

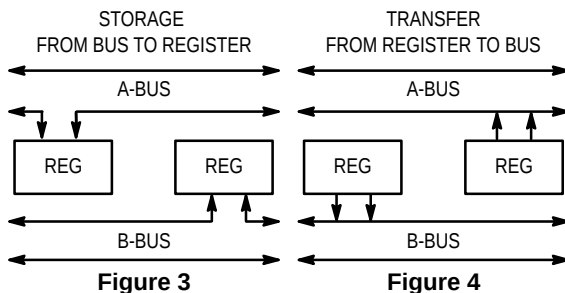
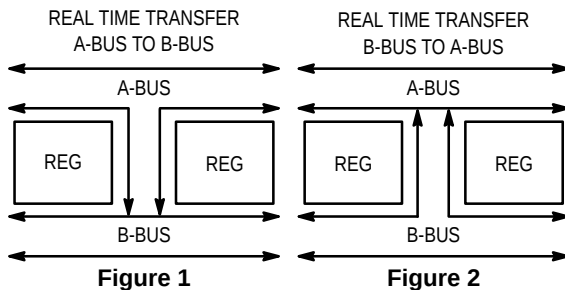


**MOTOROLA**

## Product Preview

# Octal Transceiver/Register with 3-State Outputs (Inverting)

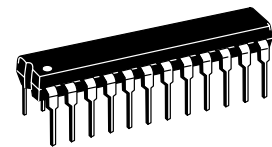
The MC74AC648/74ACT648 consist of registered bus transceiver circuits, with outputs, D-type flip-flops and control circuitry providing multiplexed transmission of data directly from the input bus or from the internal storage registers. Data on the A or B bus will be loaded into the respective registers on the LOW-to-HIGH transition of the appropriate clock pin (CAB or CBA). The four fundamental data handling functions available are illustrated in the following figures.



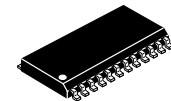
- Independent Registers for A and B Buses
- Multiplexed Real-Time and Stored Data Transfers
- Choice of True and Inverting Data Paths
- 3-State Outputs
- 300 mil Slim Dual In-Line Package
- Outputs Source/Sink 24 mA

**MC74AC648**  
**MC74ACT648**

OCTAL  
TRANSCEIVER/REGISTER  
WITH 3-STATE OUTPUTS  
(INVERTING)

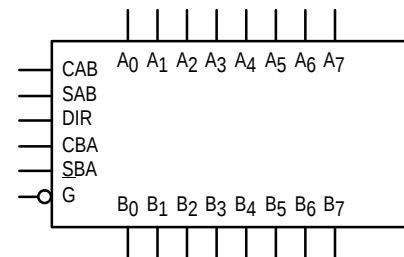


N SUFFIX  
CASE 724-03  
PLASTIC



DW SUFFIX  
CASE 751E-04  
SOIC PACKAGE

## LOGIC SYMBOL



This document contains information on a product under development. Motorola reserves the right to change or discontinue this product without notice.

# MC74AC648 MC74ACT648

**FUNCTION TABLE**

| Inputs |     |              |              |     |     | Data I/O*                      |                                | Operation or Function                               |
|--------|-----|--------------|--------------|-----|-----|--------------------------------|--------------------------------|-----------------------------------------------------|
| G      | DIR | CAB          | CBA          | SAB | SBA | A <sub>0</sub> –A <sub>7</sub> | B <sub>0</sub> –B <sub>7</sub> |                                                     |
| H      | X   | H or L       | H or L       | X   | X   | Input                          | Input                          | Isolation<br>Store A and B Data                     |
| H      | X   | $\downarrow$ | $\downarrow$ | X   | X   |                                |                                |                                                     |
| L      | L   | X            | X            | X   | L   | Output                         | Input                          | Real Time B Data to A Bus<br>Stored B Data to A Bus |
| L      | L   | X            | X            | X   | H   |                                |                                |                                                     |
| L      | H   | X            | X            | L   | X   | Input                          | Output                         | Real Time A Data to B Bus<br>Stored A Data to B Bus |
| L      | H   | H or L       | X            | H   | X   |                                |                                |                                                     |

