**FAIRCHILD**

SEMICONDUCTOR ™

# DM74ALS03B
# Quad 2-Input NAND Gate with Open Collector Outputs

## General Description

This device contains four independent gates, each of which performs the logic NAND function. The open-collector outputs require external pull-up resistors for proper logical operation.

**Pull-Up Resistor Equations**

$$R_{MAX} = \frac{V_{CC} \text{ (Min)} - V_{OH}}{N_1 (I_{OH}) + N_2 (I_{IH})}$$

$$R_{MIN} = \frac{V_{CC} \text{ (Max)} - V_{OL}}{I_{OL} - N_3 (I_{IL})}$$

Where:    $N_1 (I_{OH})$ = total maximum output HIGH current for all outputs tied to pull-up resistor

$N_2 (I_{IH})$ = total maximum input HIGH current for all inputs tied to pull-up resistor

$N_3 (I_{IL})$ = total maximum input LOW current for all inputs tied to pull-up resistor

## Features

■ Switching specifications at 50 pF

■ Switching specifications guaranteed over full temperature and $V_{CC}$ range

■ Advanced oxide-isolated, ion-implanted Schottky TTL process

■ Functionally and pin for pin compatible with Schottky and low power Schottky TTL counterpart

■ Improved AC performance over Schottky and low power Schottky counterparts

## Ordering Code:

| Order Number | Package Number | Package Description |
|---|---|---|
| DM74ALS03BM | M14A | 14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150 Narrow |
| DM74ALS03BN | N14A | 14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide |

Devices also available in Tape and Reel. Specify by appending the suffix letter "X" to the ordering code.

## Connection Diagram
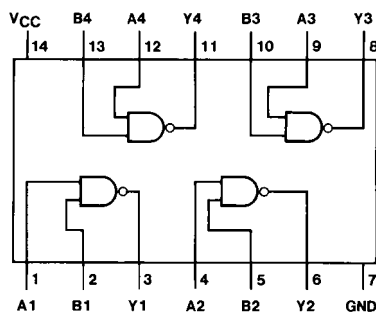


## Function Table

$$Y = \overline{AB}$$

| Inputs | | Output |
|---|---|---|
| A | B | Y |
| L | L | H |
| L | H | H |
| H | L | H |
| H | H | L |

H = HIGH Logic Level
L = LOW Logic Level

**DM74ALS03B**

## Absolute Maximum Ratings(Note 1)

| | |
|---|---|
| Supply Voltage | 7V |
| Input Voltage | 7V |
| HIGH Level Output Voltage | 7V |
| Operating Free Air Temperature Range | 0°C to +70°C |
| Storage Temperature Range | −65°C to +150°C |
| Typical $\theta_{JA}$ | |
| N Package | 86.5°C/W |
| M Package | 116.0°C/W |

**Note 1:** The "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the Electrical Characteristics tables are not guaranteed at the absolute maximum ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

## Recommended Operating Conditions

| Symbol | Parameter | Min | Nom | Max | Units |
|---|---|---|---|---|---|
| $V_{CC}$ | Supply Voltage | 4.5 | 5 | 5.5 | V |
| $V_{IH}$ | HIGH Level Input Voltage | 2 | | | V |
| $V_{IL}$ | LOW Level Input Voltage | | | 0.8 | V |
| $V_{OH}$ | HIGH Level Output Voltage | | | 5.5 | V |
| $I_{OL}$ | LOW Level Output Current | | | 8 | mA |
| $T_A$ | Free Air Operating Temperature | 0 | | 70 | °C |

