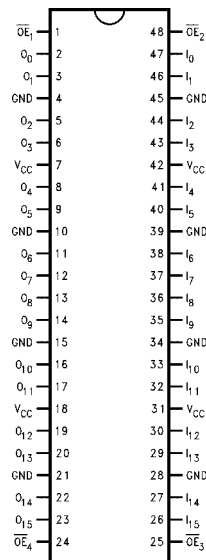
Order Number	Package Number	Package Description
74AC16244SSC	MS48A	48-Lead Small Shrink Outline Package (SSOP), JEDEC MO-118, 0.300 Wide
74ACT16244SSC	MS48A	48-Lead Small Shrink Outline Package (SSOP), JEDEC MO-118, 0.300 Wide
74ACT16244MTD	MTD48	48-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 6.1mm Wide

Device also available in Tape and Reel. Specify by appending suffix letter "X" to the ordering code.

### Logic Symbol



### Connection Diagram



### Pin Descriptions

Pin Names	Description
$\overline{OE}_n$	Output Enable Input (Active LOW)
$I_0 - I_{15}$	Inputs
$O_0 - O_{15}$	Outputs

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## Functional Description

The AC16244 and ACT16244 contain sixteen non-inverting buffers with 3-STATE standard outputs. The device is nibble (4 bits) controlled with each nibble functioning identically, but independent of the other. The control pins can be shorted together to obtain full 16-bit operation. The

3-STATE outputs are controlled by an Output Enable ( $\overline{OE}_n$ ) input for each nibble. When  $\overline{OE}_n$  is LOW, the outputs are in 2-state mode. When  $\overline{OE}_n$  is HIGH, the outputs are in the high impedance mode, but this does not interfere with entering new data into the inputs.

## Truth Tables

Inputs		Outputs
$\overline{OE}_1$	I <sub>0</sub> -I <sub>3</sub>	O <sub>0</sub> -O <sub>3</sub>
L	L	L
L	H	H
H	X	Z

Inputs		Outputs
$\overline{OE}_2$	I <sub>4</sub> -I <sub>7</sub>	O <sub>4</sub> -O <sub>7</sub>
L	L	L
L	H	H
H	X	Z

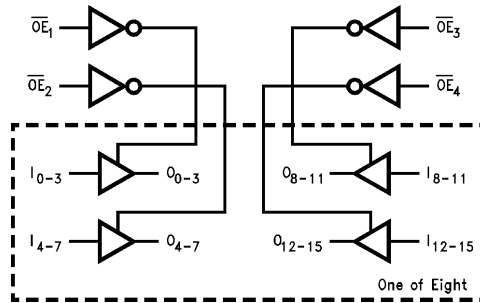
Inputs		Outputs
$\overline{OE}_3$	I <sub>8</sub> -I <sub>11</sub>	O <sub>8</sub> -O <sub>11</sub>
L	L	L
L	H	H
H	X	Z

Inputs		Outputs
$\overline{OE}_4$	I <sub>12</sub> -I <sub>15</sub>	O <sub>12</sub> -O <sub>15</sub>
L	L	L
L	H	H
H	X	Z

L = LOW Voltage Level  
H = HIGH Voltage Level

X = Immaterial  
Z = High Impedance

## Logic Diagram



**Absolute Maximum Ratings**(Note 1)

Supply Voltage ( $V_{CC}$ )	-0.5V to +7.0V
DC Input Diode Current ( $I_{IK}$ )	
$V_I = -0.5V$	-20 mA
$V_I = V_{CC} + 0.5V$	+20 mA
DC Output Diode Current ( $I_{OK}$ )	
$V_O = -0.5V$	-20 mA
$V_O = V_{CC} + 0.5V$	+20 mA
DC Output Voltage ( $V_O$ )	-0.5V to $V_{CC} + 0.5V$
DC Output Source/Sink Current ( $I_O$ )	$\pm 50$ mA
DC $V_{CC}$ or Ground Current per Output Pin	$\pm 50$ mA
Junction Temperature	+140°C
Storage Temperature	-65°C to +150°C

