

SN54ACT08, SN74ACT08 QUADRUPLE 2-INPUT POSITIVE-AND GATES

SCAS535A – SEPTEMBER 1995 – REVISED APRIL 1996

- Inputs Are TTL-Voltage Compatible
- **EPIC™** (Enhanced-Performance Implanted CMOS) 1-μm Process
- Package Options Include Plastic Small-Outline (D), Shrink Small-Outline (DB), and Thin Shrink Small-Outline (PW) Packages, Ceramic Chip Carriers (FK) and Flatpacks (W), and Standard Plastic (N) and Ceramic (J) DIPs

description

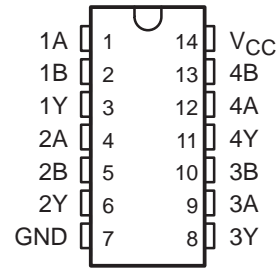
The 'ACT08 are quadruple 2-input positive-AND gates. These devices perform the Boolean functions $Y = A \bullet B$ or $Y = \overline{A} + \overline{B}$ in positive logic.

The SN54ACT08 is characterized for operation over the full military temperature range of -55°C to 125°C . The SN74ACT08 is characterized for operation from -40°C to 85°C .

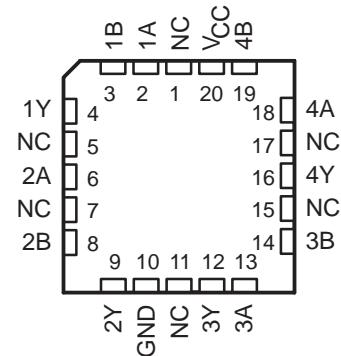
FUNCTION TABLE
(each gate)

| INPUTS | | OUTPUT |
|--------|---|--------|
| A | B | Y |
| H | H | H |
| L | X | L |
| X | L | L |

SN54ACT08 . . . J OR W PACKAGE
SN74ACT08 . . . D, DB, N, OR PW PACKAGE
(TOP VIEW)

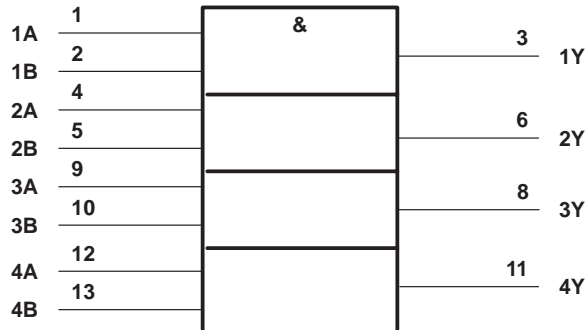


SN54ACT08 . . . FK PACKAGE
(TOP VIEW)

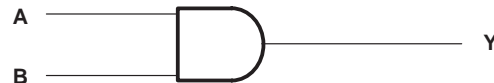


NC – No internal connection

logic symbol†



logic diagram, each gate (positive logic)



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.
Pin numbers shown are for the D, DB, J, N, PW, and W packages.



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

EPIC is a trademark of Texas Instruments Incorporated.

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

**TEXAS
INSTRUMENTS**

POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

Copyright © 1996, Texas Instruments Incorporated

SN54ACT08, SN74ACT08

QUADRUPLE 2-INPUT POSITIVE-AND GATES

SCAS535A – SEPTEMBER 1995 – REVISED APRIL 1996

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)[†]

| | |
|--|----------------------------|
| Supply voltage range, V_{CC} | –0.5 V to 7 V |
| Input voltage range, V_I (see Note 1) | –0.5 V to $V_{CC} + 0.5$ V |
| Output voltage range, V_O (see Note 1) | –0.5 V to $V_{CC} + 0.5$ V |
| Input clamp current, I_{IK} ($V_I < 0$ or $V_I > V_{CC}$) | ±20 mA |
| Output clamp current, I_{OK} ($V_O < 0$ or $V_O > V_{CC}$) | ±20 mA |
| Continuous output current, I_O ($V_O = 0$ to V_{CC}) | ±50 mA |
| Continuous current through V_{CC} or GND | ±200 mA |
| Maximum power dissipation at $T_A = 55^\circ\text{C}$ (in still air) (see Note 2): | |
| D package | 1.25 W |
| DB package | 0.5 W |
| N package | 1.1 W |
| PW package | 0.5 W |
| Storage temperature range, T_{stg} | –65°C to 150°C |

