

## 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

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

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

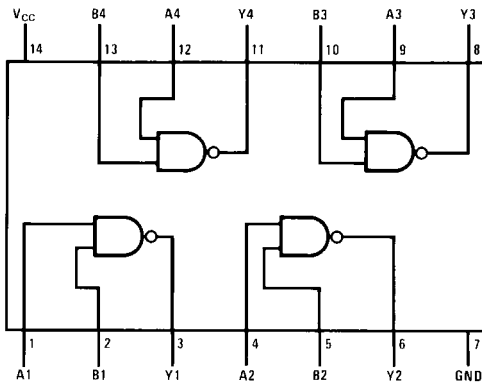
Where:  $N_1 (I_{OH})$  = total maximum output high current for all outputs tied to pull-up resistor  
 $N_2 (I_{IH})$  = total maximum input high current for all inputs tied to pull-up resistor  
 $N_3 (I_{IL})$  = total maximum input low current for all inputs tied to pull-up resistor

#### 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

**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 <sub>CC</sub>	Supply Voltage	4.75	5	5.25	V
V <sub>IH</sub>	HIGH Level Input Voltage	2			V
V <sub>IL</sub>	LOW Level Input Voltage			0.8	V
V <sub>OH</sub>	HIGH Level Output Voltage			5.5	V
I <sub>OL</sub>	LOW Level Output Current			48	mA
T <sub>A</sub>	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 <sub>I</sub>	Input Clamp Voltage	V <sub>CC</sub> = Min, I <sub>I</sub> = -12 mA			-1.5	V
I <sub>CEX</sub>	HIGH Level Output Current	V <sub>CC</sub> = Min, V <sub>O</sub> = 5.5V V <sub>IL</sub> = Max			250	μA
V <sub>OL</sub>	LOW Level Output Voltage	V <sub>CC</sub> = Min, I <sub>OL</sub> = Max V <sub>IH</sub> = Min			0.4	V
I <sub>I</sub>	Input Current @ Max Input Voltage	V <sub>CC</sub> = Max, V <sub>I</sub> = 5.5V			1	mA
I <sub>IH</sub>	HIGH Level Input Current	V <sub>CC</sub> = Max, V <sub>I</sub> = 2.4V			40	μA
I <sub>IL</sub>	LOW Level Input Current	V <sub>CC</sub> = Max, V <sub>I</sub> = 0.4V			-1.6	mA
I <sub>CCH</sub>	Supply Current with Outputs HIGH	V <sub>CC</sub> = Max		5	8.5	mA
I <sub>CCL</sub>	Supply Current with Outputs LOW	V <sub>CC</sub> = Max		34	54	mA

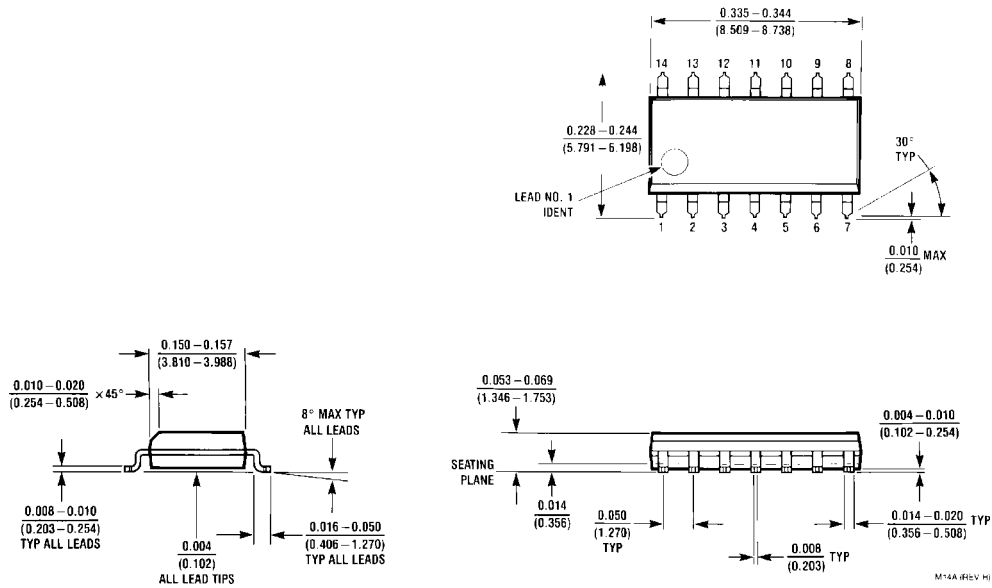
**Switching Characteristics**

at V<sub>CC</sub> = 5V and T<sub>A</sub> = 25°C

Symbol	Parameter	Conditions	Min	Max	Units
t <sub>PLH</sub>	Propagation Delay Time LOW-to-HIGH Level Output	C <sub>L</sub> = 45 pF R <sub>L</sub> = 133Ω		22	ns
t <sub>PHL</sub>	Propagation Delay Time HIGH-to-LOW Level Output			18	ns

