Gates, Series 54/74

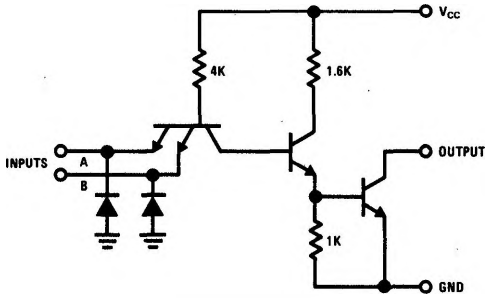
DM5401/DM7401 (SN5401/SN7401) quad two-input gate (open collector)
DM5403/DM7403 (SN5403/SN7403) quad two-input gate (open collector)
DM5405/DM7405 (SN5405/SN7405) hex inverter (open collector)

general description

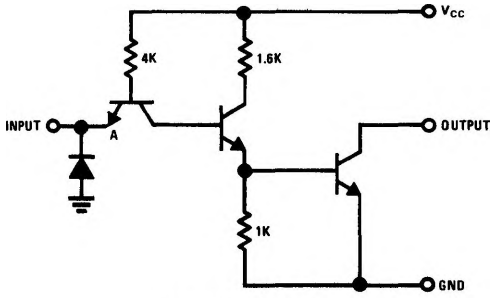
These Series 54/74 functions are designed for applications where the normal TTL "totem-pole" output configuration is not wanted. Such applications include implementation of the Wire-OR function.

Aside from the output, the circuitry is identical to the standard quad two-input gate (DM5400/DM7400) and hex inverter (DM5404/DM7404).

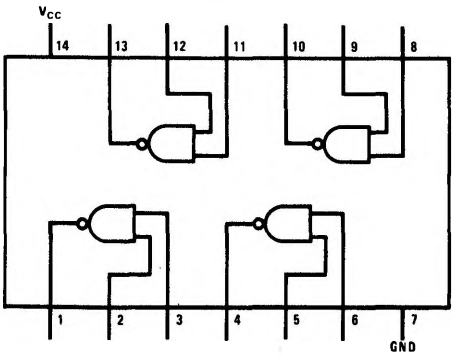
schematic and connection diagrams



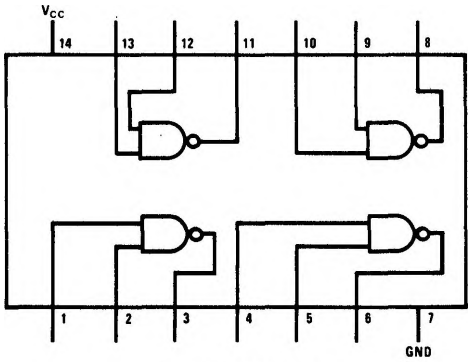
DM5401/DM7401
DM5403/DM7403



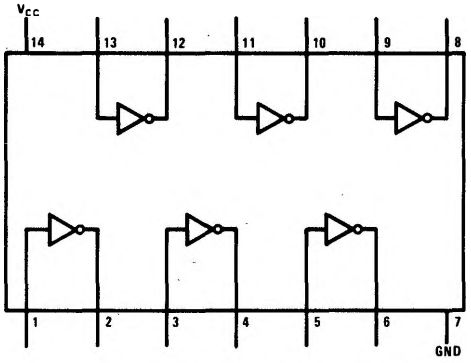
DM5405/DM7405



DM5401/DM7401



DM5403/DM7403



DM5405/DM7405

absolute maximum ratings

V_{CC}		7V
Input Voltage		5.5V
Operating Temperature Range	DM5401, DM5403, DM5405	−55°C to +125°C
	DM7401, DM7403, DM7405	0°C to 70°C
Storage Temperature Range		−65°C to +150°C
Lead Temperature (Soldering, 10 sec.)		300°C

electrical characteristics (Note 1)