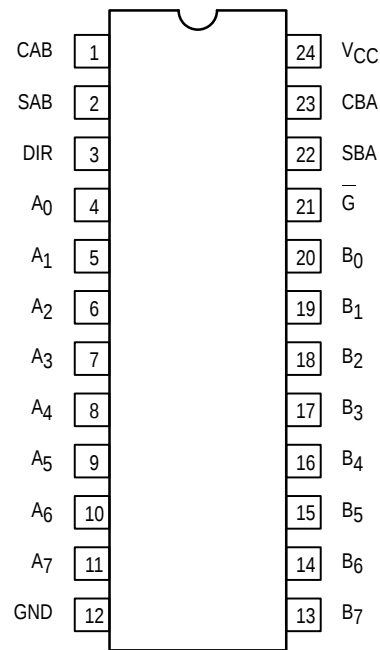
\* The data output functions may be enabled or disabled by various signals at the G and DIR inputs. Data input functions are always enabled; i.e., data at the bus pins will be stored on every LOW-to-HIGH transition of the appropriate clock inputs.

H = HIGH Voltage Level

L = LOW Voltage Level

X = Immaterial

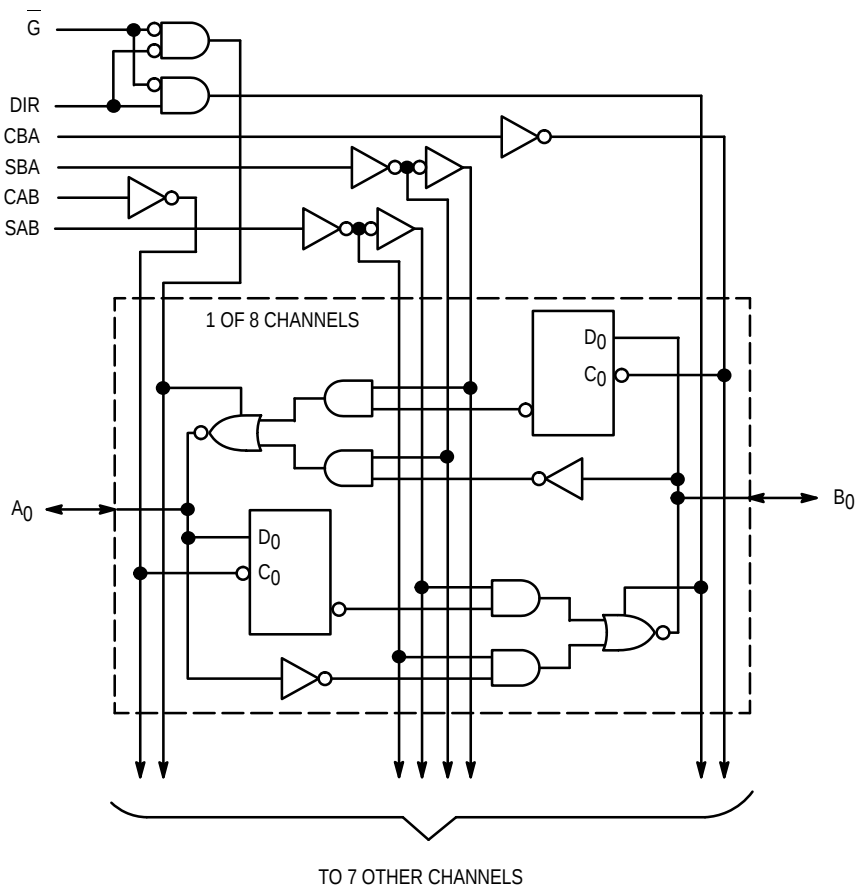
$\downarrow$  = LOW-to-HIGH Transition



## PIN NAMES

A<sub>0</sub>–A<sub>7</sub> Data Register Inputs  
Data Register A Outputs  
B<sub>0</sub>–B<sub>7</sub> Data Register B Inputs  
Data Register B Outputs  
CAB, CBA Clock Pulse Inputs  
SAB, SBA Transmit/Receive Inputs  
DIR, G Output Enable Inputs

