Gates, Series 54/74

DM7400 (SN7400) quadruple two-input NAND gate
DM7410 (SN7410) triple three-input NAND gate
DM7420 (SN7420) dual four-input NAND gate

general description

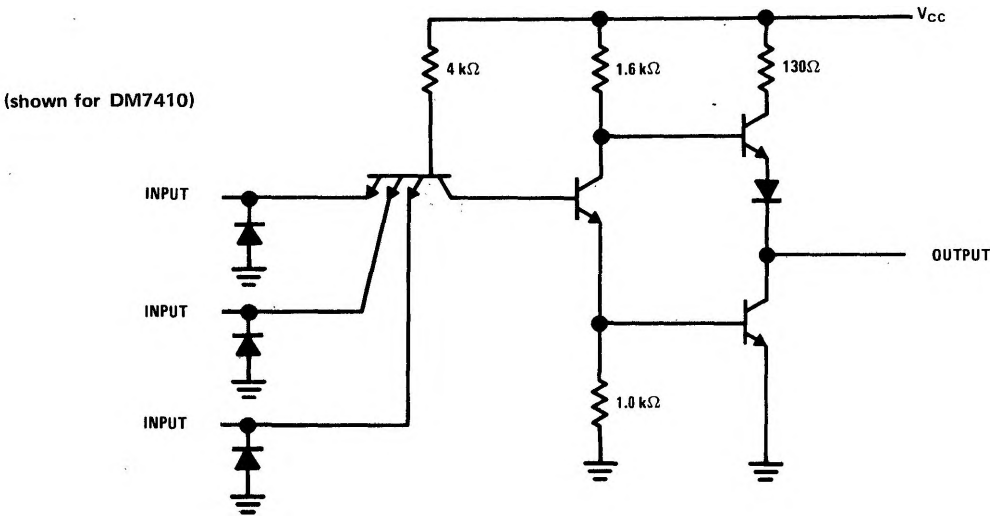
Employing TTL (Transistor-Transistor-Logic) to achieve high speed at moderate power dissipation, these gates provide the basic functions used in the implementation of digital integrated circuit systems. Characteristics of the circuits include high noise immunity, low output impedance, good capacitive drive capability, and minimal variation in switching times with temperature. The gates are compatible with and interchangeable with Series 74 equivalent.

Key features include:

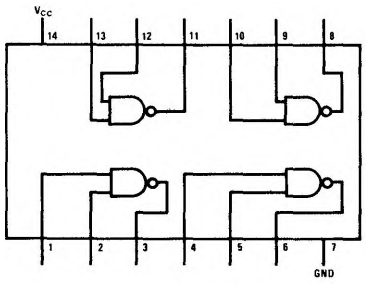
- Typical Noise Immunity 1V
- Guaranteed Noise Immunity 400 mV
- Fan Out 10
- Allowable Power Supply Variation 4.75V to 5.25V
- Average Propagation Delay 13 ns
- Average Power Dissipation 10 mW per gate

schematic and connection diagrams

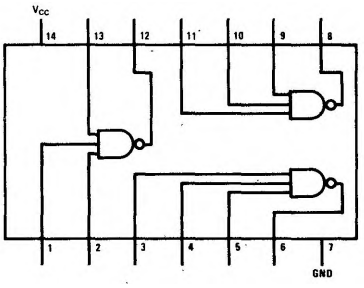
(shown for DM7410)



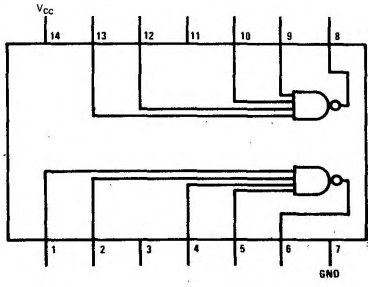
DM7400



DM7410



DM7420



absolute maximum ratings

Vcc	7.0V
Input Voltage	5.5V
Operating Temperature Range	0°C to +70°C
Storage Temperature Range	−65°C to +150°C
Fan-Out	10
Lead Temperature (Soldering, 10 sec)	300°C

electrical characteristics (Note 1)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Input Diode Clamp Voltage	V_{CC} = 5.0V, T_A = 25°C, I_{IN} = −12 mA			−1.5	V
Logical "1" Input Voltage	V_{CC} = 4.75V	2.0			V
Logical "0" Input Voltage	V_{CC} = 4.75V			0.8	V
Logical "1" Output Voltage	V_{CC} = 4.75V V_{IN} = 0.8V, I_{OUT} = −400μA	2.4			V
Logical "0" Output Voltage	V_{CC} = 4.75V V_{IN} = 2.0V, I_{OUT} = 16 mA			0.4	V
Logical "1" Input Current	V_{CC} = 5.25V V_{IN} = 2.4V			40	μA
Logical "1" Input Current	V_{CC} = 5.25V V_{IN} = 5.5V			1	mA
Logical "0" Input Current	V_{CC} = 5.25V V_{IN} = 0.4V			−1.6	mA
Output Short Circuit Current (Note 2)	V_{CC} = 5.25V V_{IN} = 0V	−18		−55	mA
Supply Current— Logical "0" (Note 3)	V_{CC} = 5.25V V_{IN} = 5.0V		3	5.1	mA
Supply Current— Logical "1" (Note 3)	V_{CC} = 5.25V V_{IN} = 0V		1	1.8	mA
Propagation Delay Time to Logical "0", t_{pd0}	V_{CC} = 5.0V, T_A = 25°C, C = 50 pF		8	15	ns
Propagation Delay Time to Logical "1", t_{pd1}	V_{CC} = 5.0V, T_A = 25°C, C = 50 pF		13	25	ns

