54ACTQ14

54ACTQ14 Quiet Series Hex Inverter with Schmitt Trigger Input

Literature Number: SNOS584

National Semiconductor

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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.

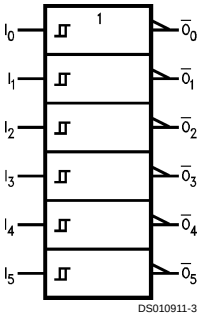
The 'ACTQ14 has hysteresis between the positive-going and negative-going input thresholds (typically 1.0V) which is determined internally by transistor ratios and is essentially insensitive to temperature and supply voltage variations.

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

IEEE/IEC



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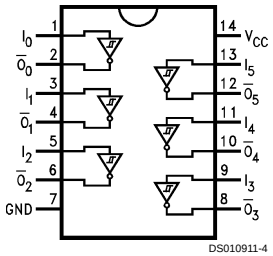
Function Table

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

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

Connection Diagrams

Pin Assignment for DIP and Flatpak



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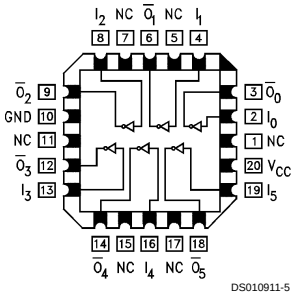
Pin Assignment for LCC



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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
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 T_A = −55˚C to +125˚C Guaranteed Limits	Units	Conditions
V_{IH}	Minimum High Level Input Voltage	4.5	2.0	V	V_{OUT} = 0.1V
		5.5	2.0		or V_{CC} − 0.1V
V_{IL}	Maximum Low Level Input Voltage	4.5	0.8	V	V_{OUT} = 0.1V
		5.5	0.8		or V_{CC} − 0.1V
V_{OH}	Minimum High Level Output Voltage	4.5	4.4	V	I_{OUT} = −50 µA
		5.5	5.4		
					(Note 3) V_{IN} = V_{IL} or V_{IH}
		4.5	3.70	V	I_{OH} = −24 mA
		5.5	4.70		I_{OH} = −24 mA
V_{OL}	Maximum Low Level Output Voltage	4.5	0.1	V	I_{OUT} = 50 µA
		5.5	0.1		
					(Note 3) V_{IN} = V_{IL} or V_{IH}
		4.5	0.50	V	I_{OL} = 24 mA
		5.5	0.50		I_{OL} = 24 mA
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 = Worst Case
		5.5	1.6		
$V_{h(min)}$	Minimum Hysteresis	4.5	0.4	V	T_A = Worst Case
		5.5	0.5		
V_t+	Maximum Positive Threshold	5.5	2.0	V	T_A = Worst Case
V_t−	Minimum Negative Threshold	5.5	0.8	V	T_A = 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_{CC} (V)	54ACTQ T_A = −55°C to +125°C Guaranteed Limits	Units	Conditions
I_{OLD}	Minimum Dynamic	5.5	50	mA	V_{OLD} = 1.65V Max
I_{OHD}	Output Current (Note 4)	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)
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.

