

DM74LS154 4-Line to 16-Line Decoder/Demultiplexer

General Description

Each of these 4-line-to-16-line decoders utilizes TTL circuitry to decode four binary-coded inputs into one of sixteen mutually exclusive outputs when both the strobe inputs, G1 and G2, are LOW. The demultiplexing function is performed by using the 4 input lines to address the output line, passing data from one of the strobe inputs with the other strobe input LOW. When either strobe input is HIGH, all outputs are HIGH. These demultiplexers are ideally suited for implementing high-performance memory decoders. All inputs are buffered and input clamping diodes are provided to minimize transmission-line effects and thereby simplify system design.

Features

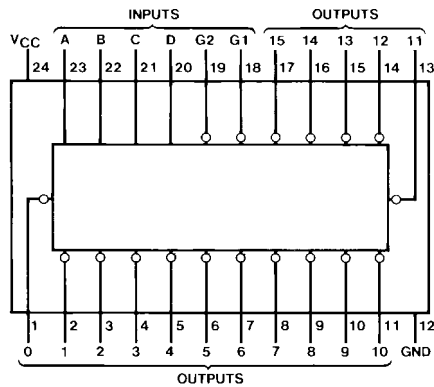
- Decodes 4 binary-coded inputs into one of 16 mutually exclusive outputs
- Performs the demultiplexing function by distributing data from one input line to any one of 16 outputs
- Input clamping diodes simplify system design
- High fan-out, low-impedance, totem-pole outputs
- Typical propagation delay
 - 3 levels of logic 23 ns
 - Strobe 19 ns
- Typical power dissipation 45 mW

Ordering Code:

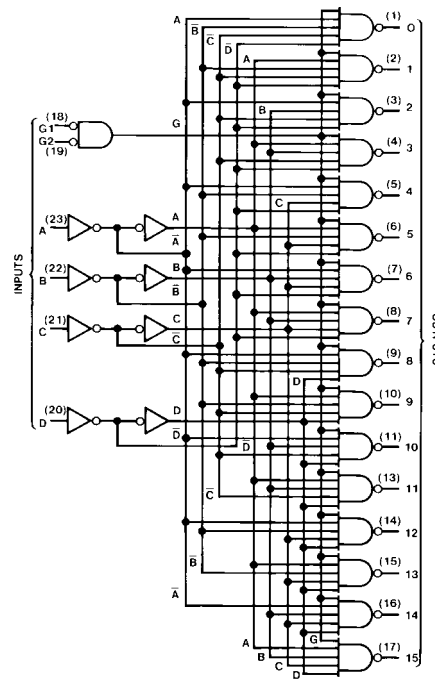
| Order Number | Package Number | Package Description |
|--------------|----------------|---------------------------------------------------------------------------|
| DM74LS154WM | M24B | 24-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide |
| DM74LS154N | N24A | 24-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-010, 0.600 Wide |

Devices also available in Tape and Reel. Specify by appending the suffix letter "X" to the ordering code.

Connection Diagram



Logic Diagram



DM74LS154

Function 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 | H |
| L | L | L | L | L | H | H | L | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H |
| L | L | L | L | H | L | H | H | L | H | H | H | H | H | H | H | H | H | H | H | H | H | H |
| L | L | L | L | H | H | H | H | L | H | H | H | H | H | H | H | H | H | H | H | H | H | H |
| L | L | L | H | L | L | H | H | H | H | L | H | H | H | H | H | H | H | H | H | H | H | H |
| L | L | L | H | L | H | H | H | H | H | L | H | H | H | H | H | H | H | H | H | H | H | H |
| L | L | L | H | H | L | H | H | H | H | H | H | L | H | H | H | H | H | H | H | H | H | H |
| L | L | L | H | H | H | H | H | H | H | H | H | H | L | H | H | H | H | H | H | H | H | H |
| L | L | H | L | L | L | H | H | H | H | H | H | H | H | L | H | H | H | H | H | H | H | H |
| L | L | H | L | L | H | H | H | H | H | H | H | H | H | H | L | H | H | H | H | H | H | H |
| L | L | H | L | H | L | H | H | H | H | H | H | H | H | H | H | L | H | H | H | H | H | H |
| L | L | H | L | H | H | H | H | H | H | H | H | H | H | H | H | H | L | H | H | H | H | H |
| L | L | H | H | L | H | H | H | H | H | H | H | H | H | H | H | H | H | H | L | H | H | H |
| L | L | H | H | H | L | H | H | H | H | H | H | H | H | H | H | H | H | H | H | L | H | H |
| L | L | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | L | H |
| L | H | X | X | X | X | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H |
| H | L | X | X | X | X | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H |
| H | H | X | X | X | X | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H | H |