## Electrical Characteristics

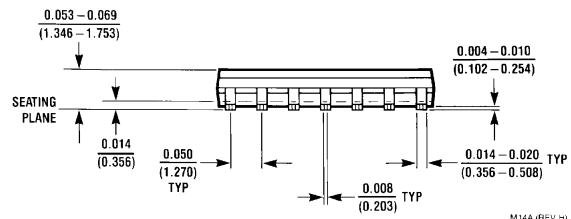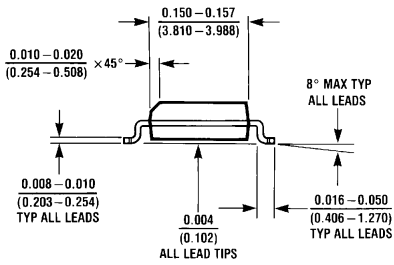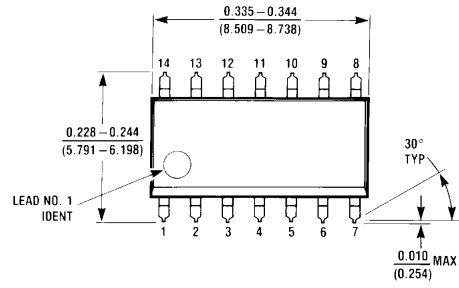over recommended operating free air temperature range. All typical values are measured at $V_{CC}$ = 5V, $T_A$ = 25°C.

| Symbol | Parameter | Conditions | | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|---|
| $V_{IK}$ | Input Clamp Voltage | $V_{CC}$ = 4.5V, $I_I$ = −18 mA | | | | −1.5 | V |
| $I_{OH}$ | HIGH Level Output Current | $V_{CC}$ = 4.5V, $V_{OH}$ = 5.5V | | | | 100 | μA |
| $V_{OL}$ | LOW Level | $V_{CC}$ = 4.5V | $I_{OL}$ =4 mA | | 0.25 | 0.4 | V |
| | Output Voltage | | $I_{OL}$ = 8 mA | | 0.35 | 0.5 | V |
| $I_I$ | Input Current @ Max. Input Voltage | $V_{CC}$ = 5.5V, $V_{IH}$ = 7V | | | | 0.1 | mA |
| $I_{IH}$ | HIGH Level Input Current | $V_{CC}$ = 5.5V, $V_{IH}$ = 2.7V | | | | 20 | μA |
| $I_{IL}$ | LOW Level Input Current | $V_{CC}$ = 5.5V, $V_{IL}$ = 0.4V | | | | −0.1 | mA |
| $I_{CC}$ | Supply Current | $V_{CC}$ = 5.5V | Outputs HIGH | | 0.43 | 0.85 | mA |
| | | | Outputs LOW | | 1.62 | 3 | mA |

## Switching Characteristics

over recommended operating free air temperature range.

| Symbol | Parameter | Conditions | Min | Max | Units |
|---|---|---|---|---|---|
| $t_{PLH}$ | Propagation Delay Time LOW-to-HIGH Level Output | $V_{CC}$ = 4.5V to 5.5V $R_L$ = 2 kΩ $C_L$ = 50 pF | 20 | 50 | ns |
| $t_{PHL}$ | Propagation Delay Time HIGH-to-LOW Level Output | | 3 | 13 | ns |

## Physical Dimensions inches (millimeters) unless otherwise noted



$$\frac{0.335 - 0.344}{(8.509 - 8.738)}$$

14 13 12 11 10 9 8

$$\frac{0.228 - 0.244}{(5.791 - 6.198)}$$

LEAD NO. 1
IDENT

30°
TYP

1 2 3 4 5 6 7

$$\frac{0.010}{(0.254)} \text{ MAX}$$

$$\frac{0.150 - 0.157}{(3.810 - 3.988)}$$

$$\frac{0.010 - 0.020}{(0.254 - 0.508)} \times 45°$$

8° MAX TYP
ALL LEADS

$$\frac{0.008 - 0.010}{(0.203 - 0.254)} \text{ TYP ALL LEADS}$$

$$\frac{0.004}{(0.102)} \text{ ALL LEAD TIPS}$$

$$\frac{0.016 - 0.050}{(0.406 - 1.270)} \text{ TYP ALL LEADS}$$

$$\frac{0.053 - 0.069}{(1.346 - 1.753)}$$

$$\frac{0.004 - 0.010}{(0.102 - 0.254)}$$

SEATING
PLANE

$$\frac{0.014}{(0.356)}$$

$$\frac{0.050}{(1.270)} \text{ TYP}$$

$$\frac{0.008}{(0.203)} \text{ TYP}$$

$$\frac{0.014 - 0.020}{(0.356 - 0.508)} \text{ TYP}$$

M14A (REV H)

**14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150 Narrow**
**Package Number M14A**

## Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



**14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide**
**Package Number N14A**

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2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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