

DM7438 • 7438

Quad 2-Input NAND Buffers 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

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

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

Where:

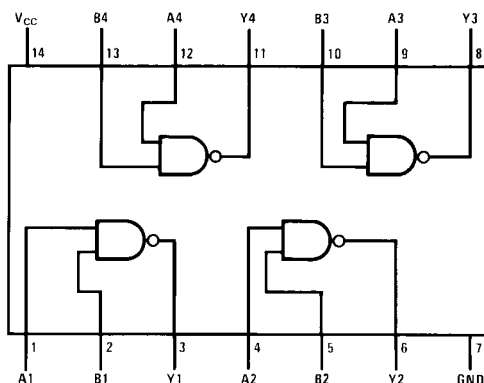
- $N_1 (I_{OH})$ = total maximum output high current for all outputs tied to pull-up resistor
- $N_2 (I_{IH})$ = total maximum input high current for all inputs tied to pull-up resistor
- $N_3 (I_{IL})$ = total maximum input low current for all inputs tied to pull-up resistor

Ordering Code:

| Order Number | Package Number | Package Description |
|--------------|----------------|---|
| DM7438M | M14A | 14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150 Narrow |
| DM7438N | N14A | 14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide |
| 7438SJ | M14D | 14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm 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

DM7438 • 7438 Quad 2-Input NAND Buffers with Open-Collector Outputs

Absolute Maximum Ratings(Note 1)

| | |
|--------------------------------------|-----------------|
| Supply Voltage | 7V |
| Input Voltage | 5.5V |
| Output Voltage | 7V |
| Operating Free Air Temperature Range | 0°C to +70°C |
| Storage Temperature Range | −65°C to +150°C |

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 | 4.75 | 5 | 5.25 | 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 | | | 48 | mA |
| T _A | Free Air Operating Temperature | 0 | | 70 | °C |

Electrical Characteristics

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

| Symbol | Parameter | Conditions | Min | Typ (Note 2) | Max | Units |
|------------------|-----------------------------------|---|-----|-----------------|------|-------|
| V _I | Input Clamp Voltage | V _{CC} = Min, I _I = −12 mA | | | −1.5 | V |
| I _{CEX} | HIGH Level Output Current | V _{CC} = Min, V _O = 5.5V V _{IL} = Max | | | 250 | μA |
| V _{OL} | LOW Level Output Voltage | V _{CC} = Min, I _{OL} = Max V _{IH} = Min | | | 0.4 | V |
| I _I | Input Current @ Max Input Voltage | V _{CC} = Max, V _I = 5.5V | | | 1 | mA |
| I _{IH} | HIGH Level Input Current | V _{CC} = Max, V _I = 2.4V | | | 40 | μA |
| I _{IL} | LOW Level Input Current | V _{CC} = Max, V _I = 0.4V | | | −1.6 | mA |
| I _{CCH} | Supply Current with Outputs HIGH | V _{CC} = Max | | 5 | 8.5 | mA |
| I _{CCL} | Supply Current with Outputs LOW | V _{CC} = Max | | 34 | 54 | mA |

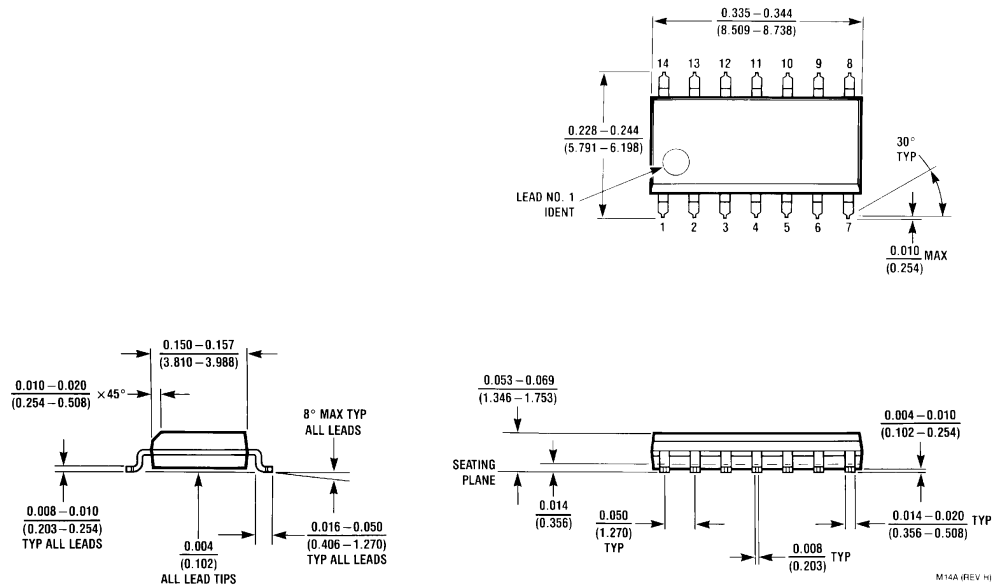
Switching Characteristics

at V_{CC} = 5V and T_A = 25°C

| Symbol | Parameter | Conditions | Min | Max | Units |
|------------------|--|---|-----|-----|-------|
| t _{PLH} | Propagation Delay Time LOW-to-HIGH Level Output | C _L = 45 pF R _L = 133Ω | | 22 | ns |
| t _{PHL} | Propagation Delay Time HIGH-to-LOW Level Output | | | 18 | ns |

