

## DM81LS95A • DM81LS96A • DM81LS97A 3-STATE Octal Buffer

### General Description

These devices provide eight, two-input buffers in each package. All employ low-power-Schottky TTL technology. One of the two inputs to each buffer is used as a control line to gate the output into the high-impedance state, while the other input passes the data through the buffer. The DM81LS95A and DM81LS97A present true data at the outputs, while the DM81LS96A is inverting. On the DM81LS95A and DM81LS96A versions, all eight 3-STATE enable lines are common, with access through a 2-input NOR gate. On the DM81LS97A version, four buffers are enabled from one common line, and the other four buffers are enabled from another common line. In all cases the outputs are placed in the 3-STATE condition by applying a high logic level to the enable pins.

### Features

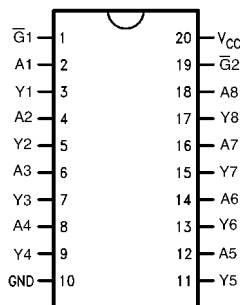
- Typical power dissipation  
DM81LS95A, DM81LS97A 80 mW  
DM81LS96A 65 mW
- Typical propagation delay  
DM81LS95A, DM81LS97A 15 ns  
DM81LS96A 10 ns
- Low power-Schottky, 3-STATE technology

### Ordering Code:

| Order Number | Package Number | Package Description                                                       |
|--------------|----------------|---------------------------------------------------------------------------|
| DM81LS95AWM  | M20B           | 20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide |
| DM81LS95AN   | N20A           | 20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide     |
| DM81LS96AWM  | M20B           | 20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide |
| DM81LS96AN   | N20A           | 20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide     |
| DM81LS97AN   | N20A           | 20-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



### Pin Descriptions

#### DM81LS95A and DM81LS96A

| Pin Names | Descriptions                       |
|-----------|------------------------------------|
| A1–A8     | Inputs                             |
| Y1–Y8     | Outputs                            |
| G1–G2     | Active LOW Output Enables (Note 1) |

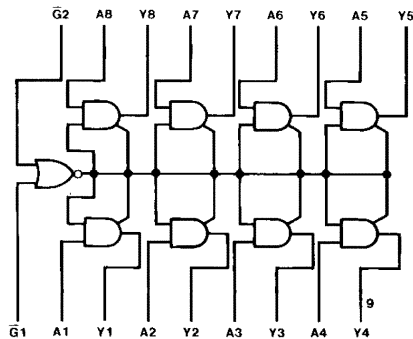
Note 1: Both G1 and G2 must be LOW for outputs to be enabled.

#### DM81LS97A

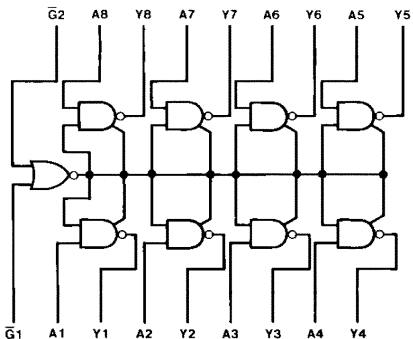
| Pin Names | Descriptions                     |
|-----------|----------------------------------|
| A1–A8     | Inputs                           |
| Y1–Y8     | Outputs                          |
| G1        | Active LOW Output Enable (Y1–Y4) |
| G2        | Active LOW Output Enable (Y5–Y8) |

## Logic Symbols

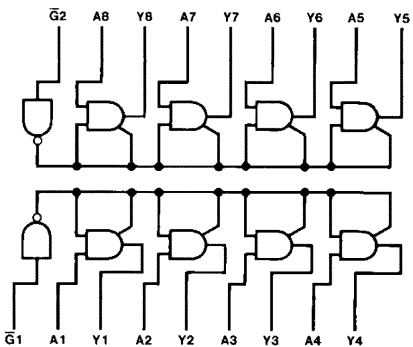
DM81LS95A



DM81LS96A



DM81LS97A



## Truth Tables

DM81LS95A

| Inputs          |                 |   | Output<br>Y |
|-----------------|-----------------|---|-------------|
| $\overline{G1}$ | $\overline{G2}$ | A |             |
| H               | X               | X | Hi-Z        |
| X               | H               | X | Hi-Z        |
| L               | L               | H | H           |
| L               | L               | L | L           |