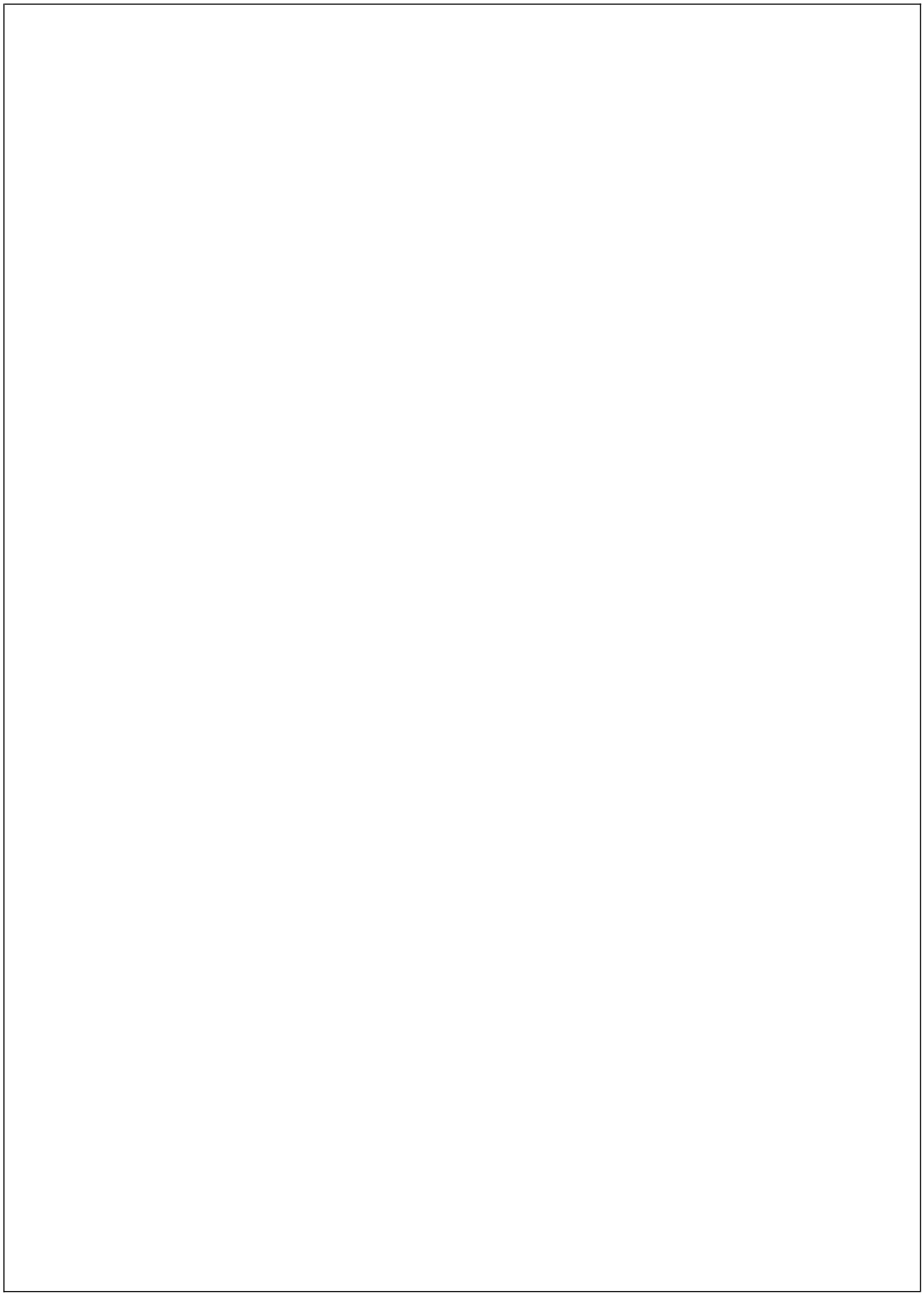
AC Electrical Characteristics

Symbol	Parameter	V_{CC} (V) (Note 7)	54ACTQ T_A = −55°C to +125°C C_L = 50 pF		Units
			Min	Max	
t_{PLH}	Propagation Delay Data to Output	5.0	1.0	12.5	ns
t_{PHL}	Propagation Delay Data to Output	5.0	1.0	11.5	ns

