National Semiconductor

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54ACTQ08
Quiet Series Quad 2-Input AND Gate

General Description

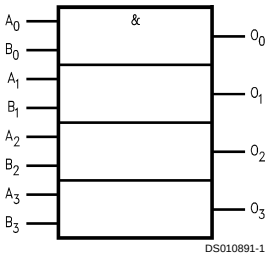
The 'ACTQ08 contains four, 2-input AND gates and utilizes NSC Quiet Series technology to guarantee quiet output switching and improved dynamic threshold performance. FACT Quiet Series™features GTO™ output control and undershoot corrector in addition to a split ground bus for superior ACMOS performance.

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
- 'ACTQ08 has TTL-compatible inputs
- Standard Microcircuit Drawing (SMD) 5962-8954701

Logic Symbol

IEEE/IEC



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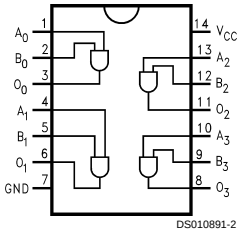
Pin Names	Description
A_n, B_n	Inputs
O_n	Outputs

Connection Diagrams

Pin Assignment for DIP and Flatpak



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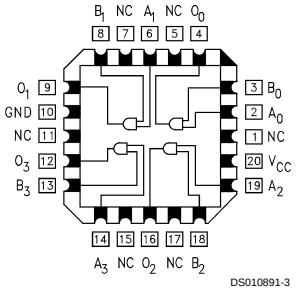
Pin Assignment for LCC



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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
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 T_A = −55˚C to +125˚C Guaranteed Limits	Units	Conditions
V_{IH}	Minimum High Level Input Voltage	4.5 5.5	2.0 2.0	V	V_{OUT} = 0.1V or V_{CC} − 0.1V
V_{IL}	Maximum Low Level Input Voltage	4.5 5.5	0.8 0.8	V	V_{OUT} = 0.1V or V_{CC} − 0.1V
V_{OH}	Minimum High Level Output Voltage	4.5 5.5	4.4 5.4	V	I_{OUT} = −50 µA
					(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 5.5	0.1 0.1	V	I_{OUT} = 50 µA
					(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
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 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 4)

DC Characteristics for 'ACTQ Family Devices (Continued)

Symbol	Parameter	V_{CC} (V)	54ACTQ T_A = −55°C to +125°C Guaranteed Limits	Units	Conditions
V_{OLP}	Quiet Output Maximum Dynamic V_{OL}	5.0	1.5	V	(Note 5)
V_{OLV}	Quiet Output Minimum Dynamic V_{OL}	5.0	-1.2	V	(Note 5)

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: Max number of outputs defined as (n). Data inputs are 0V to 3V. One output @ GND.

AC Electrical Characteristics

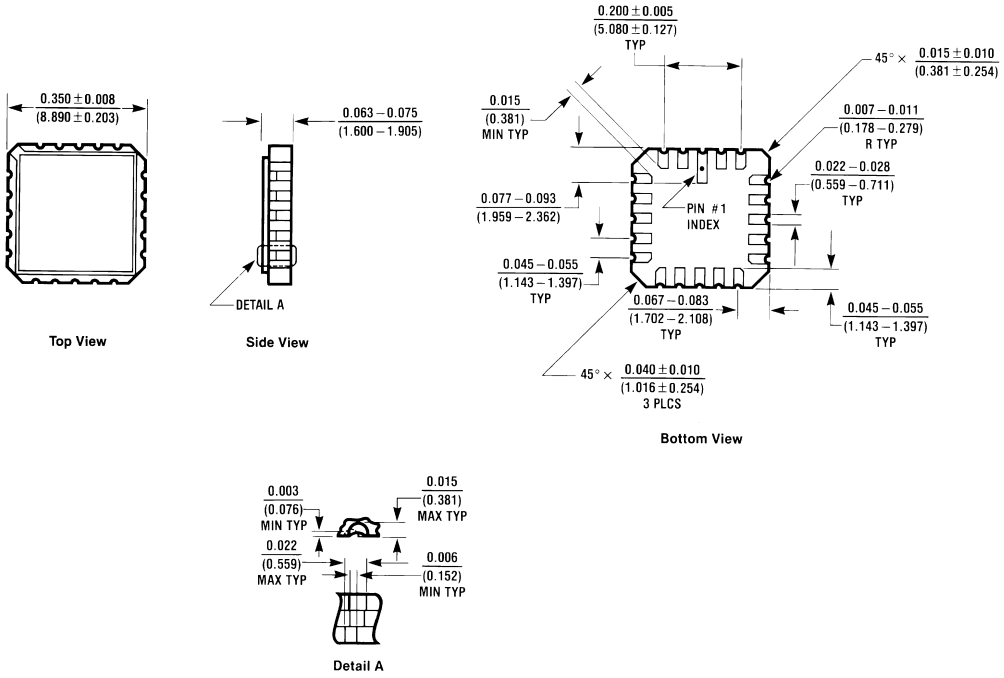
Symbol	Parameter	V_{CC} (V) (Note 6)	54ACTQ T_A = −55°C to +125°C C_L = 50 pF		Units
			Min	Max	
t_{PLH}	Propagation Delay Data to Output	5.0	1.0	9.4	ns
t_{PHL}	Propagation Delay Data to Output	5.0	1.0	8.6	ns

