FAIRCHILD SEMICONDUCTOR®

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# 74ACT16541
# 16-Bit Buffer/Line Driver with 3-STATE Outputs

## General Description

The ACT16541 contains 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 byte controlled. Each byte has separate 3-STATE control inputs which can be shorted together for full 16-bit operation.

## Features

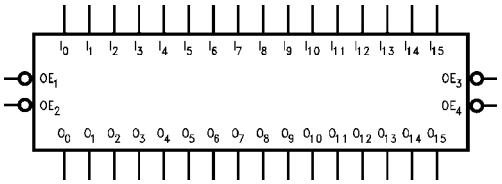
- Separate control logic for each byte
- Outputs source/sink 24 mA
- TTL-compatible inputs

## Ordering Code:

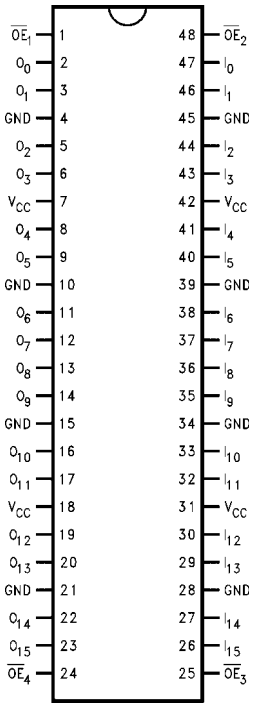
| Order Number | Package Number | Package Description |
|---|---|---|
| 74ACT16541SSC | MS48A | 48-Lead Small Shrink Outline Package (SSOP), JEDEC MO-118, 0.300" Wide |
| 74ACT16541MTD | MTD48 | 48-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 6.1mm Wide |

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 ACT16541 contains sixteen non-inverting buffers with 3-STATE standard outputs. The device is byte controlled with each byte 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 byte. 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.

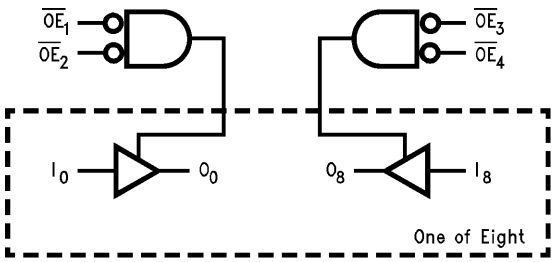
## Truth Tables

| Inputs | | | Outputs |
|---|---|---|---|
| $\overline{OE}_1$ | $\overline{OE}_2$ | $I_0$–$I_7$ | $O_0$–$O_7$ |
| L | L | H | H |
| H | X | X | Z |
| X | H | X | Z |
| L | L | L | L |

| Inputs | | | Outputs |
|---|---|---|---|
| $\overline{OE}_3$ | $\overline{OE}_4$ | $I_8$–$I_{15}$ | $O_8$–$O_{15}$ |
| L | L | H | H |
| H | X | X | Z |
| X | H | X | Z |
| L | L | L | L |

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

## Logic Diagram



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## 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 ($I_O$) | ±50 mA |
| DC $V_{CC}$ or Ground Current per Output Pin | ±50 mA |
| Storage Temperature | −65°C to +150°C |

## Recommended Operating Conditions

| | |
|---|---|
| Supply Voltage ($V_{CC}$) | 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 ($\Delta V/\Delta t$) | 125 mV/ns |
| $V_{IN}$ from 0.8V to 2.0V | |
| $V_{CC}$ @ 4.5V, 5.5V | |

