

## DM74ALS133 13-Input NAND Gate

### General Description

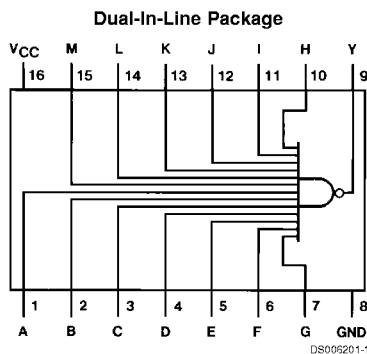
This device contains a single gate, which performs the logic NAND function.

### 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 Schottky and low power Schottky TTL counterpart
- Improved AC performance over Schottky and low power Schottky counterparts

### Connection Diagram



Order Number DM74ALS133M or DM74ALS133N  
See Package Number M16A or N16A

### Function Table

$Y = \overline{ABCDEFGHIJKLM}$

Inputs	Output
<b>A thru M</b>	<b>Y</b>
All Inputs H	L
One or More Input L	H

H = High Logic Level  
L = Low Logic Level

## Absolute Maximum Ratings (Note 1)

Supply Voltage	7V	DM74ALS	0°C to +70°C
Input Voltage	7V	Storage Temperature Range	-65°C to +150°C
Operating Free Air Temperature Range		Typical $\theta_{JA}$	
		N Package	85.0°C/W
		M Package	111.0°C/W

## Recommended Operating Conditions

Symbol	Parameter	Min	Nom	Max	Units
$V_{CC}$	Supply Voltage	4.5	5	5.5	V
$V_{IH}$	High Level Input Voltage	2			V
$V_{IL}$	Low Level Input Voltage			0.8	V
$I_{OH}$	High Level Output Current			-0.4	mA
$I_{OL}$	Low Level Output Current			8	mA
$T_A$	Free Air Operating Temperature	0		70	°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" table are not guaranteed at the absolute maximum ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

## Electrical Characteristics

over recommended operating free air temperature range. All typical values are measured at  $V_{CC} = 5V$ ,  $T_A = 25^\circ C$ .

Symbol	Parameter	Conditions	Min	Typ	Max	Units
$V_{IK}$	Input Clamp Voltage	$V_{CC} = 4.5V$ , $I_I = -18 mA$			-1.5	V
$V_{OH}$	High Level Output Voltage	$I_{OH} = -0.4 mA$ $V_{CC} = 4.5V$ to $5.5V$	$V_{CC} - 2$			V
$V_{OL}$	Low Level Output Voltage	$V_{CC} = 4.5V$	$I_{OL} = 4 mA$	0.25	0.4	V
			$I_{OL} = 8 mA$	0.35	0.5	V
$I_I$	Input Current @ 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	$\mu A$
$I_{IL}$	Low Level Input Current	$V_{CC} = 5.5V$ , $V_{IL} = 0.4V$			-0.1	mA
$I_O$	Output Drive Current	$V_{CC} = 5.5V$ , $V_O = 2.25V$	-30		-112	mA
$I_{CC}$	Supply Current	$V_{CC} = 5.5V$	Outputs High	0.24	0.34	mA
			Outputs Low	0.56	0.8	mA

## Switching Characteristics

over recommended operating free air temperature range (Note 2)

Symbol	Parameter	Conditions	Min	Max	Units
$t_{PLH}$	Propagation Delay Time Low to High Level Output	$V_{CC} = 4.5V$ to $5.5V$ $R_L = 500\Omega$	3	11	ns
$t_{PHL}$	Propagation Delay Time High to Low Level Output	$C_L = 50 pF$	5	25	ns

**Note 2:** See Section 1 for test waveforms and output load.



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