

74AC240 • 74ACT240

Octal Buffer/Line Driver with 3-STATE Outputs

General Description

The AC/ACT240 is an octal buffer and line driver designed to be employed as a memory address driver, clock driver and bus oriented transmitter or receiver which provides improved PC board density.

Features

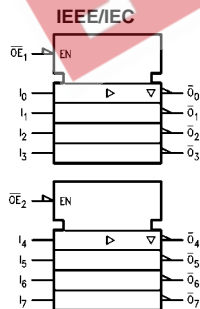
- I_{CC} and I_{OZ} reduced by 50%
- Inverting 3-STATE outputs drive bus lines or buffer memory address registers
- Outputs source/sink 24 mA
- ACT240 has TTL-compatible inputs

Ordering Code:

| Order Number | Package Number | Package Description |
|--------------|----------------|---|
| 74AC240SC | M20B | 20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide Body |
| 74AC240SJ | M20D | 20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide |
| 74AC240MTC | MTC20 | 20-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide |
| 74AC240PC | N20A | 20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide |
| 74ACT240SC | M20B | 20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide Body |
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Device also available in Tape and Reel. Specify by appending suffix letter "X" to the ordering code.

Logic Symbol



Pin Descriptions

| Pin Names | Description |
|------------------------------------|------------------------------|
| $\overline{OE}_1, \overline{OE}_2$ | 3-STATE Output Enable Inputs |
| I_0-I_7 | Inputs |
| $\overline{O}_0-\overline{O}_7$ | Outputs |

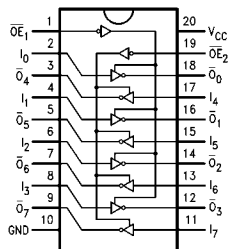
Truth Tables

| Inputs | | Outputs |
|-------------------|-------|-----------------------|
| \overline{OE}_1 | I_n | (Pins 12, 14, 16, 18) |
| L | L | H |
| L | H | L |
| H | X | Z |

| Inputs | | Outputs |
|-------------------|-------|-------------------|
| \overline{OE}_2 | I_n | (Pins 3, 5, 7, 9) |
| L | L | H |
| L | H | L |
| H | X | Z |

H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial
Z = High Impedance

Connection Diagram



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74AC240 • 74ACT240 Octal Buffer/Line Driver with 3-STATE Outputs

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 Input Voltage (V_I) | -0.5V to $V_{CC} + 0.5V$ |
| 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 or Sink Current (I_O) | ± 50 mA |
| DC V_{CC} or Ground Current per Output Pin (I_{CC} or I_{GND}) | ± 50 mA |
| Storage Temperature (T_{STG}) | -65°C to +150°C |
| Junction Temperature (T_J) | |
| PDIP | 140°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% of V_{CC} | |
| 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 | Guaranteed Limits | Guaranteed Limits | | |
| V_{IH} | Minimum HIGH Level 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 Level 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 Level 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 | $V_{IN} = V_{IL}$ or V_{IH} $I_{OH} = -12 \text{ mA}$ $I_{OH} = -24 \text{ mA}$ $I_{OH} = -24 \text{ mA}$ (Note 2) | |
| | | 4.5 | | 3.86 | 3.76 | | | |
| 5.5 | | 4.86 | 4.76 | | | | | |
| V_{OL} | Maximum LOW Level 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 | $V_{IN} = V_{IL}$ or V_{IH} $I_{OL} = 12 \text{ mA}$ $I_{OL} = 24 \text{ mA}$ $I_{OL} = 24 \text{ mA}$ (Note 2) | |
| | | 4.5 | | 0.36 | 0.44 | | | |
| 5.5 | | 0.36 | 0.44 | | | | | |
| I_{IN} (Note 4) | Maximum Input Leakage Current | 5.5 | | ± 0.1 | ± 1.0 | μA | $V_I = V_{CC}, \text{ GND}$ | |
| I_{OZ} | Maximum 3-STATE Leakage Current | 5.5 | | ± 0.25 | ± 2.5 | μA | V_I (OE) = V_{IL}, V_{IH} $V_I = V_{CC}, \text{ GND}$ $V_O = V_{CC}, \text{ GND}$ | |
| I_{OLD} | Minimum Dynamic Output Current (Note 3) | 5.5 | | | 75 | mA | $V_{OLD} = 1.65V \text{ Max}$ | |
| I_{OHD} | | 5.5 | | | -75 | mA | $V_{OHD} = 3.85V \text{ Min}$ | |
| I_{CC} (Note 4) | Maximum Quiescent Supply Current | 5.5 | | 4.0 | 40.0 | μA | $V_{IN} = V_{CC}$ or GND | |

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

Note 3: Maximum test duration 2.0 ms, one output loaded at a time.

