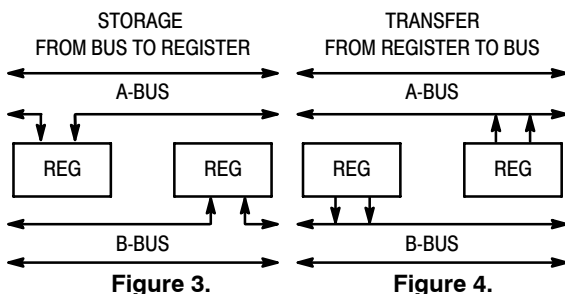
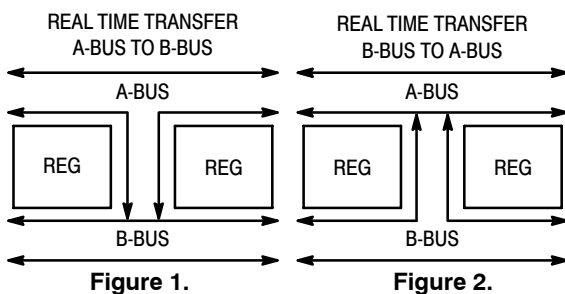


# MC74AC646, MC74ACT646

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

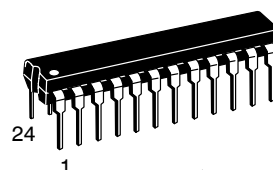
The MC74AC646/74ACT646 consist of registered bus transceiver circuits, with outputs, D-type flip-flops and control circuitry providing multiplexed transmission of data directly from the input bus or from the internal storage registers. Data on the A or B bus will be loaded into the respective registers on the LOW-to-HIGH transition of the appropriate clock pin (CAB or CBA). The four fundamental data handling functions available are illustrated Figures 1 to 4.

- 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
- 'ACT646 Has TTL Compatible Inputs
- **These devices are available in Pb-free package(s). Specifications herein apply to both standard and Pb-free devices. Please see our website at [www.onsemi.com](http://www.onsemi.com) for specific Pb-free orderable part numbers, or contact your local ON Semiconductor sales office or representative.**

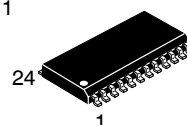


**ON Semiconductor™**

<http://onsemi.com>



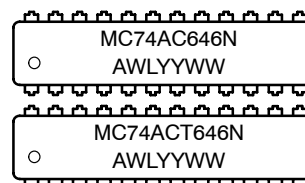
**PDIP-24  
N SUFFIX  
CASE 724**



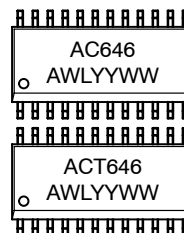
**SO-24  
DW SUFFIX  
CASE 751E**

### MARKING DIAGRAMS

#### PDIP-24



#### SO-24

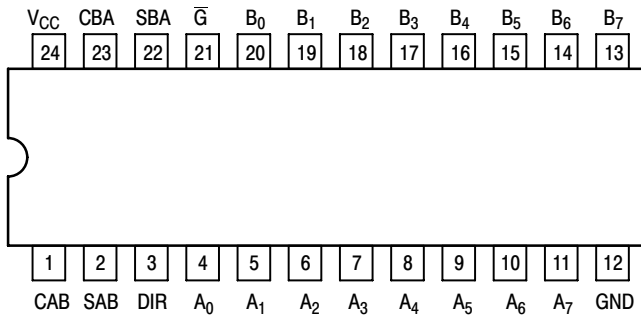


A = Assembly  
Location  
L, WL = Wafer Lot  
Y, YY = Year  
W, WW = Work Week

### ORDERING INFORMATION

| Device         | Package | Shipping         |
|----------------|---------|------------------|
| MC74AC646N     | PDIP-24 | 15 Units/Rail    |
| MC74ACT646N    | PDIP-24 | 15 Units/Rail    |
| MC74AC646DW    | SOIC-24 | 30 Units/Rail    |
| MC74AC646DWR   | SOIC-24 | 1000 Tape & Reel |
| MC74ACT646DW   | SOIC-24 | 30 Units/Rail    |
| MC74ACT646DWR2 | SOIC-24 | 1000 Tape & Reel |

