

Hex Inverter

General Description

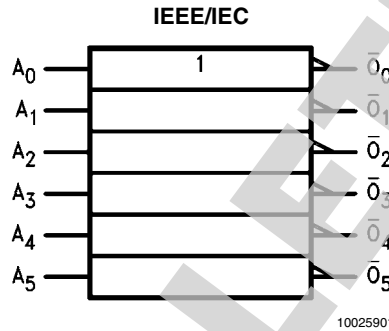
The AC04 contains six inverters.

Features

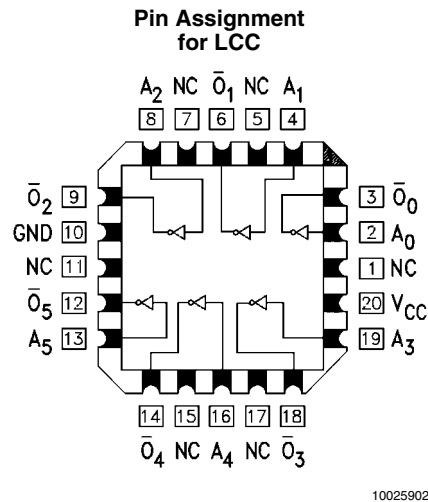
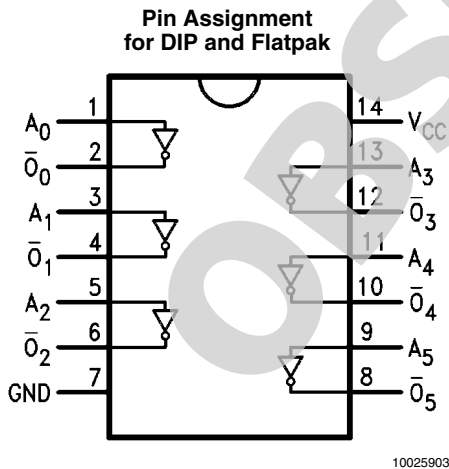
- I_{CC} reduced by 50% on 54AC only
- Outputs source/sink 24 mA

- 'ACT04 has TTL-compatible inputs
- Standard Military Drawing (SMD)
 - 'AC04: 5962-87609
- 54AC04 now qualified to 300Krad RHA designation, refer to the SMD for more information
- For Military 54ACT04 device see 54ACTQ04

Logic Symbol



Connection Diagrams



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

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 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

Junction Temperature (T_J)

CDIP

175°C

Recommended Operating Conditions

Supply Voltage (V_{CC})	
'AC	2.0V to 6.0V
Input Voltage (V_I)	0V to V_{CC}
Output Voltage (V_O)	0V to V_{CC}
Operating Temperature (T_A)	
54AC	-55°C to +125°C
Minimum Input Edge Rate ($\Delta V/\Delta t$)	
'AC Devices	
V_{IN} from 30% to 70% of V_{CC}	
V_{CC} @ 3.3V, 4.5V, 5.5V	125 mV/ns

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 of FACT™ circuits outside databook specifications.

DC Characteristics for 'AC Family Devices

Symbol	Parameter	V_{CC} (V)	54AC		Units	Conditions
			$T_A = -55^\circ\text{C to } +125^\circ\text{C}$			
			Guaranteed Limits			
V_{IH}	Minimum High Level Input Voltage	3.0	2.1		V	$V_{OUT} = 0.1V$ or $V_{CC} - 0.1V$
		4.5	3.15			
		5.5	3.85			
V_{IL}	Maximum Low Level Input Voltage	3.0	0.9		V	$V_{OUT} = 0.1V$ or $V_{CC} - 0.1V$
		4.5	1.35			
		5.5	1.65			
V_{OH}	Minimum High Level Output Voltage	3.0	2.9		V	$I_{OUT} = -50 \mu A$
		4.5	4.4			
		5.5	5.4			
V_{OL}	Maximum Low Level Output Voltage	3.0	2.4		V	<i>(Note 2)</i> $V_{IN} = V_{IL}$ or V_{IH} -12 mA $I_{OH} -24$ mA -24 mA
		4.5	3.7			
		5.5	4.7			
V_{OL}	Maximum Low Level Output Voltage	3.0	0.1		V	$I_{OUT} = 50 \mu A$
		4.5	0.1			
		5.5	0.1			
V_{OL}	Maximum Low Level Output Voltage	3.0	0.5		V	<i>(Note 2)</i> $V_{IN} = V_{IL}$ or V_{IH} 12 mA $I_{OL} 24$ mA 24 mA
		4.5	0.5			
		5.5	0.5			
I_{IN}	Maximum Input Leakage Current	5.5	±1.0		μA	$V_I = V_{CC}, GND$
I_{OLD}	<i>(Note 3)</i> Minimum Dynamic Output Current	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 2: All outputs loaded; thresholds on input associated with output under test.