**Recommended Operating Conditions**

Supply Voltage ( $V_{CC}$ )	
AC	2.0V to 6.0V
ACT	4.5V to 5.5V
Input Voltage ( $V_I$ )	0V to $V_{CC}$
Output Voltage ( $V_O$ )	0V to $V_{CC}$
Operating Temperature ( $T_A$ )	-40°C to +85°C
Minimum Input Edge Rate ( $\Delta V/\Delta t$ )	
AC Devices	
$V_{IN}$ from 30% to 70%	
$V_{CC}$ @ 3.3V, 4.5V, 5.5V	125 mV/ns
Minimum Input Edge Rate ( $\Delta V/\Delta t$ )	
ACT Devices	
$V_{IN}$ from 0.8V to 2.0V	
$V_{CC}$ @ 4.5V, 5.5V	125 mV/ns

**Note 1:** Absolute maximum ratings are those values beyond which damage to the device may occur. The databook specifications should be met, without exception to ensure that the system design is reliable over its power supply, temperature, and output/input loading variables. Fairchild does not recommend operation of FACT™ circuits outside databook specifications.

**DC Electrical Characteristics for AC**

Symbol	Parameter	$V_{CC}$ (V)	$T_A = +25^\circ\text{C}$		$T_A = -40^\circ\text{C to } +85^\circ\text{C}$		Units	Conditions
			Typ	Guaranteed Limits				
$V_{IH}$	Minimum HIGH Input Voltage	3.0	1.5	2.1	2.1		V	$V_{OUT} = 0.1V$ or $V_{CC} - 0.1V$
		4.5	2.25	3.15	3.15			
		5.5	2.75	3.85	3.85			
$V_{IL}$	Maximum LOW Input Voltage	3.0	1.5	0.9	0.9		V	$V_{OUT} = 0.1V$ or $V_{CC} - 0.1V$
		4.5	2.25	1.35	1.35			
		5.5	2.75	1.65	1.65			
$V_{OH}$	Minimum HIGH Output Voltage	3.0	2.99	2.9	2.9		V	$I_{OUT} = -50 \mu\text{A}$
		4.5	4.49	4.4	4.4			
		5.5	5.49	5.4	5.4			
		3.0		2.56	2.46		V	$I_{OH} = -12 \text{ mA}$ $I_{OH} = -24 \text{ mA}$ $I_{OH} = -24 \text{ mA (Note 2)}$
		4.5		3.86	3.76			
		5.5		4.86	4.76			
$V_{OL}$	Maximum LOW Output Voltage	3.0	0.002	0.1	0.1		V	$I_{OUT} = 50 \mu\text{A}$
		4.5	0.001	0.1	0.1			
		5.5	0.001	0.1	0.1			
		3.0		0.36	0.44		V	$I_{OL} = 12 \text{ mA}$ $I_{OL} = 24 \text{ mA}$ $I_{OL} = 24 \text{ mA (Note 2)}$
		4.5		0.36	0.44			
		5.5		0.36	0.44			
$I_{OZ}$	Maximum 3-STATE Leakage Current	5.5		0.50	$\pm 5.0$		$\mu\text{A}$	$V_I$ (OE) = $V_{IL}$ , $V_{IH}$ $V_I = V_{CC}$ , GND $V_O = V_{CC}$ , GND
$I_{IN}$	Maximum Input Leakage Current (Note 3)	5.5		$\pm 0.1$	$\pm 1.0$		$\mu\text{A}$	$V_I = V_{CC}$ , GND
$I_{CC}$	Max Quiescent Supply Current (Note 3)	5.5		8.0	80.0		$\mu\text{A}$	$V_{IN} = V_{CC}$ or GND
$I_{OLD}$	Minimum Dynamic	5.5			75		mA	$V_{OLD} = 1.65V$ Max
$I_{OHD}$	Output Current (Note 4)	5.5			-75		mA	$V_{OHD} = 3.85V$ Min

**Note 2:** All outputs loaded; thresholds associated with output under test.

**Note 3:**  $I_{IN}$  and  $I_{CC}$  @ 3.0V are guaranteed to be less than or equal to the respective limit @ 5.5V  $V_{CC}$ .

