

# 54ACTQ14

## Quiet Series Hex Inverter with Schmitt Trigger Input

### General Description

The 'ACTQ14 contains six inverter gates each with a Schmitt trigger input. They are capable of transforming slowly changing input signals into sharply defined, jitter-free output signals. In addition, they have a greater noise margin than conventional inverters.

The 'ACTQ14 utilizes NSC Quiet Series Technology to guarantee quiet output switching and improve dynamic threshold performance. FACT Quiet Series® features GTO® output control and undershoot corrector in addition to a split ground bus for superior performance.

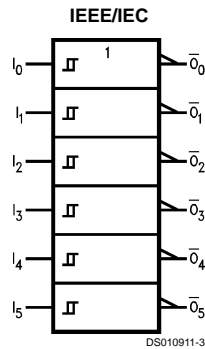
The 'ACTQ14 has hysteresis between the positive-going and negative-going input thresholds (typically 1.0V) which is de-

termined internally by transistor ratios and is essentially insensitive to temperature and supply voltage variations.

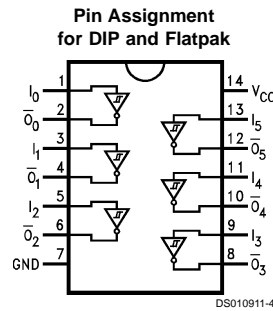
### Features

- $I_{CC}$  reduced by 50%
- Guaranteed simultaneous switching noise level and dynamic threshold performance
- Improved latch-up immunity
- 4 kV minimum ESD performance
- Outputs source/sink 24 mA
- Standard Microcircuit Drawing (SMD) 5962-92183

### Logic Symbol



### Connection Diagrams

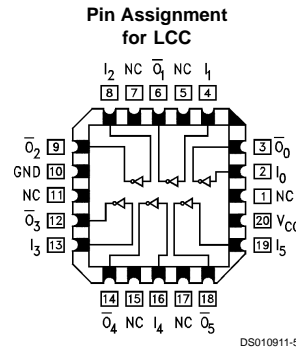


### Function Table

Input	Output
A	$\bar{O}$
L	H
H	L

Pin Names	Description
$I_n$	Inputs
$\bar{O}_n$	Outputs



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FACT Quiet Series™ is a trademark 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

**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 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 $V_{IH}$ $I_{OH} = -24 \text{ mA}$ $I_{OH} = -24 \text{ mA}$
		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 3) $V_{IN} = V_{IL}$ or $V_{IH}$ $I_{OL} = 24 \text{ mA}$ $I_{OL} = 24 \text{ mA}$
		5.5	0.50		
$I_{IN}$	Maximum Input Leakage Current	5.5	±1.0	µA	$V_I = V_{CC}, GND$
$V_{h(max)}$	Maximum Hysteresis	4.5	1.4	V	$T_A = \text{Worst Case}$
		5.5	1.6		
$V_{h(min)}$	Minimum Hysteresis	4.5	0.4	V	$T_A = \text{Worst Case}$
		5.5	0.5		
$V_{t+}$	Maximum Positive Threshold	5.5	2.0	V	$T_A = \text{Worst Case}$
$V_{t-}$	Minimum Negative Threshold	5.5	0.8	V	$T_A = \text{Worst Case}$
$I_{CCT}$	Maximum $I_{CC}$ /Input	5.5	1.6	mA	$V_I = V_{CC} - 2.1V$

## 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			
I <sub>OLD</sub>	Minimum Dynamic Output Current (Note 4)	5.5	50		mA	V <sub>OLD</sub> = 1.65V Max
I <sub>OHD</sub>		5.5	-50		mA	V <sub>OHD</sub> = 3.85V Min
I <sub>CC</sub>	Maximum Quiescent Supply Current	5.5	40.0		µA	V <sub>IN</sub> = V <sub>CC</sub> or GND (Note 5)
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.

## AC Electrical Characteristics

Symbol	Parameter	V <sub>CC</sub> (V) (Note 7)	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 Data to Output	5.0	1.0	12.5	ns
t <sub>PHL</sub>	Propagation Delay Data to Output	5.0	1.0	11.5	ns

**Note 7:** Voltage Range 5.0 is 5.0V ±0.5V.

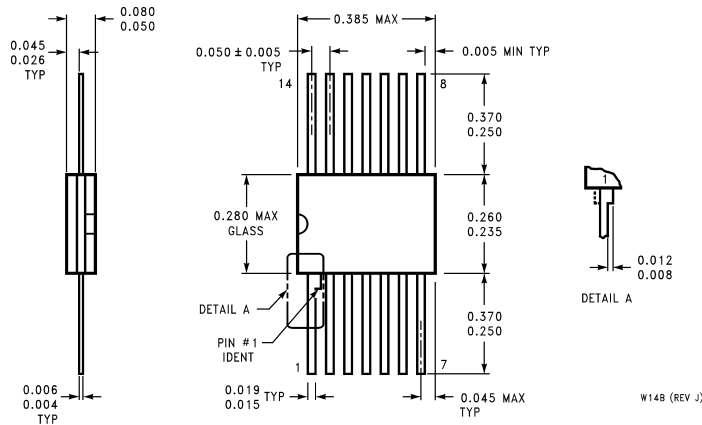
## Capacitance

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	80	pF	V <sub>CC</sub> = 5.0V





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



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

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