FAIRCHILD SEMICONDUCTOR™

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# DM74LS259
# 8-Bit Addressable Latches

## General Description

These 8-bit addressable latches are designed for general purpose storage applications in digital systems. Specific uses include working registers, serial-holding registers, and active-high decoders or demultiplexers. They are multifunctional devices capable of storing single-line data in eight addressable latches, and being a 1-of-8 decoder or demultiplexer with active-high outputs.

Four distinct modes of operation are selectable by controlling the clear and enable inputs as enumerated in the function table. In the addressable-latch mode, data at the data-in terminal is written into the addressed latch. The addressed latch will follow the data input with all unaddressed latches remaining in their previous states. In the memory mode, all latches remain in their previous states and are unaffected by the data or address inputs. To eliminate the possibility of entering erroneous data in the latches, the enable should be held HIGH (inactive) while the address lines are changing. In the 1-of-8 decoding or demultiplexing mode, the addressed output will follow the level of the D input with all other outputs LOW. In the clear mode, all outputs are LOW and unaffected by the address and data inputs.

## Features

- 8-Bit parallel-out storage register performs serial-to-parallel conversion with storage
- Asynchronous parallel clear
- Active high decoder
- Enable/disable input simplifies expansion
- Direct replacement for Fairchild DM9334
- Expandable for N-bit applications
- Four distinct functional modes
- Typical propagation delay times:
  - Enable-to-output 18 ns
  - Data-to-output 16 ns
  - Address-to-output 21 ns
  - Clear-to-output 17 ns
- Fan-out
  - $I_{OL}$ (sink current) 8 mA
  - $I_{OH}$ (source current) –0.4 mA
- Typical $I_{CC}$ 22 mA

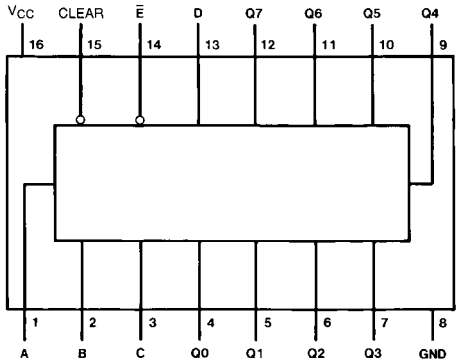
## Ordering Code:

| Order Number | Package Number | Package Description |
|---|---|---|
| DM74LS259M | M16A | 16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150 Narrow |
| DM74LS259WM | M16B | 16-Lead Small Outline Intergrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide |
| DM74LS259N | N16E | 16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide |

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

## Connection Diagram




## Function Table

| Inputs | | Output of Addressed Latch | Each Other Output | Function |
|---|---|---|---|---|
| Clear | $\overline{E}$ | | | |
| H | L | D | $Q_{i0}$ | Addressable Latch |
| H | H | $Q_{i0}$ | $Q_{i0}$ | Memory |
| L | L | D | L | 8-Line Demultiplexer |
| L | H | L | L | Clear |

## Latch Selection Table

| Select Inputs | | | Latch Addressed |
|---|---|---|---|
| C | B | A | |
| L | L | L | 0 |
| L | L | H | 1 |
| L | H | L | 2 |
| L | H | H | 3 |
| H | L | L | 4 |
| H | L | H | 5 |
| H | H | L | 6 |
| H | H | H | 7 |

H = HIGH Level
L = LOW Level
D = the Level of the Data Input
$Q_{i0}$ = the Level of $Q_i$ (i = 0, 1,...7, as Appropriate) before the Indicated Steady-State Input Conditions Were Established.

## 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" table 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 |
| $t_W$ | Pulse Width | Enable | 15 | | | ns |
| | (Note 5) | Clear | 15 | | | |
| $t_{SU}$ | Setup Time | Data | 15↑ | | | ns |
| | (Note 2)(Note 3)(Note 4)(Note 5) | Select | 15↓ | | | |
| $t_H$ | Hold Time | Data | 2.5↑ | | | ns |
| | (Note 2)(Note 3)(Note 5) | Select | 2.5↑ | | | |
| $T_A$ | Free Air Operating Temperature | | 0 | | 70 | °C |

**Note 2:** The symbols (↓, ↑) indicate the edge of the clock pulse used for reference: ↑ for rising edge, ↓ for falling edge.

**Note 3:** Setup and hold times are with reference to the enable input.

**Note 4:** The select-to-enable setup time is the time before the HIGH-to-LOW enable transition that the select must be stable so that the correct latch is selected and the others not affected.

