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January 2008

## 74AC244, 74ACT244 Octal Buffer/Line Driver with 3-STATE Outputs

#### **Features**

- I<sub>CC</sub> and I<sub>OZ</sub> reduced by 50%
- 3-STATE outputs drive bus lines or buffer memory address registers
- Outputs source/sink 24mA
- ACT244 has TTL-compatible inputs

## **General Description**

The AC/ACT244 is an octal buffer and line driver designed to be employed as a memory address driver, clock driver and bus-oriented transmitter/receiver which provides improved PC board density.

## **Ordering Information**

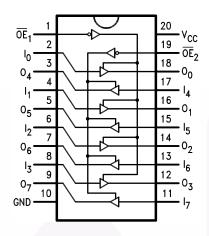
Order Number	Package Number	Package Description
74AC244SC	M20B	20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide
74AC244SJ	M20D	20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
74AC244MTC	MTC20	20-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
74AC244PC	N20A	20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide
74ACT244SC	M20B	20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide
74ACT244SJ	M20D	20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
74ACT244MSA	MSA20	20-Lead Shrink Small Outline Package (SSOP), JEDEC MO-150, 5.3mm Wide
74ACT244MTC	MTC20	20-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
74ACT244PC	N20A	20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide

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



All packages are lead free per JEDEC: J-STD-020B standard.

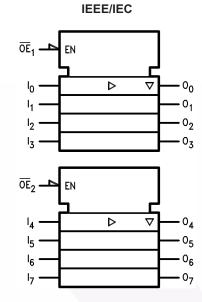
## **Connection Diagram**



## **Pin Description**

Pin					
Names	s Description				
$\overline{OE}_1, \overline{OE}_2$	3-STATE Output Enable Inputs				
I <sub>0</sub> —I <sub>7</sub>	Inputs				
O <sub>0</sub> –O <sub>7</sub>	Outputs				

## **Logic Symbol**



## **Truth Tables**

Inputs		Outputs
OE <sub>1</sub>	In	(Pins 12, 14, 16, 18)
L	L	L
L	Н	Н
Н	Х	Z

Inp	uts	Outputs
OE <sub>2</sub>	I <sub>n</sub>	(Pins 3, 5, 7, 9)
L	L	L
L	Н	Н
Н	Х	Z

X = Immaterial

Z = High Impedance

## **Absolute Maximum Ratings**

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

Symbol	Parameter	Rating
V <sub>CC</sub>	Supply Voltage	-0.5V to +7.0V
I <sub>IK</sub>	DC Input Diode Current	
	$V_{I} = -0.5V$	-20mA
	$V_{I} = V_{CC} + 0.5$	+20mA
V <sub>I</sub>	DC Input Voltage	-0.5V to V <sub>CC</sub> + 0.5V
I <sub>OK</sub>	DC Output Diode Current	
	$V_{O} = -0.5V$	-20mA
	$V_O = V_{CC} + 0.5V$	+20mA
Vo	DC Output Voltage	-0.5V to V <sub>CC</sub> + 0.5V
Io	DC Output Source or Sink Current	±50mA
I <sub>CC</sub> or I <sub>GND</sub>	DC V <sub>CC</sub> or Ground Current per Output Pin	±50mA
T <sub>STG</sub>	Storage Temperature	−65°C to +150°C
T <sub>J</sub>	Junction Temperature	140°C

## **Recommended Operating Conditions**

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. Fairchild does not recommend exceeding them or designing to absolute maximum ratings.

Symbol	Parameter	Rating			
V <sub>CC</sub>	Supply Voltage				
	AC	2.0V to 6.0V			
	ACT	4.5V to 5.5V			
VI	Input Voltage 0V				
Vo	Output Voltage 0V				
T <sub>A</sub>	Operating Temperature -40°C to +85°				
ΔV / Δt	Minimum Input Edge Rate, AC Devices: 125mV/				
	V <sub>IN</sub> from 30% to 70% of V <sub>CC</sub> , V <sub>CC</sub> @ 3.3V, 4.5V, 5.5V				
ΔV / Δt	Minimum Input Edge Rate, ACT Devices: 125mV/r				
	V <sub>IN</sub> from 0.8V to 2.0V, V <sub>CC</sub> @ 4.5V, 5.5V				

