



Gates, Series 54/74

DM7450, DM7451, DM7453, DM7454, DM7460

- 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

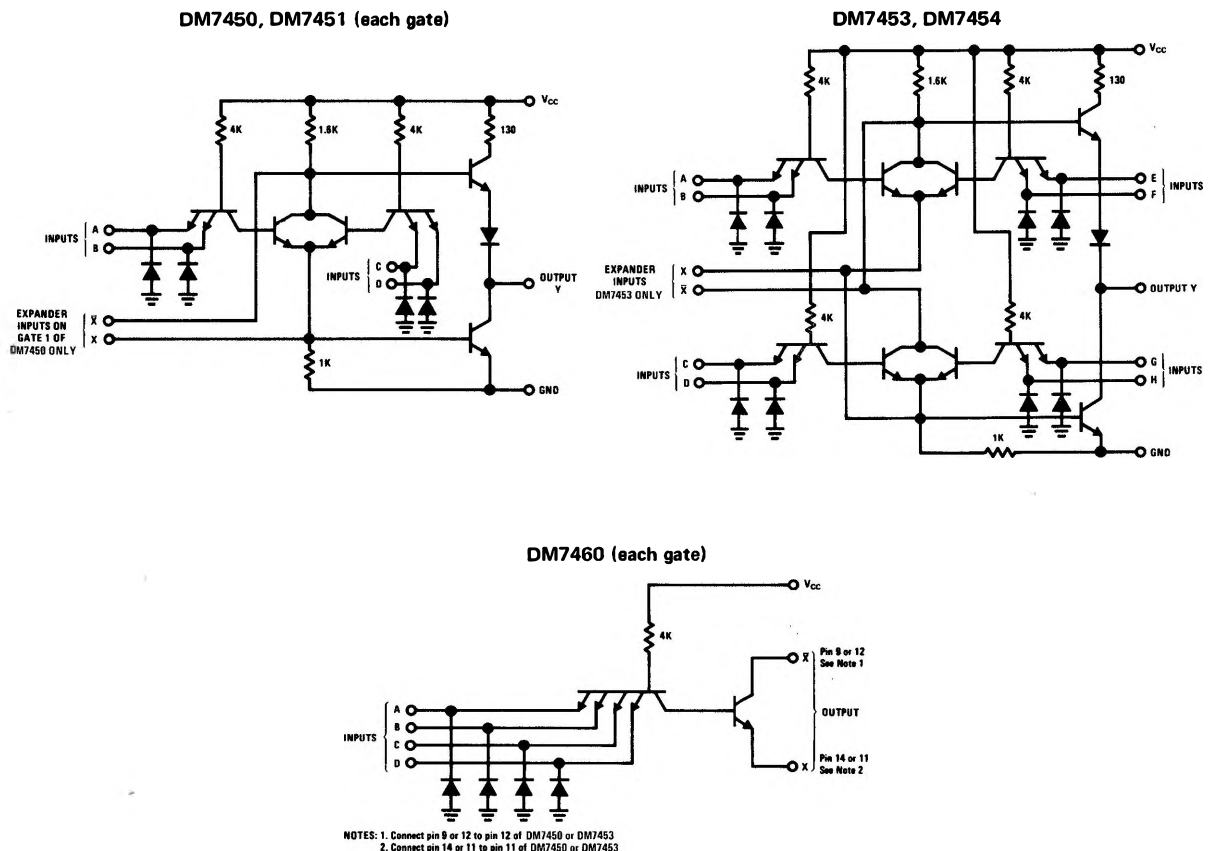
general description

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



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 | $V_{CC} = 5.0V$, $T_A = 25^\circ C$ $I_{IN} = -12 \text{ mA}$ | | | -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 | $V_{CC} = 4.75V$, $V_{IN} = 0.8V$ $I_{OUT} = -400 \mu A$ | 2.4 | | | V |
| Logical "0" Output Voltage | $V_{CC} = 4.75V$, $V_{IN} = 2.0V$ $I_{OUT} = 16 \text{ mA}$ | | | 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} | $V_{CC} = 5.0V$, $T_A = 25^\circ C$ $C = 50 \text{ pF}$, $N = 10$ | | | 15 | ns |
| Propagation Delay Time to a Logical "1", t_{pd1} | $V_{CC} = 5.0V$, $T_A = 25^\circ C$ $C = 50 \text{ pF}$, $N = 10$ | | | 25 | ns |
| Propagation Delay Time to Logical "0" Level (through DM7450 or DM7453) | $V_{CC} = 5.0V$, $T_A = 25^\circ C$ $C = 50 \text{ pF}$, $N = 10$ | | | 20 | ns |
| Propagation Delay Time to Logical "1" Level (through DM7450 or DM7453) | $V_{CC} = 5.0V$, $T_A = 25^\circ C$ $C = 50 \text{ pF}$, $N = 10$ | | | 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 $T_A = 25^\circ C$.

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

Note 3: Measurements made with expandable inputs open.

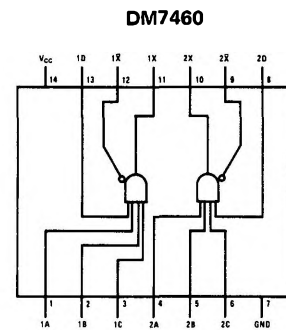
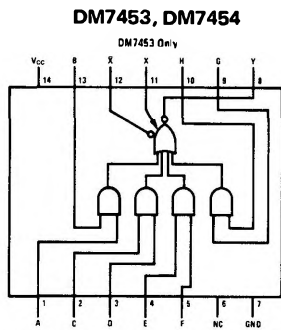