**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

| Symbol | Parameter | $V_{CC}$ (V) | $T_A$ = +25°C Typ | $T_A$ = −40°C to +85°C Guaranteed Limits | | Units | Conditions |
|---|---|---|---|---|---|---|---|
| $V_{IH}$ | Minimum HIGH Input Voltage | 4.5<br>5.5 | 1.5<br>1.5 | 2.0<br>2.0 | 2.0<br>2.0 | V | $V_{OUT}$ = 0.1V or $V_{CC}$ − 0.1V |
| $V_{IL}$ | Maximum LOW Input Voltage | 4.5<br>5.5 | 1.5<br>1.5 | 0.8<br>0.8 | 0.8<br>0.8 | V | $V_{OUT}$ = 0.1V or $V_{CC}$ − 0.1V |
| $V_{OH}$ | Minimum HIGH Output Voltage | 4.5<br>5.5 | 4.49<br>5.49 | 4.4<br>5.4 | 4.4<br>5.4 | V | $I_{OUT}$ = −50 μA |
| | | 4.5<br>5.5 | | 3.86<br>4.86 | 3.76<br>4.76 | V | $V_{IN}$ = $V_{IL}$ or $V_{IH}$<br>$I_{OH}$ = −24 mA<br>$I_{OH}$ = −24 mA (Note 2) |
| $V_{OL}$ | Maximum LOW Output Voltage | 4.5<br>5.5 | 0.001<br>0.001 | 0.1<br>0.1 | 0.1<br>0.1 | V | $I_{OUT}$ = 50 μA |
| | | 4.5<br>5.5 | | 0.36<br>0.36 | 0.44<br>0.44 | V | $V_{IN}$ = $V_{IL}$ or $V_{IH}$<br>$I_{OL}$ = 24 mA<br>$I_{OL}$ = 24 mA (Note 2) |
| $I_{OZ}$ | Maximum 3-STATE Leakage Current | 5.5 | | ±0.5 | ±5.0 | μA | $V_I$ = $V_{IL}$, $V_{IH}$<br>$V_O$ = $V_{CC}$, GND |
| $I_{IN}$ | Maximum Input Leakage Current | 5.5 | | ±0.1 | ±1.0 | μA | $V_I$ = $V_{CC}$, GND |
| $I_{CCT}$ | Maximum $I_{CC}$/Input | 5.5 | 0.6 | | 1.5 | mA | $V_I$ = $V_{CC}$ − 2.1V |
| $I_{CC}$ | Max Quiescent Supply Current | 5.5 | | 8.0 | 80.0 | μA | $V_{IN}$ = $V_{CC}$ or GND |
| $I_{OLD}$ | Minimum Dynamic Output Current (Note 3) | 5.5 | | | 75 | mA | $V_{OLD}$ = 1.65V Max |
| $I_{OHD}$ | | | | | −75 | mA | $V_{OHD}$ = 3.85V Min |

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

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



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## AC Electrical Characteristics

| Symbol | Parameter | $V_{CC}$ (V) (Note 4) | $T_A = +25°C$, $C_L = 50$ pF | | | $T_A = -40°C$ to $+85°C$, $C_L = 50$ pF | | Units |
|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Max | |
| $t_{PLH}$ | Propagation Delay | 5.0 | 3.0 | 5.2 | 7.3 | 3.0 | 7.8 | ns |
| $t_{PHL}$ | Data to Output | | 2.5 | 4.8 | 7.3 | 2.5 | 7.8 | |
| $t_{PZH}$ | Output Enable Time | 5.0 | 2.6 | 5.0 | 7.4 | 2.6 | 7.9 | ns |
| $t_{PZL}$ | | | 2.7 | 5.4 | 8.0 | 2.7 | 8.5 | |
| $t_{PHZ}$ | Output Disable Time | 5.0 | 2.7 | 5.6 | 8.3 | 2.7 | 8.7 | ns |
| $t_{PLZ}$ | | | 2.4 | 5.2 | 7.9 | 2.4 | 8.4 | |

**Note 4:** Voltage Range 5.0 is 5.0V ± 0.5V.

## Capacitance

| Symbol | Parameter | Typ | Units | Conditions |
|---|---|---|---|---|
| $C_{IN}$ | Input Capacitance | 4.5 | pF | $V_{CC}$ = 5.0V |
| $C_{PD}$ | Power Dissipation Capacitance | 30 | pF | $V_{CC}$ = 5.0V |