[†] Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTES: 1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.
2. The maximum package power dissipation is calculated using a junction temperature of 150°C and a board trace length of 750 mils, except for the N package, which has a trace length of zero.

recommended operating conditions (see Note 3)

| | SN54ACT08 | | SN74ACT08 | | UNIT |
|--|-----------|----------|-----------|----------|------|
| | MIN | MAX | MIN | MAX | |
| V_{CC} Supply voltage | 4.5 | 5.5 | 4.5 | 5.5 | V |
| V_{IH} High-level input voltage | 2 | | 2 | | V |
| V_{IL} Low-level input voltage | | 0.8 | | 0.8 | V |
| V_I Input voltage | 0 | V_{CC} | 0 | V_{CC} | V |
| V_O Output voltage | 0 | V_{CC} | 0 | V_{CC} | V |
| I_{OH} High-level output current | | –24 | | –24 | mA |
| I_{OL} Low-level output current | | 24 | | 24 | mA |
| $\Delta t/\Delta v$ Input transition rise or fall rate | 0 | 8 | 0 | 8 | ns/V |
| T_A Operating free-air temperature | –55 | 125 | –40 | 85 | °C |

NOTE 3: Unused inputs must be held high or low to prevent them from floating.

SN54ACT08, SN74ACT08 QUADRUPLE 2-INPUT POSITIVE-AND GATES

SCAS535A – SEPTEMBER 1995 – REVISED APRIL 1996

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

| PARAMETER | TEST CONDITIONS | V _{CC} | T _A = 25°C | | | SN54ACT08 | | SN74ACT08 | | UNIT |
|--------------------|---|-----------------|-----------------------|-------|-------|-----------|------|-----------|------|------|
| | | | MIN | TYP | MAX | MIN | MAX | MIN | MAX | |
| V _{OH} | I _{OH} = – 50 µA | 4.5 V | 4.4 | 4.49 | | 4.4 | | 4.4 | | V |
| | | 5.5 V | 5.4 | 5.49 | | 5.4 | | 5.4 | | |
| | I _{OH} = – 24 mA | 4.5 V | 3.86 | | | 3.7 | | 3.76 | | |
| | | 5.5 V | 4.86 | | | 4.7 | | 4.76 | | |
| | I _{OH} = – 50 mA† | 5.5 V | | | | 3.85 | | | | |
| | I _{OH} = – 75 mA† | 5.5 V | | | | | | 3.85 | | |
| V _{OL} | I _{OL} = 50 µA | 4.5 V | | 0.001 | 0.1 | | 0.1 | | 0.1 | V |
| | | 5.5 V | | 0.001 | 0.1 | | 0.1 | | 0.1 | |
| | I _{OL} = 24 mA | 4.5 V | | | 0.36 | | 0.5 | | 0.44 | |
| | | 5.5 V | | | 0.36 | | 0.5 | | 0.44 | |
| | I _{OL} = 50 mA† | 5.5 V | | | | | 1.65 | | | |
| | I _{OL} = 75 mA† | 5.5 V | | | | | | | 1.65 | |
| I _I | V _I = V _{CC} or GND | 5.5 V | | | ± 0.1 | | ± 1 | | ± 1 | µA |
| I _{CC} | V _I = V _{CC} or GND, I _O = 0 | 5.5 V | | | 2 | | 80 | | 20 | µA |
| ΔI _{CC} ‡ | One input at 3.4 V, Other inputs at GND or V _{CC} | 5.5 V | | 0.6 | | | 1.6 | | 1.5 | mA |
| C _i | V _I = V _{CC} or GND | 5 V | | 4.5 | | | | | | pF |

† Not more than one output should be tested at a time, and the duration of the test should not exceed 2 ms.

‡ This is the increase in supply current for each input that is at one of the specified TTL voltage levels rather than 0 V or V_{CC}.

