FAIRCHILD SEMICONDUCTOR™

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# DM74AS240 • DM74AS244
# 3-STATE Bus Driver/Receiver

## General Description

This family of Advance Schottky 3-STATE Bus circuits are designed to provide either bidirectional or unidirectional buffer interface in Memory, Microprocessor, and Communication Systems. The output characteristics of the circuits have low impedance sufficient to drive terminated transmission lines down to 133Ω. The input characteristics of the circuits likewise have a high impedance so it will not significantly load the transmission line. The package contains eight 3-STATE buffers organized with four buffers having a common 3-STATE enable gate. The DM74AS240 and DM74AS244 are eight wide in a 20 pin package, and may be used as a 4 wide bidirectional or eight wide unidirectional. The buffer selection includes inverting and noninverting, with enable or disable 3-STATE control.

## Features

- Advanced oxide-isolated, ion-implanted Schottky TTL process
- Improved switching performance with less power dissipation compared with Schottky counterpart
- Functional and pin compatible with 74LS and Schottky counterpart
- Switching response specified into 500Ω and 50 pF
- Specified to interface with CMOS at $V_{OH} = V_{CC} - 2V$

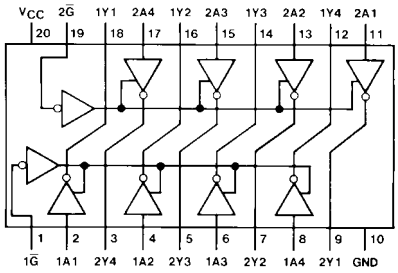
## Ordering Code:

| Order Number | Package Number | Package Description |
|---|---|---|
| DM74AS240WM | M20B | 20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide |
| DM74AS240N | N20A | 20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide |
| DM74AS244WM | M20B | 20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide |
| DM74AS244N | N20A | 20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide |

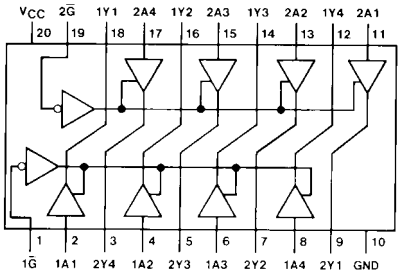
Devices also available in Tape and Reel. Specify by appending the suffix letter "X" to the ordering code.

## Connection Diagrams

**DM74AS240**




**DM74AS244**




## Function Tables

**DM74AS240**

| Inputs | | Output |
|---|---|---|
| $\overline{G}$ | A | Y |
| L | L | H |
| L | H | L |
| H | X | Z |

**DM74AS244**

| Inputs | | Output |
|---|---|---|
| $\overline{G}$ | A | Y |
| L | L | L |
| L | H | H |
| H | X | Z |

L = LOW Logic Level H = HIGH Logic Level X = Either LOW or HIGH Logic Level Z = High Impedance