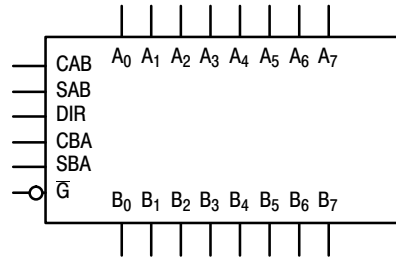
# MC74AC646, MC74ACT646



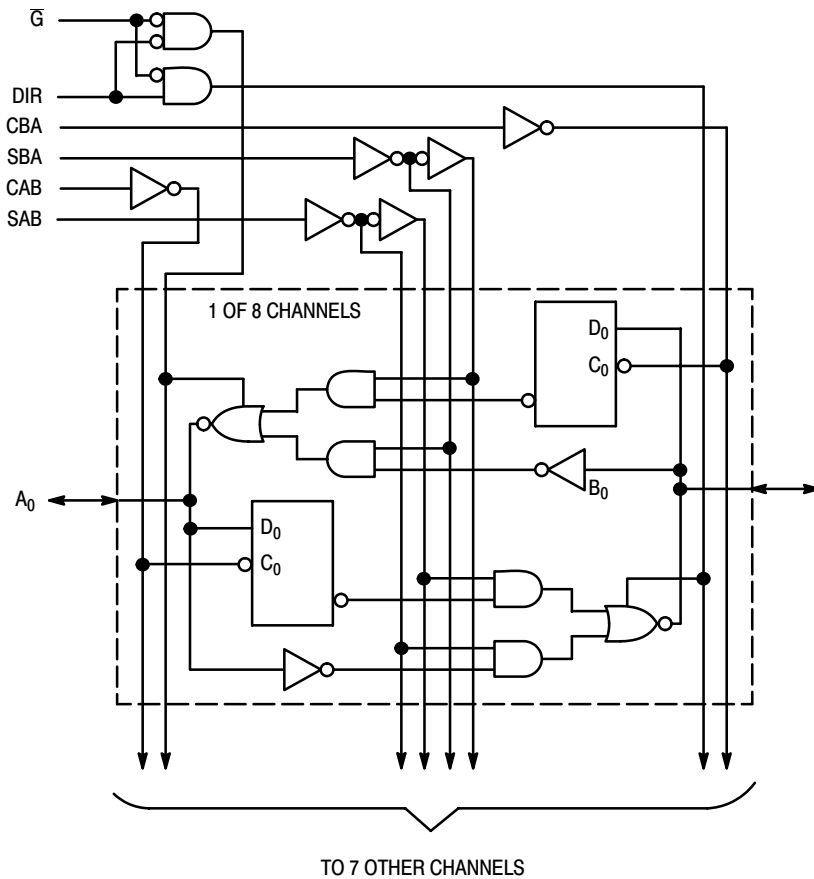
**Figure 5. Pinout: 24-Lead Packages Conductors**  
(Top View)

## PIN ASSIGNMENT

| PIN                            | FUNCTION                                          |
|--------------------------------|---------------------------------------------------|
| A <sub>0</sub> –A <sub>7</sub> | Data Register Inputs<br>Data Register A Outputs   |
| B <sub>0</sub> –B <sub>7</sub> | Data Register B Inputs<br>Data Register B Outputs |
| CAB, CBA                       | Clock Pulse Inputs                                |
| SAB, SBA                       | Transmit/Receive Inputs                           |
| DIR, $\bar{G}$                 | Output Enable Inputs                              |



**Figure 6. Logic Symbol**



NOTE: This diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

**Figure 7. Logic Diagram**

# MC74AC646, MC74ACT646

## FUNCTION TABLE

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

\*The data output functions may be enabled or disabled by various signals at the  $\bar{G}$  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.

NOTE: H = HIGH Voltage Level; L = LOW Voltage Level; X = Immaterial; ┐ = LOW-to-HIGH Transition

