National Semiconductor Corporation

DM9002C Quad 2-Input NAND Gates

General Description

The DM9002C device is designed to be used in existing systems as replacements for Fairchild 9000-type circuits. The DM9002C circuit offers several significant advantages over 9000 type circuits, some of which are:

- Input clamp diodes
- Output short-circuit current specified to guarantee the high-level impedance.
- Power-dissipation of DM9002C circuit is in most cases lower than that for the equivalent 9002 type.

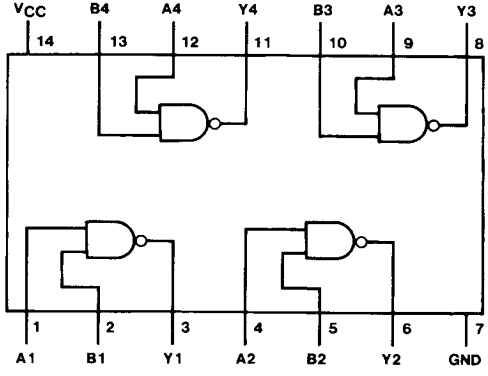
The DM9002C circuit is characterized for operation over the industrial temperature range of 0°C to 75°C.

For the new designs, the 54/74 families of TTL circuits offer the industry's broadest choice of high-performance digital circuits. Series 54/74 pin-for-pin equivalent is available for the following SSI type:

DM9000C Series	Equivalent Series 74
DM9002C	DM7400

Connection Diagrams

Dual-In-Line Package



TL/F/6594–1

Order Number DM9002CN
See NS Package Number N14A

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Absolute Maximum Ratings (Note)

Specifications for Military/Aerospace products are not contained in this datasheet. Refer to the associated reliability electrical test specifications document.

Supply Voltage	7V
Input Voltage	5.5V
Operating Free Air Temperature Range	0°C to +75°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		DM9002C			Units
			Min	Nom	Max	
V_{CC}	Supply Voltage		4.75	5	5.25	V
V_{IH}	High Level Input Voltage	0°C	1.9			V
		25°C	1.8			
		75°C	1.6			
V_{IL}	Low Level Input Voltage				0.85	V
I_{OH}	High Level Output Current				−1.2	mA
I_{OL}	Low Level Output Current				50	mA
T_A	Free Air Operating Temperature		0		75	°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} = Min, I_I = −12 mA				−1.5	V
V_{OH}	High Level Output Voltage	V_{CC} = Min, I_{OH} = Max, V_{IL} = Max		2.4			V
V_{OL}	Low Level Output Voltage	V_{CC} = Max, I_{OL} = 16 mA, V_{IH} = Min				0.45	V
		I_{OL} = 14.1 mA, V_{CC} = Min				0.45	
I_{IH}	High Level Input Current	V_{CC} = Max, V_I = 4.5V, Other Input at 0V				60	μA
I_{IL}	Low Level Input Current	V_I = 4.5V	V_{CC} = 5.25V			−1.6	mA
			V_{CC} = 4.75V			−1.41	
I_{OS}	Short Circuit Output Current	V_{CC} = Max (Note 2)		−18		−55	mA
I_{CCH}	Supply Current with Outputs High	V_{CC} = 5V				1.7	mA
I_{CCL}	Supply Current with Outputs Low	V_{CC} = 5V				6.1	mA

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
t_{PLH}	Propagation Delay Time Low to High Level Output	C_L = 15 pF, R_L = 400Ω	3		13	ns
t_{PHL}	Propagation Delay Time High to Low Level Output		3		15	ns

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

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