Note 3: Maximum test duration 2.0 ms, one output loaded at a time.

Note 4: I_{IN} and I_{CC} @ 3.0V are guaranteed to be less than or equal to the respective limit @ 5.5V V_{CC} .
 I_{CC} for 54AC @ 25°C is identical to 74AC @ 25°C.

AC Electrical Characteristics

Symbol	Parameter	V_{CC} (V) (Note 5)	54AC		Units	Fig. No.
			$T_A = -55^\circ\text{C}$ to $+125^\circ\text{C}$ $C_L = 50\text{ pF}$			
			Min	Max		
t_{PLH}	Propagation Delay	3.3 5.0	1.0 1.5	11.0 8.5	ns	
t_{PHL}	Propagation Delay	3.3 5.0	1.0 1.5	10.0 7.5	ns	

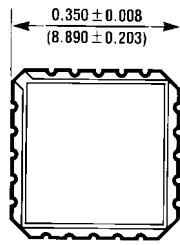
Note 5: Voltage Range 3.3 is $3.3V \pm 0.3V$

Voltage Range 5.0 is $5.0V \pm 0.5V$

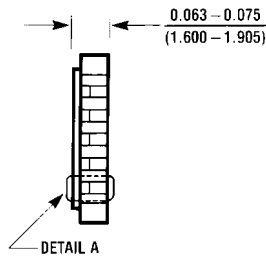
Capacitance

Symbol	Parameter	Typ	Units	Conditions
C_{IN}	Input Capacitance	4.5	pF	$V_{CC} = \text{Open}$
C_{PD}	Power Dissipation Capacitance	30.0	pF	$V_{CC} = 5.0V$

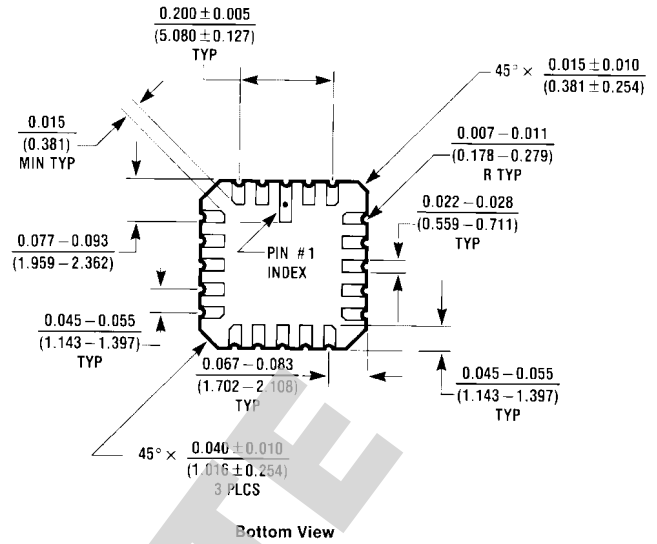
Physical Dimensions inches (millimeters) unless otherwise noted



