

## 54ACTQ32 Quiet Series Quad 2-Input OR Gate

### General Description

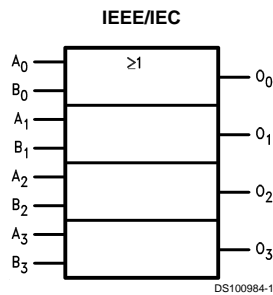
The 'ACTQ32 contains four, 2-input OR gates and utilizes NSC Quiet Series technology to guarantee quiet output switching and improved dynamic threshold performance. FACT Quiet Series™ features GTO™ output control and undershoot corrector in addition to a split ground bus for superior CMOS performance.

- Guaranteed simultaneous switching noise level and dynamic threshold performance
- Improved latch-up immunity
- Outputs source/sink 24 mA
- 'ACTQ32 has TTL-compatible inputs
- Standard Microcircuit Drawing (SMD) 5962-8973601

### Features

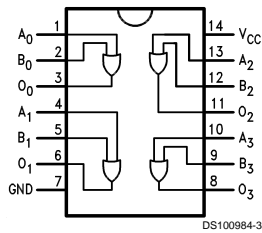
- I<sub>CC</sub> reduced by 50%

### Logic Symbol

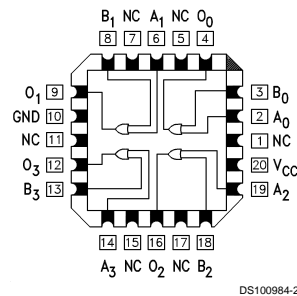


### Connection Diagrams

Pin Assignment for DIP and Flatpak



Pin Assignment for LCC



| Pin Names                       | Description |
|---------------------------------|-------------|
| A <sub>n</sub> , B <sub>n</sub> | Inputs      |
| O <sub>n</sub>                  | Outputs     |

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### Absolute Maximum Ratings (Note 1)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

|  |                          |
|--|--------------------------|
| Supply Voltage ( $V_{CC}$ )  | -0.5V to +7.0V           |
| DC Input Diode Current ( $I_{IK}$ )                                    |                          |
| $V_I = -0.5V$  | -20 mA                   |
| $V_I = V_{CC} + 0.5V$  | +20 mA                   |
| DC Input Voltage ( $V_I$ )   | -0.5V to $V_{CC} + 0.5V$ |
| DC Output Diode Current ( $I_{OK}$ )                                   |                          |
| $V_O = -0.5V$  | -20 mA                   |
| $V_O = V_{CC} + 0.5V$  | +20 mA                   |
| DC Output Voltage ( $V_O$ )  | -0.5V to $V_{CC} + 0.5V$ |
| DC Output Source or Sink Current ( $I_O$ )                             | ±50 mA                   |
| DC $V_{CC}$ or Ground Current per Output Pin ( $I_{CC}$ or $I_{GND}$ ) | ±50 mA                   |
| Storage Temperature ( $T_{STG}$ )                                      | -65°C to +150°C          |

Junction Temperature ( $T_J$ )

CDIP

175°C

### Recommended Operating Conditions

|   |                 |
|---|-----------------|
| Supply Voltage ( $V_{CC}$ )                     |                 |
| 'ACTQ   | 4.5V to 5.5V    |
| Input Voltage ( $V_I$ )                         | 0V to $V_{CC}$  |
| Output Voltage ( $V_O$ )                        | 0V to $V_{CC}$  |
| Operating Temperature ( $T_A$ )                 |                 |
| 54ACTQ  | -55°C to +125°C |
| Minimum Input Edge Rate ( $\Delta V/\Delta t$ ) |                 |
| 'ACTQ Devices                                   |                 |
| $V_{IN}$ from 0.8V to 2.0V                      |                 |
| $V_{CC}$ @ 4.5V, 5.5V                           | 125 mV/ns       |

**Note 1:** Absolute maximum ratings are those values beyond which damage to the device may occur. The databook specifications should be met, without exception, to ensure that the system design is reliable over its power supply, temperature, and output/input loading variables. National does not recommend operation of FACT™ circuits outside databook specifications.

