



# TTL MSI

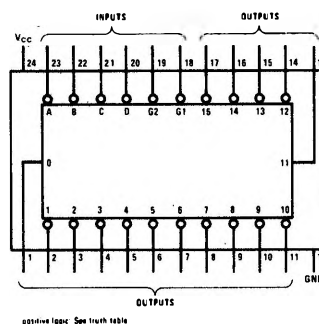
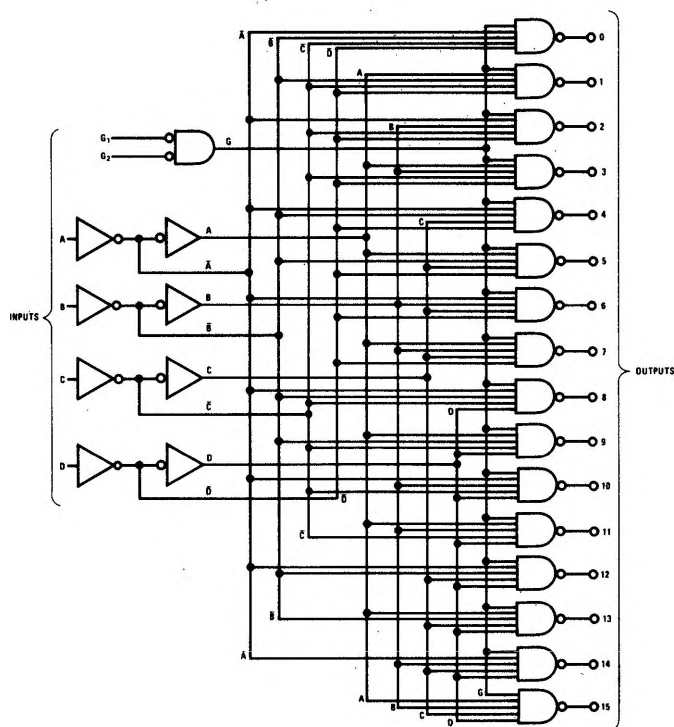
## DM54154/DM74154 (SN54154/SN74154) 4-line-to-16-line decoder/demultiplexer

### general description

The DM54154/DM74154 is a TTL monolithic 4-line-to-16-line decoder which allows decoding of a 4 bit binary coded input into one of 16 separate outputs. The device is provided with two strobe lines, both of which have to be in the low state in order to perform the decoding function; if either of the strobes is high, all 16 outputs will remain high. The device can be used as a demultiplexer by passing information from one of the strobes (the other being low) to an output selected by the 4 line input address. Other device features include:

- Equivalent to Fairchild's 9311-51/9311-59 and Texas Instruments' SN54154/SN74154
- All inputs contain clamp diodes
- Unit performs as a one line to 16 line demultiplexer
- Unit performs as a decoder of a 4 bit binary input to 1 of 16 outputs
- Typical propagation delay is 20 ns from inputs and 17 ns from strobe

### logic and connection diagrams



### truth table

| INPUTS |    |   |   |   |   | OUTPUTS |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |
|--------|----|---|---|---|---|---------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
| G1     | G2 | D | C | B | A | 0       | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| L      | L  | L | L | L | L | L       | H | H | H | H | H | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | L | L | H       | L | H | H | H | H | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | L | H | L       | H | L | H | H | H | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | L | L       | H | H | H | L | H | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | L | L       | H | L | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H | H | H | L | H | H | H | H | H  | H  | H  | H  | H  | H  |
| L      | L  | L | L | H | H | L       | H | H |   |   |   |   |   |   |   |    |    |    |    |    |    |

X = "Don't Care" Condition

**absolute maximum ratings**

|                                      |                 |
|--------------------------------------|-----------------|
| $V_{CC}$                             | 7.0V            |
| Input Voltage                        | 5.5V            |
| Operating Temperature Range          |                 |
| DM54154                              | -55°C to +125°C |
| DM74154                              | 0°C to 75°C     |
| Storage Temperature Range            | -65°C to +150°C |
| Lead Temperature (Soldering, 10 sec) | 300°C           |