### **DC Electrical Characteristics for AC**

				<b>T</b> <sub>A</sub> = -	+25°C	T <sub>A</sub> = -55°C to +125°C	T <sub>A</sub> = -40°C to +85°C	
Symbol	Parameter	V <sub>CC</sub> (V)	Conditions	Тур.		Guaranteed L	imits	Units
V <sub>IH</sub>	Minimum HIGH Level	3.0	$V_{OUT} = 0.1V$ or	1.5	2.1	2.1	2.1	V
	Input Voltage	4.5	V <sub>CC</sub> – 0.1V	2.25	3.15	3.15	3.15	
		5.5		2.75	3.85	3.85	3.85	
V <sub>IL</sub>	Maximum LOW Level	3.0	$V_{OUT} = 0.1V$ or	1.5	0.9	0.9	0.9	V
	Input Voltage	4.5	V <sub>CC</sub> – 0.1V	2.25	1.35	1.35	1.35	
		5.5		2.75	1.65	1.65	1.65	
V <sub>OH</sub>	Minimum HIGH Level	3.0	$I_{OUT} = -50\mu A$	2.99	2.9	2.9	2.9	V
	Output Voltage	4.5		4.49	4.4	4.4	4.4	
		5.5		5.49	5.4	5.4	5.4	
		3.0	$V_{IN} = V_{IL} \text{ or } V_{IH},$ $I_{OH} = 12\text{mA}$		2.56	2.4	2.46	
		4.5	$V_{IN} = V_{IL} \text{ or } V_{IH},$ $I_{OH} = 24\text{mA}$		3.86	3.7	3.76	
		5.5	$V_{IN} = V_{IL} \text{ or } V_{IH},$ $I_{OH} = 24\text{mA}^{(1)}$		4.86	4.7	4.76	
V <sub>OL</sub>	Maximum LOW Level	3.0	I <sub>OUT</sub> = 50μA	0.002	0.1	0.1	0.1	V
	Output Voltage	4.5		0.001	0.1	0.1	0.1	
		5.5		0.001	0.1	0.1	0.1	
		3.0	$V_{IN} = V_{IL} \text{ or } V_{IH},$ $I_{OL} = 12\text{mA}$		0.36	0.50	0.44	
		4.5	$V_{IN} = V_{IL} \text{ or } V_{IH},$ $I_{OL} = 24\text{mA}$		0.36	0.50	0.44	
		5.5	$V_{IN} = V_{IL} \text{ or } V_{IH},$ $I_{OL} = 24\text{mA}^{(1)}$		0.36	0.50	0.44	
I <sub>IN</sub> <sup>(2)</sup>	Maximum Input Leakage Current	5.5	$V_I = V_{CC}$ , GND		±0.1	±1.0	±1.0	μA
l <sub>OZ</sub>	Maximum 3-STATE Leakage Current	5.5	$\begin{aligned} &V_{I}\left(OE\right)=V_{IL},V_{IH};\\ &V_{I}=V_{CC},V_{GND};\\ &V_{O}=V_{CC},GND \end{aligned}$		±0.25	±5.0	±2.5	μA
I <sub>OLD</sub>	Minimum Dynamic	5.5	V <sub>OLD</sub> = 1.65V Max.			50	75	mA
I <sub>OHD</sub>	Output Current <sup>(3)</sup>	5.5	V <sub>OHD</sub> = 3.85V Min.			-50	-75	mA
I <sub>CC</sub> <sup>(2)</sup>	Maximum Quiescent Supply Current	5.5	$V_{IN} = V_{CC}$ or GND		4.0	80.0	40.0	μA

#### Notes:

- 1. All outputs loaded; thresholds on input associated with output under test.
- 2.  $I_{IN}$  and  $I_{CC}$  @ 3.0V are guaranteed to be less than or equal to the respective limit @ 5.5V  $V_{CC}$ .
- 3. Maximum test duration 2.0ms, one output loaded at a time.