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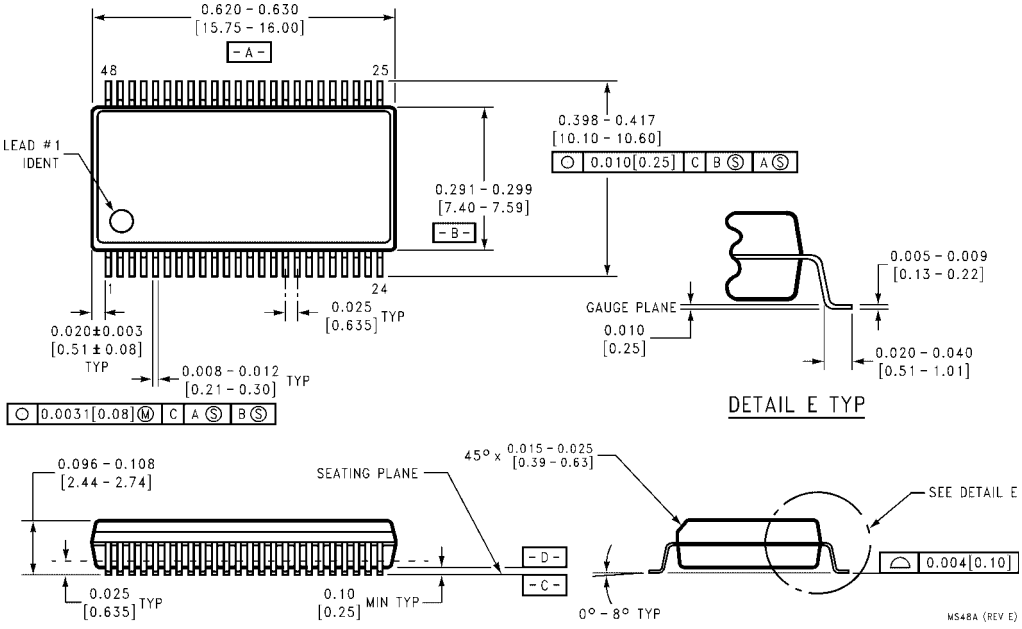
## Physical Dimensions inches (millimeters) unless otherwise noted




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



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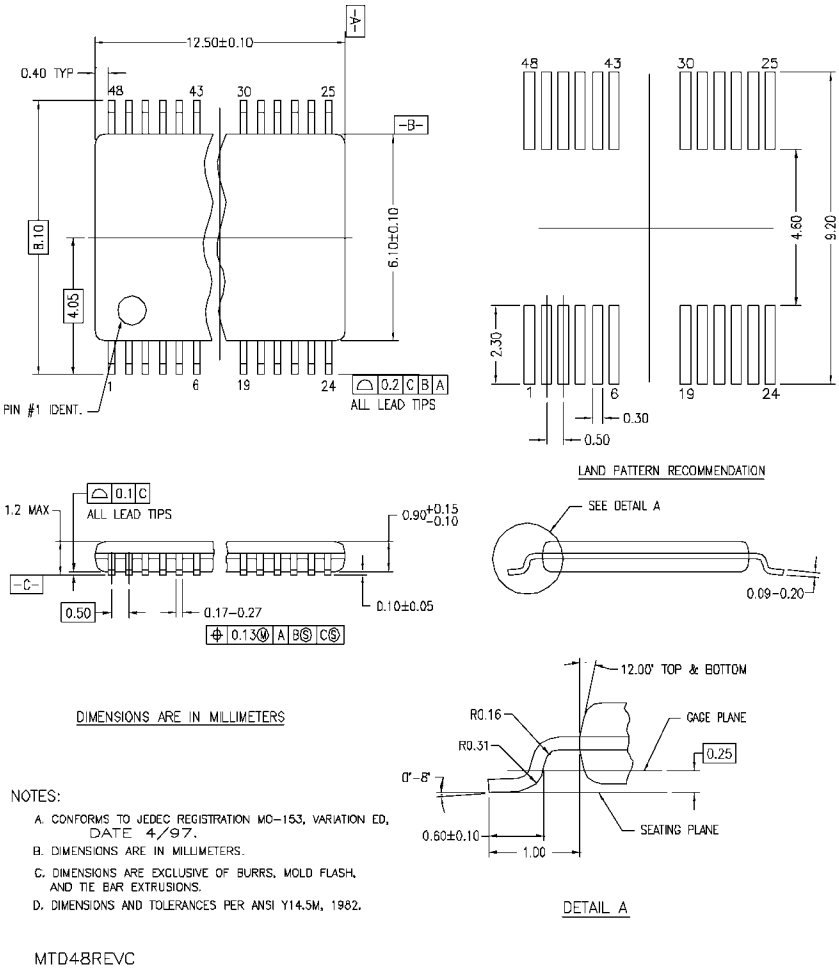
## Physical Dimensions inches (millimeters) unless otherwise noted (Continued)




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

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