## Absolute Maximum Ratings(Note 1)

| | |
|---|---|
| Supply Voltage, $V_{CC}$ | 7V |
| Input Voltage | 7V |
| Voltage Applied to Disabled Output | 5.5V |
| Operating Free Air Temperature Range | 0°C to +70°C |
| Storage Temperature Range | −65°C to +150°C |
| Typical $\theta_{JA}$ | |
| N Package | 57.0°C/W |
| M Package | 76.0°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 |
| $I_{OH}$ | HIGH Level Output Current | | | −15 | mA |
| $I_{OL}$ | LOW Level Output Current | | | 64 | 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, $I_{IN}$ = −18 mA | | | | | −1.2 | V |
| $V_{OH}$ | HIGH Level Output Voltage | $V_{CC}$ = 4.5V, $I_{OH}$ = −3 mA | | | 2.4 | 3.2 | | V |
| | | $V_{CC}$ = 4.5V, $I_{OH}$ = Max | | | 2.4 | | | |
| | | $I_{OH}$ = −2 mA, $V_{CC}$ = 4.5V to 5.5V | | | $V_{CC}$−2 | | | |
| $V_{OL}$ | LOW Level Output Voltage | $V_{CC}$ = 4.5V, $I_{OL}$ = Max | | | | 0.35 | 0.55 | V |
| $I_I$ | Input Current at Max Input Voltage | $V_{CC}$ = 5.5V | $V_{IN}$ = 7V | Others | | | 100 | µA |
| $I_{IH}$ | HIGH Level Input Current | $V_{CC}$ = 5.5V, $V_{IN}$ = 2.7V | | Others | | | 20 | µA |
| $I_{IL}$ | LOW Level Input Current | $V_{CC}$ = 5.5V, $V_{IN}$ = 0.4V | | AS240, (G, $\overline{G}$), (Control Inputs), DM74AS244 ($\overline{G}$) | | | −500 | µA |
| | | | | DM74AS244 (A) | | | −1000 | |
| $I_{OZH}$ | HIGH Level 3-STATE Output Current | $V_{CC}$ = 5.5V, V= 2.7V | | | | | 50 | µA |
| $I_{OZL}$ | LOW Level 3-STATE Output Current | $V_{CC}$ = 5.5V, V = 0.4V | | DM74AS240, DM74AS244 | | | −50 | µA |
| $I_O$ (Note 2) | Output Drive Current | $V_{CC}$ = 5.5V, $V_{OUT}$ = 2.25V | | | −50 | −115 | −150 | mA |
| $I_{CC}$ | DM74AS240 Supply Current | $V_{CC}$ = 5.5V | Outputs HIGH | | | 11 | 17 | mA |
| | | | Outputs LOW | | | 51 | 75 | |
| | | | 3-STATE | | | 24 | 38 | |
| $I_{CC}$ | DM74AS244 Supply Current | $V_{CC}$ = 5.5V | Outputs HIGH | | | 22 | 34 | mA |
| | | | Outputs LOW | | | 60 | 90 | |
| | | | 3-STATE | | | 34 | 54 | |

**Note 2:** The output conditions have been chosen to produce a current that closely approximates one half the true short-circuit output current, $I_{OS}$.

## DM74AS240 Switching Characteristics

over recommended operating free air temperature range

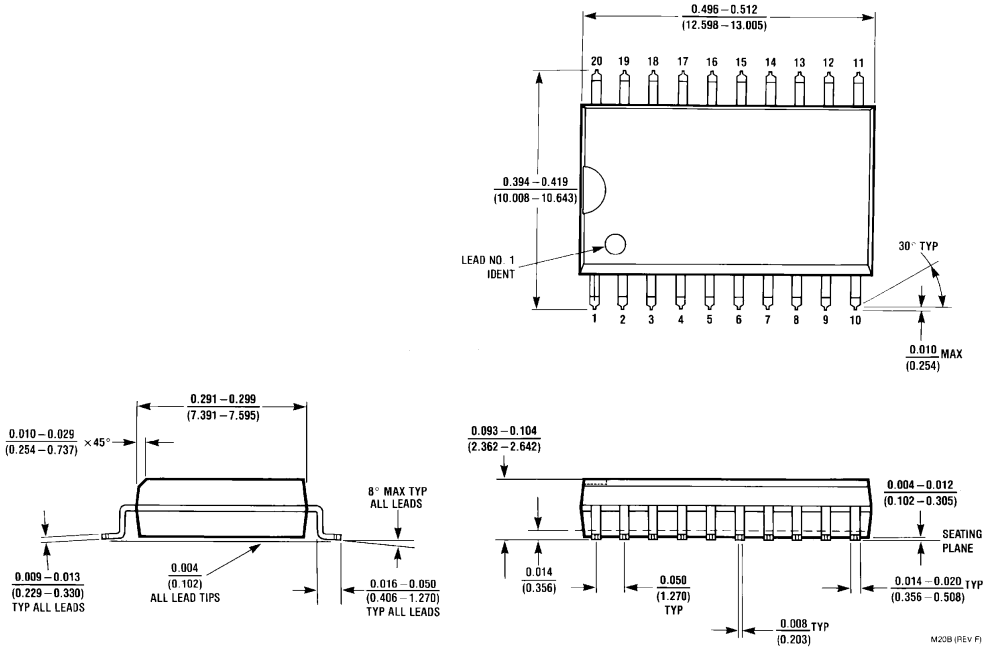
| Symbol | Parameter | Conditions | From (Input) | To (Output) | Min | Max | Units |
|---|---|---|---|---|---|---|---|
| $t_{PLH}$ | Propagation Delay Time LOW-to-HIGH Level Output | $V_{CC}$ = 4.5V to 5.5V<br>$R_1 = R_2 = 500\Omega$<br>$C_L$ = 50 pF | A | Y | 2 | 6.5 | ns |
| $t_{PHL}$ | Propagation Delay Time HIGH-to-LOW Level Output | | A | Y | 2 | 5.7 | ns |
| $t_{PZL}$ | Output Enable to LOW Level | | $\overline{G}$ | Y | 2 | 9 | ns |
| $t_{PZH}$ | Output Enable to HIGH Level | | $\overline{G}$ | Y | 2 | 6.4 | ns |
| $t_{PLZ}$ | Output Disable from LOW Level | | $\overline{G}$ | Y | 2 | 9.5 | ns |
| $t_{PHZ}$ | Output Disable from HIGH Level | | $\overline{G}$ | Y | 2 | 5 | ns |

