# 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).
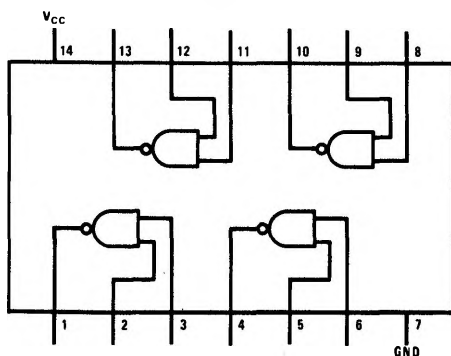
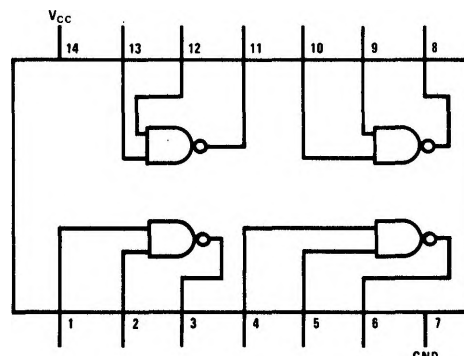## schematic and connection diagrams
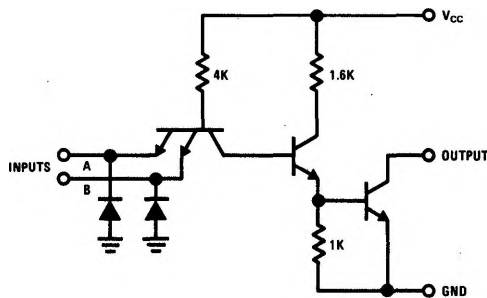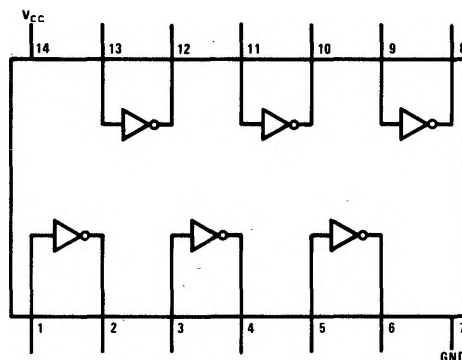

DM5401/DM7401
DM5403/DM7403
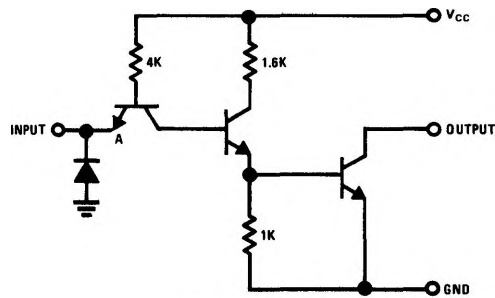
DM5405/DM7405

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 $+125^{\circ}$C
DM7401, DM7403, DM7405	0°C to 70°C
Storage Temperature Range	-65°C to $+150^{\circ}$C
Lead Temperature (Soldering, 10 sec.)	300°C

electrical characteristics (Note 1)

