Gates, Series 54/74

DM7450 (SN7450) expandable dual 2-wide 2-input AND-OR-INVERT gate
DM7451 (SN7451) dual 2-wide 2-input AND-OR-INVERT gate
DM7453 (SN7453) expandable 4-wide 2-input AND-OR-INVERT gate
DM7454 (SN7454) 4-wide 2-input AND-OR-INVERT gate
DM7460 (SN7460) dual 4-input expander

general description

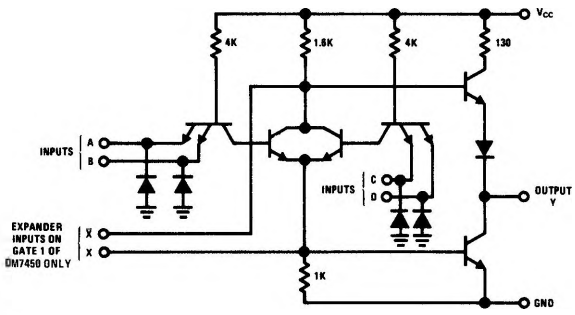
The devices described in this data sheet employ TTL to achieve high speed at moderate power dissipation. They are consolidated onto one sheet since they perform the AND-OR-INVERT function with only differing numbers of AND inputs and OR terms. Characteristics include high noise immunity, low output impedance, good capacitance drive capability, and minimal variation in switching time with temperature. The gates are compatible with and interchangeable with Series 74 devices.

Key features include:

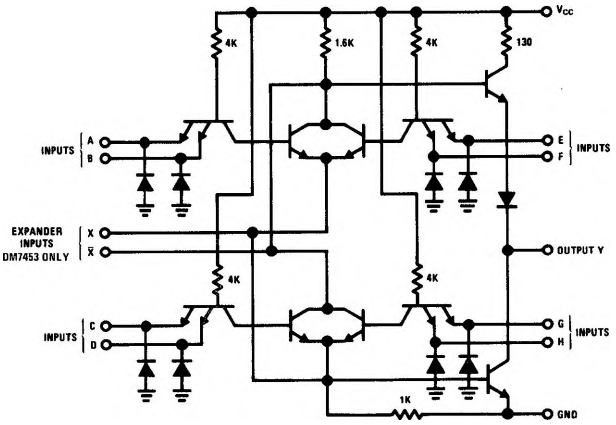
- Input Clamping Diodes
- Typical Noise Immunity 1 Volt
- Guaranteed Noise Immunity 400 mV
- Fan-out 10
- Allowable Power Supply Variation 4.75V to 5.25V
- Average Propagation Delay 13 ns
- Average Power Dissipation 14 mW/ gate

schematic diagrams

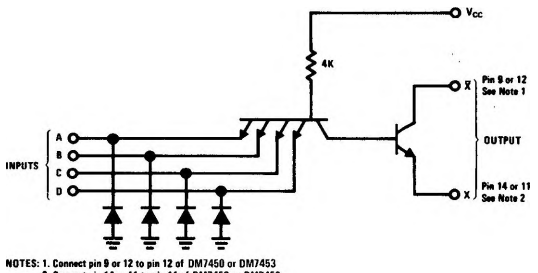
DM7450, DM7451 (each gate)



DM7453, DM7454



DM7460 (each gate)



NOTES: 1. Connect pin 9 or 12 to pin 12 of DM7450 or DM7453
2. Connect pin 14 or 11 to pin 11 of DM7450 or DM7453

absolute maximum ratings

V_{CC}	7V
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 (Notes 1, 3) (DM7450, DM7451, DM7453, DM7454)

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} = −400 μA	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" (Each Gate)	V_{CC} = 5.25V, V_{IN} = 5.0V		3.7	6.5	mA
Supply Current — Logical "1" (Each Gate)	V_{CC} = 5.25V, V_{IN} = 0V		2.0	3.6	mA
Propagation Delay Time to a Logical "0", t_{pd0}	V_{CC} = 5.0V, T_A = 25°C C = 50 pF, N = 10			15	ns
Propagation Delay Time to a Logical "1", t_{pd1}	V_{CC} = 5.0V, T_A = 25°C C = 50 pF, N = 10			25	ns
Propagation Delay Time to Logical "0" Level (through DM7450 or DM7453)	V_{CC} = 5.0V, T_A = 25°C C = 50 pF, N = 10			20	ns
Propagation Delay Time to Logical "1" Level (through DM7450 or DM7453)	V_{CC} = 5.0V, T_A = 25°C C = 50 pF, N = 10			34	ns

Note 1: Min/Max units apply across the guaranteed temperature range of 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: Measurements made with expandable inputs open.

electrical characteristics (Note 1) (DM7460)

