

## 54ACTQ10 Quiet Series Triple 3-Input NAND Gate

### General Description

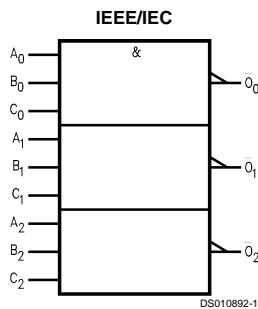
The 'ACTQ10 contains three, 3-input NAND gates and utilizes NSC Quiet Series technology to guarantee quiet output switching and improved dynamic threshold performance. FACT Quiet Series® features GTO® output control and undershoot corrector in addition to a split ground bus for superior CMOS performance.

- Guaranteed simultaneous switching noise level and dynamic threshold performance
- Improved latch-up immunity
- Minimum 2 kV ESD protection
- Outputs source/sink 24 mA
- 'ACTQ10 has TTL-compatible inputs
- Standard Microcircuit Drawing (SMD) 5962-9218201

### Features

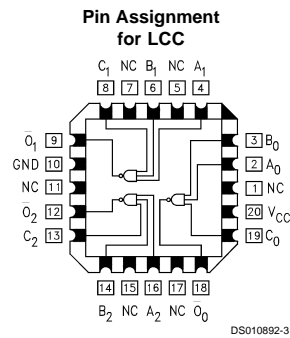
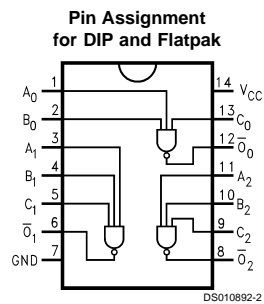
- $I_{CC}$  reduced by 50%

### Logic Symbol



Pin Names	Description
$A_n, B_n, C_n$	Inputs
$O_n$	Outputs

### Connection Diagrams



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FACT® and FACT Quiet Series® are trademarks of Fairchild Semiconductor Corporation.

## 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
DC Latch-Up Source or Sink Current	±300 mA
Junction Temperature ( $T_J$ )	

CDIP

175°C

## Recommended Operating Conditions (Note 2)

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 (dV/dt)	
'ACTQ Devices	125 mV/ns
$V_{IN}$ from 0.8V to 2.0V	
$V_{CC}$ @ 4.5V, 5.5V	

**Note 1:** Absolute maximum ratings are 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 outside of databook specifications.

**Note 2:** All commercial packaging is not recommended for applications requiring greater than 2000 temperature cycles from -40°C to +125°C.

## DC Characteristics for 'ACTQ Family Devices

Symbol	Parameter	$V_{CC}$ (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	$V_{OUT} = 0.1V$ or $V_{CC} - 0.1V$
		5.5	2.0		
$V_{IL}$	Maximum Low Level Input Voltage	4.5	0.8	V	$V_{OUT} = 0.1V$ 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 3) $V_{IN} = V_{IL}$ or $V_{IH}$ $I_{OH} = -24 mA$ $I_{OH} = -24 mA$
		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 3) $V_{IN} = V_{IL}$ or $V_{IH}$ $I_{OL} = 24 mA$ $I_{OL} = 24 mA$
		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 Output Current (Note 4)	5.5	50	mA	$V_{OLD} = 1.65V$ Max
$I_{OHD}$		5.5	-50	mA	$V_{OHD} = 3.85V$ Min
$I_{CC}$	Maximum Quiescent Supply Current	5.5	40.0	µA	$V_{IN} = V_{CC}$ or GND (Note 5)

## DC Characteristics for 'ACTQ Family Devices (Continued)

Symbol	Parameter	V <sub>CC</sub> (V)	54ACTQ		Units	Conditions
			T <sub>A</sub> = -55°C to +125°C			
			Guaranteed Limits			
V <sub>OLP</sub>	Quiet Output Maximum Dynamic V <sub>OL</sub>	5.0	1.5		V	(Note 6)
V <sub>OLV</sub>	Quiet Output Minimum Dynamic V <sub>OL</sub>	5.0	-1.2		V	(Note 6)

**Note 3:** All outputs loaded; thresholds on input associated with output under test.

**Note 4:** Maximum test duration 2.0 ms, one output loaded at a time.

**Note 5:** I<sub>CC</sub> for 54ACTQ @ 25°C is identical to 74ACTQ @ 25°C.

**Note 6:** Max number of outputs defined as (n). Data inputs are 0V to 3V. One output @ GND.

**Note 7:** Max number of data inputs (n) switching. (n-1) inputs switching 0V to 3V ('ACTQ). Input-under-test switching: 3V to threshold (V<sub>ILD</sub>), 0V to threshold (V<sub>IHD</sub>). f = 1 MHz.