## LOGIC DIAGRAM



Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

# MC74AC648 MC74ACT648

## MAXIMUM RATINGS\*

| Symbol    | Parameter                                 | Value                 | Unit |
|-----------|-------------------------------------------|-----------------------|------|
| $V_{CC}$  | DC Supply Voltage (Referenced to GND)     | −0.5 to +7.0          | V    |
| $V_{in}$  | DC Input Voltage (Referenced to GND)      | −0.5 to $V_{CC}$ +0.5 | V    |
| $V_{out}$ | DC Output Voltage (Referenced to GND)     | −0.5 to $V_{CC}$ +0.5 | V    |
| $I_{in}$  | DC Input Current, per Pin                 | ±20                   | mA   |
| $I_{out}$ | DC Output Sink/Source Current, per Pin    | ±50                   | mA   |
| $I_{CC}$  | DC $V_{CC}$ or GND Current per Output Pin | ±50                   | mA   |
| $T_{stg}$ | Storage Temperature                       | −65 to +150           | °C   |

\* Maximum Ratings are those values beyond which damage to the device may occur. Functional operation should be restricted to the Recommended Operating Conditions.

## RECOMMENDED OPERATING CONDITIONS

| Symbol            | Parameter                                                               | Min              | Typ | Max      | Unit |
|-------------------|-------------------------------------------------------------------------|------------------|-----|----------|------|
| $V_{CC}$          | Supply Voltage                                                          | 'AC              | 2.0 | 5.0      | V    |
|                   |                                                                         | 'ACT             | 4.5 | 5.0      |      |
| $V_{in}, V_{out}$ | DC Input Voltage, Output Voltage (Ref. to GND)                          | 0                |     | $V_{CC}$ | V    |
| $t_r, t_f$        | Input Rise and Fall Time (Note 1)<br>'AC Devices except Schmitt Inputs  | $V_{CC}$ @ 3.0 V | 150 |          | ns/V |
|                   |                                                                         | $V_{CC}$ @ 4.5 V | 40  |          |      |
|                   |                                                                         | $V_{CC}$ @ 5.5 V | 25  |          |      |
| $t_r, t_f$        | Input Rise and Fall Time (Note 2)<br>'ACT Devices except Schmitt Inputs | $V_{CC}$ @ 4.5 V | 10  |          | ns/V |
|                   |                                                                         | $V_{CC}$ @ 5.5 V | 8.0 |          |      |
| $T_J$             | Junction Temperature (PDIP)                                             |                  |     | 140      | °C   |
| $T_A$             | Operating Ambient Temperature Range                                     | −40              | 25  | 85       | °C   |
| $I_{OH}$          | Output Current — High                                                   |                  |     | −24      | mA   |
| $I_{OL}$          | Output Current — Low                                                    |                  |     | 24       | mA   |

1.  $V_{in}$  from 30% to 70%  $V_{CC}$ ; see individual Data Sheets for devices that differ from the typical input rise and fall times.

2.  $V_{in}$  from 0.8 V to 2.0 V; see individual Data Sheets for devices that differ from the typical input rise and fall times.