Note 4: I_{IN} and I_{CC} @ 3.0V are guaranteed to be less than or equal to the respective limit @ 5.5V V_{CC} .

DC Electrical Characteristics for ACT

| Symbol | Parameter | V _{CC} (V) | T _A = +25°C | | T _A = -40°C to +85°C | Units | Conditions |
|------------------|--------------------------------------|------------------------|------------------------|-------------------|---------------------------------|---|--|
| | | | Typ | Guaranteed Limits | | | |
| V _{IH} | Minimum HIGH Level Input Voltage | 4.5 | 1.5 | 2.0 | 2.0 | V | V _{OUT} = 0.1V or V _{CC} - 0.1V |
| | | 5.5 | 1.5 | 2.0 | 2.0 | | |
| V _{IL} | Maximum LOW Level Input Voltage | 4.5 | 1.5 | 0.8 | 0.8 | V | V _{OUT} = 0.1V or V _{CC} - 0.1V |
| | | 5.5 | 1.5 | 0.8 | 0.8 | | |
| V _{OH} | Minimum HIGH Level Output Voltage | 4.5 | 4.49 | 4.4 | 4.4 | V | I _{OUT} = -50 μA |
| | | 5.5 | 5.49 | 5.4 | 5.4 | | |
| | 4.5 | | 3.86 | 3.76 | V | V _{IN} = V _{IL} or V _{IH} I _{OH} = -24 mA I _{OH} = -24 mA (Note 5) | |
| | 5.5 | | 4.86 | 4.76 | | | |
| V _{OL} | Maximum LOW Level Output Voltage | 4.5 | 0.001 | 0.1 | 0.1 | V | I _{OUT} = 50 μA |
| | | 5.5 | 0.001 | 0.1 | 0.1 | | |
| | 4.5 | | 0.36 | 0.44 | V | V _{IN} = V _{IL} or V _{IH} I _{OL} = 24 mA I _{OL} = 24 mA (Note 5) | |
| | 5.5 | | 0.36 | 0.44 | | | |
| I _{IN} | Maximum Input Leakage Current | 5.5 | | ±0.1 | ±1.0 | μA | V _I = V _{CC} , GND |
| I _{OZ} | Maximum 3-STATE Leakage Current | 5.5 | | ±0.25 | ±2.5 | μA | V _I = V _{IL} , V _{IH} V _O = V _{CC} , GND |
| I _{CCT} | Maximum I _{CC} /Input | 5.5 | 0.6 | | 1.5 | mA | V _I = V _{CC} - 2.1V |
| I _{OLD} | Minimum Dynamic | 5.5 | | | 75 | mA | V _{OLD} = 1.65V Max |
| I _{OHD} | Output Current (Note 6) | 5.5 | | | -75 | mA | V _{OHD} = 3.85V Min |
| I _{CC} | Maximum Quiescent Supply Current | 5.5 | | 4.0 | 40.0 | μA | V _{IN} = V _{CC} or GND |

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

Note 6: Maximum test duration 2.0 ms, one output loaded at a time.

| AC Electrical Characteristics | | | | | | | | |
|-------------------------------|---------------------|------------------------------------|--|-----|------|---|------|-------|
| Symbol | Parameter | V _{CC} (V) (Note 7) | T _A = +25°C C _L = 50 pF | | | T _A = -40°C to +85°C C _L = 50 pF | | Units |
| | | | Min | Typ | Max | Min | Max | |
| t _{PLH} | Propagation Delay | 3.3 | 1.5 | 6.0 | 8.0 | 1.0 | 9.0 | ns |
| | Data to Output | 5.0 | 1.5 | 4.5 | 6.5 | 1.0 | 7.0 | |
| t _{PHL} | Propagation Delay | 3.3 | 1.5 | 5.5 | 8.0 | 1.0 | 8.5 | ns |
| | Data to Output | 5.0 | 1.5 | 4.5 | 6.0 | 1.0 | 6.5 | |
| t _{PZH} | Output Enable Time | 3.3 | 1.5 | 6.0 | 10.5 | 1.0 | 11.0 | ns |
| | | 5.0 | 1.5 | 5.0 | 7.0 | 1.0 | 8.0 | |
| t _{PZL} | Output Enable Time | 3.3 | 1.5 | 7.0 | 10.0 | 1.0 | 11.0 | ns |
| | | 5.0 | 1.5 | 5.5 | 8.0 | 1.0 | 8.5 | |
| t _{PHZ} | Output Disable Time | 3.3 | 1.5 | 7.0 | 10.0 | 1.0 | 10.5 | ns |
| | | 5.0 | 1.5 | 6.5 | 9.0 | 1.0 | 9.5 | |
| t _{PLZ} | Output Disable Time | 3.3 | 1.5 | 7.5 | 10.5 | 1.0 | 11.5 | ns |
| | | 5.0 | 1.5 | 6.5 | 9.0 | 1.0 | 9.5 | |