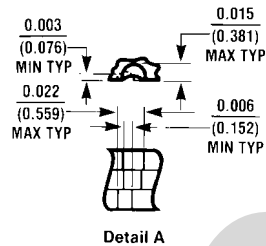
Top View



Side View



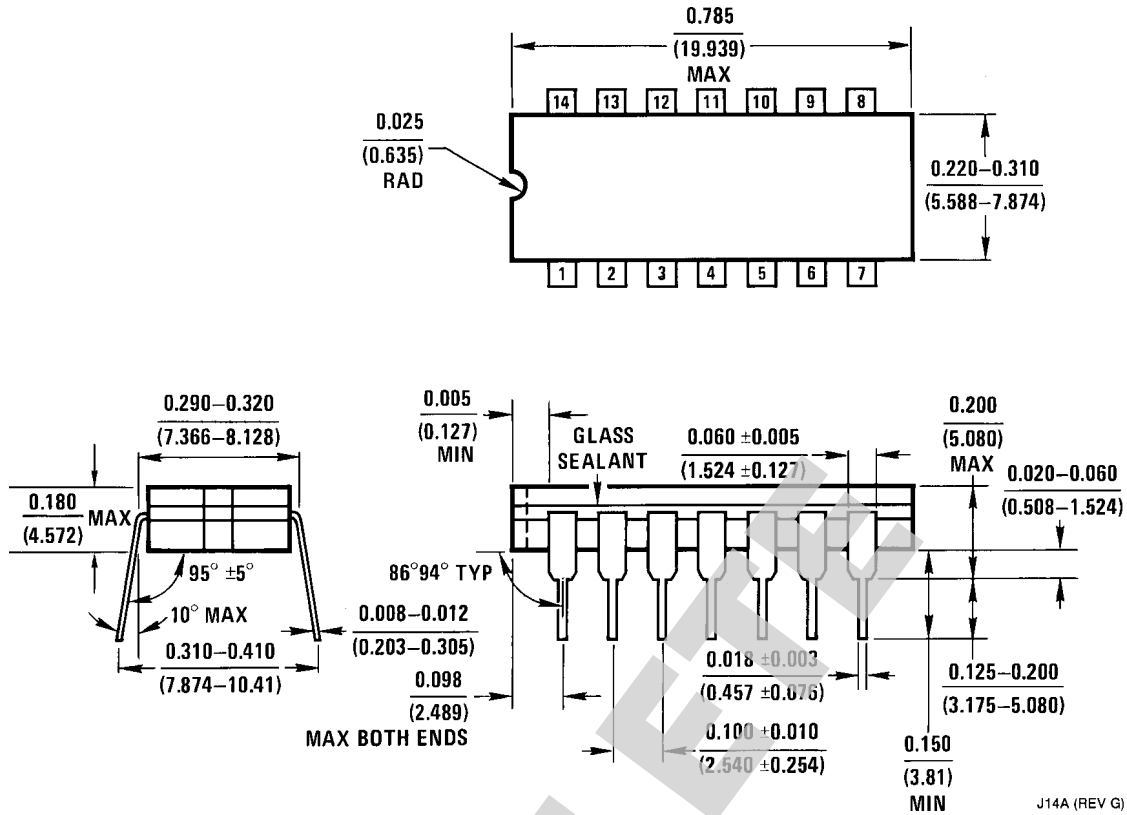
Bottom View



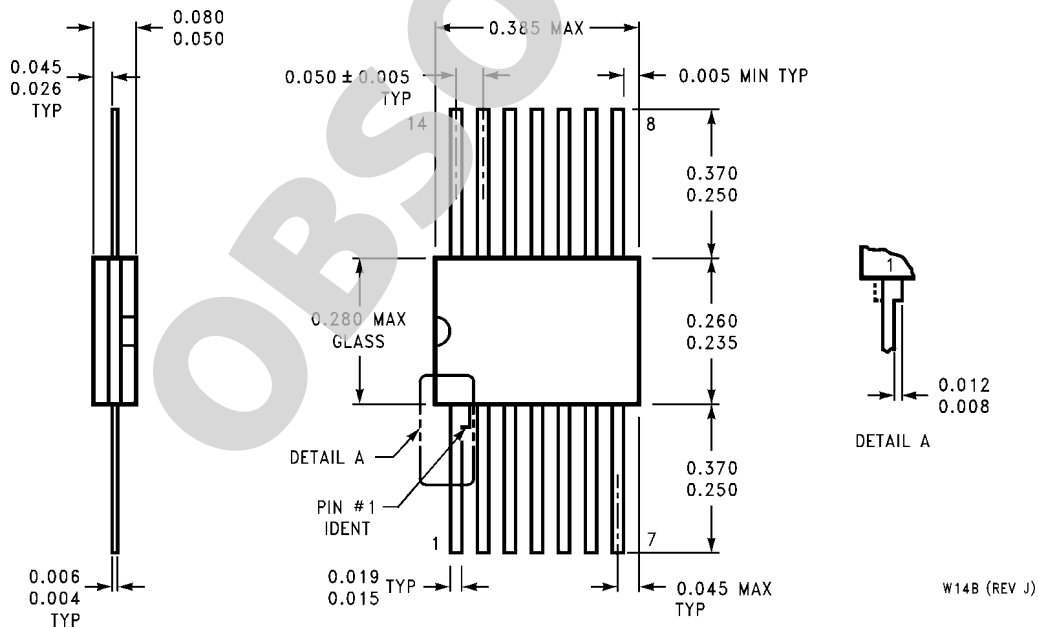
Detail A

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

L20A (REV D)



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



14 Lead Ceramic Flatpak (F)
NS Package Number W14B

Notes

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