# MC74AC648 MC74ACT648

## DC CHARACTERISTICS

| Symbol           | Parameter                            | V <sub>CC</sub><br>(V) | 74AC                   |                   | 74AC                               |    | Unit                                                                                                                                        | Conditions |
|------------------|--------------------------------------|------------------------|------------------------|-------------------|------------------------------------|----|---------------------------------------------------------------------------------------------------------------------------------------------|------------|
|                  |                                      |                        | T <sub>A</sub> = +25°C |                   | T <sub>A</sub> =<br>–40°C to +85°C |    |                                                                                                                                             |            |
|                  |                                      |                        | Typ                    | Guaranteed Limits |                                    |    |                                                                                                                                             |            |
| V <sub>IH</sub>  | Minimum High Level<br>Input Voltage  | 3.0                    | 1.5                    | 2.1               | 2.1                                | V  | V <sub>OUT</sub> = 0.1 V<br>or V <sub>CC</sub> – 0.1 V                                                                                      |            |
|                  |                                      | 4.5                    | 2.25                   | 3.15              | 3.15                               |    |                                                                                                                                             |            |
|                  |                                      | 5.5                    | 2.75                   | 3.85              | 3.85                               |    |                                                                                                                                             |            |
| V <sub>IL</sub>  | Maximum Low Level<br>Input Voltage   | 3.0                    | 1.5                    | 0.9               | 0.9                                | V  | V <sub>OUT</sub> = 0.1 V<br>or V <sub>CC</sub> – 0.1 V                                                                                      |            |
|                  |                                      | 4.5                    | 2.25                   | 1.35              | 1.35                               |    |                                                                                                                                             |            |
|                  |                                      | 5.5                    | 2.75                   | 1.65              | 1.65                               |    |                                                                                                                                             |            |
| V <sub>OH</sub>  | Minimum High Level<br>Output Voltage | 3.0                    | 2.99                   | 2.9               | 2.9                                | V  | I <sub>OUT</sub> = –50 μA                                                                                                                   |            |
|                  |                                      | 4.5                    | 4.49                   | 4.4               | 4.4                                |    |                                                                                                                                             |            |
|                  |                                      | 5.5                    | 5.49                   | 5.4               | 5.4                                |    |                                                                                                                                             |            |
|                  |                                      | 3.0                    |                        | 2.56              | 2.46                               | V  | *V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub><br>–12 mA<br>I <sub>OH</sub> –24 mA<br>–24 mA                                         |            |
|                  |                                      | 4.5                    |                        | 3.86              | 3.76                               |    |                                                                                                                                             |            |
|                  |                                      | 5.5                    |                        | 4.86              | 4.76                               |    |                                                                                                                                             |            |
| V <sub>OL</sub>  | Maximum Low Level<br>Output Voltage  | 3.0                    | 0.002                  | 0.1               | 0.1                                | V  | I <sub>OUT</sub> = 50 μA                                                                                                                    |            |
|                  |                                      | 4.5                    | 0.001                  | 0.1               | 0.1                                |    |                                                                                                                                             |            |
|                  |                                      | 5.5                    | 0.001                  | 0.1               | 0.1                                |    |                                                                                                                                             |            |
|                  |                                      | 3.0                    |                        | 0.36              | 0.44                               | V  | *V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub><br>12 mA<br>I <sub>OL</sub> 24 mA<br>24 mA                                            |            |
|                  |                                      | 4.5                    |                        | 0.36              | 0.44                               |    |                                                                                                                                             |            |
|                  |                                      | 5.5                    |                        | 0.36              | 0.44                               |    |                                                                                                                                             |            |
| I <sub>IN</sub>  | Maximum Input<br>Leakage Current     | 5.5                    |                        | ±0.1              | ±1.0                               | μA | V <sub>I</sub> = V <sub>CC</sub> , GND                                                                                                      |            |
| I <sub>OZT</sub> | Maximum<br>3-State<br>Current        | 5.5                    |                        | ±0.6              | ±6.0                               | μA | V <sub>I</sub> (OE) = V <sub>IL</sub> , V <sub>IH</sub><br>V <sub>I</sub> = V <sub>CC</sub> , GND<br>V <sub>O</sub> = V <sub>CC</sub> , GND |            |
| I <sub>OLD</sub> | †Minimum Dynamic<br>Output Current   | 5.5                    |                        |                   | 75                                 | mA | V <sub>OLD</sub> = 1.65 V Max                                                                                                               |            |
| I <sub>OHD</sub> |                                      | 5.5                    |                        |                   | –75                                | mA | V <sub>OHD</sub> = 3.85 V Min                                                                                                               |            |
| I <sub>CC</sub>  | Maximum Quiescent<br>Supply Current  | 5.5                    |                        | 8.0               | 80                                 | μA | V <sub>IN</sub> = V <sub>CC</sub> or GND                                                                                                    |            |

\* All outputs loaded; thresholds on input associated with output under test.

† Maximum test duration 2.0 ms, one output loaded at a time.

Note: I<sub>IN</sub> and I<sub>CC</sub> @ 3.0 V are guaranteed to be less than or equal to the respective limit @ 5.5 V V<sub>CC</sub>.

