

54ACTQ10 Quiet Series Triple 3-Input NAND Gate

General Description

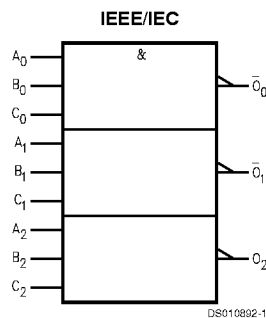
The 'ACTQ10 contains three, 3-input NAND gates and utilizes NSC Quiet Series technology to guarantee quiet output switching and improved dynamic threshold performance. FACT Quiet Series® features GTO® output control and undershoot corrector in addition to a split ground bus for superior AC MOS performance.

- 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

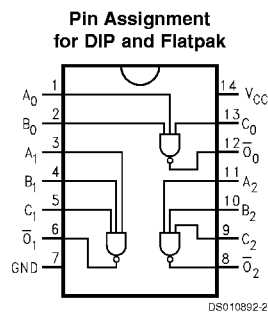
Features

- I_{CC} reduced by 50%

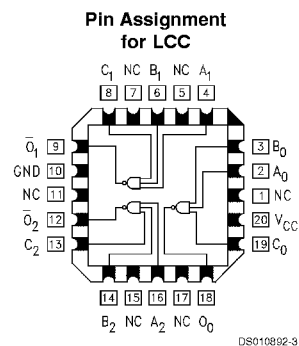
Logic Symbol



Connection Diagrams



Pin Names	Description
A_n, B_n, C_n	Inputs
\bar{O}_n	Outputs



GTO® is a trademark of National Semiconductor Corporation.
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} $I_{OH} = -24 \text{ mA}$ $I_{OH} = -24 \text{ mA}$
		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	$V_I = V_{CC}, \text{ GND}$
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	$V_{OLD} = 1.65V \text{ Max}$
I_{OHD}	Output Current (Note 4)	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)

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 _{OLP}	Quiet Output Maximum Dynamic V _{OL}	5.0	1.5		V	(Note 6)
V _{OLV}	Quiet Output Minimum Dynamic V _{OL}	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_{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

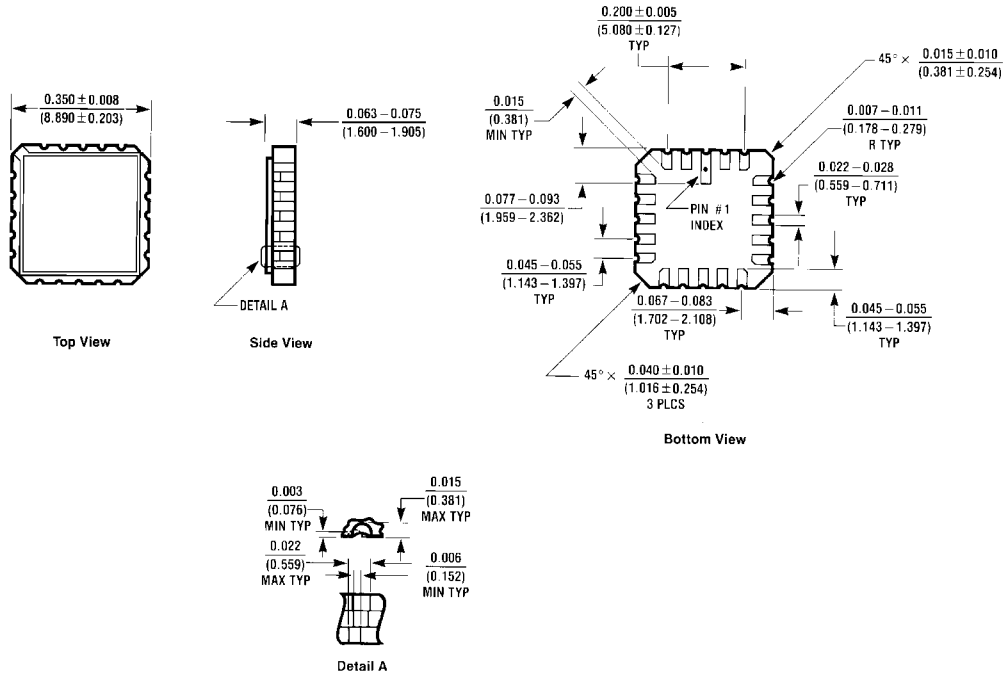
Symbol	Parameter	V _{CC} (V) (Note 8)	54ACTQ		Units
			T _A = -55°C to +125°C C _L = 50 pF		
			Min	Max	
t _{PLH}	Propagation Delay	5.0	2.0	9.5	ns
t _{PHL}	Propagation Delay	5.0	2.0	9.5	ns