**Note 4:** Maximum test duration 2.0 millisecond; one output loaded at a time.

## DC Electrical Characteristics for ACT

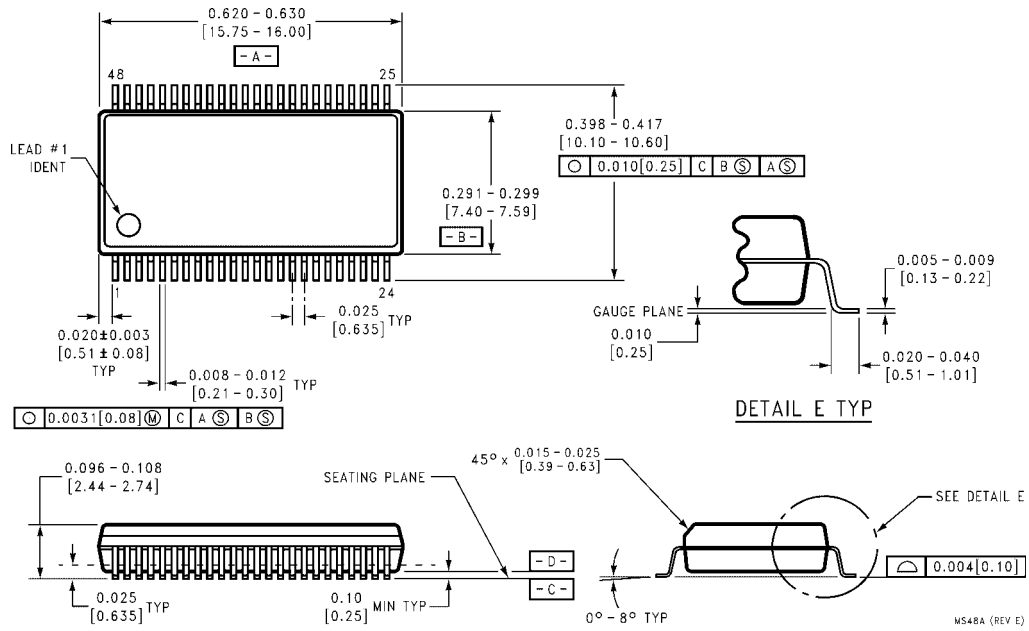
Symbol	Parameter	V <sub>CC</sub> (V)	T <sub>A</sub> = +25°C		T <sub>A</sub> = -40°C to +85°C	Units	Conditions
			Typ	Guaranteed Limits			
V <sub>IH</sub>	Minimum HIGH Input Voltage	4.5	1.5	2.0	2.0	V	V <sub>OUT</sub> = 0.1V or V <sub>CC</sub> - 0.1V
		5.5	1.5	2.0	2.0		
V <sub>IL</sub>	Maximum LOW Input Voltage	4.5	1.5	0.8	0.8	V	V <sub>OUT</sub> = 0.1V or V <sub>CC</sub> - 0.1V
		5.5	1.5	0.8	0.8		
V <sub>OH</sub>	Minimum HIGH Output Voltage	4.5	4.49	4.4	4.4	V	I <sub>OUT</sub> = -50 μA
		5.5	5.49	5.4	5.4		
		4.5		3.86	3.76	V	V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> I <sub>OH</sub> = -24 mA
		5.5		4.86	4.76		I <sub>OH</sub> = -24 mA (Note 5)
V <sub>OL</sub>	Maximum LOW Output Voltage	4.5	0.001	0.1	0.1	V	I <sub>OUT</sub> = 50 μA
		5.5	0.001	0.1	0.1		
		4.5		0.36	0.44	V	V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> I <sub>OH</sub> = 24 mA
		5.5		0.36	0.44		I <sub>OH</sub> = 24 mA (Note 5)
I <sub>OZ</sub>	Maximum 3-STATE Leakage Current	5.5		± 0.5	± 5.0	μA	V <sub>I</sub> = V <sub>IL</sub> , V <sub>IH</sub> V <sub>O</sub> = V <sub>CC</sub> , GND
I <sub>IN</sub>	Maximum Input Leakage Current	5.5		± 0.1	± 1.0	μA	V <sub>I</sub> = V <sub>CC</sub> , GND
I <sub>CCT</sub>	Maximum I <sub>CC</sub> /Input	5.5	0.6		1.5	mA	V <sub>I</sub> = V <sub>CC</sub> - 2.1V
I <sub>CC</sub>	Max Quiescent Supply Current	5.5		8.0	80.0	μA	V <sub>IN</sub> = V <sub>CC</sub> or GND
I <sub>OLD</sub>	Minimum Dynamic	5.5			75	mA	V <sub>OLD</sub> = 1.65V Max
I <sub>OHD</sub>	Output Current (Note 6)				-75	mA	V <sub>OHD</sub> = 3.85V Min