# MC74AC648 MC74ACT648

## AC CHARACTERISTICS (For Figures and Waveforms — See Section 3)

| Symbol           | Parameter                                                                                                               | V <sub>CC</sub> *<br>(V) | 74AC                                             |            |              | 74AC                                                         |              | Unit | Fig. No. |
|------------------|-------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------------------------------|------------|--------------|--------------------------------------------------------------|--------------|------|----------|
|                  |                                                                                                                         |                          | T <sub>A</sub> = +25°C<br>C <sub>L</sub> = 50 pF |            |              | T <sub>A</sub> = -40°C<br>to +85°C<br>C <sub>L</sub> = 50 pF |              |      |          |
|                  |                                                                                                                         |                          | Min                                              | Typ        | Max          | Min                                                          | Max          |      |          |
| t <sub>PLH</sub> | Propagation Delay<br>Clock to Bus                                                                                       | 3.3<br>5.0               | 1.5<br>1.5                                       | 10<br>7.0  | 15.5<br>11   | 1.5<br>1.5                                                   | 17<br>12     | ns   | 3-6      |
| t <sub>PHL</sub> | Propagation Delay<br>Clock to Bus                                                                                       | 3.3<br>5.0               | 1.5<br>1.5                                       | 8.5<br>6.0 | 13.5<br>10.5 | 1.5<br>1.5                                                   | 14.5<br>11.5 | ns   | 3-6      |
| t <sub>PLH</sub> | Propagation Delay<br>Bus to Bus                                                                                         | 3.3<br>5.0               | 1.5<br>1.5                                       | 6.0<br>4.0 | 10<br>7.0    | 1.5<br>1.0                                                   | 11<br>7.5    | ns   | 3-5      |
| t <sub>PHL</sub> | Propagation Delay<br>Bus to Bus                                                                                         | 3.3<br>5.0               | 1.5<br>1.5                                       | 5.5<br>3.5 | 9.0<br>7.5   | 1.5<br>1.0                                                   | 10<br>8.0    | ns   | 3-5      |
| t <sub>PLH</sub> | Propagation Delay<br>SBA or SAB to A <sub>n</sub> or B <sub>n</sub><br>(w/A <sub>n</sub> or B <sub>n</sub> HIGH or LOW) | 3.3<br>5.0               | 1.5<br>1.5                                       | 7.5<br>5.5 | 12.5<br>9.0  | 1.5<br>1.5                                                   | 14<br>10     | ns   | 3-6      |
| t <sub>PHL</sub> | Propagation Delay<br>SBA or SAB to A <sub>n</sub> or B <sub>n</sub><br>(w/A <sub>n</sub> or B <sub>n</sub> HIGH or LOW) | 3.3<br>5.0               | 1.5<br>1.5                                       | 7.5<br>5.5 | 12.5<br>9.5  | 1.5<br>1.5                                                   | 14<br>10.5   | ns   | 3-6      |
| t <sub>PZH</sub> | Enable Time<br>G to A <sub>n</sub> or B <sub>n</sub>                                                                    | 3.3<br>5.0               | 1.5<br>1.5                                       | 6.5<br>5.0 | 11<br>8.0    | 1.0<br>1.0                                                   | 11.5<br>9.0  | ns   | 3-7      |
| t <sub>PZL</sub> | Enable Time<br>G to A <sub>n</sub> or B <sub>n</sub>                                                                    | 3.3<br>5.0               | 1.5<br>1.5                                       | 7.0<br>5.0 | 11<br>8.0    | 1.0<br>1.0                                                   | 12.5<br>9.0  | ns   | 3-8      |
| t <sub>PHZ</sub> | Disable Time<br>G to A <sub>n</sub> or B <sub>n</sub>                                                                   | 3.3<br>5.0               | 1.5<br>1.5                                       | 7.5<br>6.0 | 12<br>10     | 1.0<br>1.0                                                   | 13<br>11     | ns   | 3-7      |
| t <sub>PLZ</sub> | Disable Time<br>G to A <sub>n</sub> or B <sub>n</sub>                                                                   | 3.3<br>5.0               | 1.5<br>1.5                                       | 7.0<br>5.5 | 11.5<br>9.0  | 1.0<br>1.0                                                   | 12.5<br>10   | ns   | 3-8      |
| t <sub>PZH</sub> | Enable Time<br>DIR to A <sub>n</sub> or B <sub>n</sub>                                                                  | 3.3<br>5.0               | 1.5<br>1.5                                       | 6.0<br>4.5 | 12.5<br>9.5  | 1.0<br>1.0                                                   | 14<br>10.5   | ns   | 3-7      |
| t <sub>PZL</sub> | Enable Time<br>DIR to A <sub>n</sub> or B <sub>n</sub>                                                                  | 3.3<br>5.0               | 1.5<br>1.5                                       | 6.5<br>4.5 | 13<br>9.0    | 1.5<br>1.0                                                   | 14.5<br>10.5 | ns   | 3-8      |
| t <sub>PHZ</sub> | Disable Time<br>DIR to A <sub>n</sub> or B <sub>n</sub>                                                                 | 3.3<br>5.0               | 1.5<br>1.5                                       | 7.0<br>5.5 | 11.5<br>9.0  | 1.0<br>1.0                                                   | 13.5<br>10   | ns   | 3-7      |
| t <sub>PLZ</sub> | Disable Time<br>DIR to A <sub>n</sub> or B <sub>n</sub>                                                                 | 3.3<br>5.0               | 1.5<br>1.5                                       | 7.0<br>5.0 | 13.5<br>9.5  | 1.5<br>1.0                                                   | 15<br>10     | ns   | 3-8      |