Note 6: Voltage Range 5.0 is 5.0V ±0.5V.

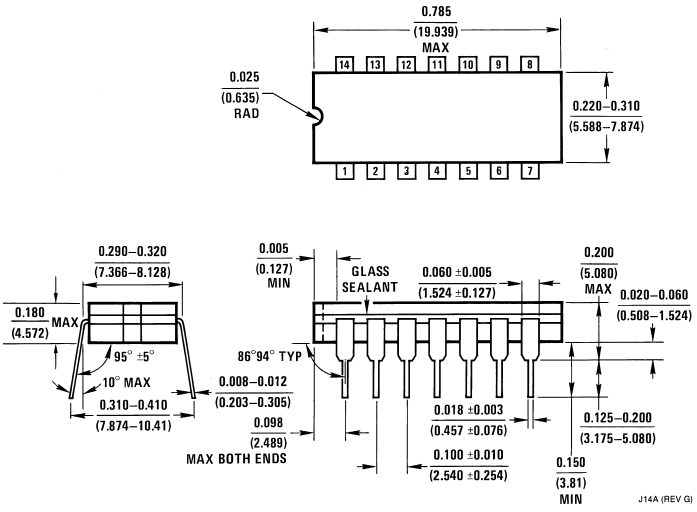
Capacitance

Symbol	Parameter	Typ	Units	Conditions
C_{IN}	Input Capacitance	4.5	pF	V_{CC} = OPEN
C_{PD}	Power Dissipation Capacitance	70	pF	V_{CC} = 5.0V

Physical Dimensions inches (millimeters) unless otherwise noted

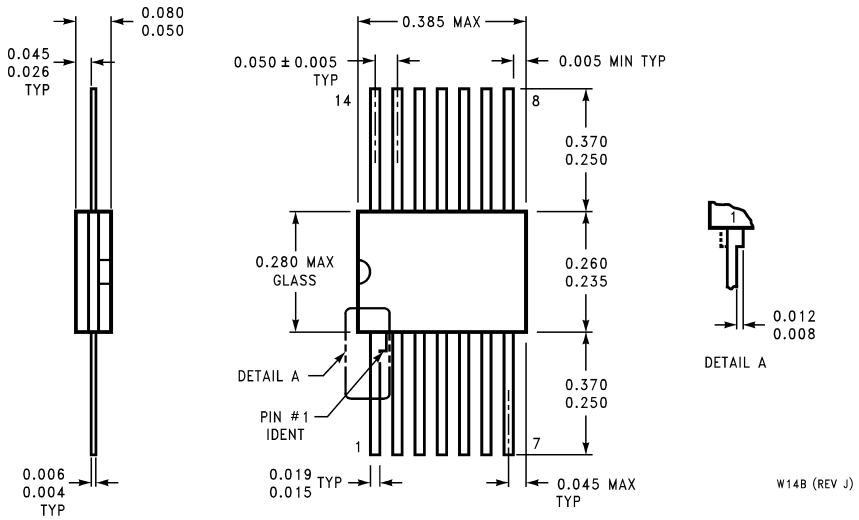


20-Terminal Ceramic Leadless Chip Carrier (L)
NS Package Number E20A



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

www.national.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