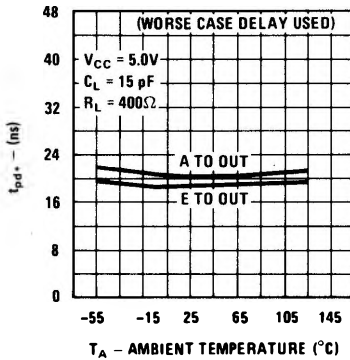
**electrical characteristics** (Note 1)

| PARAMETER                                             | CONDITIONS                                                                          | MIN        | TYP      | MAX        | UNITS    |
|-------------------------------------------------------|-------------------------------------------------------------------------------------|------------|----------|------------|----------|
| Input Diode Clamp Voltage                             | $V_{CC} = 5.0V$ , $T_A = 25^\circ C$<br>$I_{IN} = -12\text{ mA}$                    |            |          | -1.5       | V        |
| Logical "1" Input Voltage                             | DM54154 $V_{CC} = 4.5V$<br>DM74154 $V_{CC} = 4.75V$                                 | 2.0        |          |            | V        |
| Logical "0" Input Voltage                             | DM54154 $V_{CC} = 4.5V$<br>DM74154 $V_{CC} = 4.75V$                                 |            |          | 0.8        | V        |
| Logical "1" Output Voltage                            | DM54154 $V_{CC} = 4.5V$<br>DM74154 $V_{CC} = 4.75V$ , $I_{OUT} = -800\text{ }\mu A$ | 2.4        | 3.4      |            | V        |
| Logical "0" Output Voltage                            | DM54154 $V_{CC} = 4.5V$<br>DM74154 $V_{CC} = 4.75V$ , $I_{OUT} = 16\text{ mA}$      |            | 0.25     | 0.4        | V        |
| Logical "1" Input Current                             | DM54154 $V_{CC} = 5.5V$<br>DM74154 $V_{CC} = 5.25V$ , $V_{IN} = 2.4V$               |            |          | 40         | $\mu A$  |
| Logical "1" Input Current                             | DM54154 $V_{CC} = 5.5V$<br>DM74154 $V_{CC} = 5.25V$ , $V_{IN} = 5.5V$               |            |          | 1          | mA       |
| Logical "0" Input Current                             | DM54154 $V_{CC} = 5.5V$<br>DM74154 $V_{CC} = 5.25V$ , $V_{IN} = 0.4V$               |            |          | -1.6       | mA       |
| Short Circuit Current                                 | DM54154 $V_{CC} = 5.5V$<br>DM74154 $V_{CC} = 5.25V$                                 | -20<br>-18 | -30      | -55<br>-57 | mA<br>mA |
| Supply Current                                        | DM54154 $V_{CC} = 5.5V$<br>DM74154 $V_{CC} = 5.25V$                                 |            | 34<br>34 | 49<br>56   | mA       |
| Propagation Delay Time to Logical "1" from A,B,C or D | $V_{CC} = 5.0V$ , $C_L = 15\text{ pF}$ , $R_L = 400\Omega$                          |            | 18       | 36         | ns       |
| Propagation Delay Time to Logical "0" from A,B,C or D | $V_{CC} = 5.0V$ , $C_L = 15\text{ pF}$ , $R_L = 400\Omega$                          |            | 21       | 33         | ns       |
| Propagation Delay Time to Logical "1" from Strobe     | $V_{CC} = 5.0V$ , $C_L = 15\text{ pF}$ , $R_L = 400\Omega$                          |            | 17       | 30         | ns       |
| Propagation Delay Time to Logical "0" from Strobe     | $V_{CC} = 5.0V$ , $C_L = 15\text{ pF}$ , $R_L = 400\Omega$                          |            | 18       | 27         | ns       |

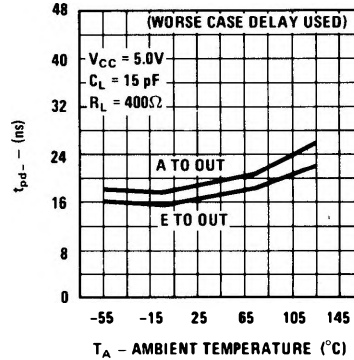
**Note 1:** Min/Max limits apply across the guaranteed temperature range unless otherwise specified. All typicals are given for  $V_{CC} = 5.0V$  and  $T_A = 25^\circ C$ . Min/Max apply to absolute values.