\* Voltage Range 3.3 V is 3.3 V ±0.3 V.  
Voltage Range 5.0 V is 5.0 V ±0.5 V.

# MC74AC648 MC74ACT648

## AC OPERATING REQUIREMENTS

| Symbol         | Parameter                               | V <sub>CC</sub> *<br>(V) | 74AC                                             |                    | 74AC                                                         | Unit | Fig.<br>No. |
|----------------|-----------------------------------------|--------------------------|--------------------------------------------------|--------------------|--------------------------------------------------------------|------|-------------|
|                |                                         |                          | T <sub>A</sub> = +25°C<br>C <sub>L</sub> = 50 pF |                    | T <sub>A</sub> = -40°C<br>to +85°C<br>C <sub>L</sub> = 50 pF |      |             |
|                |                                         |                          | Typ                                              | Guaranteed Minimum |                                                              |      |             |
| t <sub>s</sub> | Setup Time, HIGH or LOW<br>Bus to Clock | 3.3                      | 2.0                                              | 3.0                | 3.5                                                          | ns   | 3-9         |
|                |                                         | 5.0                      | 1.5                                              | 2.0                | 2.0                                                          |      |             |
| t <sub>h</sub> | Hold Time, HIGH or LOW<br>Bus to Clock  | 3.3                      | -1.5                                             | 0                  | 0                                                            | ns   | 3-9         |
|                |                                         | 5.0                      | -0.5                                             | 1.0                | 1.0                                                          |      |             |
| t <sub>w</sub> | Clock Pulse Width<br>HIGH or LOW        | 3.3                      | 2.0                                              | 3.5                | 4.0                                                          | ns   | 3-6         |
|                |                                         | 5.0                      | 2.0                                              | 3.0                | 3.0                                                          |      |             |

\* Voltage Range 3.3 V is 3.3 V ±0.3 V.  
Voltage Range 5.0 V is 5.0 V ±0.5 V.