switching characteristics over recommended operating free-air temperature range,
V_{CC} = 5 V ± 0.5 V (unless otherwise noted) (see Figure 1)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | T _A = 25°C | | | SN54ACT08 | | SN74ACT08 | | UNIT |
|------------------|-----------------|----------------|-----------------------|-----|-----|-----------|-----|-----------|-----|------|
| | | | MIN | TYP | MAX | MIN | MAX | MIN | MAX | |
| t _{PLH} | A or B | Y | 1 | 6.5 | 9 | 1 | 10 | 1 | 10 | ns |
| t _{PHL} | | | 1 | 6.5 | 9 | 1 | 10 | 1 | 10 | |

operating characteristics, V_{CC} = 5 V, T_A = 25°C

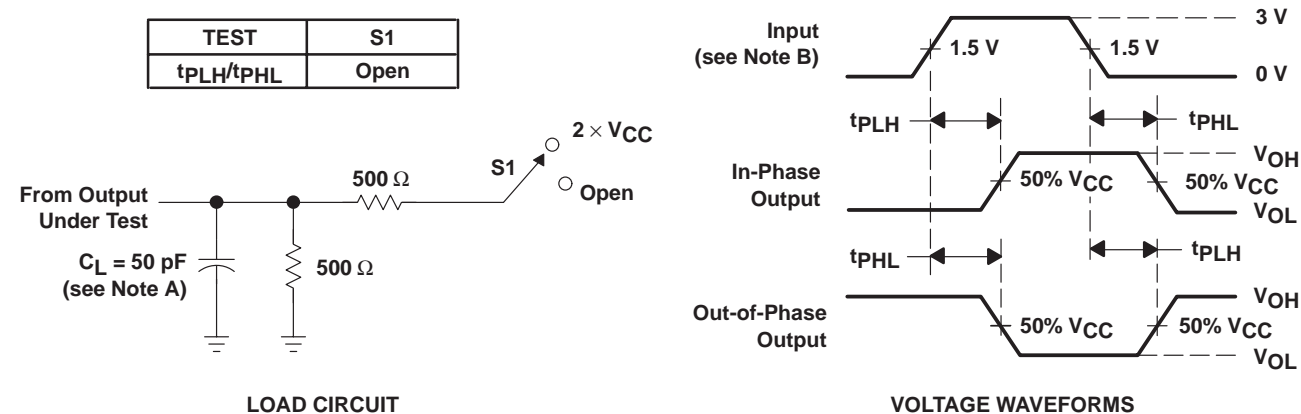
| PARAMETER | TEST CONDITIONS | TYP | UNIT |
|---|-----------------------------------|-----|------|
| C _{pd} Power dissipation capacitance | C _L = 50 pF, f = 1 MHz | 20 | pF |



SN54ACT08, SN74ACT08 QUADRUPLE 2-INPUT POSITIVE-AND GATES

SCAS535A – SEPTEMBER 1995 – REVISED APRIL 1996

PARAMETER MEASUREMENT INFORMATION



- NOTES:
- A. C_L includes probe and jig capacitance.
 - B. All input pulses are supplied by generators having the following characteristics: $PRR \leq 1\text{ MHz}$, $Z_O = 50\ \Omega$, $t_r \leq 2.5\text{ ns}$, $t_f \leq 2.5\text{ ns}$.
 - C. The outputs are measured one at a time with one input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms

IMPORTANT NOTICE

Texas Instruments and its subsidiaries (TI) reserve the right to make changes to their products or to discontinue any product or service without notice, and advise customers to obtain the latest version of relevant information to verify, before placing orders, that information being relied on is current and complete. All products are sold subject to the terms and conditions of sale supplied at the time of order acknowledgement, including those pertaining to warranty, patent infringement, and limitation of liability.

TI warrants performance of its semiconductor products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are utilized to the extent TI deems necessary to support this warranty. Specific testing of all parameters of each device is not necessarily performed, except those mandated by government requirements.

CERTAIN APPLICATIONS USING SEMICONDUCTOR PRODUCTS MAY INVOLVE POTENTIAL RISKS OF DEATH, PERSONAL INJURY, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE ("CRITICAL APPLICATIONS"). TI SEMICONDUCTOR PRODUCTS ARE NOT DESIGNED, AUTHORIZED, OR WARRANTED TO BE SUITABLE FOR USE IN LIFE-SUPPORT DEVICES OR SYSTEMS OR OTHER CRITICAL APPLICATIONS. INCLUSION OF TI PRODUCTS IN SUCH APPLICATIONS IS UNDERSTOOD TO BE FULLY AT THE CUSTOMER'S RISK.

In order to minimize risks associated with the customer's applications, adequate design and operating safeguards must be provided by the customer to minimize inherent or procedural hazards.

TI assumes no liability for applications assistance or customer product design. TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right of TI covering or relating to any combination, machine, or process in which such semiconductor products or services might be or are used. TI's publication of information regarding any third party's products or services does not constitute TI's approval, warranty or endorsement thereof.