**Note 5:** All outputs loaded; thresholds associated with output under test.

**Note 6:** Maximum test duration 2.0 millisecond; one output loaded at a time.

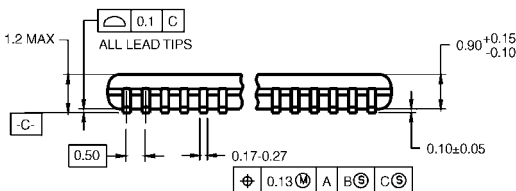
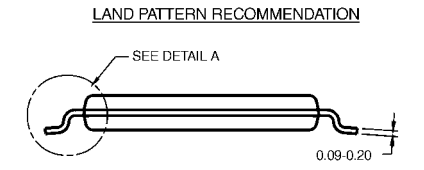
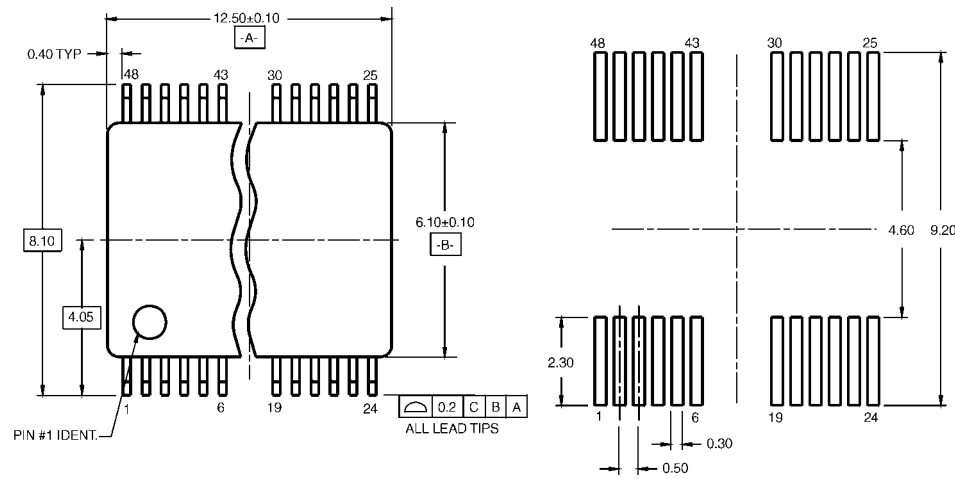
AC Electrical Characteristics for AC								
Symbol	Parameter	V <sub>CC</sub> (V) (Note 7)	T <sub>A</sub> = +25°C C <sub>L</sub> = 50 pF			T <sub>A</sub> = -40°C to +85°C C <sub>L</sub> = 50 pF		Units
			Min	Typ	Max	Min	Max	
t <sub>PLH</sub>	Propagation Delay	3.3	2.0	6.3	9.4	2.0	10.8	ns
	Data to Output	5.0	1.6	4.6	6.5	1.6	7.1	
t <sub>PHL</sub>	Propagation Delay	3.3	2.4	5.7	10.7	2.4	11.8	ns
	Data to Output	5.0	2.0	4.3	7.0	2.0	7.9	
t <sub>PZH</sub>	Output Enable Time	3.3	2.2	6.2	10	2.2	11.5	ns
		5.0	1.7	4.6	6.7	1.7	7.5	
t <sub>PZL</sub>	Output Enable Time	3.3	2.9	6.4	13.0	2.9	14.6	ns
		5.0	2.2	4.7	8.1	2.2	9.0	
t <sub>PHZ</sub>	Output Disable Time	3.3	3.1	5.5	8.4	3.1	9.1	ns
		5.0	1.9	3.9	7.8	1.9	8.4	
t <sub>PLZ</sub>	Output Disable Time	3.3	2.4	4.7	8.1	2.4	8.8	ns
		5.0	1.7	3.6	7.2	1.7	7.6	
<b>Note 7:</b> Voltage Range 5.0 is 5.0V ± 0.5V. Voltage Range 3.3 is 3.3V ± 0.3V.								
AC Electrical Characteristics for ACT								
Symbol	Parameter	V <sub>CC</sub> (V) (Note 8)	T <sub>A</sub> = +25°C C <sub>L</sub> = 50 pF			T <sub>A</sub> = -40°C to +85°C C <sub>L</sub> = 50 pF		Units