DM81LS96A

| Inputs          |                 |   | Output<br>Y |
|-----------------|-----------------|---|-------------|
| $\overline{G1}$ | $\overline{G2}$ | A |             |
| H               | X               | X | Hi-Z        |
| X               | H               | X | Hi-Z        |
| L               | L               | H | L           |
| L               | L               | L | H           |

DM81LS97A

| Inputs          |       | Output<br>Y1-Y4 |
|-----------------|-------|-----------------|
| $\overline{G1}$ | A1-A4 |                 |
| H               | X     | Hi-Z            |
| L               | H     | H               |
| L               | L     | L               |
| $\overline{G2}$ | A5-A6 | Y5-Y8           |
| H               | X     |                 |
| L               | H     | H               |
| L               | L     | L               |

**Absolute Maximum Ratings**(Note 2)

|                                      |                 |
|--------------------------------------|-----------------|
| 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 2:** 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 <sub>CC</sub> | Supply Voltage                 | 4.75 | 5   | 5.25 | V     |
| V <sub>IH</sub> | HIGH Level Input Voltage       | 2    |     |      | V     |
| V <sub>IL</sub> | LOW Level Input Voltage        |      |     | 0.8  | V     |
| I <sub>OH</sub> | HIGH Level Output Current      |      |     | –5.2 | mA    |
| I <sub>OL</sub> | LOW Level Output Current       |      |     | 24   | mA    |
| T <sub>A</sub>  | Free Air Operating Temperature | 0    |     | 70   | °C    |

**DC Electrical Characteristics** DM81LS95A and DM81LS97A

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

| Symbol    | Parameter                                                             | Conditions                                                                                                                                | Min | Typ<br>(Note 3) | Max               | Units         |
|-----------|-----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|-----|-----------------|-------------------|---------------|
| $V_I$     | Input Clamp Voltage                                                   | $V_{CC} = \text{Min}, I_I = -18 \text{ mA}$                                                                                               |     |                 | -1.5              | V             |
| $V_{OH}$  | HIGH Level Output Voltage                                             | $V_{CC} = \text{Min}, I_{OH} = \text{Max}$<br>$V_{IL} = \text{Max}, V_{IH} = \text{Min}$                                                  | 2.7 |                 |                   | V             |
| $V_{OL}$  | LOW Level Output Voltage                                              | $V_{CC} = \text{Min}, I_{OL} = \text{Max}$<br>$I_{OL} = \text{Max}, V_{IH} = \text{Min}$<br>$I_{OL} = 12 \text{ mA}, V_{CC} = \text{Min}$ |     |                 | 0.5<br>0.4        | V             |
| $I_I$     | Input Current @ Max<br>Input Voltage                                  | $V_{CC} = \text{Max}, V_I = 7\text{V}$                                                                                                    |     |                 | 0.1               | mA            |
| $I_{IH}$  | HIGH Level Input Current                                              | $V_{CC} = \text{Max}, V_I = 2.7\text{V}$                                                                                                  |     |                 | 20                | $\mu\text{A}$ |
| $I_{IL}$  | LOW Level Input Current                                               | $V_{CC} = \text{Max}$<br>$V_I = 0.5\text{V}$ A (Note 4)<br>$V_I = 0.4\text{V}$ A (Note 5)<br>$\overline{G}$                               |     |                 | -20<br>-50<br>-50 | $\mu\text{A}$ |
| $I_{OZH}$ | Off-State Output Current<br>with HIGH Level Output<br>Voltage Applied | $V_{CC} = \text{Max}, V_O = 2.4\text{V}$<br>$V_{IH} = \text{Min}, V_{IL} = \text{Max}$                                                    |     |                 | 20                | $\mu\text{A}$ |
| $I_{OZL}$ | Off-State Output Current<br>with LOW Level Output<br>Voltage Applied  | $V_{CC} = \text{Max}, V_O = 0.4\text{V}$<br>$V_{IH} = \text{Min}, V_{IL} = \text{Max}$                                                    |     |                 | -20               | $\mu\text{A}$ |
| $I_{OS}$  | Short Circuit<br>Output Current                                       | $V_{CC} = \text{Max}$<br>(Note 6)                                                                                                         | -20 |                 | -100              | mA            |
| $I_{CC}$  | Supply Current                                                        | $V_{CC} = \text{Max}$ (Note 4)                                                                                                            |     | 16              | 26                | mA            |