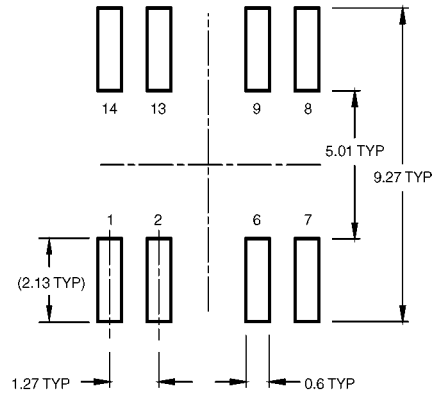
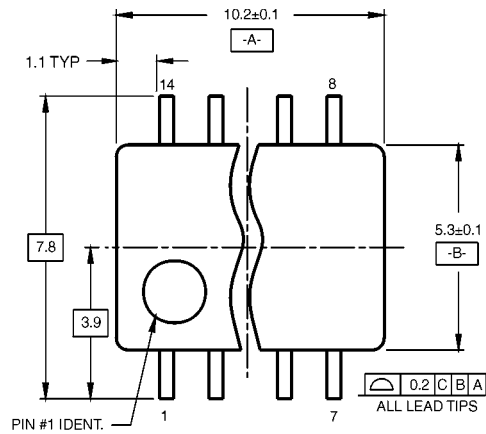
Note 2: All typicals are at V_{CC} = 5V, T_A = 25°C.

Physical Dimensions inches (millimeters) unless otherwise noted

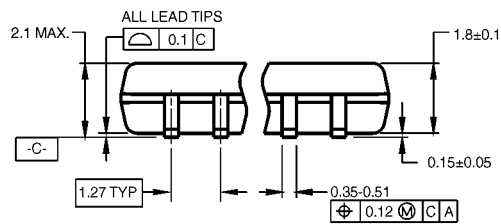


**14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150 Narrow
Package Number M14A**

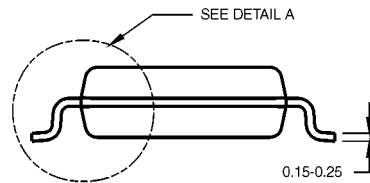
Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



LAND PATTERN RECOMMENDATION



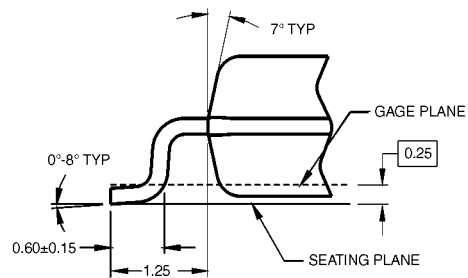
DIMENSIONS ARE IN MILLIMETERS



NOTES:

- A. CONFORMS TO EIAJ EDR-7320 REGISTRATION, ESTABLISHED IN DECEMBER, 1998.
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

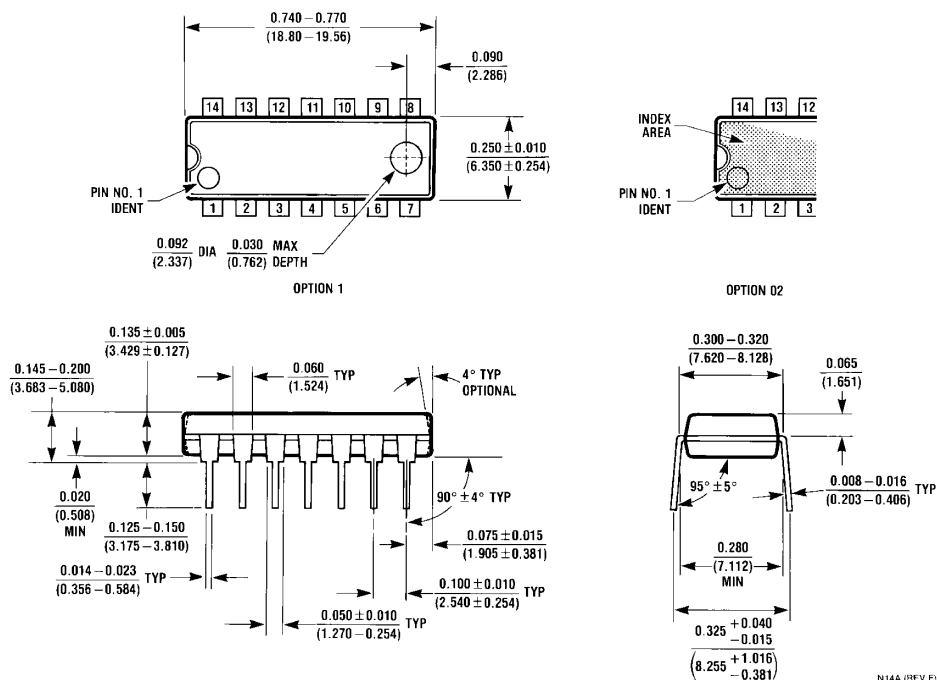
M14DRevB1



DETAIL A

**14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
Package Number M14D**

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

N14A (REV F)

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