**Note 5:** $T_A = 25°C$ and $V_{CC} = 5V$.

## Electrical Characteristics

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

| Symbol | Parameter | Conditions | Min | Typ (Note 6) | 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<br>$V_{IL}$ = Max, $V_{IH}$ = Min | 2.7 | 3.4 | | V |
| $V_{OL}$ | LOW Level Output Voltage | $V_{CC}$ = Min, $I_{OL}$ = Max<br>$V_{IL}$ = Max, $V_{IH}$ = Min | | 0.35 | 0.5 | V |
| | | $I_{OL}$ = 4 mA, $V_{CC}$ = Min | | 0.25 | 0.4 | |
| $I_I$ | Input Current @ Max Input Voltage | $V_{CC}$ = Max, $V_I$ = 7V<br>$V_I$ = 10V | | | 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 |
| | Enable | $V_{CC}$ = Max, $V_I$ = 0.4V | | | −0.8 | |
| $I_{OS}$ | Short Circuit Output Current | $V_{CC}$ = Max (Note 7) | −20 | | −100 | mA |
| $I_{CC}$ | Supply Current | $V_{CC}$ = Max (Note 8) | | 22 | 36 | mA |

**Note 6:** All typicals are at $V_{CC} = 5V$, $T_A = 25°C$.

**Note 7:** Not more than one output should be shorted at a time, and the duration should not exceed one second.

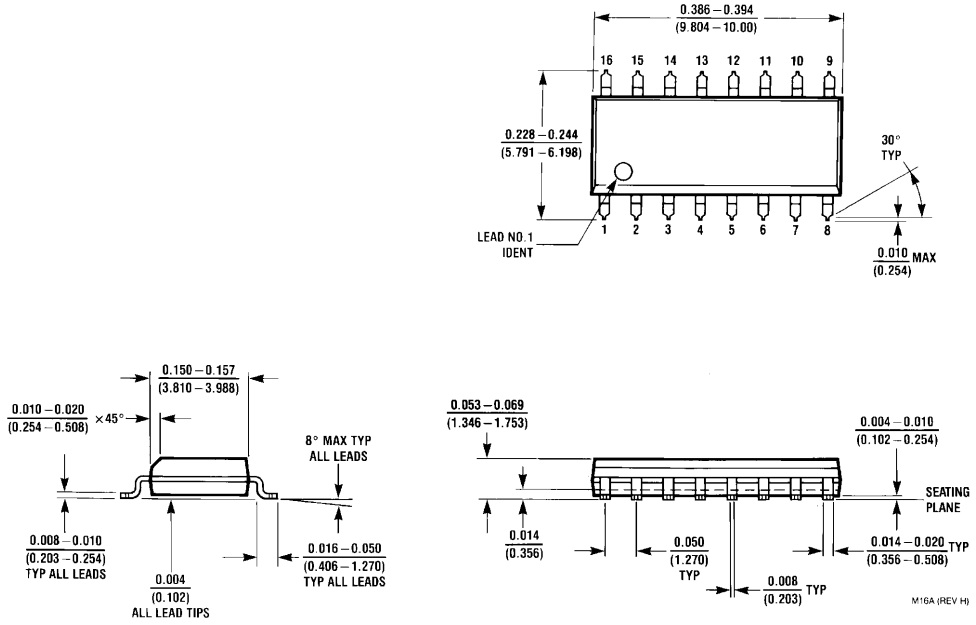
**Note 8:** $I_{CC}$ is measured with all inputs at 4.5V, and all outputs OPEN.

