

54ACTQ04 Quiet Series Hex Inverter

General Description

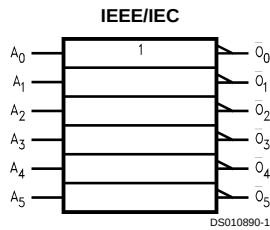
The 'ACTQ04 contains six inverters and utilizes NSC Quiet Series technology to guarantee quiet output switching and improved dynamic threshold performance. FACT Quiet Series™ features GTO™ output control and undershoot corrector in addition to a split ground bus for superior AC MOS performance.

Features

- I_{CC} reduced by 50%

- Guaranteed simultaneous switching noise level and dynamic threshold performance
- Improved latch-up immunity
- Minimum 4 kV ESD protection
- Outputs source/sink 24 mA
- 'ACTQ04 has TTL-compatible inputs
- Standard Microcircuit Drawing (SMD) 5962-8973401

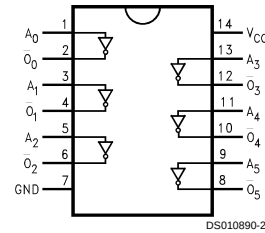
Logic Symbol



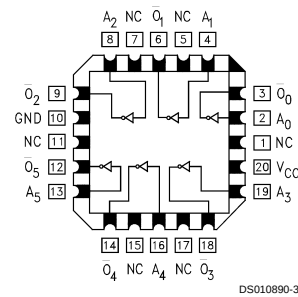
Pin Names	Description
A_n	Inputs
$\bar{O}_n$	Outputs

Connection Diagrams

Pin Assignment for DIP and Flatpak



Pin Assignment for LCC



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 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	$V_I = V_{CC}, GND$
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	$V_{OLD} = 1.65V \text{ Max}$
I_{OHD}		5.5	–50	mA	$V_{OHD} = 3.85V \text{ Min}$
I_{CC}	Maximum Quiescent Supply Current	5.5	40.0	μA	$V_{IN} = V_{CC}$ or GND (Note 5)
V_{OLP}	Quiet Output Maximum Dynamic V_{OL}	5.0	1.5	V	13 (Note 6)

DC Characteristics for 'ACTQ Family Devices (Continued)

Symbol	Parameter	V _{CC} (V)	54ACTQ	Units	Conditions
			T _A = -55°C to +125°C		
			Guaranteed Limits		
V _{OLV}	Quiet Output Minimum Dynamic V _{OL}	5.0	-1.2	V	Figures 2-12, 13 (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_{CC} 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_{ILD}), 0V to threshold (V_{IHD}), f = 1 MHz.

AC Electrical Characteristics

Symbol	Parameter	V _{CC} (V) (Note 8)	54ACTQ	Units	Fig. No.
			T _A = -55°C to +125°C C _L = 50 pF		
			Min Max		
t _{PLH}	Propagation Delay Data to Output	5.0	1.0 9.5	ns	
t _{PHL}	Propagation Delay Data to Output	5.0	1.0 9.5	ns	

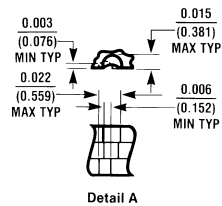
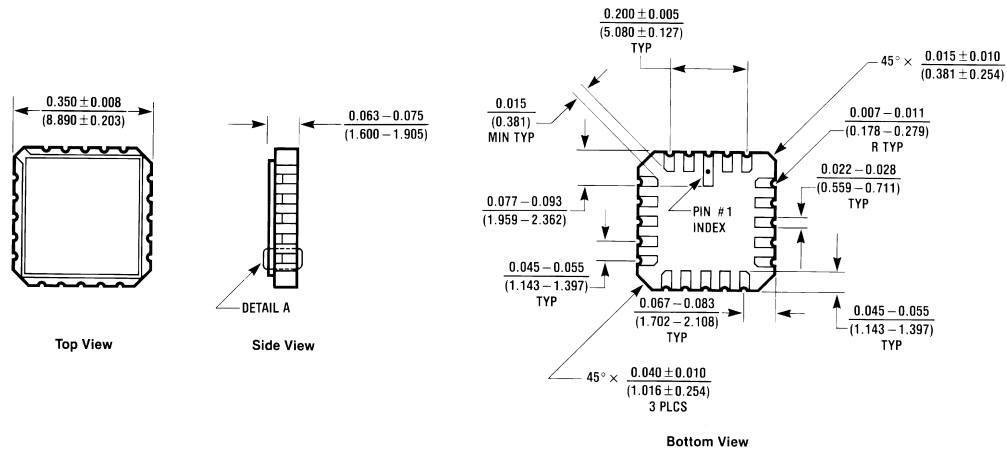
Note 8: Voltage Range 5.0 is 5.0V ±0.5V.