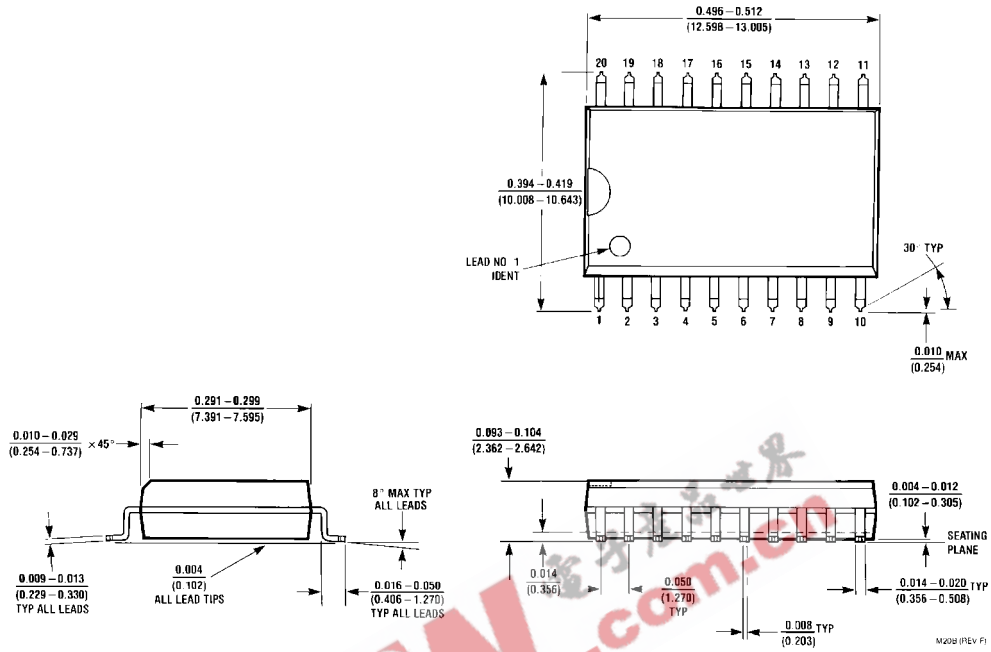
Note 7: Voltage Range 3.3 is 3.3V ± 0.3V
Voltage Range 5.0 is 5.0V ± 0.5V

| AC Electrical Characteristics | | | | | | | | |
|-------------------------------|---------------------|------------------------------------|--|-----|------|---|------|-------|
| Symbol | Parameter | V _{CC} (V) (Note 8) | T _A = +25°C C _L = 50 pF | | | T _A = -40°C to +85°C C _L = 50 pF | | Units |
| | | | Min | Typ | Max | Min | Max | |
| t _{PLH} | Propagation Delay | 5.0 | 1.5 | 6.0 | 8.5 | 1.5 | 9.5 | ns |
| | Data to Output | | | | | | | |
| t _{PHL} | Propagation Delay | 5.0 | 1.5 | 5.5 | 7.5 | 1.5 | 8.5 | ns |
| | Data to Output | | | | | | | |
| t _{PZH} | Output Enable Time | 5.0 | 1.5 | 7.0 | 8.5 | 1.0 | 9.5 | ns |
| t _{PZL} | Output Enable Time | 5.0 | 2.0 | 7.0 | 9.5 | 1.5 | 10.5 | ns |
| t _{PHZ} | Output Disable Time | 5.0 | 2.0 | 8.0 | 9.5 | 2.0 | 10.5 | ns |
| t _{PLZ} | Output Disable Time | 5.0 | 2.5 | 6.5 | 10.0 | 2.0 | 10.5 | ns |

Note 8: Voltage Range 5.0 is 5.0V ± 0.5V

| Capacitance | | | | |
|-----------------|-------------------------------|------|-------|------------------------|
| Symbol | Parameter | Typ | Units | Conditions |
| C _{IN} | Input Capacitance | 4.5 | pF | V _{CC} = OPEN |
| C _{PD} | Power Dissipation Capacitance | 45.0 | pF | V _{CC} = 5.0V |