## MAXIMUM RATINGS\*

| Symbol           | Parameter                                        | Value                        | Unit |
|------------------|--------------------------------------------------|------------------------------|------|
| V <sub>CC</sub>  | DC Supply Voltage (Referenced to GND)            | –0.5 to +7.0                 | V    |
| V <sub>in</sub>  | DC Input Voltage (Referenced to GND)             | –0.5 to V <sub>CC</sub> +0.5 | V    |
| V <sub>out</sub> | DC Output Voltage (Referenced to GND)            | –0.5 to V <sub>CC</sub> +0.5 | V    |
| I <sub>in</sub>  | DC Input Current, per Pin                        | ±20                          | mA   |
| I <sub>out</sub> | DC Output Sink/Source Current, per Pin           | ±50                          | mA   |
| I <sub>CC</sub>  | DC V <sub>CC</sub> or GND Current per Output Pin | ±50                          | mA   |
| T <sub>stg</sub> | 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 <sub>CC</sub>                    | Supply Voltage                                                          | 'AC                     | 2.0 | 5.0             | V    |
|                                    |                                                                         | 'ACT                    | 4.5 | 5.0             |      |
| V <sub>in</sub> , V <sub>out</sub> | DC Input Voltage, Output Voltage (Ref. to GND)                          | 0                       | –   | V <sub>CC</sub> | V    |
| t <sub>r</sub> , t <sub>f</sub>    | Input Rise and Fall Time (Note 1)<br>'AC Devices except Schmitt Inputs  | V <sub>CC</sub> @ 3.0 V | –   | 150             | ns/V |
|                                    |                                                                         | V <sub>CC</sub> @ 4.5 V | –   | 40              |      |
|                                    |                                                                         | V <sub>CC</sub> @ 5.5 V | –   | 25              |      |
| t <sub>r</sub> , t <sub>f</sub>    | Input Rise and Fall Time (Note 2)<br>'ACT Devices except Schmitt Inputs | V <sub>CC</sub> @ 4.5 V | –   | 10              | ns/V |
|                                    |                                                                         | V <sub>CC</sub> @ 5.5 V | –   | 8.0             |      |
| T <sub>J</sub>                     | Junction Temperature (PDIP)                                             | –                       | –   | 140             | °C   |
| T <sub>A</sub>                     | Operating Ambient Temperature Range                                     | –40                     | 25  | 85              | °C   |
| I <sub>OH</sub>                    | Output Current – High                                                   | –                       | –   | –24             | mA   |
| I <sub>OL</sub>                    | Output Current – Low                                                    | –                       | –   | 24              | mA   |

1. V<sub>in</sub> from 30% to 70% V<sub>CC</sub>; see individual Data Sheets for devices that differ from the typical input rise and fall times.
2. V<sub>in</sub> from 0.8 V to 2.0 V; see individual Data Sheets for devices that differ from the typical input rise and fall times.

