

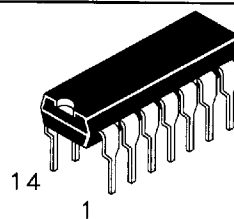
DV74ACT04 Available Q2, 1995

### Hex Inverter

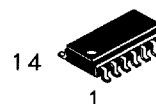
This device contains six independent three-stage-inverters, each of which performs the logic INVERT function.

- Advanced very high speed CMOS
- Outputs source/sink 24 mA
- Transmission line driving 50 ohms
- ACT has TTL compatible inputs
- AC device operation guaranteed from 2 to 6 volts
- DC & AC Parameters guaranteed over  $-40$  to  $+85^{\circ}\text{C}$

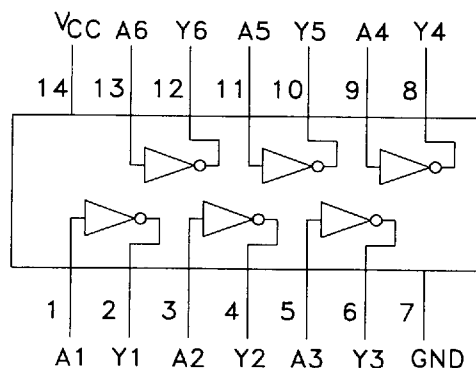
### DV74AC04 DV74ACT04



N Suffix  
Plastic DIP  
AVG-001 Case



D Suffix  
Plastic SOP  
AVG-002 Case



#### TRUTH TABLE

| Inputs | Outputs |
|--------|---------|
| A      | Y       |
| L      | H       |
| H      | L       |

H=High Level Logic  
L=Low Level Logic  
X=Don't Care

#### ABSOLUTE MAXIMUM RATINGS

Maximum ratings are those values beyond which damage to the device may occur.

| Symbol           | Parameter                                        | AC04, ACT04            | 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 $V_{CC}+0.5$ | V                  |
| V <sub>OUT</sub> | DC Output Voltage (Referenced to GND)            | $-0.5$ to $V_{CC}+0.5$ | V                  |
| I <sub>IN</sub>  | DC Input Current, per Pin                        | $\pm 20$               | mA                 |
| I <sub>OUT</sub> | DC Output Sink/Source Current, per Pin           | $\pm 50$               | mA                 |
| I <sub>CC</sub>  | DC V <sub>CC</sub> or GND Current per Output Pin | $\pm 50$               | mA                 |
| T <sub>STG</sub> | Storage Temperature                              | $-65$ to $+150$        | $^{\circ}\text{C}$ |

#### GUARANTEED 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 | V <sub>CC</sub> @ 3.0 V |     | 150             | ns/V |
|                                    |                                                 | V <sub>CC</sub> @ 4.5 V |     | 40              | ns/V |
|                                    |                                                 | V <sub>CC</sub> @ 5.5 V |     | 25              | ns/V |

# GUARANTEED OPERATING CONDITIONS (continued)

| Symbol     | Parameter                                         | Min              | Typ | Max | Unit |
|------------|---------------------------------------------------|------------------|-----|-----|------|
| $t_r, t_f$ | Input Rise and Fall Time (Note 2)<br>'ACT Devices | $V_{CC} @ 4.5 V$ |     | 10  | ns/V |
|            |                                                   | $V_{CC} @ 5.5 V$ |     | 8.0 | ns/V |
| $T_A$      | Operating Ambient Temperature Range               | -40              | 25  | 85  | °C   |
| $C_{IN}$   | Input Capacitance                                 | $V_{CC} = 5.0 V$ | 4.5 |     | pF   |
| $CPD$      | Power Dissipation Capacitance                     | $V_{CC} = 5.0 V$ | 30  |     | pF   |

