National Semiconductor

DM54L03/DM74L03 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: $N_1\,(I_{OH})$ = 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

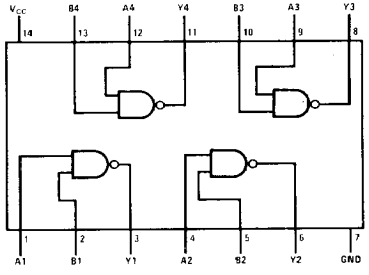
Absolute Maximum Ratings (Note 1)

Supply Voltage	8V
Input Voltage	5.5V
Output Voltage	8V
Storage Temperature Range	−65°C to 150°C

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

Connection Diagram

Dual-In-Line Package



TL/F/6615-1

DM54L03 (J) DM74L03 (N)

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

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Recommended Operating Conditions

Sym	Parameter	DM54L03			DM74L03			Units
		Min	Nom	Max	Min	Nom	Max	
V_{CC}	Supply Voltage	4.5	5	5.5	4.75	5	5.25	V
V_{IH}	High Level Input Voltage	2			2			V
V_{IL}	Low Level Input Voltage			0.6			0.6	V
V_{OH}	High Level Output Voltage			5.5			5.5	V
I_{OL}	Low Level Output Current			2			3.6	mA
T_A	Free Air Operating Temperature	−55		125	0		70	°C

Electrical Characteristics over recommended operating free air temperature (unless otherwise noted)

Sym	Parameter	Conditions		Min	Typ (Note 1)	Max	Units
I_{CEX}	High Level Output Current	V_{CC} = Min, V_O = 5.5V V_{IL} = Max				50	μA
V_{OL}	Low Level Output Voltage	V_{CC} = Min I_{OL} = Max V_{IH} = Min	DM54		0.15	0.3	V
			DM74		0.2	0.4	
I_I	Input Current@Max Input Voltage	V_{CC} = Max, V_I = 5.5V				0.1	mA
I_{IH}	High Level Input Current	V_{CC} = Max, V_I = 2.4V				10	μA
I_{IL}	Low Level Input Current	V_{CC} = Max, V_I = 0.3V				−0.18	mA
I_{CCH}	Supply Current With Outputs High	V_{CC} = Max			0.44	0.8	mA
I_{CCL}	Supply Current With Outputs Low	V_{CC} = Max			1.2	2.04	mA

Switching Characteristics at V_{CC} = 5V and T_A = 25°C (See Section 1 for Test Waveforms and Output Load)

Parameter	Conditions	R_L = 4 kΩ C_L = 50 pF			Units
		Min	Typ	Max	
t_{PLH} Propagation Delay Time Low to High Level Output			60	90	ns
t_{PHL} Propagation Delay Time High to Low Level Output			33	60	ns

Note 1: All typicals are at V_{CC} = 5V, T_A = 25°C.