			Min	Typ	Max	Min	Max	
t <sub>PLH</sub>	Propagation Delay	5.0	3.0	5.2	7.3	3.0	7.8	ns
	Data to Output		2.5	4.8	6.8	2.5	7.3	
t <sub>PZH</sub>	Output Enable	5.0	2.5	5.0	7.4	2.5	7.9	ns
	Time		2.7	4.6	7.5	2.7	8.0	
t <sub>PZL</sub>	Output Disable	5.0	2.3	5.0	7.9	2.3	8.2	ns
	Time		2.0	4.6	7.4	2.0	7.9	
<b>Note 8:</b> Voltage Range 5.0 is 5.0V ± 0.5V.								
Capacitance								
Symbol	Parameter	Typ	Units	Conditions				
C <sub>IN</sub>	Input Pin Capacitance	4.5	pF	V <sub>CC</sub> = 5.0V				
C <sub>OUT</sub>	Output Pin Capacitance	12	pF	V <sub>CC</sub> = 5.0V				
C <sub>PD</sub>	Power Dissipation Capacitance	74AC16244	35	pF	V <sub>CC</sub> = 5.0V			
		74ACT16244	30					

**Physical Dimensions** inches (millimeters) unless otherwise noted



**48-Lead Small Shrink Outline Package (SSOP), JEDEC MO-118, 0.300 Wide  
Package Number MS48A**

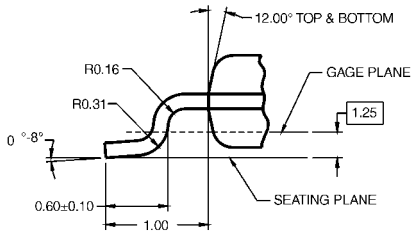
**Physical Dimensions** inches (millimeters) unless otherwise noted (Continued)



DIMENSIONS ARE IN MILLIMETERS

- NOTES:
- A. CONFORMS TO JEDEC REGISTRATION MO-153, VARIATION AB, REF NOTE 6, DATE 7/93.
  - 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.

MTD48RevB1



**48-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 6.1mm Wide Package Number MTD48**

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