PARAMETER	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Input Diode Clamp Voltage	V_{CC} = 5.0V I_{IN} = −12 mA	T_A = 25°C			−1.5	V
Logical "1" Input Voltage	V_{CC} = 4.75V, $R_{V_{CC}\text{ to COLLECTOR}}$ = 1.1 kΩ,	$V_{EMITTER}$ = 1V, T_A = 0°C	2			V
Logical "0" Input Voltage	V_{CC} = 4.75V, $R_{EMITTER\text{ to GRD}}$ = 1.2 kΩ, T_A = 0°C	$V_{COLLECTOR}$ = 4.5V, $I_{COLLECTOR}$ = 0.27 mA,			0.8	V
Logical "0" Output Voltage (With Respect to Emitter)	V_{CC} = 4.75V, $V_{EMITTER}$ = 1V, T_A = 0°C	V_{IN} = 2V, $R_{V_{CC}\text{ to COLLECTOR}}$ = 1.1 kΩ,			0.4	V
Logical "1" Output Current	V_{CC} = 4.75V, $V_{COLLECTOR}$ = 4.5V, T_A = 0°C	V_{IN} = 0.8V, $R_{EMITTER\text{ to GRD}}$ = 1.2 kΩ,			270	μA
Logical "0" Output Current	V_{CC} = 4.75V, $V_{EMITTER}$ = 1V	V_{IN} = 2V,	−0.43			mA
Logical "0" Input Current	V_{CC} = 5.25V,	V_{IN} = 0.4V			−1.6	mA
Logical "1" Input Current	V_{CC} = 5.25V, V_{CC} = 5.25V,	V_{IN} = 2.4V V_{IN} = 5.5V			40 1	μA mA
Logical "0" Supply Current (Each Gate)	V_{CC} = 5V, $V_{EMITTER}$ = 0.85V	V_{IN} = 5V,		0.6	1.25	mA
Logical "1" Supply Current (Each Gate)	V_{CC} = 5V, $V_{EMITTER}$ = 0.85V	V_{IN} = 0		1.0	1.8	mA

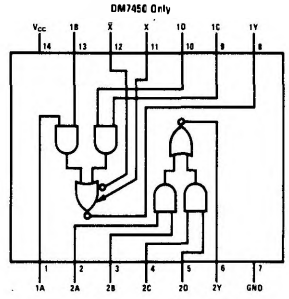
(DM7450, DM7453 only) using expander inputs, T_A = 0°C

PARAMETER	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Expander Current	V_{CC} = 4.75V, I_{SINK} = 16 mA	$V_{PIN\ 11\text{ to PIN }12}$ = 0.4V			3.1	mA
Base-Emitter Voltage of Output Transistor (Q)	V_{CC} = 4.75V, $I_{PIN\ 11}$ = 0.62 mA,	I_{SINK} = 16 mA, $R_{PIN\ 11\text{ to PIN }12}$ = 0			1	V
Logical "1" Output Voltage	V_{CC} = 4.75V, $I_{PIN\ 11}$ = 0.27 mA,	I_{LOAD} = −400 μA, $I_{PIN\ 12}$ = −0.27 mA	2.4			V
Logical "0" Output Voltage	V_{CC} = 4.75V, $I_{PIN\ 11}$ = 0.43 mA,	I_{SINK} = 16 mA, $R_{PIN\ 11\text{ to }12}$ = 130Ω			0.4	V

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

connection diagrams

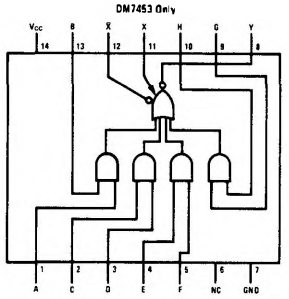
DM7450, DM7451



$Y = \overline{(AB) + (CD) + X}$ X = ABCD from DM7460

NOTES: Expander nodes X and X̄ are on the DM7450 only. If not used, leave open. Make no external connection to pins 11 and 12 of the DM7451. A total of four expander gates may be connected to the DM7450 expandable gate.

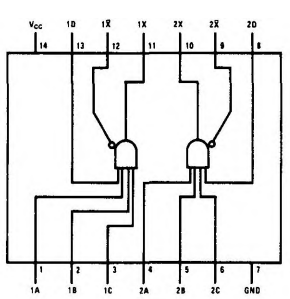
DM7453, DM7454



$Y = \overline{(AB) + (CD) + (EF) + (GH) + X}$ X = ABCD from DM7460

NOTES: Expander nodes X and X̄ are on the DM7453 only. If not used, leave open. Make no external connection to pins 11 and 12 of the DM7454. A total of four expander gates may be connected to the DM7453 expandable gate.

DM7460



X = ABCD

NOTE: Connect Pin 9 or 12 to pin 12 of DM7450 or DM7453. Connect Pin 10 or 11 to pin 11 of DM7450 or DM7453.