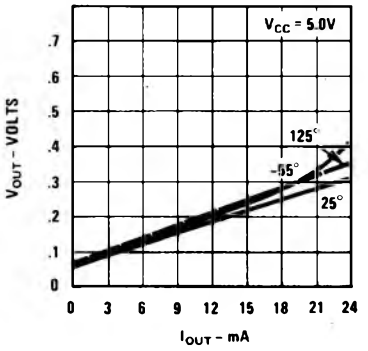
PARAMETER		CONDITIONS	MIN	TYP	MAX	UNITS
Input Diode Clamp Voltage		V_{CC} = 5.0V, T_A = 25°C, I_{IN} = −12 mA			−1.5	V
Logical "1" Input Voltage	DM5401,3,5 / DM7401,3,5	V_{CC} = 4.5V / V_{CC} = 4.75V	2.0			V
Logical "0" Input Voltage	DM5401,3,5 / DM7401,3,5	V_{CC} = 4.5V / V_{CC} = 4.75V			0.8	V
Logical "1" Output Current	DM5401,3,5 / DM7401,3,5	V_{CC} = 5.5V / V_{CC} = 5.25V, V_{IN} = 0.8V			250	μA
		V_{OUT} = 5.5V, V_{IN} = 0.0V			40	μA
Logical "0" Output Voltage	DM5401,3,5 / DM7401,3,5	V_{CC} = 4.5V / V_{CC} = 4.75V, V_{IN} = 2.0V, I_{OUT} = 16 mA			0.4	V
Logical "1" Input Current	DM5401,3,5 / DM7401,3,5	V_{CC} = 5.5V / V_{CC} = 5.25V, V_{IN} = 2.4V			40	μA
Logical "1" Input Current	DM5401,3,5 / DM7401,3,5	V_{CC} = 5.5V / V_{CC} = 5.25V, V_{IN} = 5.5V			1	mA
Logical "0" Input Current	DM5401,3,5 / DM7401,3,5	V_{CC} = 5.5V / V_{CC} = 5.25V, V_{IN} = 0.4V			−1.6	mA
Supply Current—Logical "0" (Each Gate)	DM5401,3,5 / DM7401,3,5	V_{CC} = 5.5V / V_{CC} = 5.25V, V_{IN} = 5.0V		3.0	5.1	mA
Supply Current—Logical "1" (Each Gate)	DM5401,3,5 / DM7401,3,5	V_{CC} = 5.5V / V_{CC} = 5.25V, V_{IN} = 0V		1.0	1.8	mA
Propagation Delay Time to a Logical "0", t_{pd0}		V_{CC} = 5.0V, T_A = 25°C, C_{OUT} = 15 pF, R_L = 390Ω (Note 2)	3	7.5	15	ns
Propagation Delay Time to a Logical "1", t_{pd1}		V_{CC} = 5.0V, T_A = 25°C, C_{OUT} = 15 pF, R_L = 3.9 kΩ (Note 2)	18	28	45	ns

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

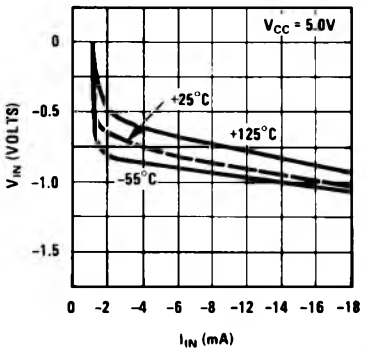
Note 2: C_{OUT} includes device output capacitance of approximately 8.5 pF and wiring capacitance.

typical performance characteristics

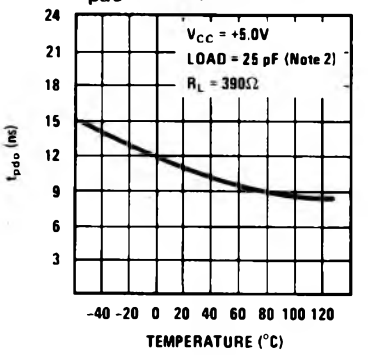
V_{OUT} vs I_{OUT} Logical "0"



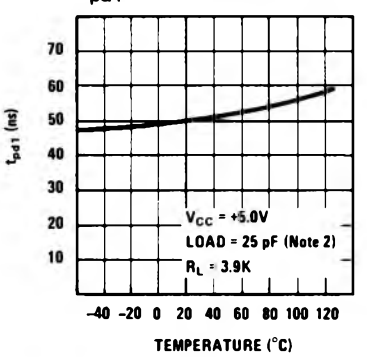
Input Clamp Diode Characteristics



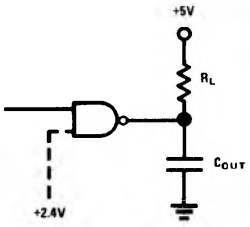
Transition Time to a Logical "0" (t_{pd0}) vs Temperature



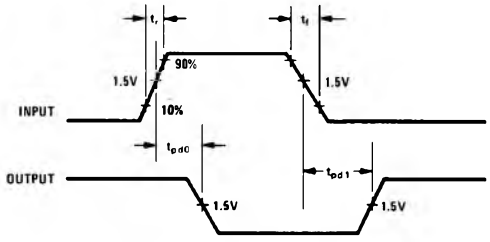
Transition Time to a Logical "1" (t_{pd1}) vs Temperature



ac test circuit



switching time waveform



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