## **DC Electrical Characteristics for ACT**

				<b>T</b> <sub>A</sub> =	+25°C	T <sub>A</sub> = -55°C to +125°C	T <sub>A</sub> =-40°C to +85°C	
Symbol	Parameter	V <sub>CC</sub> (V)	Conditions	Тур.		Guaranteed L	_imits	Units
V <sub>IH</sub>	Minimum HIGH Level	4.5	$V_{OUT} = 0.1V$ or	1.5	2.0	2.0	2.0	V
	Input Voltage	5.5	V <sub>CC</sub> – 0.1V	1.5	2.0	2.0	2.0	
V <sub>IL</sub>	Maximum LOW Level	4.5	$V_{OUT} = 0.1V$ or	1.5	0.8	0.8	0.8	V
	Input Voltage	5.5	V <sub>CC</sub> – 0.1V	1.5	0.8	0.8	0.8	
V <sub>OH</sub>	Minimum HIGH Level	4.5	$I_{OUT} = -50\mu A$	4.49	4.4	4.4	4.4	V
	Output Voltage	5.5		5.49	5.4	5.4	5.4	
		4.5	$V_{IN} = V_{IL} \text{ or } V_{IH},$ $I_{OH} = 24\text{mA}$		3.86	3.70	3.76	
		5.5	$V_{IN} = V_{IL} \text{ or } V_{IH},$ $I_{OH} = 24\text{mA}^{(4)}$		4.86	4.70	4.76	
V <sub>OL</sub>	Maximum LOW Level	4.5	$I_{OUT} = 50\mu A$	0.001	0.1	0.1	0.1	V
	Output Voltage	5.5		0.001	0.1	0.1	0.1	
		4.5	$V_{IN} = V_{IL} \text{ or } V_{IH},$ $I_{OL} = 24\text{mA}$		0.36	0.50	0.44	
		5.5	$V_{IN} = V_{IL} \text{ or } V_{IH},$ $I_{OL} = 24\text{mA}^{(4)}$		0.36	0.50	0.44	
I <sub>IN</sub>	Maximum Input Leakage Current	5.5	$V_I = V_{CC}$ , GND		±0.1	±1.0	±1.0	μA
l <sub>OZ</sub>	Maximum 3-STATE Leakage Current	5.5	$V_I = V_{IL}, V_{IH};$ $V_O = V_{CC}, GND$		±0.25	±5.0	±2.5	μA
I <sub>CCT</sub>	Maximum I <sub>CC</sub> /Input	5.5	$V_I = V_{CC} - 2.1V$	0.6		1.6	1.5	mA
I <sub>OLD</sub>	Minimum Dynamic	5.5	V <sub>OLD</sub> = 1.65V Max.			50	75	mA
I <sub>OHD</sub>	Output Current <sup>(5)</sup>	5.5	V <sub>OHD</sub> = 3.85V Min.			-50	-75	mA
I <sub>CC</sub>	Maximum Quiescent Supply Current	5.5	$V_{IN} = V_{CC}$ or GND		4.0	80.0	40.0	μА

#### Notes:

- 4. All outputs loaded; thresholds on input associated with output under test.
- 5. Maximum test duration 2.0ms, one output loaded at a time.

## **AC Electrical Characteristics for AC**

			T <sub>A</sub> C	_ = +25° L = 50p	C, F	to +1	-55°C 25°C, 50pF	T <sub>A</sub> = - to +8 C <sub>L</sub> =	85°C,	
Symbol	Parameter	$V_{CC}(V)^{(6)}$	Min.	Тур.	Max.	Min.	Max.	Min.	Max.	Units
t <sub>PLH</sub>	Propagation Delay,	3.3	2.0	6.5	9.0	1.0	12.5	1.5	10.0	ns
	Data to Output	5.0	1.5	5.0	7.0	1.0	9.5	1.0	7.5	
t <sub>PHL</sub>	Propagation Delay,	3.3	2.0	6.5	9.0	1.0	12.0	2.0	10.0	ns
	Data to Output	5.0	1.5	5.0	7.0	1.0	9.0	1.0	7.5	
t <sub>PZH</sub>	Output Enable Time	3.3	2.0	6.0	10.5	1.0	11.5	1.5	11.0	ns
		5.0	1.5	5.0	7.0	1.0	9.0	1.5	8.0	
t <sub>PZL</sub>	Output Enable Time	3.3	2.5	7.5	10.0	1.0	13.0	2.0	11.0	ns
		5.0	1.5	5.5	8.0	1.0	10.5	1.5	8.5	
t <sub>PHZ</sub>	Output Disable Time	3.3	3.0	7.0	10.0	1.0	12.5	1.5	10.5	ns
		5.0	2.5	6.5	9.0	1.0	10.5	1.0	9.5	
t <sub>PLZ</sub>	Output Disable Time	3.3	2.5	7.5	10.5	1.0	13.0	2.5	11.5	ns
		5.0	2.0	6.5	9.0	1.0	11.0	2.0	9.5	