## AC Electrical Characteristics

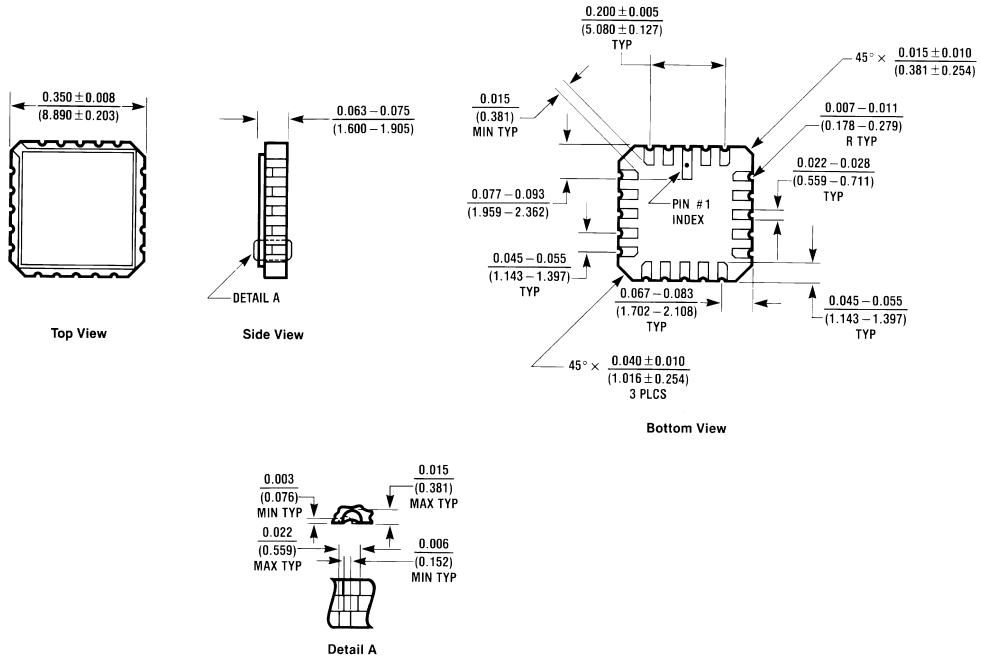
Symbol	Parameter	V <sub>CC</sub> (V) (Note 8)	54ACTQ		Units
			T <sub>A</sub> = -55°C to +125°C C <sub>L</sub> = 50 pF		
			Min	Max	
t <sub>PLH</sub>	Propagation Delay	5.0	2.0	9.5	ns
t <sub>PHL</sub>	Propagation Delay	5.0	2.0	9.5	ns

**Note 8:** Voltage Range 5.0 is 5.0V ±0.5V.

## Capacitance

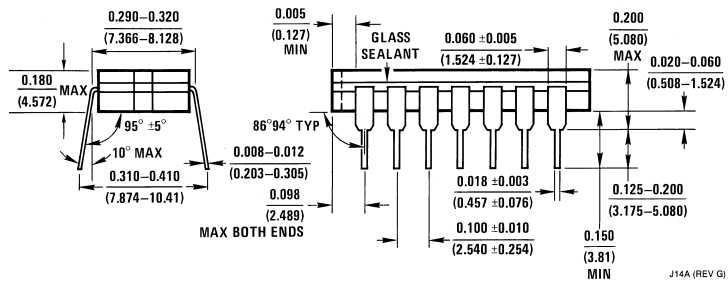
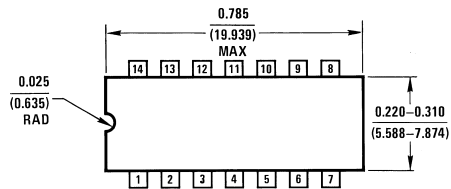
Symbol	Parameter	Typ	Units	Conditions
C <sub>IN</sub>	Input Capacitance	4.5	pF	V <sub>CC</sub> = OPEN
C <sub>PD</sub>	Power Dissipation Capacitance	85	pF	V <sub>CC</sub> = 5.0V

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



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

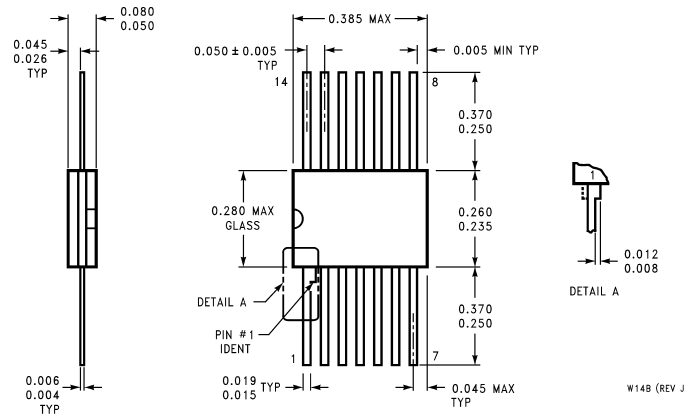
E20A (REV D)



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

J14A (REV G)

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



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

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