**Note 3:** All typicals are at  $V_{CC} = 5\text{V}$ ,  $T_A = 25^\circ\text{C}$ .**Note 4:** Both  $\overline{G}$  inputs are at 2V.**Note 5:** Both  $\overline{G}$  inputs are at 0.4V.**Note 6:** Not more than one output should be shorted at a time, and the duration should not exceed one second.**AC Electrical Characteristics** DM81LS95A and DM81LS97A $V_{CC} = 5\text{V}$ ,  $T_A = 25^\circ\text{C}$ 

| Symbol           | Parameter                                              | R <sub>L</sub> = 667 Ω |     |                         |     | Units |
|------------------|--------------------------------------------------------|------------------------|-----|-------------------------|-----|-------|
|                  |                                                        | C <sub>L</sub> = 50 pF |     | C <sub>L</sub> = 150 pF |     |       |
|                  |                                                        | Min                    | Max | Min                     | Max |       |
| t <sub>PLH</sub> | Propagation Delay Time<br>LOW-to-HIGH Level Output     |                        | 16  |                         | 25  | ns    |
| t <sub>PHL</sub> | Propagation Delay Time<br>HIGH-to-LOW Level Output     |                        | 28  |                         | 40  | ns    |
| t <sub>PZH</sub> | Output Enable Time<br>to HIGH Level Output             |                        | 25  |                         | 30  | ns    |
| t <sub>PZL</sub> | Output Enable Time<br>to LOW Level Output              |                        | 30  |                         | 42  | ns    |
| t <sub>PHZ</sub> | Output Disable Time<br>from HIGH Level Output (Note 7) |                        | 20  |                         |     | ns    |
| t <sub>PLZ</sub> | Output Disable Time<br>from LOW Level Output (Note 7)  |                        | 27  |                         |     | ns    |