## DC CHARACTERISTICS

| Symbol            | Parameter                              | V <sub>CC</sub><br>(V) | 74ACT                  |                   | 74ACT                              | Unit | Conditions                                                                                                                                  |
|-------------------|----------------------------------------|------------------------|------------------------|-------------------|------------------------------------|------|---------------------------------------------------------------------------------------------------------------------------------------------|
|                   |                                        |                        | T <sub>A</sub> = +25°C |                   | T <sub>A</sub> =<br>−40°C to +85°C |      |                                                                                                                                             |
|                   |                                        |                        | Typ                    | Guaranteed Limits |                                    |      |                                                                                                                                             |
| V <sub>IH</sub>   | Minimum High Level Input Voltage       | 4.5<br>5.5             | 1.5<br>1.5             | 2.0<br>2.0        | 2.0<br>2.0                         | V    | V <sub>OUT</sub> = 0.1 V<br>or V <sub>CC</sub> − 0.1 V                                                                                      |
| V <sub>IL</sub>   | Maximum Low Level Input Voltage        | 4.5<br>5.5             | 1.5<br>1.5             | 0.8<br>0.8        | 0.8<br>0.8                         | V    | V <sub>OUT</sub> = 0.1 V<br>or V <sub>CC</sub> − 0.1 V                                                                                      |
| V <sub>OH</sub>   | Minimum High Level Output Voltage      | 4.5<br>5.5             | 4.49<br>5.49           | 4.4<br>5.4        | 4.4<br>5.4                         | V    | I <sub>OUT</sub> = −50 μA                                                                                                                   |
|                   |                                        | 4.5<br>5.5             |                        | 3.86<br>4.86      | 3.76<br>4.76                       | V    | *V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub><br>−24 mA<br>I <sub>OH</sub> −24 mA                                                   |
| V <sub>OL</sub>   | Maximum Low Level Output Voltage       | 4.5<br>5.5             | 0.001<br>0.001         | 0.1<br>0.1        | 0.1<br>0.1                         | V    | I <sub>OUT</sub> = 50 μA                                                                                                                    |
|                   |                                        | 4.5<br>5.5             |                        | 0.36<br>0.36      | 0.44<br>0.44                       | V    | *V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub><br>24 mA<br>I <sub>OL</sub> 24 mA                                                     |
| I <sub>IN</sub>   | Maximum Input Leakage Current          | 5.5                    |                        | ±0.1              | ±1.0                               | μA   | V <sub>I</sub> = V <sub>CC</sub> , GND                                                                                                      |
| ΔI <sub>CCT</sub> | Additional Max. I <sub>CC</sub> /Input | 5.5                    | 0.6                    |                   | 1.5                                | mA   | V <sub>I</sub> = V <sub>CC</sub> − 2.1 V                                                                                                    |
| I <sub>OZT</sub>  | Maximum 3-State Current                | 5.5                    |                        | ±0.6              | ±6.0                               | μA   | V <sub>I</sub> (OE) = V <sub>IL</sub> , V <sub>IH</sub><br>V <sub>I</sub> = V <sub>CC</sub> , GND<br>V <sub>O</sub> = V <sub>CC</sub> , GND |
| I <sub>OLD</sub>  | †Minimum Dynamic Output Current        | 5.5                    |                        |                   | 75                                 | mA   | V <sub>OLD</sub> = 1.65 V Max                                                                                                               |
| I <sub>OHD</sub>  |                                        | 5.5                    |                        |                   | −75                                | mA   | V <sub>OHD</sub> = 3.85 V Min                                                                                                               |
| I <sub>CC</sub>   | Maximum Quiescent Supply Current       | 5.5                    |                        | 8.0               | 80                                 | μA   | V <sub>IN</sub> = V <sub>CC</sub> or GND                                                                                                    |

\* All outputs loaded; thresholds on input associated with output under test.

† Maximum test duration 2.0 ms, one output loaded at a time.