H = HIGH Level
 L = Low Level
 X = Don't Care

Absolute Maximum Ratings(Note 1)

| | |
|--------------------------------------|-----------------|
| Supply Voltage | 7V |
| Input Voltage | 7V |
| Operating Free Air Temperature Range | 0°C to +70°C |
| Storage Temperature Range | -65°C to +150°C |

Note 1: The "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the Electrical Characteristics tables are not guaranteed at the absolute maximum ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

Recommended Operating Conditions

| Symbol | Parameter | Min | Nom | Max | Units |
|-----------------|--------------------------------|------|-----|------|-------|
| V _{CC} | Supply Voltage | 4.75 | 5 | 5.25 | V |
| V _{IH} | HIGH Level Input Voltage | 2 | | | V |
| V _{IL} | LOW Level Input Voltage | | | 0.8 | V |
| I _{OH} | HIGH Level Output Current | | | -0.4 | mA |
| I _{OL} | LOW Level Output Current | | | 8 | mA |
| T _A | Free Air Operating Temperature | 0 | | 70 | °C |

Electrical Characteristics

over recommended operating free air temperature range (unless otherwise noted)

| Symbol | Parameter | Conditions | Min | Typ (Note 2) | Max | Units |
|-----------------|-----------------------------------|----------------------------------------------------------------------------------------------|-----|-----------------|------|-------|
| V _I | Input Clamp Voltage | V _{CC} = Min, I _I = -18 mA | | | -1.5 | V |
| V _{OH} | HIGH Level Output Voltage | V _{CC} = Min, I _{OH} = Max V _{IL} = Max, V _{IH} = Min | 2.7 | 3.4 | | V |
| V _{OL} | LOW Level Output Voltage | V _{CC} = Min, I _{OL} = Max | | 0.25 | 0.4 | V |
| | | V _{IL} = Max, V _{IH} = Min | | 0.35 | 0.5 | |
| | | I _{OL} = 4 mA, V _{CC} = Min | | 0.25 | 0.4 | |
| I _I | Input Current @ Max Input Voltage | V _{CC} = Max, V _I = 7V | | | 0.1 | mA |
| I _{IH} | HIGH Level Input Current | V _{CC} = Max, V _I = 2.7V | | | 20 | μA |
| I _{IL} | LOW Level Input Current | V _{CC} = Max, V _I = 0.4V | | | -0.4 | mA |
| I _{OS} | Short Circuit Output Current | V _{CC} = Max (Note 3) | -20 | | -100 | mA |
| I _{CC} | Supply Current | V _{CC} = Max (Note 4) | | 9 | 14 | mA |

Note 2: All typicals are at V_{CC} = 5V, T_A = 25°C.

Note 3: Not more than one output should be shorted at a time, and the duration should not exceed one second.

Note 4: I_{CC} is measured with all outputs OPEN and all inputs GROUNDED.