**Note 7:**  $C_L = 5 \text{ pF}$ .

**DC Electrical Characteristics** DM81LS96A

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

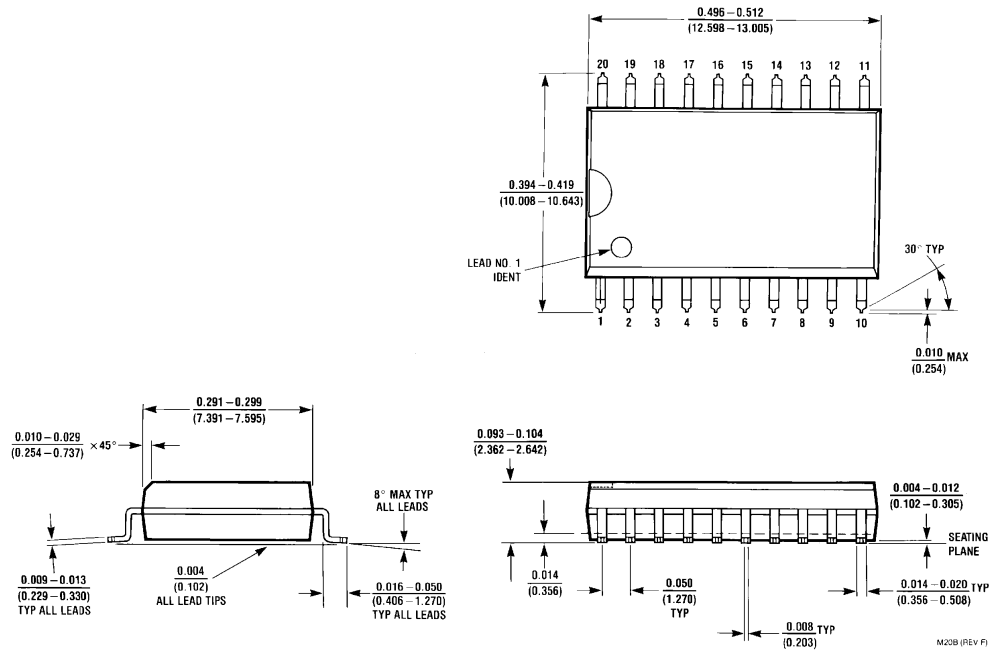
| Symbol    | Parameter                                                       | Conditions                                                                               | Min | Typ<br>(Note 8) | Max  | Units         |
|-----------|-----------------------------------------------------------------|------------------------------------------------------------------------------------------|-----|-----------------|------|---------------|
| $V_I$     | Input Clamp Voltage                                             | $V_{CC} = \text{Min}, I_I = -18 \text{ mA}$                                              |     |                 | -1.5 | V             |
| $V_{OH}$  | HIGH Level Output Voltage                                       | $V_{CC} = \text{Min}, I_{OH} = \text{Max}$<br>$V_{IL} = \text{Max}, V_{IH} = \text{Min}$ | 2.7 |                 |      | V             |
| $V_{OL}$  | LOW Level Output Voltage                                        | $V_{CC} = \text{Min}, I_{OL} = \text{Max}$<br>$I_{OL} = \text{Max}, V_{IH} = \text{Min}$ |     |                 | 0.5  | V             |
|           |                                                                 | $I_{OL} = 12 \text{ mA}, V_{CC} = \text{Min}$                                            |     |                 | 0.4  |               |
| $I_I$     | Input Current @ Max Input Voltage                               | $V_{CC} = \text{Max}, V_I = 7V$                                                          |     |                 | 0.1  | mA            |
| $I_{IH}$  | HIGH Level Input Current                                        | $V_{CC} = \text{Max}, V_I = 2.7V$                                                        |     |                 | 20   | $\mu\text{A}$ |
| $I_{IL}$  | LOW Level Input Current                                         | $V_{CC} = \text{Max}$<br>$V_I = 0.5V$<br>A (Note 9)                                      |     |                 | -20  | $\mu\text{A}$ |
|           |                                                                 | $V_I = 0.4V$<br>A (Note 10)                                                              |     |                 | -50  |               |
|           |                                                                 | $\overline{G}$                                                                           |     |                 | -50  |               |
| $I_{OZH}$ | Off-State Output Current with HIGH Level Output Voltage Applied | $V_{CC} = \text{Max}, V_O = 2.4V$<br>$V_{IH} = \text{Min}, V_{IL} = \text{Max}$          |     |                 | 20   | $\mu\text{A}$ |
| $I_{OZL}$ | Off-State Output Current with LOW Level Output Voltage Applied  | $V_{CC} = \text{Max}, V_O = 0.4V$<br>$V_{IH} = \text{Min}, V_{IL} = \text{Max}$          |     |                 | -20  | $\mu\text{A}$ |
| $I_{OS}$  | Short Circuit Output Current                                    | $V_{CC} = \text{Max}$<br>(Note 11)                                                       | -20 |                 | -100 | mA            |
| $I_{CC}$  | Supply Current                                                  | $V_{CC} = \text{Max}$ (Note 10)                                                          |     | 13              | 21   | mA            |

