National Semiconductor

July 1998

# 54AC11
# Triple 3-Input AND Gate

## General Description

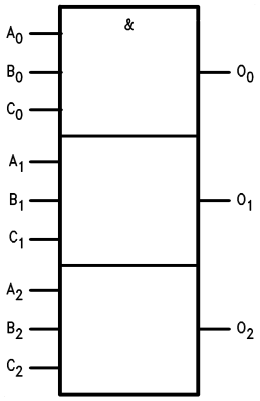
The 'AC11 contains three 3-input AND gates.

## Features

- $I_{CC}$ reduced by 50%
- Outputs source/sink 24 mA
- Standard Military Drawing (SMD)
- 'AC11: 5962-87611

## Logic Symbol

**IEEE/IEC**

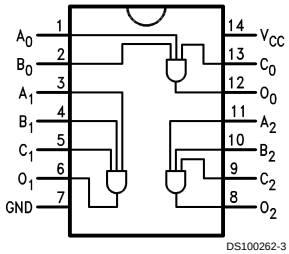



DS100262-1

| Pin Names | Description |
|---|---|
| $A_n$, $B_n$, $C_n$ | Inputs |
| $O_n$ | Outputs |

## Connection Diagrams

**Pin Assignment for DIP and Flatpak**

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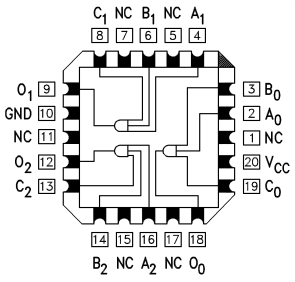
**Pin Assignment for LCC**

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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 |
| 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 $T_A$ = −55˚C to +125˚C Guaranteed Limits | Units | Conditions |
|---|---|---|---|---|---|
| $V_{IH}$ | 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 µA |
| | | 4.5 | 4.4 | | |
| | | 5.5 | 5.4 | | |
| | | | | | (Note 2) $V_{IN}$ = $V_{IL}$ or $V_{IH}$ |
| | | 3.0 | 2.4 | V | $I_{OH}$ = −12 mA |
| | | 4.5 | 3.7 | | $I_{OH}$ = −24 mA |
| | | 5.5 | 4.7 | | $I_{OH}$ = −24 mA |
| $V_{OL}$ | Maximum Low Level Output Voltage | 3.0 | 0.1 | V | $I_{OUT}$ = 50 µA |
| | | 4.5 | 0.1 | | |
| | | 5.5 | 0.1 | | |
| | | | | | (Note 2) $V_{IN}$ = $V_{IL}$ or $V_{IH}$ |
| | | 3.0 | 0.5 | V | $I_{OL}$ = 12 mA |
| | | 4.5 | 0.5 | | $I_{OL}$ = 24 mA |
| | | 5.5 | 0.5 | | $I_{OL}$ = 24 mA |
| $I_{IN}$ | Maximum Input Leakage Current | 5.5 | ±1.0 | µA | $V_I$ = $V_{CC}$, GND |
| $I_{OLD}$ | Minimum Dynamic Output Current (Note 3) | 5.5 | 50 | mA | $V_{OLD}$ = 1.65V Max |
| $I_{OHD}$ | | 5.5 | −50 | mA | $V_{OHD}$ = 3.85V Min |

## DC Characteristics for 'AC Family Devices (Continued)

| Symbol | Parameter | $V_{CC}$ (V) | 54AC $T_A$ = −55°C to +125°C Guaranteed Limits | Units | Conditions |
|---|---|---|---|---|---|
| $I_{CC}$ | 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.