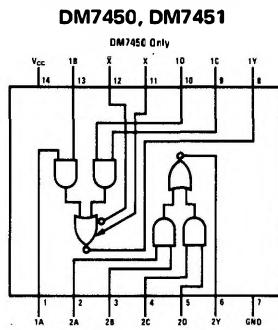
| electrical characteristics (Note 1) (DM7460) | | | | | | |
|--|---|---|-------|-----|---------|---------------|
| PARAMETER | TEST CONDITIONS | | MIN | TYP | MAX | UNIT |
| Input Diode Clamp Voltage | $V_{CC} = 5.0V$ $I_{IN} = -12\text{ mA}$ | $T_A = 25^\circ C$ | | | -1.5 | V |
| Logical "1" Input Voltage | $V_{CC} = 4.75V$, $R_{V_{CC}\text{ to COLLECTOR}} = 1.1\text{ k}\Omega$, | $V_{EMITTER} = 1V$, $T_A = 0^\circ C$ | 2 | | | V |
| Logical "0" Input Voltage | $V_{CC} = 4.75V$, $R_{EMITTER\text{ to GND}} = 1.2\text{ k}\Omega$, | $V_{COLLECTOR} = 4.5V$, $I_{COLLECTOR} = 0.27\text{ mA}$, $T_A = 0^\circ C$ | | | 0.8 | V |
| Logical "0" Output Voltage (With Respect to Emitter) | $V_{CC} = 4.75V$, $V_{EMITTER} = 1V$, | $V_{IN} = 2V$, $R_{V_{CC}\text{ to COLLECTOR}} = 1.1\text{ k}\Omega$, | | | 0.4 | V |
| Logical "1" Output Current | $V_{CC} = 4.75V$, $V_{COLLECTOR} = 4.5V$, | $V_{IN} = 0.8V$, $R_{EMITTER\text{ to GND}} = 1.2\text{ k}\Omega$, | | | 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, $T_A = 0^\circ C$

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

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

connection diagrams



NOTES: Expander nodes X and \bar{X} 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.

NOTES: Expander nodes X and \bar{X} 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.

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.