**Note 8:** All typicals are at  $V_{CC} = 5V, T_A = 25^\circ\text{C}$ .**Note 9:** Both  $\overline{G}$  inputs are at 2V.**Note 10:** Both  $\overline{G}$  inputs are at 0.4V.**Note 11:** Not more than one output should be shorted at a time, and the duration should not exceed one second.**AC Electrical Characteristics** DM81LS96A $V_{CC} = 5V, T_A = 25^\circ\text{C}$ 

| Symbol           | Parameter                                               | R <sub>L</sub> = 667 Ω |     |                         |     | Units |
|------------------|---------------------------------------------------------|------------------------|-----|-------------------------|-----|-------|
|                  |                                                         | C <sub>L</sub> = 50 pF |     | C <sub>L</sub> = 150 pF |     |       |
|                  |                                                         | Min                    | Max | Min                     | Max |       |
| t <sub>PLH</sub> | Propagation Delay Time<br>LOW-to-HIGH Level Output      |                        | 10  |                         | 16  | ns    |
| t <sub>PHL</sub> | Propagation Delay Time<br>HIGH-to-LOW Level Output      |                        | 17  |                         | 30  | ns    |
| t <sub>PZH</sub> | Output Enable Time<br>to HIGH Level Output              |                        | 15  |                         | 30  | ns    |
| t <sub>PZL</sub> | Output Enable Time<br>to LOW Level Output               |                        | 35  |                         | 45  | ns    |
| t <sub>PHZ</sub> | Output Disable Time<br>from HIGH Level Output (Note 12) |                        | 20  |                         |     | ns    |
| t <sub>PLZ</sub> | Output Disable Time<br>from LOW Level Output (Note 12)  |                        | 27  |                         |     | ns    |

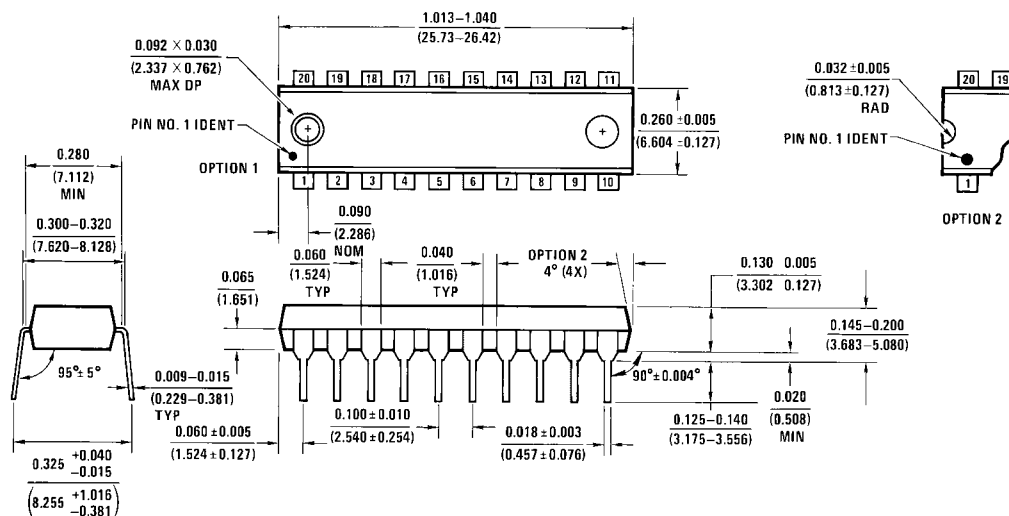
**Note 12:**  $C_L = 5 \text{ pF}$ .

# Physical Dimensions inches (millimeters) unless otherwise noted



20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide  
Package Number M20B

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



20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide  
Package Number N20A

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