# MC74AC646, MC74ACT646

## 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<br>+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>.

# MC74AC646, MC74ACT646

**AC CHARACTERISTICS** (For Figures and Waveforms – See Section 3 of the ON Semiconductor FACT Data Book, DL138/D)

| 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               | 4.0<br>2.5                                       | 10.5<br>7.5 | 16.5<br>12   | 3.0<br>2.0                                                   | 18.5<br>13   | ns   | 3–6      |
| t <sub>PHL</sub> | Propagation Delay<br>Clock to Bus                                                                                       | 3.3<br>5.0               | 3.0<br>2.0                                       | 9.5<br>6.5  | 14.5<br>10.5 | 2.5<br>1.5                                                   | 16<br>11.5   | ns   | 3–6      |
| t <sub>PLH</sub> | Propagation Delay<br>Bus to Bus                                                                                         | 3.3<br>5.0               | 2.5<br>1.5                                       | 7.5<br>5.0  | 12<br>8.0    | 2.0<br>1.0                                                   | 13.5<br>9.0  | ns   | 3–5      |
| t <sub>PHL</sub> | Propagation Delay<br>Bus to Bus                                                                                         | 3.3<br>5.0               | 1.5<br>1.5                                       | 7.5<br>5.0  | 12.5<br>9.0  | 1.5<br>1.0                                                   | 13.5<br>9.5  | 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               | 2.0<br>1.5                                       | 8.5<br>6.0  | 13.5<br>10   | 1.5<br>1.5                                                   | 15.5<br>11   | 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                                       | 8.5<br>6.0  | 13.5<br>10   | 1.5<br>1.5                                                   | 15<br>11     | ns   | 3–6      |
| t <sub>PZH</sub> | Enable Time<br>G̅ to A <sub>n</sub> or B <sub>n</sub>                                                                   | 3.3<br>5.0               | 2.5<br>1.5                                       | 7.0<br>5.0  | 11.5<br>8.5  | 2.0<br>1.5                                                   | 12.5<br>9.0  | ns   | 3–7      |
| t <sub>PZL</sub> | Enable Time<br>G̅ to A <sub>n</sub> or B <sub>n</sub>                                                                   | 3.3<br>5.0               | 2.5<br>1.5                                       | 7.5<br>5.5  | 12.5<br>9.0  | 2.0<br>1.5                                                   | 14<br>10     | ns   | 3–8      |
| t <sub>PHZ</sub> | Disable Time<br>G̅ to A <sub>n</sub> or B <sub>n</sub>                                                                  | 3.3<br>5.0               | 3.0<br>2.0                                       | 8.0<br>6.5  | 12.5<br>10   | 2.5<br>2.0                                                   | 13.5<br>11   | ns   | 3–7      |
| t <sub>PLZ</sub> | Disable Time<br>G̅ to A <sub>n</sub> or B <sub>n</sub>                                                                  | 3.3<br>5.0               | 2.0<br>1.5                                       | 7.5<br>6.0  | 12<br>9.5    | 2.0<br>1.5                                                   | 13.5<br>10.5 | 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               | 2.0<br>1.5                                       | 6.5<br>5.0  | 11<br>7.5    | 1.5<br>1.0                                                   | 12<br>8.5    | 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               | 2.5<br>1.5                                       | 7.0<br>5.0  | 11.5<br>8.0  | 2.0<br>1.0                                                   | 13<br>9.0    | 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               | 2.5<br>1.5                                       | 7.5<br>5.5  | 11.5<br>9.5  | 1.5<br>1.5                                                   | 12.5<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                                       | 7.5<br>5.5  | 12<br>9.5    | 1.5<br>1.5                                                   | 13.5<br>10.5 | 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.

# MC74AC646, MC74ACT646

## 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                                              | 5.0                | 5.5                                                          | ns   | 3-9         |
|                |                                         | 5.0                      | 1.5                                              | 4.0                | 4.5                                                          |      |             |
| 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                                             | 0.5                | 1.0                                                          |      |             |
| t <sub>w</sub> | Clock Pulse Width<br>HIGH or LOW        | 3.3                      | 2.0                                              | 3.5                | 4.5                                                          | ns   | 3-6         |
|                |                                         | 5.0                      | 2.0                                              | 3.5                | 3.5                                                          |      |             |

\*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<br>+85°C |      |                                                                                                                                             |
|                   |                                        |                        | Typ                    | Guaranteed Limits |                                       |      |                                                                                                                                             |
| V <sub>IH</sub>   | Minimum High Level<br>Input Voltage    | 4.5                    | 1.5                    | 2.0               | 2.0                                   | V    | V <sub>OUT</sub> = 0.1 V<br>or V <sub>CC</sub> − 0.1 V                                                                                      |
|                   |                                        | 5.5                    | 1.5                    | 2.0               | 2.0                                   |      |                                                                                                                                             |
| V <sub>IL</sub>   | Maximum Low Level<br>Input Voltage     | 4.5                    | 1.5                    | 0.8               | 0.8                                   | V    | V <sub>OUT</sub> = 0.1 V<br>or V <sub>CC</sub> − 0.1 V                                                                                      |
|                   |                                        | 5.5                    | 1.5                    | 0.8               | 0.8                                   |      |                                                                                                                                             |
| V <sub>OH</sub>   | Minimum High Level<br>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><br>−24 mA<br>I <sub>OH</sub> −24 mA                                                   |
|                   |                                        | 5.5                    | −                      | 4.86              | 4.76                                  |      |                                                                                                                                             |
| V <sub>OL</sub>   | Maximum Low Level<br>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><br>24 mA<br>I <sub>OL</sub> 24 mA                                                     |
|                   |                                        | 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                                                                                                      |
| 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<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.

