

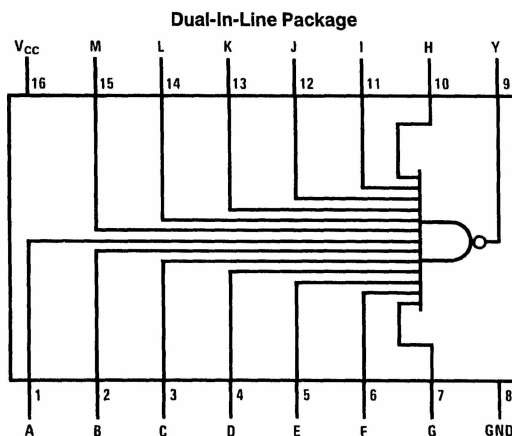


DM54S133/DM74S133 13-Input NAND Gate

General Description

This device contains a single gate which performs the logic NAND function.

Connection Diagram



TL/F/6462-1

Order Number DM54S133J, DM74S133M or DM74S133N
See NS Package Number J16A, M16A or N16E

Function Table

$$Y = \overline{ABCDEFGHIJKLM}$$

Inputs	Output
A thru M	Y
All Inputs H	L
One or More Input L	H

H = High Logic Level

L = Low Logic Level

Absolute Maximum Ratings (Note)

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

Supply Voltage	7V
Input Voltage	5.5V
Operating Free Air Temperature Range	
DM54S	−55°C to +125°C
DM74S	0°C to +70°C
Storage Temperature Range	−65°C to +150°C

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	DM54S133			DM74S133			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			0.8			0.8	V
I_{OH}	High Level Output Current			−1			−1	mA
I_{OL}	Low Level Output Current			20			20	mA
T_A	Free Air Operating Temperature	−55		125	0		70	°C

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

Symbol	Parameter	Conditions	Min	Typ (Note 1)	Max	Units
V_I	Input Clamp Voltage	$V_{CC} = \text{Min}, I_I = -18 \text{ mA}$			−1.2	V
V_{OH}	High Level Output Voltage	$V_{CC} = \text{Min}, I_{OH} = \text{Max}$	DM54	2.5	3.4	V
		$V_{IL} = \text{Max}$	DM74	2.7	3.4	
V_{OL}	Low Level Output Voltage	$V_{CC} = \text{Min}, I_{OL} = \text{Max}$ $V_{IH} = \text{Min}$			0.5	V
I_I	Input Current @ Max Input Voltage	$V_{CC} = \text{Max}, V_I = 5.5 \text{ V}$			1	mA
I_{IH}	High Level Input Current	$V_{CC} = \text{Max}, V_I = 2.7 \text{ V}$			50	μA
I_{IL}	Low Level Input Current	$V_{CC} = \text{Max}, V_I = 0.5 \text{ V}$			−2	mA
I_{OS}	Short Circuit Output Current	$V_{CC} = \text{Max}$ (Note 2)	DM54	−40	−100	mA
			DM74	−40	−100	
I_{CCH}	Supply Current with Outputs High	$V_{CC} = \text{Max}$		3	5	mA
I_{CCL}	Supply Current with Outputs Low	$V_{CC} = \text{Max}$		5.5	10	mA

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

Symbol	Parameter	R _L = 280Ω				Units
		C _L = 15 pF		C _L = 50 pF		
		Min	Max	Min	Max	
t _{PLH}	Propagation Delay Time Low to High Level Output	2	6	2	8	ns
t _{PHL}	Propagation Delay Time High to Low Level Output	2	7	3	10	ns

Note 1: All typicals are at $V_{CC} = 5 \text{ V}$, $T_A = 25^\circ \text{C}$.

Note 2: Not more than one output should be shorted at a time, and the duration should not exceed one second.