## typical performance characteristics

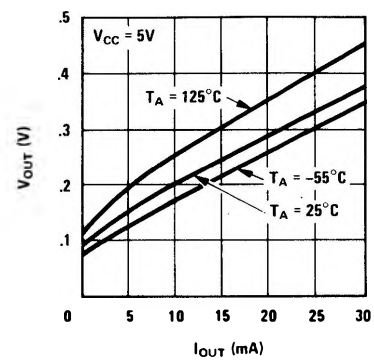
Propagation Delay to a Logical "0" ( $t_{pd0}$ ) vs Temperature



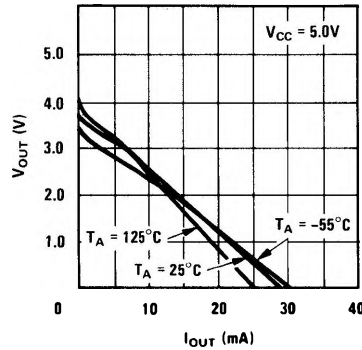
Propagation Delay to a Logical "1" ( $t_{pd1}$ ) vs Temperature



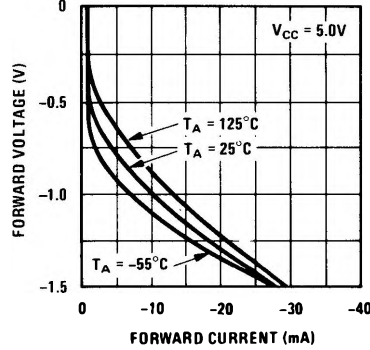
Logical "0" Output Voltage vs Sink Current



Logical "1" Output Voltage vs Source Current



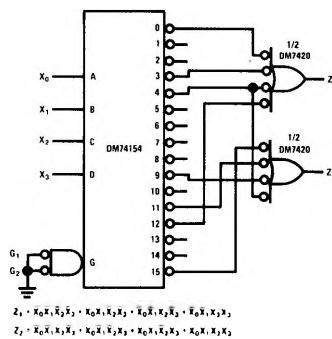
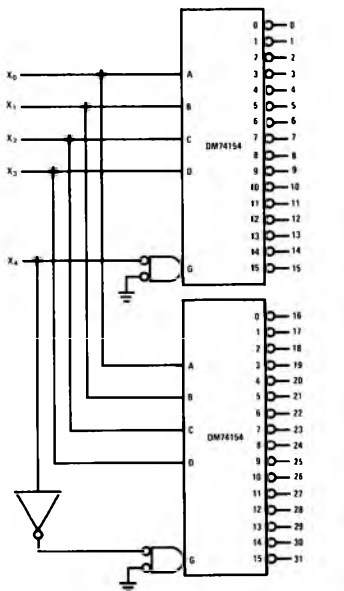
Input Clamp Diode



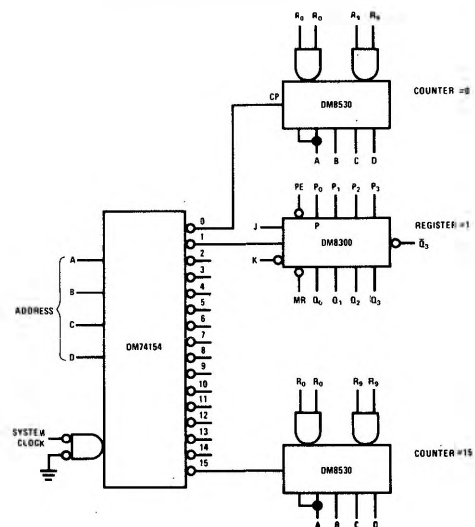
## typical applications

DM74154 Used as a Minterm Generator

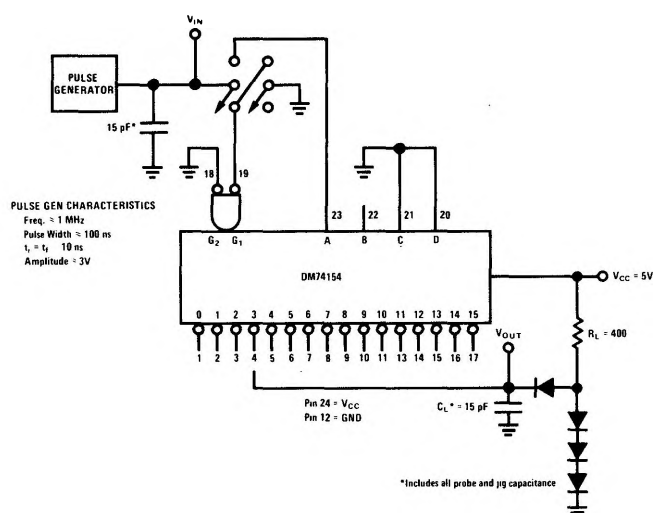
DM74154 Expanded to Perform 1 Out of 32 Decode Function



Demultiplexing System Clock



## ac test circuit



## switching time waveforms