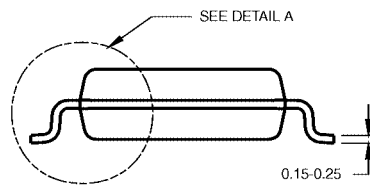
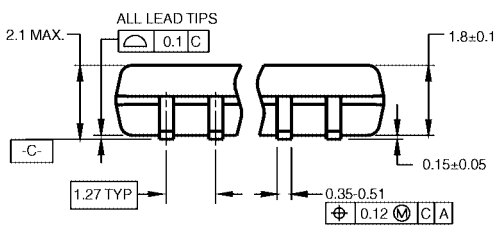
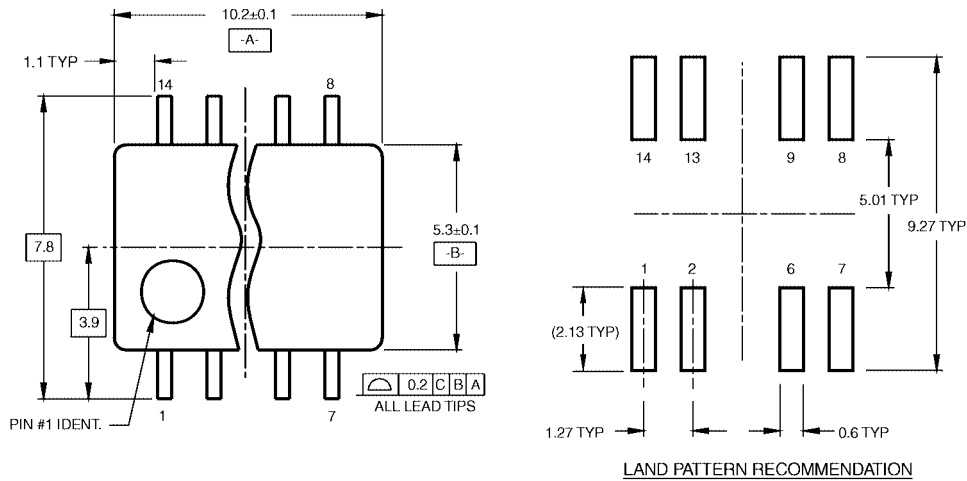
**Note 2:** All typicals are at V<sub>CC</sub> = 5V, T<sub>A</sub> = 25°C.

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



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

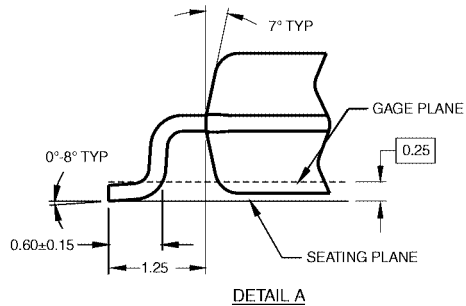
**Physical Dimensions** inches (millimeters) unless otherwise noted (Continued)



DIMENSIONS ARE IN MILLIMETERS

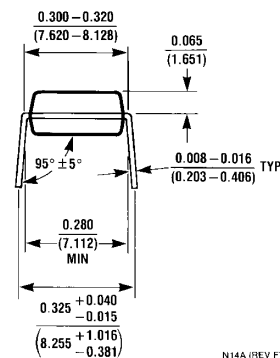
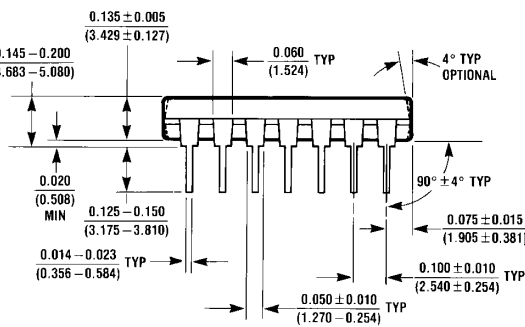
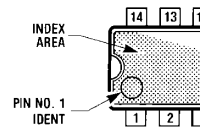
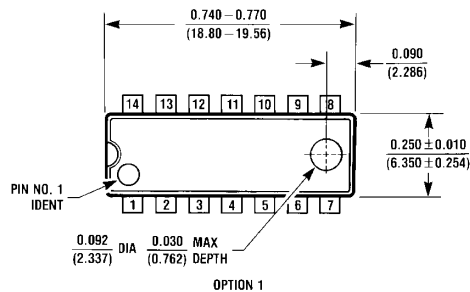
- NOTES:  
 A. CONFORMS TO EIAJ EDR-7320 REGISTRATION, ESTABLISHED IN DECEMBER, 1998.  
 B. DIMENSIONS ARE IN MILLIMETERS.  
 C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

M14DRevB1



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

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



N14A (REV F)

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

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