Physical Dimensions inches (millimeters) unless otherwise noted

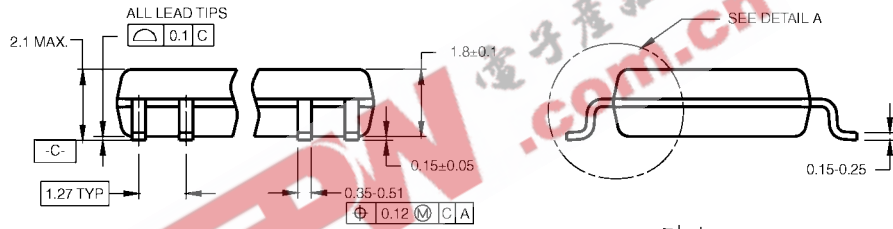


20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide Body
Package Number M20B

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



LAND PATTERN RECOMMENDATION



DIMENSIONS ARE IN MILLIMETERS

NOTES:

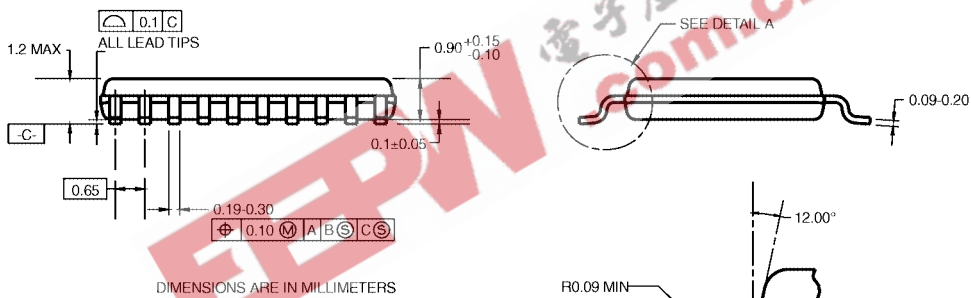
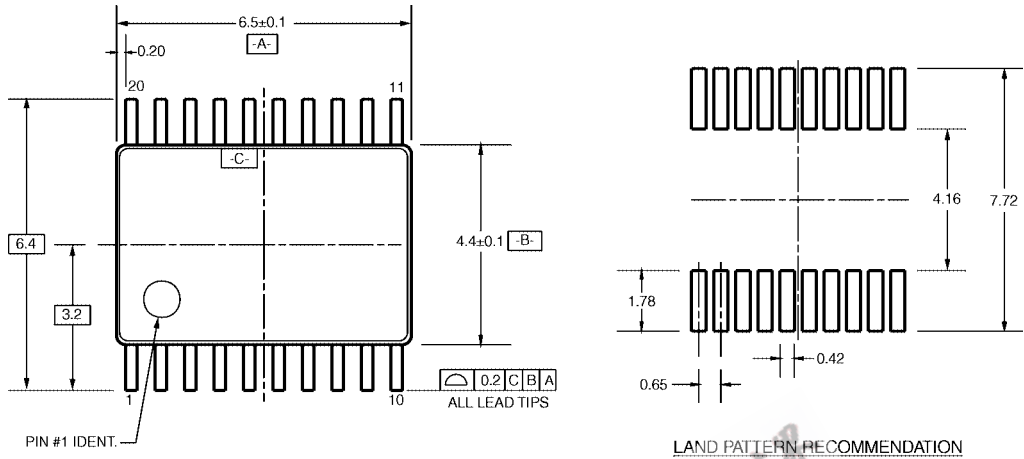
- A. CONFORMS TO EIAJ EDR-7320 REGISTRATION, ESTABLISHED IN DECEMBER, 1996.
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

M20DRevB1

DETAIL A

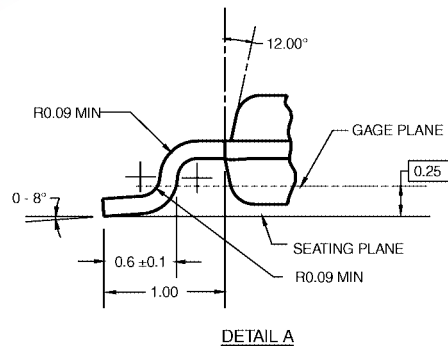
**20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
Package Number M20D**

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



- NOTES:
- A. CONFORMS TO JEDEC REGISTRATION MO-153, VARIATION AC, 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.

MTC20RevD1



**20-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
Package Number MTC20**