### DC Characteristics for 'ACTQ Family Devices

| Symbol    | Parameter                         | $V_{CC}$<br>(V) | 54ACTQ            | Units | Conditions  |
|-----------|-----------------------------------|-----------------|-------------------|-------|---|
|           |                                   |                 | $T_A =$           |       |   |
|           |                                   |                 | -55°C to +125°C   |       |   |
|           |                                   |                 | Guaranteed Limits |       |   |
| $V_{IH}$  | Minimum High Level Input Voltage  | 4.5             | 2.0               | V     | $V_{OUT} = 0.1V$<br>or $V_{CC} - 0.1V$  |
|           |                                   | 5.5             | 2.0               |       |   |
| $V_{IL}$  | Maximum Low Level Input Voltage   | 4.5             | 0.8               | V     | $V_{OUT} = 0.1V$<br>or $V_{CC} - 0.1V$  |
|           |                                   | 5.5             | 0.8               |       |   |
| $V_{OH}$  | Minimum High Level Output Voltage | 4.5             | 4.4               | V     | $I_{OUT} = -50 \mu A$   |
|           |                                   | 5.5             | 5.4               |       |   |
|           |                                   | 4.5             | 3.70              | V     | (Note 2)<br>$V_{IN} = V_{IL}$ or $V_{IH}$<br>$I_{OH} = -24 \text{ mA}$<br>$I_{OH} = -24 \text{ mA}$ |
|           |                                   | 5.5             | 4.70              |       |   |
| $V_{OL}$  | Maximum Low Level Output Voltage  | 4.5             | 0.1               | V     | $I_{OUT} = 50 \mu A$  |
|           |                                   | 5.5             | 0.1               |       |   |
|           |                                   | 4.5             | 0.50              | V     | (Note 2)<br>$V_{IN} = V_{IL}$ or $V_{IH}$<br>$I_{OL} = 24 \text{ mA}$<br>$I_{OL} = 24 \text{ mA}$   |
|           |                                   | 5.5             | 0.50              |       |   |
| $I_{IN}$  | Maximum Input Leakage Current     | 5.5             | ±1.0              | μA    | $V_I = V_{CC}, GND$   |
| $I_{CCT}$ | Maximum $I_{CC}$ /Input           | 5.5             | 1.6               | mA    | $V_I = V_{CC} - 2.1V$   |
| $I_{OLD}$ | Minimum Dynamic                   | 5.5             | 50                | mA    | $V_{OLD} = 1.65V$ Max   |
| $I_{OHD}$ | Output Current (Note 3)           | 5.5             | -50               | mA    | $V_{OHD} = 3.85V$ Min   |
| $I_{CC}$  | Maximum Quiescent Supply Current  | 5.5             | 80.0              | μA    | $V_{IN} = V_{CC}$<br>or GND (Note 3)  |

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

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

## AC Electrical Characteristics

| Symbol           | Parameter         | V <sub>CC</sub><br>(V)<br>(Note 4) | 54ACTQ  |     | Units | Fig.<br>No. |
|------------------|-------------------|------------------------------------|---|-----|-------|-------------|
|                  |                   |                                    | T <sub>A</sub> = -55°C<br>to +125°C<br>C <sub>L</sub> = 50 pF |     |       |             |
|                  |                   |                                    | Min   | Max |       |             |
| t <sub>PLH</sub> | Propagation Delay | 5.0                                | 1.5   | 7.5 | ns    |             |
| t <sub>PHL</sub> | Propagation Delay | 5.0                                | 1.5   | 7.5 | ns    |             |