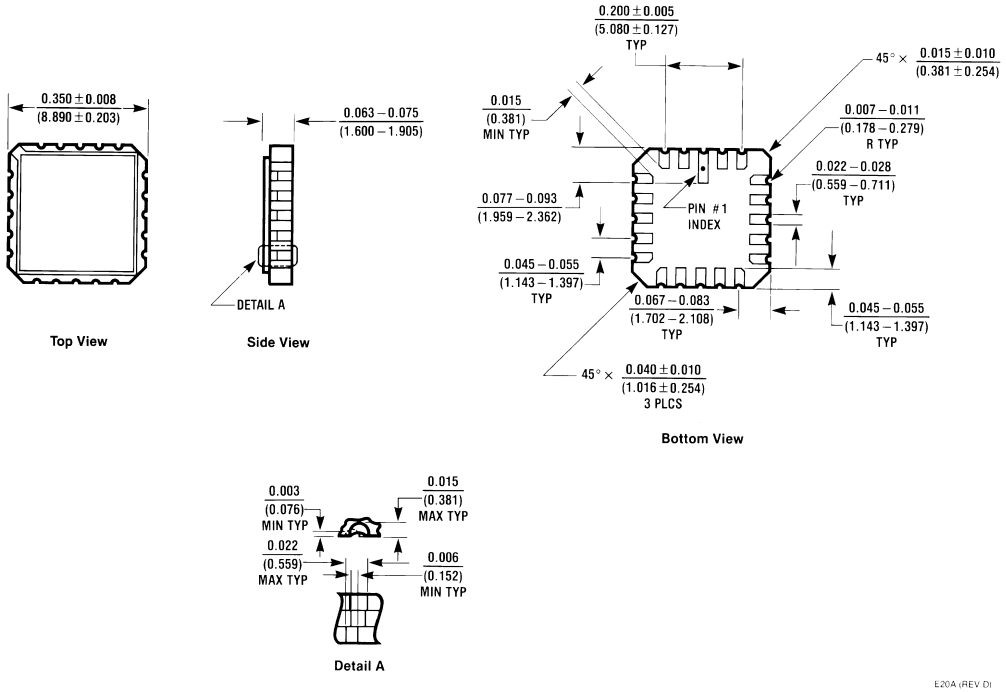
Note 7: Voltage Range 5.0 is 5.0V ±0.5V.

Capacitance

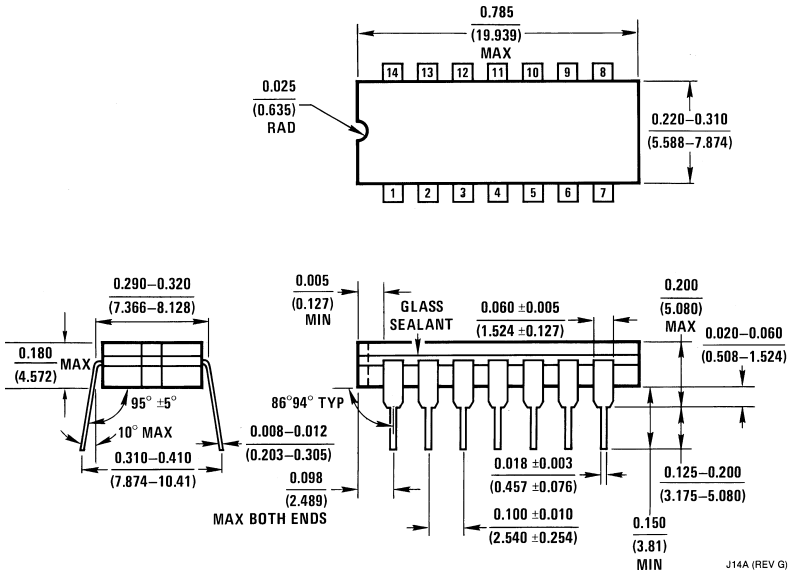
Symbol	Parameter	Typ	Units	Conditions
C_{IN}	Input Capacitance	4.5	pF	V_{CC} = OPEN
C_{PD}	Power Dissipation Capacitance	80	pF	V_{CC} = 5.0V



Physical Dimensions inches (millimeters) unless otherwise noted

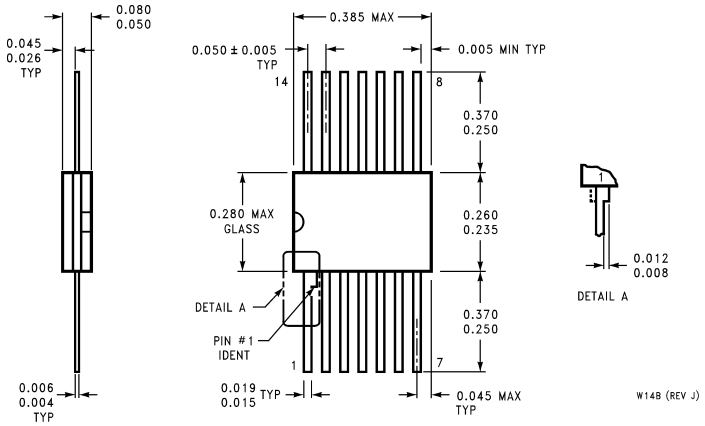


20-Terminal Ceramic Leadless Chip Carrier (L)
NS Package Number E20A



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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