# MC74AC646, MC74ACT646

**AC CHARACTERISTICS** (For Figures and Waveforms – See Section 3 of the ON Semiconductor FACT Data Book, DL138/D)

| 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                      | 3.5                                              | 12.0 | 14.5 | 3.0                                                          | 16.0 | ns   | 3–6         |
| t <sub>PHL</sub> | Propagation Delay<br>Clock to Bus                                                                                       | 5.0                      | 4.0                                              | 12.0 | 14.5 | 3.5                                                          | 16.0 | ns   | 3–6         |
| t <sub>PLH</sub> | Propagation Delay<br>Bus to Bus                                                                                         | 5.0                      | 3.0                                              | 8.5  | 11.0 | 2.5                                                          | 12.0 | ns   | 3–5         |
| t <sub>PHL</sub> | Propagation Delay<br>Bus to Bus                                                                                         | 5.0                      | 2.5                                              | 8.5  | 11.0 | 2.0                                                          | 12.0 | 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                      | 3.0                                              | 9.5  | 12.0 | 2.5                                                          | 13.0 | 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                      | 3.0                                              | 9.5  | 12.0 | 2.5                                                          | 13.0 | ns   | 3–6         |
| t <sub>PZH</sub> | Enable Time<br>G̅ to A <sub>n</sub> or B <sub>n</sub>                                                                   | 5.0                      | 2.0                                              | 9.0  | 11.0 | 1.5                                                          | 12.0 | ns   | 3–7         |
| t <sub>PZL</sub> | Enable Time<br>G̅ to A <sub>n</sub> or B <sub>n</sub>                                                                   | 5.0                      | 3.5                                              | 9.0  | 11.0 | 3.0                                                          | 12.0 | ns   | 3–8         |
| t <sub>PHZ</sub> | Disable Time<br>G̅ to A <sub>n</sub> or B <sub>n</sub>                                                                  | 5.0                      | 5.0                                              | 10.5 | 13.0 | 4.5                                                          | 14.5 | ns   | 3–7         |
| t <sub>PLZ</sub> | Disable Time<br>G̅ to A <sub>n</sub> or B <sub>n</sub>                                                                  | 5.0                      | 3.5                                              | 10.0 | 12.5 | 3.0                                                          | 14.0 | ns   | 3–8         |
| t <sub>PZH</sub> | Enable Time<br>DIR to A <sub>n</sub> or B <sub>n</sub>                                                                  | 5.0                      | 2.0                                              | 6.5  | 12.5 | 1.5                                                          | 13.5 | ns   | 3–7         |
| t <sub>PZL</sub> | Enable Time<br>DIR to A <sub>n</sub> or B <sub>n</sub>                                                                  | 5.0                      | 3.5                                              | 6.5  | 12.5 | 3.0                                                          | 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                      | 5.0                                              | 8.5  | 12.5 | 4.5                                                          | 13.5 | ns   | 3–7         |
| t <sub>PLZ</sub> | Disable Time<br>DIR to A <sub>n</sub> or B <sub>n</sub>                                                                 | 5.0                      | 3.5                                              | 8.5  | 12.5 | 3.0                                                          | 13.5 | ns   | 3–8         |

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

# MC74AC646, MC74ACT646

## 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                      | –                                                | 7.0                | 8.0                                                          | ns   | 3–9         |
| t <sub>h</sub> | Hold Time, HIGH or LOW<br>Bus to Clock  | 5.0                      | –                                                | 2.5                | 2.5                                                          | ns   | 3–9         |
| t <sub>w</sub> | Clock Pulse Width<br>HIGH or LOW        | 5.0                      | –                                                | 7.0                | 8.0                                                          | ns   | 3–6         |

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

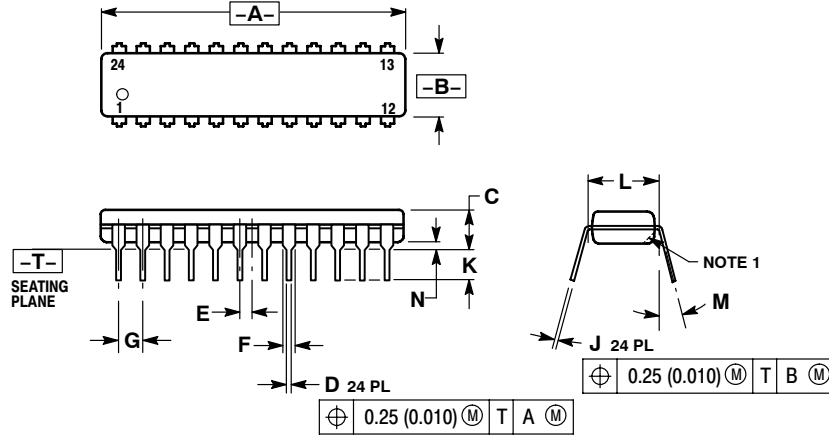
## CAPACITANCE

| 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 | 60           | pF   | V <sub>CC</sub> = 5.0 V |