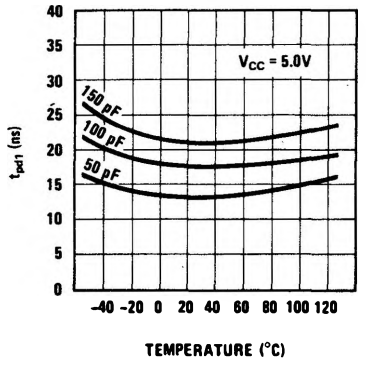
Note 1: Min/max limits apply across the guaranteed temperature range 0°C to 70°C unless otherwise specified. All typicals are given for V_{CC} = 5.0V and T_A = 25°C.

Note 2: Not more than 1 output should be shorted at a time.

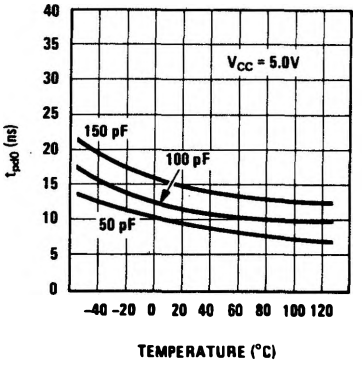
Note 3: Each gate.

typical performance characteristics

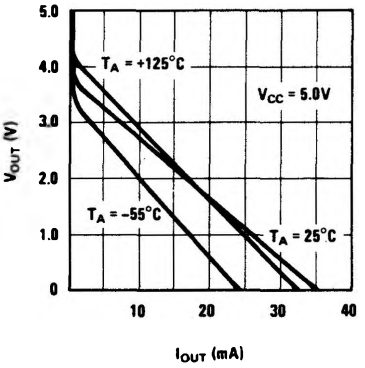
Transition Time to a Logical "1" (t_{pd1}) vs Temperature



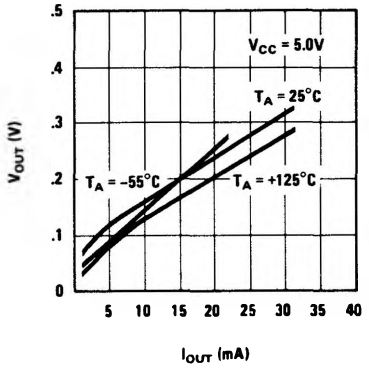
Transition Time to a Logical "0" (t_{pd0}) vs Temperature



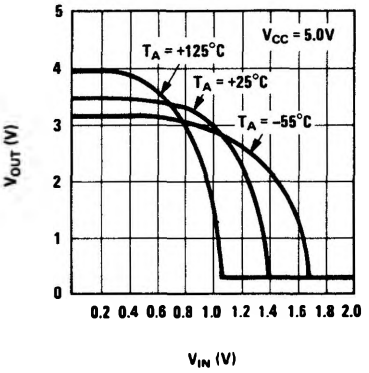
Logical "1" Output Voltage vs Source Current



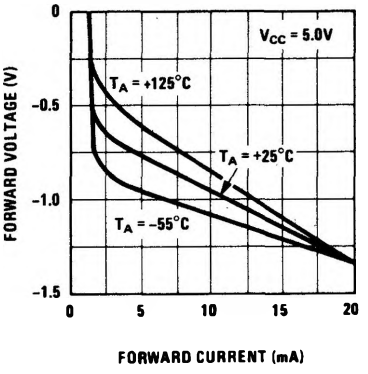
Logical "0" Output Voltage vs Sink Current



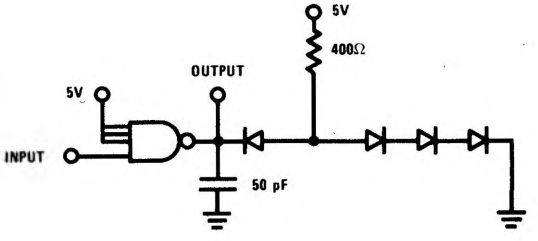
V_{IN} vs V_{OUT}



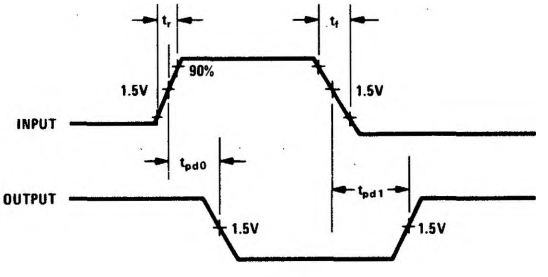
Input Clamp Diode Characteristics



ac test circuit



switching time waveform



$t_r = t_f = 10\ \mu s$
pw = 100 ns
frequency = 1 MHz
V_{CC} = 5.0V