## Switching Characteristics

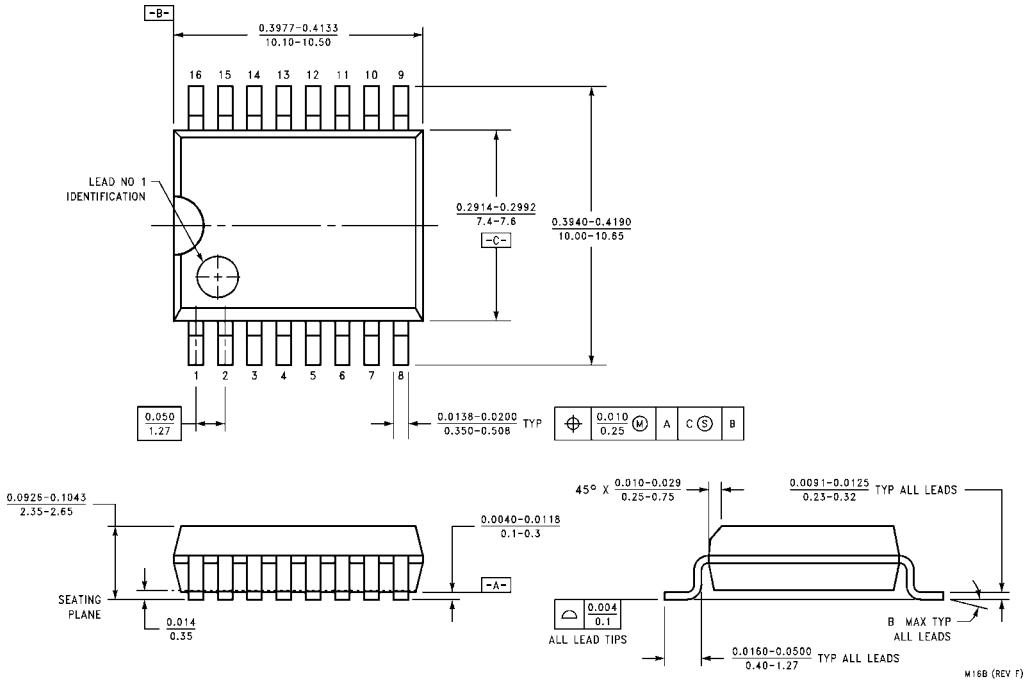
at $V_{CC}$ = 5V and $T_A$ = 25°C

| Symbol | Parameter | From (Input) To (Output) | $C_L$ = 50 pF, $R_L$ = 2 kΩ | | Units |
|---|---|---|---|---|---|
| | | | Min | Max | |
| $t_{PLH}$ | Propagation Delay Time LOW-to-HIGH Level Output | Enable to Output | | 38 | ns |
| $t_{PHL}$ | Propagation Delay Time HIGH-to-LOW Level Output | Enable to Output | | 32 | ns |
| $t_{PLH}$ | Propagation Delay Time LOW-to-HIGH Level Output | Data to Output | | 35 | ns |
| $t_{PHL}$ | Propagation Delay Time HIGH-to-LOW Level Output | Data to Output | | 30 | ns |
| $t_{PLH}$ | Propagation Delay Time LOW-to-HIGH Level Output | Select to Output | | 41 | ns |
| $t_{PHL}$ | Propagation Delay Time HIGH-to-LOW Level Output | Select to Output | | 38 | ns |
| $t_{PHL}$ | Propagation Delay Time HIGH-to-LOW Level Output | Clear to Output | | 36 | ns |

## Physical Dimensions inches (millimeters) unless otherwise noted

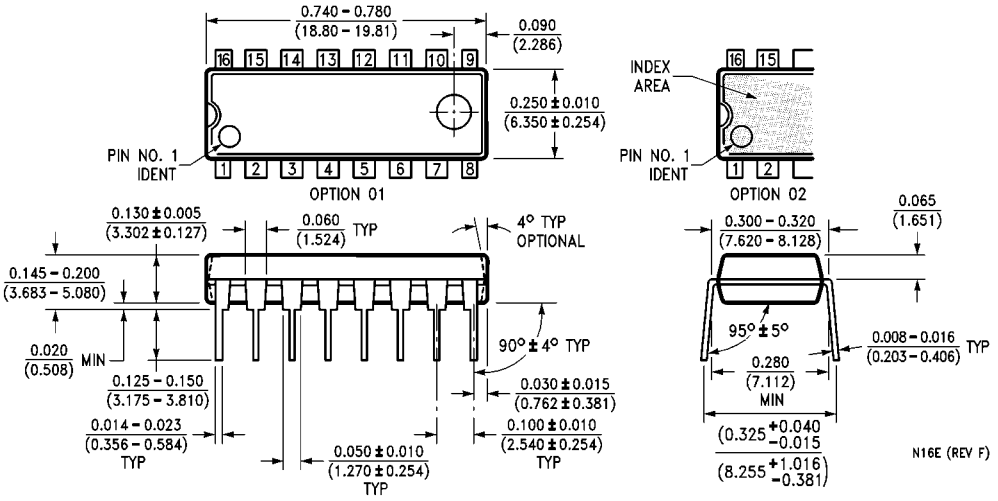



**16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150 Narrow**
**Package Number M16A**




**16-Lead Small Outline Intergrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide**
**Package Number M16B**

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




**16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide**
**Package Number N16E**