Note 9: Skew is defined as the absolute value of the difference between the actual propagation delay for any two separate outputs of the same device. The specification applies to any outputs switching in the same direction, either HIGH to LOW (t_{OSHL}) or LOW to HIGH (t_{OSLH}). Parameter guaranteed by design.

Capacitance

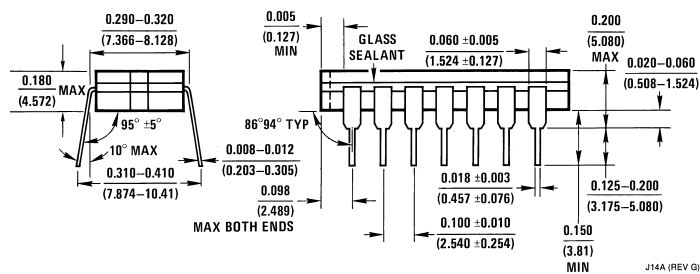
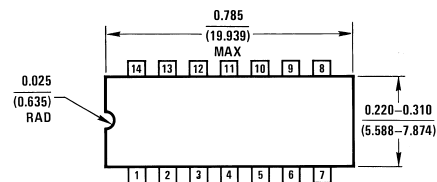
Symbol	Parameter	Typ	Units	Conditions
C _{IN}	Input Capacitance	4.5	pF	V _{CC} = OPEN
C _{PD}	Power Dissipation Capacitance	75	pF	V _{CC} = 5.0V

Physical Dimensions inches (millimeters) unless otherwise noted



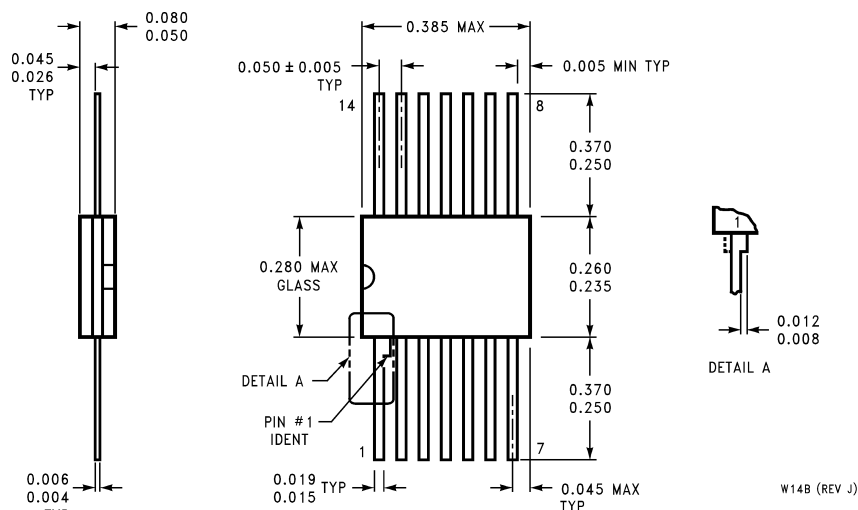
E20A (REV D)

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)



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