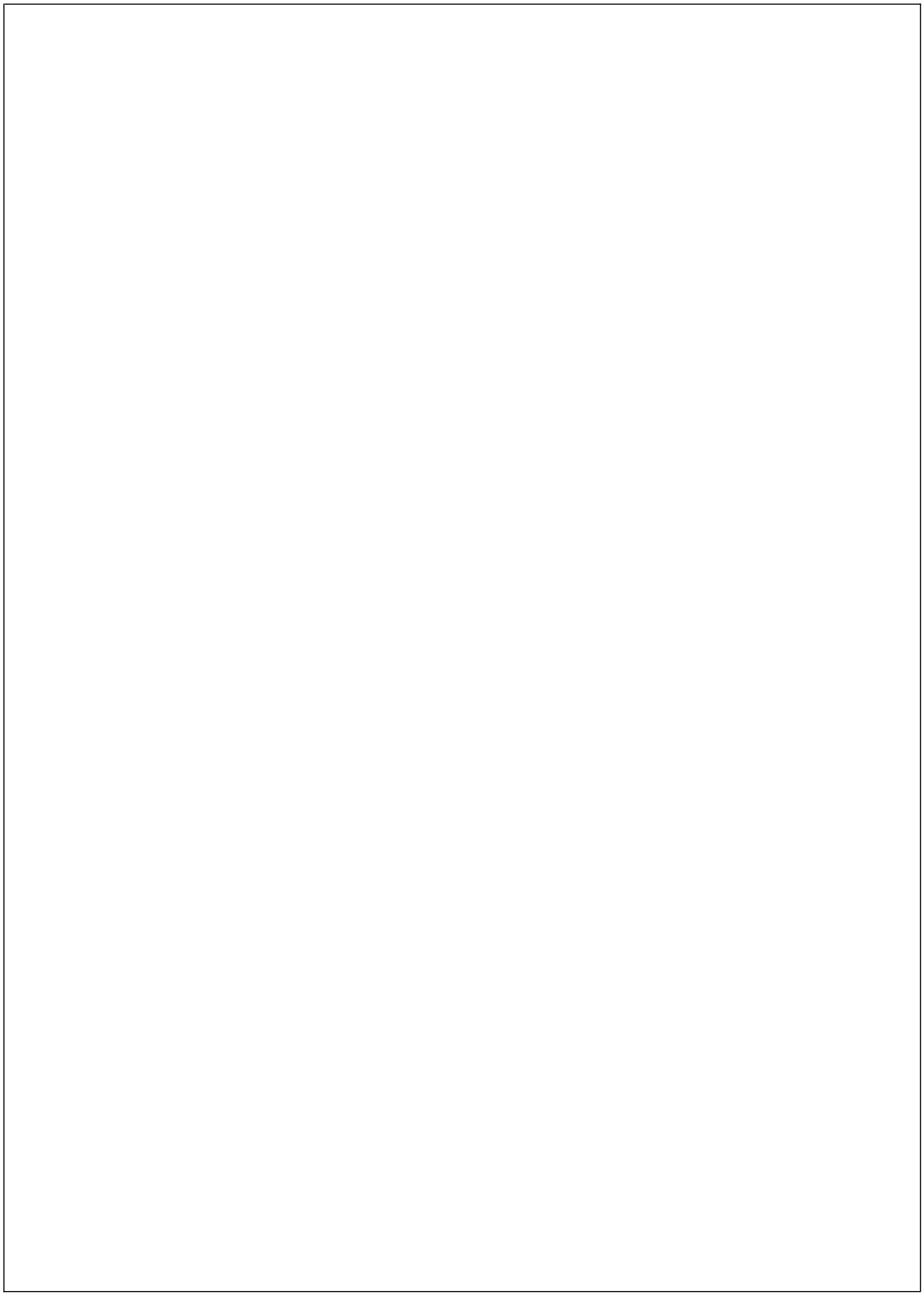
## AC Characteristics

| Symbol | Parameter | $V_{CC}$ (V) (Note 5) | 54AC $T_A$ = −55°C to +125°C $C_L$ = 50 pF | | Units | Fig. No. |
|---|---|---|---|---|---|---|
| | | | Min | Max | | |
| $t_{PLH}$ | Propagation Delay | 3.3 | 1.0 | 11.0 | ns | |
| | | 5.0 | 1.0 | 8.5 | | |
| $t_{PHL}$ | Propagation Delay | 3.3 | 1.0 | 10.5 | ns | |
| | | 5.0 | 1.0 | 8.0 | | |