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

Capacitance

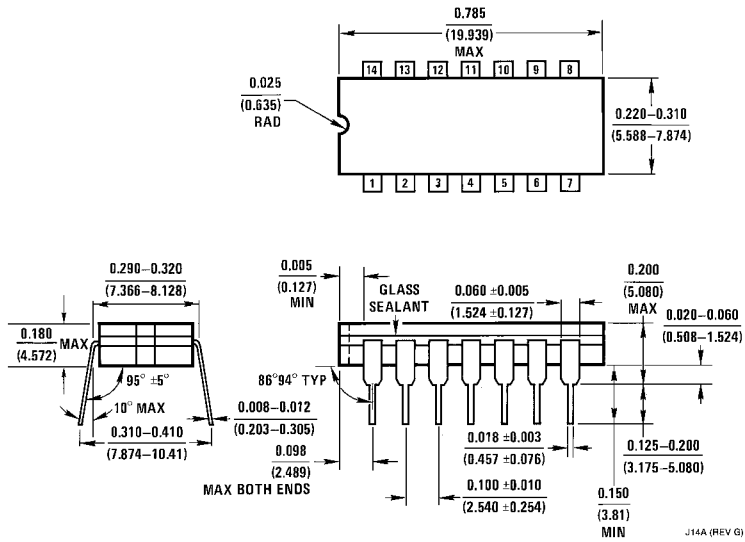
Symbol	Parameter	Typ	Units	Conditions
C _{IN}	Input Capacitance	4.5	pF	V _{CC} = OPEN
C _{PD}	Power Dissipation Capacitance	85	pF	V _{CC} = 5.0V

Physical Dimensions inches (millimeters) unless otherwise noted



E20A (REV D)

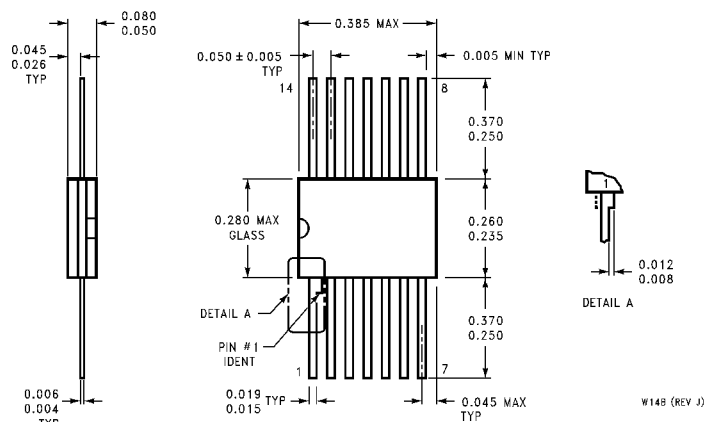
**20-Terminal Ceramic Leadless Chip Carrier (L)
 NS Package Number E20A**



J14A (REV G)

**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**

LIFE SUPPORT POLICY

NATIONAL'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF NATIONAL SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.



National Semiconductor Corporation
Americas
Tel: 1-800-272-9959
Fax: 1-800-737-7018
Email: support@nsc.com

National Semiconductor Europe
Fax: +49 (0) 1 80-530 85 86
Email: europe.support@nsc.com
Deutsch Tel: +49 (0) 1 80-530 85 85
English Tel: +49 (0) 1 80-532 78 32
Français Tel: +49 (0) 1 80-532 93 58
Italiano Tel: +49 (0) 1 80-534 16 80

National Semiconductor Asia Pacific Customer Response Group
Tel: 65-2544466
Fax: 65-2504466
Email: sea.support@nsc.com

National Semiconductor Japan Ltd.
Tel: 81-3-5620-6175
Fax: 81-3-5620-6179

www.national.com