1.  $V_{IN}$  from 30% to 70%  $V_{CC}$

2.  $V_{IN}$  from 0.8 to 2.0 V

## AC — 04

### DC ELECTRICAL CHARACTERISTICS

| Symbol          | Parameter                            | Conditions                                                                                      | V <sub>CC</sub><br>(V) | AC04       |                   |                      | Unit |
|-----------------|--------------------------------------|-------------------------------------------------------------------------------------------------|------------------------|------------|-------------------|----------------------|------|
|                 |                                      |                                                                                                 |                        | TA = +25°C |                   | TA = -40<br>to +85°C |      |
|                 |                                      |                                                                                                 |                        | Typ        | Guaranteed Limits |                      |      |
| V <sub>IH</sub> | Minimum High Level<br>Input Voltage  | V <sub>OUT</sub> = 0.1V<br>or V <sub>CC</sub> - 0.1 V                                           | 3.0                    | 1.5        | 2.1               | 2.1                  | 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   | V <sub>OUT</sub> = 0.1V<br>or V <sub>CC</sub> - 0.1 V                                           | 3.0                    | 1.5        | 0.9               | 0.9                  | 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 | I <sub>OUT</sub> = -50 μA                                                                       | 3.0                    | 2.99       | 2.9               | 2.9                  | V    |
|                 |                                      |                                                                                                 | 4.5                    | 4.49       | 4.4               | 4.4                  |      |
|                 |                                      |                                                                                                 | 5.5                    | 5.49       | 5.4               | 5.4                  |      |
|                 |                                      | V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub><br>-12mA<br>I <sub>OH</sub> -24mA<br>-24mA | 3.0                    |            | 2.56              | 2.46                 | V    |
|                 |                                      |                                                                                                 | 4.5                    |            | 3.86              | 3.76                 |      |
|                 |                                      |                                                                                                 | 5.5                    |            | 4.86              | 4.76                 |      |
| V <sub>OL</sub> | Maximum Low Level<br>Output Voltage  | I <sub>OUT</sub> = 50 μA                                                                        | 3.0                    | 0.002      | 0.1               | 0.1                  | V    |
|                 |                                      |                                                                                                 | 4.5                    | 0.001      | 0.1               | 0.1                  |      |
|                 |                                      |                                                                                                 | 5.5                    | 0.001      | 0.1               | 0.1                  |      |
|                 |                                      | V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub><br>12mA<br>I <sub>OL</sub> 24mA<br>24mA    | 3.0                    |            | 0.36              | 0.44                 | V    |
|                 |                                      |                                                                                                 | 4.5                    |            | 0.36              | 0.44                 |      |
|                 |                                      |                                                                                                 | 5.5                    |            | 0.36              | 0.44                 |      |
| I <sub>IN</sub> | Maximum Input Leakage Current        | V <sub>IN</sub> = V <sub>CC</sub> or GND                                                        | 5.5                    |            | ±0.1              | ±1.0                 | μA   |
| I <sub>CC</sub> | Maximum Quiescent<br>Supply Current  | V <sub>IN</sub> = V <sub>CC</sub> or GND                                                        | 5.5                    |            | 4.0               | 40                   | μA   |

### AC CHARACTERISTICS over full operating conditions

| Symbol | Parameter         | Vcc<br>±10%<br>(V) | AC04                     |            |                                    |            | Unit |
|--------|-------------------|--------------------|--------------------------|------------|------------------------------------|------------|------|
|        |                   |                    | TA = +25°C<br>CL = 50 pF |            | TA = − 40°C to +85°C<br>CL = 50 pF |            |      |
|        |                   |                    | Min                      | Max        | Min                                | Max        |      |
| tPLH   | Propagation Delay | 3.3<br>5.0         | 1.5<br>1.5               | 9.0<br>7.0 | 1.0<br>1.0                         | 10<br>7.5  | ns   |
| tPHL   | Propagation Delay | 3.3<br>5.0         | 1.5<br>1.5               | 8.5<br>6.5 | 1.0<br>1.0                         | 9.5<br>7.0 | ns   |

