

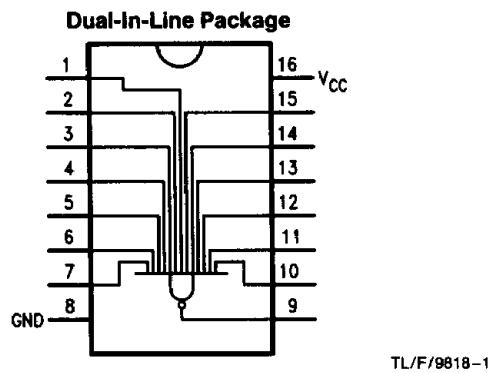


## 54LS133/DM74LS133 13-Input NAND Gate

### General Description

This device contains one, 13-input gate that performs the logic NAND functions.

### Connection Diagram



Order Number 54LS133DMQB, 54LS133FMQB,  
54LS133LMQB, DM74LS133M or DM74LS133N

See NS Package Number E20A, J16A, M16A, N16E or W16A

## 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	7V
Operating Free Air Temperature Range	
54LS	-55°C to +125°C
DM74LS	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	54LS133			DM74LS133			Units
		Min	Nom	Max	Min	Nom	Max	
V <sub>CC</sub>	Supply Voltage	4.5	5	5.5	4.75	5	5.25	V
V <sub>IH</sub>	High Level Input Voltage	2			2			V
V <sub>IL</sub>	Low Level Input Voltage			0.7			0.8	V
I <sub>OH</sub>	High Level Output Current			-0.4			-0.4	mA
I <sub>OL</sub>	Low Level Output Current			4			8	mA
T <sub>A</sub>	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 <sub>I</sub>	Input Clamp Voltage	V <sub>CC</sub> = Min, I <sub>I</sub> = -18 mA				-1.5	V
V <sub>OH</sub>	High Level Output Voltage	V <sub>CC</sub> = Min, I <sub>OH</sub> = Max V <sub>IL</sub> = Max		54LS	2.5		V
				DM74	2.7	3.4	
V <sub>OL</sub>	Low Level Output Voltage	V <sub>CC</sub> = Min, I <sub>OL</sub> = Max V <sub>IH</sub> = Min		54LS		0.4	V
				DM74		0.35	
		I <sub>OL</sub> = 4 mA, V <sub>CC</sub> = Min		DM74		0.25	
I <sub>I</sub>	Input Current @ Max Input Voltage	V <sub>CC</sub> = Max, V <sub>I</sub> = 10V				0.1	mA
I <sub>IH</sub>	High Level Input Current	V <sub>CC</sub> = Max, V <sub>I</sub> = 2.7V				20	μA
I <sub>IL</sub>	Low Level Input Current	V <sub>CC</sub> = Max, V <sub>I</sub> = 0.4V				-0.4	mA
I <sub>OS</sub>	Short Circuit Output Current	V <sub>CC</sub> = Max (Note 2)		54LS	-20	-100	mA
				DM74	-20	-100	
I <sub>CCH</sub>	Supply Current with Outputs High	V <sub>CC</sub> = Max, V <sub>IN</sub> = GND				0.5	mA
I <sub>CCL</sub>	Supply Current with Outputs Low	V <sub>CC</sub> = Max, V <sub>IN</sub> = Open				1.1	mA

Note 1: All typicals are at V<sub>CC</sub> = 5V, T<sub>A</sub> = 25°C.

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

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## Switching Characteristics

at V<sub>CC</sub> = 5V and T<sub>A</sub> = 25°C (See Section 1 for Test Waveforms and Output Load)

Symbol	Parameter	R <sub>L</sub> = 2 kΩ, C <sub>L</sub> = 15 pF		Units
		Min	Max	
t <sub>PLH</sub>	Propagation Delay Time Low to High Level Output		15	ns
t <sub>PHL</sub>	Propagation Delay Time High to Low Level Output		38	ns