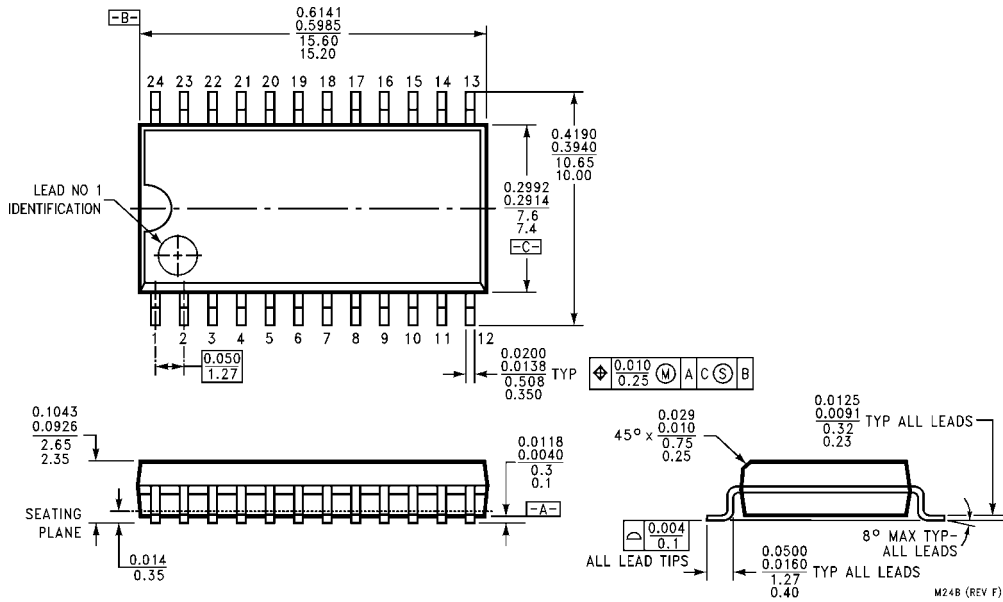
Switching Characteristics

at V_{CC} = 5V and T_A = 25°C

| Symbol | Parameter | From (Input) To (Output) | R _L = 2 kΩ | | | | Units |
|------------------|----------------------------------------------------|-----------------------------|------------------------|-----|------------------------|-----|-------|
| | | | C _L = 15 pF | | C _L = 50 pF | | |
| | | | Min | Max | Min | Max | |
| t _{PLH} | Propagation Delay Time LOW-to-HIGH Level Output | Data to Output | | 30 | | 35 | ns |
| t _{PHL} | Propagation Delay Time HIGH-to-LOW Level Output | Data to Output | | 30 | | 35 | ns |
| t _{PLH} | Propagation Delay Time LOW-to-HIGH Level Output | Strobe to Output | | 20 | | 25 | ns |
| t _{PHL} | Propagation Delay Time HIGH-to-LOW Level Output | Strobe to Output | | 25 | | 35 | ns |

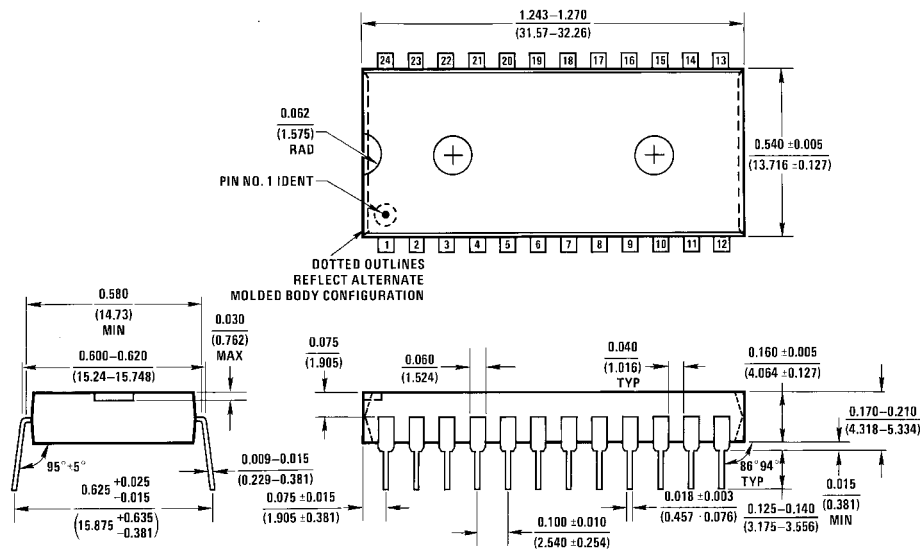
DM74LS154

Physical Dimensions inches (millimeters) unless otherwise noted



**24-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide
Package Number M24B**

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



N24A (REV E)

24-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-010, 0.600 Wide Package Number N24A

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