# MC74AC648 MC74ACT648

## AC CHARACTERISTICS (For Figures and Waveforms — See Section 3)

| Symbol           | Parameter                                                                                                               | V <sub>CC</sub> *<br>(V) | 74ACT                                            |     |      | 74ACT                                                        |      | Unit | Fig.<br>No. |
|------------------|-------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------------------------------|-----|------|--------------------------------------------------------------|------|------|-------------|
|                  |                                                                                                                         |                          | T <sub>A</sub> = +25°C<br>C <sub>L</sub> = 50 pF |     |      | T <sub>A</sub> = -40°C<br>to +85°C<br>C <sub>L</sub> = 50 pF |      |      |             |
|                  |                                                                                                                         |                          | Min                                              | Typ | Max  | Min                                                          | Max  |      |             |
| t <sub>PLH</sub> | Propagation Delay<br>Clock to Bus                                                                                       | 5.0                      | 1.5                                              |     | 14.0 | 1.5                                                          | 15.5 | ns   | 3-6         |
| t <sub>PHL</sub> | Propagation Delay<br>Clock to Bus                                                                                       | 5.0                      | 1.5                                              |     | 14.0 | 1.5                                                          | 15.5 | ns   | 3-6         |
| t <sub>PLH</sub> | Propagation Delay<br>Bus to Bus                                                                                         | 5.0                      | 1.5                                              |     | 11.5 | 1.0                                                          | 13.0 | ns   | 3-5         |
| t <sub>PHL</sub> | Propagation Delay<br>Bus to Bus                                                                                         | 5.0                      | 1.5                                              |     | 11.5 | 1.0                                                          | 13.0 | ns   | 3-5         |
| t <sub>PLH</sub> | Propagation Delay<br>SBA or SAB to A <sub>n</sub> or B <sub>n</sub><br>(w/A <sub>n</sub> or B <sub>n</sub> HIGH or LOW) | 5.0                      | 1.5                                              |     | 12.0 | 1.5                                                          | 14.0 | ns   | 3-6         |
| t <sub>PHL</sub> | Propagation Delay<br>SBA or SAB to A <sub>n</sub> or B <sub>n</sub><br>(w/A <sub>n</sub> or B <sub>n</sub> HIGH or LOW) | 5.0                      | 1.5                                              |     | 12.0 | 1.5                                                          | 14.0 | ns   | 3-6         |
| t <sub>PZH</sub> | Enable Time<br>G to A <sub>n</sub> or B <sub>n</sub>                                                                    | 5.0                      | 1.5                                              |     | 11.0 | 1.0                                                          | 12.5 | ns   | 3-7         |
| t <sub>PZL</sub> | Enable Time<br>G to A <sub>n</sub> or B <sub>n</sub>                                                                    | 5.0                      | 1.5                                              |     | 11.5 | 1.0                                                          | 13.0 | ns   | 3-8         |
| t <sub>PHZ</sub> | Disable Time<br>G to A <sub>n</sub> or B <sub>n</sub>                                                                   | 5.0                      | 1.5                                              |     | 12.5 | 1.0                                                          | 14.0 | ns   | 3-7         |
| t <sub>PLZ</sub> | Disable Time<br>G to A <sub>n</sub> or B <sub>n</sub>                                                                   | 5.0                      | 1.5                                              |     | 12.0 | 1.0                                                          | 13.5 | ns   | 3-8         |
| t <sub>PZH</sub> | Enable Time<br>DIR to A <sub>n</sub> or B <sub>n</sub>                                                                  | 5.0                      | 1.5                                              |     | 13.0 | 1.0                                                          | 14.5 | ns   | 3-7         |
| t <sub>PZL</sub> | Enable Time<br>DIR to A <sub>n</sub> or B <sub>n</sub>                                                                  | 5.0                      | 1.5                                              |     | 12.0 | 1.0                                                          | 13.5 | ns   | 3-8         |
| t <sub>PHZ</sub> | Disable Time<br>DIR to A <sub>n</sub> or B <sub>n</sub>                                                                 | 5.0                      | 1.5                                              |     | 11.5 | 1.0                                                          | 13.0 | ns   | 3-7         |
| t <sub>PLZ</sub> | Disable Time<br>DIR to A <sub>n</sub> or B <sub>n</sub>                                                                 | 5.0                      | 1.5                                              |     | 11.0 | 1.0                                                          | 12.5 | ns   | 3-8         |

\* Voltage Range 5.0 V is 5.0 V ±0.5 V.

# MC74AC648 MC74ACT648

## AC OPERATING REQUIREMENTS

| Symbol         | Parameter                               | V <sub>CC</sub> *<br>(V) | 74ACT                                            |                    | 74ACT                                                        | Unit | Fig.<br>No. |
|----------------|-----------------------------------------|--------------------------|--------------------------------------------------|--------------------|--------------------------------------------------------------|------|-------------|
|                |                                         |                          | T <sub>A</sub> = +25°C<br>C <sub>L</sub> = 50 pF |                    | T <sub>A</sub> = -40°C<br>to +85°C<br>C <sub>L</sub> = 50 pF |      |             |
|                |                                         |                          | Typ                                              | Guaranteed Minimum |                                                              |      |             |
| t <sub>s</sub> | Setup Time, HIGH or LOW<br>Bus to Clock | 5.0                      |                                                  | 4.0                | 5.0                                                          | ns   | 3-9         |
| t <sub>h</sub> | Hold Time, HIGH or LOW<br>Bus to Clock  | 5.0                      |                                                  | 2.0                | 3.0                                                          | ns   | 3-9         |
| t <sub>w</sub> | Clock Pulse Width<br>HIGH or LOW        | 5.0                      |                                                  | 5.0                | 6.0                                                          | ns   | 3-6         |

\* Voltage Range 5.0 V is 5.0 V ±0.5 V.

## CAPACITANCE

| Symbol           | Parameter                     | Value<br>Typ | Unit | Test Conditions         |
|------------------|-------------------------------|--------------|------|-------------------------|
| C <sub>IN</sub>  | Input Capacitance             | 4.5          | pF   | V <sub>CC</sub> = 5.0 V |
| C <sub>I/O</sub> | Input/Output Capacitance      | 15           | pF   | V <sub>CC</sub> = 5.0 V |
| C <sub>PD</sub>  | Power Dissipation Capacitance | 65           | pF   | V <sub>CC</sub> = 5.0 V |