# MC74AC646, MC74ACT646

## PACKAGE DIMENSIONS

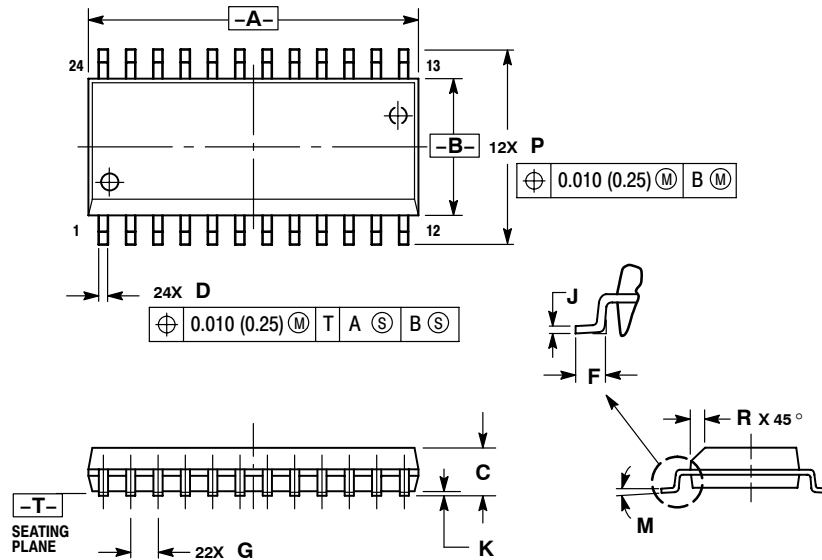
### PDIP-24 N SUFFIX 24 PIN PLASTIC DIP PACKAGE CASE 724-03 ISSUE D



- NOTES:
1. CHAMFERED CONTOUR OPTIONAL.
  2. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
  3. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  4. CONTROLLING DIMENSION: INCH.

| DIM | INCHES    |       | MILLIMETERS |       |
|-----|-----------|-------|-------------|-------|
|     | MIN       | MAX   | MIN         | MAX   |
| A   | 1.230     | 1.265 | 31.25       | 32.13 |
| B   | 0.250     | 0.270 | 6.35        | 6.85  |
| C   | 0.145     | 0.175 | 3.69        | 4.44  |
| D   | 0.015     | 0.020 | 0.38        | 0.51  |
| E   | 0.050 BSC |       | 1.27 BSC    |       |
| F   | 0.040     | 0.060 | 1.02        | 1.52  |
| G   | 0.100 BSC |       | 2.54 BSC    |       |
| J   | 0.007     | 0.012 | 0.18        | 0.30  |
| K   | 0.110     | 0.140 | 2.80        | 3.55  |
| L   | 0.300 BSC |       | 7.62 BSC    |       |
| M   | 0°        | 15°   | 0°          | 15°   |
| N   | 0.020     | 0.040 | 0.51        | 1.01  |

### SO-24 DW SUFFIX 24 PIN PLASTIC SOIC PACKAGE CASE 751E-04 ISSUE E



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: MILLIMETER.
  3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
  4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
  5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.13 (0.005) TOTAL IN EXCESS OF D DIMENSION AT MAXIMUM MATERIAL CONDITION.

| DIM | MILLIMETERS |       | INCHES    |       |
|-----|-------------|-------|-----------|-------|
|     | MIN         | MAX   | MIN       | MAX   |
| A   | 15.25       | 15.54 | 0.601     | 0.612 |
| B   | 7.40        | 7.60  | 0.292     | 0.299 |
| C   | 2.35        | 2.65  | 0.093     | 0.104 |
| D   | 0.35        | 0.49  | 0.014     | 0.019 |
| F   | 0.41        | 0.90  | 0.016     | 0.035 |
| G   | 1.27 BSC    |       | 0.050 BSC |       |
| J   | 0.23        | 0.32  | 0.009     | 0.013 |
| K   | 0.13        | 0.29  | 0.005     | 0.011 |
| M   | 0°          | 8°    | 0°        | 8°    |
| P   | 10.05       | 10.55 | 0.395     | 0.415 |
| R   | 0.25        | 0.75  | 0.010     | 0.029 |

## **Notes**

## Notes

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