#### Note:

6. Voltage range 3.3 is 3.3V  $\pm$  0.3V. Voltage range 5.0 is 5.0V  $\pm$  0.5V.

### **AC Electrical Characteristics for ACT**

				√ = +25° 5∟ = 50p		to +1	-55°C 25°C, 50pF	to +8	–40°C 35°C, 50pF	
Symbol	Parameter	V <sub>CC</sub> (V) <sup>(7)</sup>	Min.	Тур.	Max.	Min.	Max.	Min.	Max.	Units
t <sub>PLH</sub>	Propagation Delay, Data to Output	5.0	2.0	6.5	9.0	1.0	10.0	1.5	10.0	ns
t <sub>PHL</sub>	Propagation Delay, Data to Output	5.0	2.0	7.0	9.0	1.0	10.0	1.5	10.0	ns
t <sub>PZH</sub>	Output Enable Time	5.0	1.5	6.0	8.5	1.0	9.5	1.0	9.5	ns
t <sub>PZL</sub>	Output Enable Time	5.0	2.0	7.0	9.5	1.0	11.0	1.5	10.5	ns
t <sub>PHZ</sub>	Output Disable Time	5.0	2.0	7.0	9.5	1.0	11.0	1.5	10.5	ns
t <sub>PLZ</sub>	Output Disable Time	5.0	2.5	7.5	10.0	1.0	11.5	2.0	10.5	ns

#### Note:

7. Voltage range 5.0 is 5.0V  $\pm$  0.5V.

## Capacitance

Symbol	Parameter	Conditions	Тур	Units
C <sub>IN</sub>	Input Capacitance	V <sub>CC</sub> = OPEN	4.5	pF
C <sub>PD</sub>	Power Dissipation Capacitance	V <sub>CC</sub> = 5.0V	45.0	pF

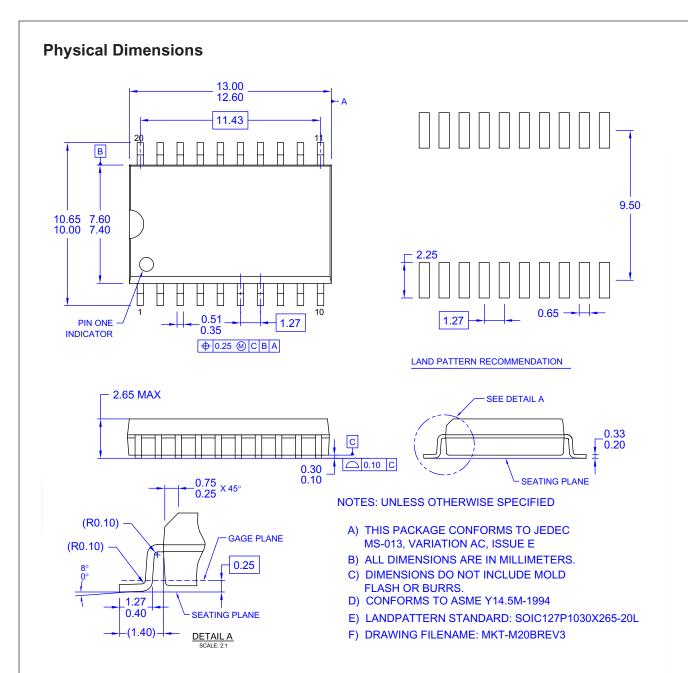
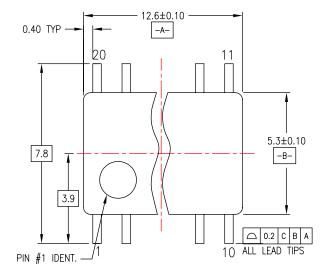
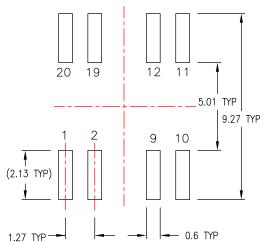


Figure 1. 20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide

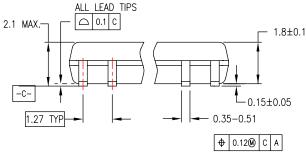
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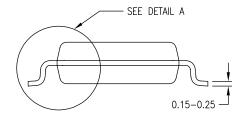
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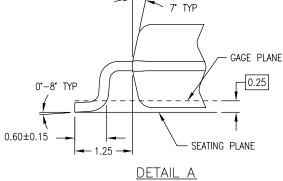




DIMENSIONS ARE IN MILLIMETERS

#### NOTES:

- A. CONFORMS TO EIAJ EDR-7320 REGISTRATION, ESTABLISHED IN DECEMBER, 1998.
  B. DIMENSIONS ARE IN MILLIMETERS.
  C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.