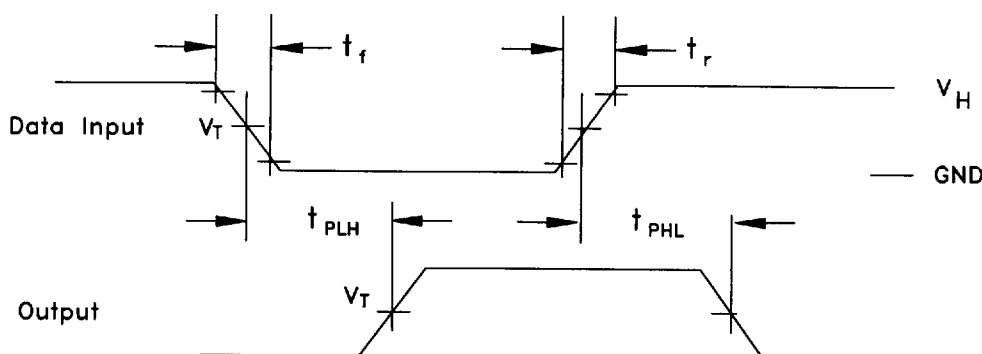
**DC ELECTRICAL CHARACTERISTICS**

| Symbol             | Parameter                              | Conditions                                                                              | V <sub>CC</sub><br>(V) | ACT04          |                   |                      | Unit |
|--------------------|----------------------------------------|-----------------------------------------------------------------------------------------|------------------------|----------------|-------------------|----------------------|------|
|                    |                                        |                                                                                         |                        | TA = +25°C     |                   | TA = -40<br>to +85°C |      |
|                    |                                        |                                                                                         |                        | Typ            | Guaranteed Limits |                      |      |
| V <sub>IH</sub>    | Minimum High Level<br>Input Voltage    | V <sub>OUT</sub> = 0.1V<br>or V <sub>CC</sub> - 0.1 V                                   | 4.5<br>5.5             | 1.5<br>1.5     | 2.0<br>2.0        | 2.0<br>2.0           | V    |
| V <sub>IL</sub>    | Maximum Low Level<br>Input Voltage     | V <sub>OUT</sub> = 0.1V<br>or V <sub>CC</sub> - 0.1 V                                   | 4.5<br>5.5             | 1.5<br>1.5     | 0.8<br>0.8        | 0.8<br>0.8           | V    |
| V <sub>OH</sub>    | Minimum High Level<br>Output Voltage   | I <sub>OUT</sub> = -50 μA                                                               | 4.5<br>5.5             | 4.49<br>5.49   | 4.4<br>5.4        | 4.4<br>5.4           | V    |
|                    |                                        | V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub><br>I <sub>OH</sub> -24mA<br>-24 mA | 4.5<br>5.5             |                | 3.86<br>4.86      | 3.76<br>4.76         | V    |
| V <sub>OL</sub>    | Maximum Low Level<br>Output Voltage    | I <sub>OUT</sub> = 50 μA                                                                | 4.5<br>5.5             | 0.001<br>0.001 | 0.1<br>0.1        | 0.1<br>0.1           | V    |
|                    |                                        | V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub><br>I <sub>OL</sub> 24mA<br>24 mA   | 4.5<br>5.5             |                | 0.36<br>0.36      | 0.44<br>0.44         | V    |
| I <sub>IN</sub>    | Maximum Input Leakage Current          | V <sub>IN</sub> = V <sub>CC</sub> or GND                                                | 5.5                    |                | ±0.1              | ±1.0                 | μA   |
| ΔI <sub>CC</sub> T | Additional Max I <sub>CC</sub> / Input | V <sub>IN</sub> = V <sub>CC</sub> - 2.1 V                                               | 5.5                    | 0.6            |                   | 1.5                  | mA   |
| I <sub>CC</sub>    | Maximum Quiescent<br>Supply Current    | V <sub>IN</sub> = V <sub>CC</sub> or GND                                                | 5.5                    |                | 4.0               | 40                   | μA   |

**AC CHARACTERISTICS** over full operating conditions

| Symbol           | Parameter         | V <sub>CC</sub><br>±10%<br>(V) | ACT04                                            |     |                                                            |     | Unit |
|------------------|-------------------|--------------------------------|--------------------------------------------------|-----|------------------------------------------------------------|-----|------|
|                  |                   |                                | T <sub>A</sub> = +25°C<br>C <sub>L</sub> = 50 pF |     | T <sub>A</sub> = − 40°C to +85°C<br>C <sub>L</sub> = 50 pF |     |      |
|                  |                   |                                | Min                                              | Max | Min                                                        | Max |      |
| t <sub>PLH</sub> | Propagation Delay | 5.0                            | 1.5                                              | 8.5 | 1.0                                                        | 9.0 | ns   |
| t <sub>PHL</sub> | Propagation Delay | 5.0                            | 1.5                                              | 8.0 | 1.0                                                        | 8.5 | ns   |

**SWITCHING WAVEFORMS**



Input and output threshold voltage:  
 $V_T$  = 50% V<sub>CC</sub> for AC; 1.5V for ACT  
 $V_H$  = V<sub>CC</sub> for AC, 3V for ACT