

August 1986 Revised February 2000

DM7403

Quad 2-Input NAND Gates 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:

N₁ (I_{OH}) = total maximum output high current

for all outputs tied to pull-up resistor ${\rm N_2~(I_{IH})=total~maximum~input~high~current~for}$

all inputs tied to pull-up resistor

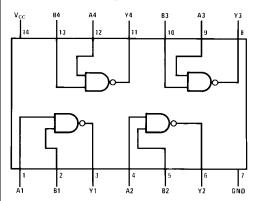
 \mbox{N}_{3} ($\mbox{I}_{\mbox{\scriptsize IL}})$ = total maximum input low current for

all inputs tied to pull-up resistor

Ordering Code:

Order Number	Package Number	Package Description
DM7403N	N14A	14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide

Connection Diagram



Function Table

 $Y = \overline{AB}$

H = HIGH Logic Level L = LOW Logic Level

Absolute Maximum Ratings(Note 1)

Supply Voltage7VInput Voltage5.5VOutput Voltage7V

Operating Free Air Temperature Range 0°C to $+70^{\circ}\text{C}$ Storage Temperature Range -65°C to $+150^{\circ}\text{C}$ 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
OL	LOW Level Output Current			16	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
VI	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	μА
V _{OL}	LOW Level Output Voltage	V _{CC} = Min, I _{OL} = Max V _{IH} = Min		0.2	0.4	V
II	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	μΑ
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		4	8	mA
I _{CCL}	Supply Current with Outputs LOW	V _{CC} = Max		12	22	mA

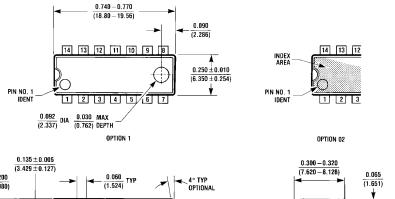
Note 2: All typicals are at $V_{CC} = 5V$, $T_A = 25$ °C.

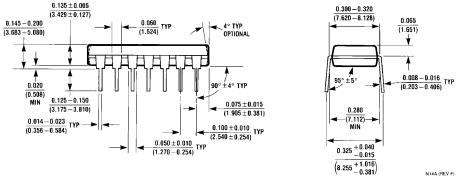
Switching Characteristics

at $V_{CC} = 5V$ and $T_A = 25$ °C

Symbol	Parameter	Conditions	Min	Max	Units
t _{PLH}	Propagation Delay Time	C _L = 15 pF		45	ns
	LOW-to-HIGH Level Output	$R_L = 4 k\Omega (t_{PLH})$		45	
t _{PHL}	Propagation Delay Time	$R_L = 400\Omega (t_{PHL})$		15	ns
	HIGH-to-LOW Level Output			13	

Physical Dimensions inches (millimeters) unless otherwise noted





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

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