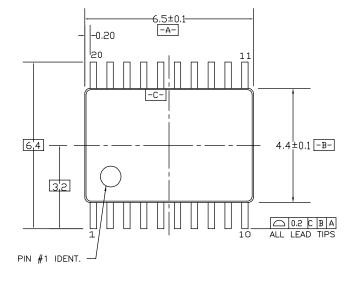
M20DREVC

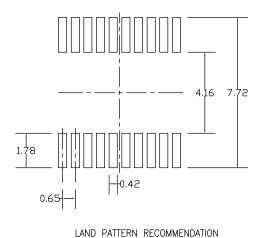
Figure 2. 20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide

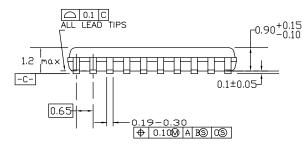
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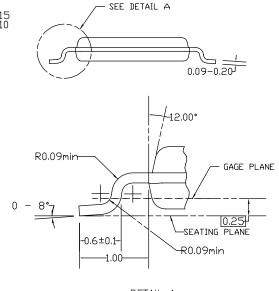




DIMENSIONS ARE IN MILLIMETERS

#### NOTES:

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- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLDS FLASH, AND TIE BAR EXTRUSIONS.
- D. DIMENSIONS AND TOLERANCES PER ANSI Y14.5M, 1982.



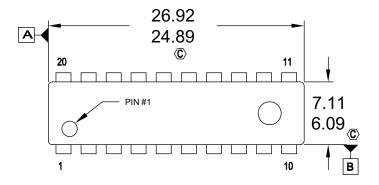
DETAIL A

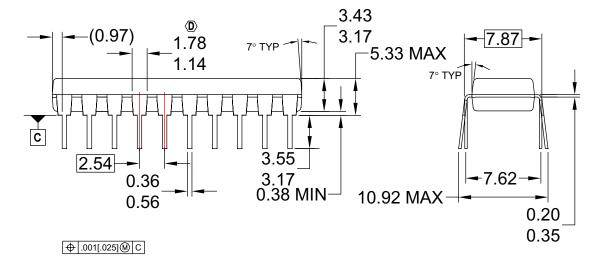
#### MTC20REVD1

#### Figure 3. 20-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide

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NOTES:
A. CONFORMS TO JEDEC REGISTRATION MS-001,
VARIATIONS AD.

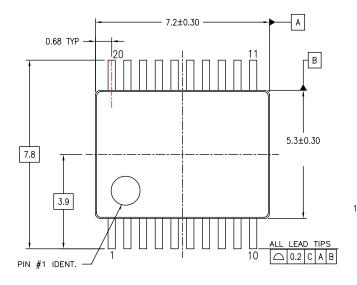
- **B. ALL DIMENSIONS ARE IN MILLIMETERS**
- © DOES NOT INCLUDE MOLD FLASH OR PROTRUSIONS.
  MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED
- 0.25MM.

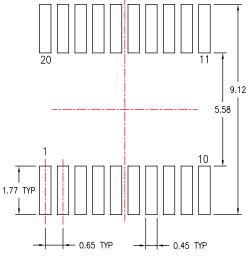
  D. DOES NOT INCLUDE DAMBAR PROTRUSIONS. DAMBAR PROTRUSIONS SHALL NOT EXCEED
- E. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
- F. DRAWING FILE NAME: N20AREV8

Figure 4. 20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide

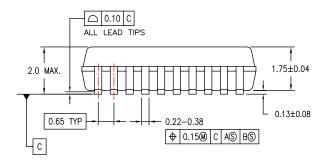
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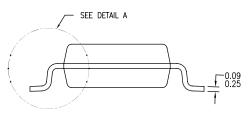
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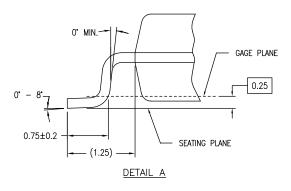




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#### NOTES:

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- D. DIMENSIONS AND TOLERANCES PER ASME Y14.5M 1994.



#### MSA20REVB

Figure 5. 20-Lead Shrink Small Outline Package (SSOP), JEDEC MO-150, 5.3mm Wide

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