



T-43-15

DM54ALS1003A/DM74ALS1003A

DM54ALS1003A/DM74ALS1003A Quadruple 2-Input NAND Buffers with Open-Collector Outputs

General Description

This device contains four independent 2-input buffers, each of which performs the logic NAND function. The outputs require an external pull-up resistor for proper logical operation. The 'ALS1003A is a buffer version of the 'ALS03A.

Pull-Up Resistor Equations

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

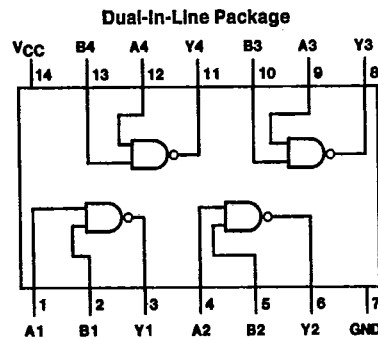
$$R_{MIN} = \frac{V_{CC} (Max) - V_{OL}}{I_{OL} - N_3 (I_{IL})}$$

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

Features

- Switching specifications at 50 pF
- Switching specifications guaranteed over full temperature and V_{CC} range
- Advanced oxide-isolated, ion-implanted Schottky TTL process
- Functionally and pin for pin compatible with LS TTL counterpart
- Improved line receiving characteristics

Connection Diagram



TL/F/6251-1

Order Number DM54ALS1003AJ, DM74ALS1003AM or DM74ALS1003AN
 See NS Package Number J14A, M14A or N14A

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

If Military/Aerospace specified devices are required, contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage	7V
Input Voltage	7V
Off State (High Level) Output Voltage	7V

Operating Free Air Temperature Range	
DM54ALS	-55°C to +125°C
DM74ALS	0°C to +70°C
Storage Temperature Range	-65°C to +150°C

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Note: 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" table 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	DM54ALS1003A			DM74ALS1003A			Units
		Min	Nom	Max	Min	Nom	Max	
V _{CC}	Supply Voltage	4.5	5	5.5	4.5	5	5.5	V
V _{IH}	High Level Input Voltage	2			2			V
V _{IL}	Low Level Input Voltage			0.7			0.8	V
V _{OH}	High Level Output Voltage			5.5			5.5	V
I _{OL}	Low Level Output Current			12			24	mA
T _A	Free Air Operating Temperature	-55		125	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 _I = -18 mA			-1.5	V
I _{OH}	High Level Output Current	V _{CC} = 4.5V, V _{OH} = 5.5V			100	μA
V _{OL}	Low Level Output Voltage	V _{CC} = 4.5V V _{IH} = 2V 54/74ALS I _{OL} = 12 mA		0.25	0.4	V
		74ALS I _{OL} = 24 mA		0.35	0.5	V
I _I	Input Current at Max Input Voltage	V _{CC} = 5.5V, V _{IH} = 7V			0.1	mA
I _{IH}	High Level Input Current	V _{CC} = 5.5V, V _{IH} = 2.7V			20	μA
I _{IL}	Low Level Input Current	V _{CC} = 5.5V, V _{IL} = 0.4V			-0.1	mA
I _{CC}	Supply Current with Outputs High	V _{CC} = 5.5V, V _I = 0V		0.86	1.6	mA
I _{CC}	Supply Current with Outputs Low	V _{CC} = 5.5V, V _I = 4.5V		4.8	7.8	mA

Switching Characteristics over recommended operating free air temperature range (Note 1)

Symbol	Parameter	Conditions	DM54ALS1003A		DM74ALS1003A		Units
			Min	Max	Min	Max	
t _{PLH}	Propagation Delay Time Low to High Level Output	V _{CC} = 4.5V to 5.5V R _L = 667Ω C _L = 50 pF	10	40	10	33	ns
t _{PHL}	Propagation Delay Time High to Low Level Output		2	18	2	12	ns

Note 1: See Section 1 for test waveforms and output load.