PARAMETER		CONDITIONS	MIN	TYP	MAX	UNITS
Input Diode Clamp Voltage		$V_{CC} = 5.0$V, $T_A = 25^{\circ}$C $I_{IN} = -12$ mA			-1.5	V
Logical "1" Input Voltage	DM5401,3,5	$V_{CC} = 4.5$V	2.0			V
	DM7401,3,5	$V_{CC} = 4.75$V				
Logical "0" Input Voltage	DM5401,3,5	$V_{CC} = 4.5$V			0.8	V
	DM7401,3,5	$V_{CC} = 4.75$V				
Logical "1" Output Current	DM5401,3,5	$V_{CC} = 5.5$V			250	μA
	DM7401,3,5	$V_{CC} = 5.25$V, $V_{IN} = 0.8$V				
		$V_{OUT} = 5.5$V, $V_{IN} = 0.0$V			40	μA
Logical "0" Output Voltage	DM5401,3,5	$V_{CC} = 4.5$V			0.4	V
	DM7401,3,5	$V_{CC} = 4.75$V, $V_{IN} = 2.0$V				
		$I_{OUT} = 16$ mA				
Logical "1" Input Current	DM5401,3,5	$V_{CC} = 5.5$V			40	μA
	DM7401,3,5	$V_{CC} = 5.25$V, $V_{IN} = 2.4$V				
Logical "1" Input Current	DM5401,3,5	$V_{CC} = 5.5$V			1	mA
	DM7401,3,5	$V_{CC} = 5.25$V, $V_{IN} = 5.5$V				
Logical "0" Input Current	DM5401,3,5	$V_{CC} = 5.5$V			-1.6	mA
	DM7401,3,5	$V_{CC} = 5.25$V, $V_{IN} = 0.4$V				
Supply Current—Logical "0" (Each Gate)	DM5401,3,5	$V_{CC} = 5.5$V		3.0	5.1	mA
	DM7401,3,5	$V_{CC} = 5.25$V, $V_{IN} = 5.0$V				
Supply Current—Logical "1" (Each Gate)	DM5401,3,5	$V_{CC} = 5.5$V		1.0	1.8	mA
	DM7401,3,5	$V_{CC} = 5.25$V, $V_{IN} = 0$V				
Propagation Delay Time to a Logical "0", t_{pd0}		$V_{CC} = 5.0$V, $T_A = 25^{\circ}$C $C_{OUT} = 15$ pF, $R_L = 390\Omega$ (Note 2)	3	7.5	15	ns
Propagation Delay Time to a Logical "1", t_{pd1}		$V_{CC} = 5.0$V, $T_A = 25^{\circ}$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.
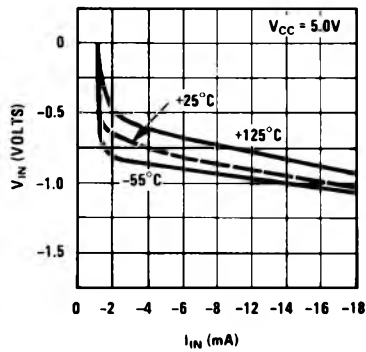   All typicals are given for $V_{CC} = 5.0$V and $T_A = 25^{\circ}$C.

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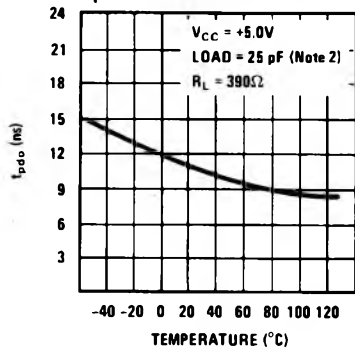
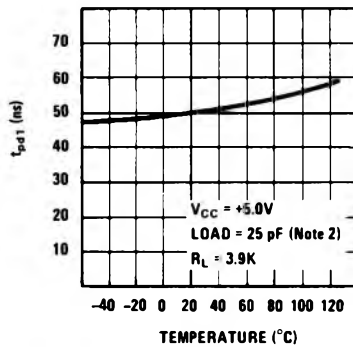# typical performance characteristics

V_{OUT} vs I_{OUT} Logical "0"
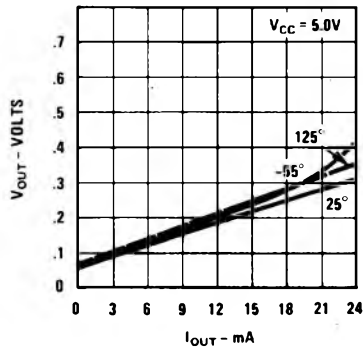
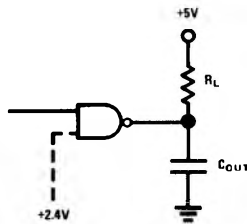### Input Clamp Diode Characteristics

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
$V_{CC} = 5.0V$