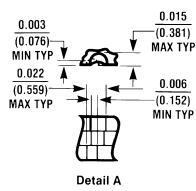
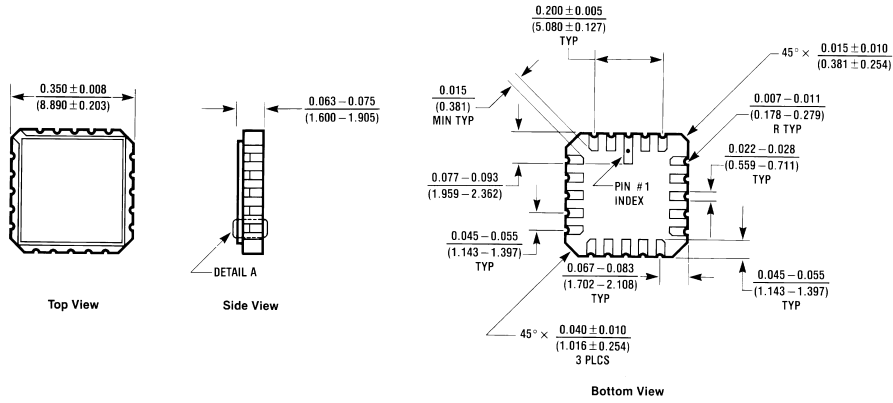
**Note 4:** Voltage Range 5.0 is 5.0V ±0.5V

## Capacitance

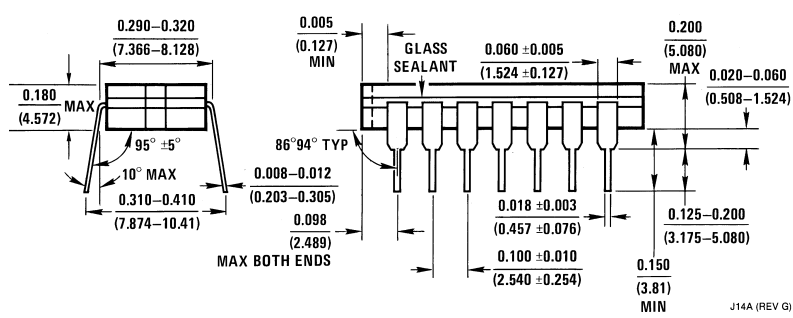
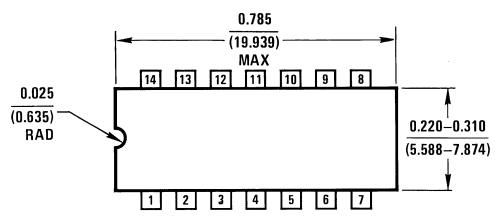
| Symbol          | Parameter                        | Max  | Units | Conditions             |
|-----------------|----------------------------------|------|-------|------------------------|
| C <sub>IN</sub> | Input Capacitance                | 10.0 | pF    | V <sub>CC</sub> = OPEN |
| C <sub>PD</sub> | Power Dissipation<br>Capacitance | 72.0 | pF    | V <sub>CC</sub> = 5.0V |



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

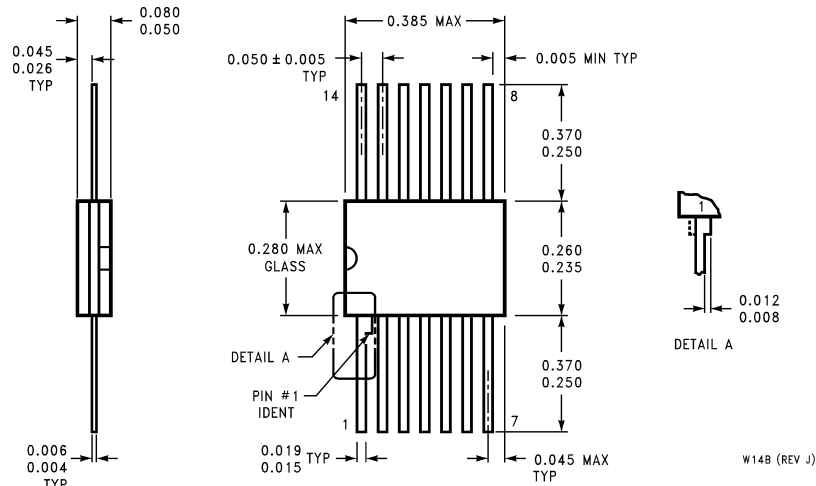


**20 Terminal Ceramic Leadless Chip Carrier (L)**  
NS Package Number E20A



**14-Lead Ceramic Dual-In-Line Package (D)**  
NS Package Number J14A

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



**14-Lead Ceramic Flatpak (F)  
NS Package Number W14B**

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