## DM74AS244 Switching Characteristics

over recommended operating free air temperature range

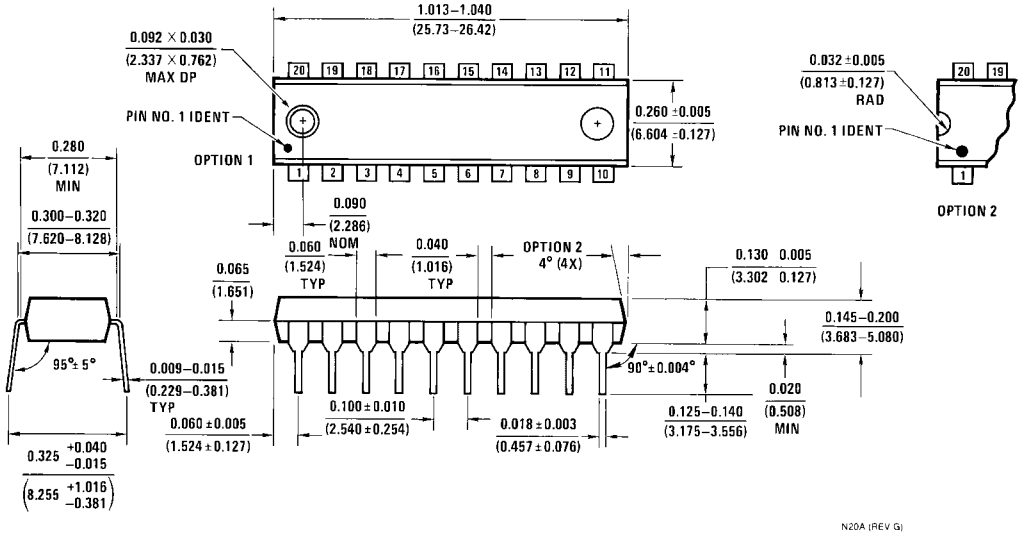
| Symbol | Parameter | Conditions | From (Input) | To (Output) | Min | Max | Units |
|---|---|---|---|---|---|---|---|
| $t_{PLH}$ | Propagation Delay Time LOW-to-HIGH Level Output | $V_{CC}$ = 4.5V to 5.5V<br>$R_1 = R_2 = 500\Omega$<br>$C_L$ = 50 pF | A | Y | 2 | 6.2 | ns |
| $t_{PHL}$ | Propagation Delay Time HIGH-to-LOW Level Output | | A | Y | 2 | 6.2 | ns |
| $t_{PZL}$ | Output Enable to LOW Level | | $\overline{G}$ | Y | 2 | 7.5 | ns |
| $t_{PZH}$ | Output Enable to HIGH Level | | $\overline{G}$ | Y | 2 | 9 | ns |
| $t_{PLZ}$ | Output Disable from LOW Level | | $\overline{G}$ | Y | 2 | 9 | ns |
| $t_{PHZ}$ | Output Disable from HIGH Level | | $\overline{G}$ | Y | 2 | 6 | ns |

## Physical Dimensions inches (millimeters) unless otherwise noted




**20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide**
**Package Number M20B**

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




**20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide**
**Package Number N20A**