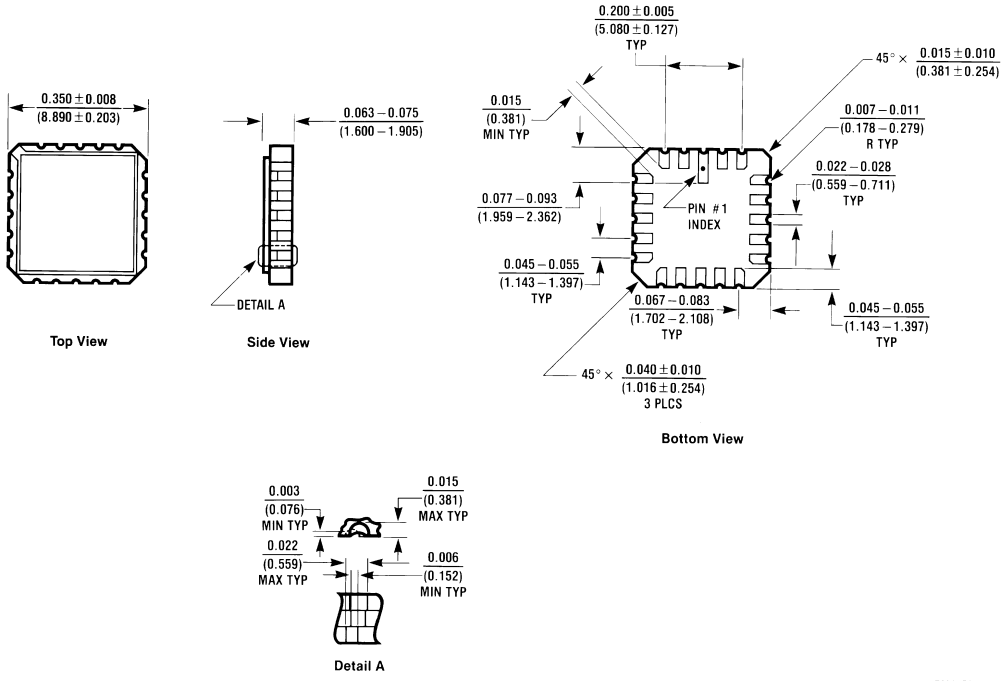
**Note 5:** Voltage Range 3.3 is 3.3V ±0.3V
Voltage Range 5.0 is 5.0V ±0.5V

## Capacitance

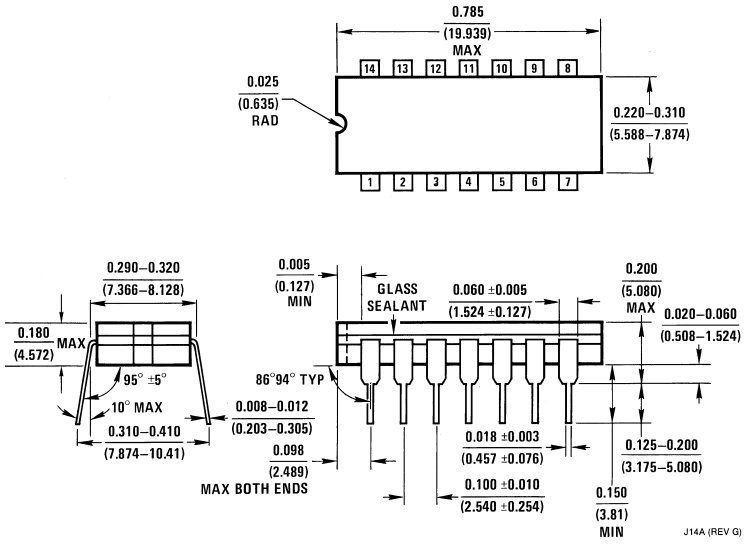
| Symbol | Parameter | Typ | Units | Conditions |
|---|---|---|---|---|
| $C_{IN}$ | Input Capacitance | 4.5 | pF | $V_{CC}$ = OPEN |
| $C_{PD}$ | Power Dissipation Capacitance | 20.0 | pF | $V_{CC}$ = 5.0V |



## Physical Dimensions inches (millimeters) unless otherwise noted

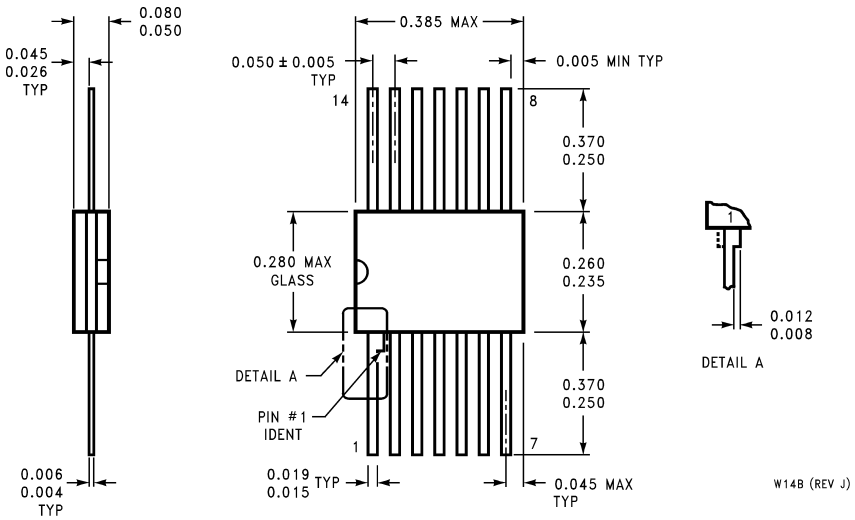



**20 Terminal Ceramic Leadless Chip Carrier (L)**
**NS Package Number E20A**




**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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