

# DM77/87S190, DM77/87S191, DM77/87S290, DM77/87S291, DM77/87S191A, DM77/87S291A, DM77/87S191B, DM77/87S291B (2048 x 8) 16,384-Bit TTL PROMs

## General Description

These Schottky memories are organized in the popular 2048 words by 8 bits configuration. Memory enable inputs are provided to control the output states. When the device is enabled, the outputs represent the contents of the selected word. When disabled, the 8 outputs go to the "OFF" or high impedance state. The memories are available in both open-collector and TRI-STATE® versions.

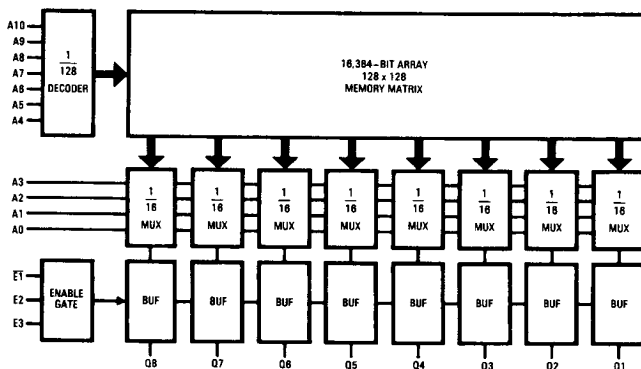
PROMs are shipped from the factory with lows in all locations. A high may be programmed into any selected location by following the programming instructions.

## Features

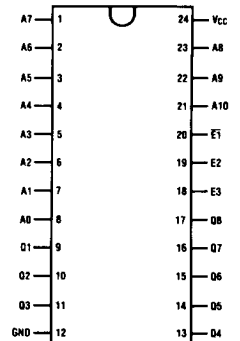
- Advanced tungsten (W) fuses
- Schottky-clamped for high speed
  - Address access—35 ns max (B Version)
  - Enable access—15 ns typ
  - Enable recovery—15 ns typ
- PNP inputs for reduced input loading
- All DC and AC parameters guaranteed over temperature
- Low voltage TRI-SAFE™ programming

|          | Military | Commercial | Open-Collector | TRI-STATE | Package | 24-Pin Standard | 24-Pin Thin-Dip |
|----------|----------|------------|----------------|-----------|---------|-----------------|-----------------|
| DM87S190 |          | X          | X              |           | N, J, V | X               |                 |
| DM87S191 |          | X          |                | X         | N, J, V | X               |                 |
| DM77S190 | X        |            | X              |           | J       | X               |                 |
| DM77S191 | X        |            |                | X         | J       | X               |                 |
| DM87S290 |          | X          | X              |           | N, J, V |                 | X               |
| DM87S291 |          | X          |                | X         | N, J, V |                 | X               |
| DM77S290 | X        |            | X              |           | J       |                 | X               |
| DM77S291 | X        |            |                | X         | J       |                 | X               |

## Block and Connection Diagrams



TL/L/9198-1



TL/L/9198-2

### Top View

**Order Number DM77/87S190J,  
191J, 290J, 291J,  
191A/BJ, 291A/BJ, DM87S190N,  
191N, 290N, 291N, 191A/BN, 291A/BN,  
DM87S190V, 191V, 290V, 291V,  
191A/BV or 291A/BV  
See NS Package Number  
J24A, J24F, N24A, N24C or V28A**

**DC Electrical Characteristics** (Note 1)

| Symbol   | Parameter                                       | Conditions                                                                           | DM77S190/191<br>DM77S290/291 |      |      | DM87S190/191<br>DM87S290/291 |      |      | Units   |
|----------|-------------------------------------------------|--------------------------------------------------------------------------------------|------------------------------|------|------|------------------------------|------|------|---------|
|          |                                                 |                                                                                      | Min                          | Typ  | Max  | Min                          | Typ  | Max  |         |
| $I_{IL}$ | Input Load Current                              | $V_{CC} = \text{Max}, V_{IN} = 0.45V$                                                |                              | -80  | -250 |                              | -80  | -250 | $\mu A$ |
| $I_{IH}$ | Input Leakage Current                           | $V_{CC} = \text{Max}, V_{IN} = 2.7V$                                                 |                              |      | 25   |                              |      | 25   | $\mu A$ |
|          |                                                 | $V_{CC} = \text{Max}, V_{IN} = 5.5V$                                                 |                              |      | 1.0  |                              |      | 1.0  | mA      |
| $V_{OL}$ | Low Level Output Voltage                        | $V_{CC} = \text{Min}, I_{OL} = 16 \text{ mA}$                                        |                              | 0.35 | 0.50 |                              | 0.35 | 0.45 | V       |
| $V_{IL}$ | Low Level Input Voltage                         |                                                                                      |                              |      | 0.80 |                              |      | 0.80 | V       |
| $V_{IH}$ | High Level Input Voltage                        |                                                                                      | 2.0                          |      |      | 2.0                          |      |      | V       |
| $I_{OZ}$ | Output Leakage Current<br>(Open-Collector Only) | $V_{CC} = \text{Max}, V_{CEX} = 2.4V$                                                |                              |      | 50   |                              |      | 50   | $\mu A$ |
|          |                                                 | $V_{CC} = \text{Max}, V_{CEX} = 5.5V$                                                |                              |      | 100  |                              |      | 100  | $\mu A$ |
| $V_C$    | Input Clamp Voltage                             | $V_{CC} = \text{Min}, I_{IN} = -18 \text{ mA}$                                       |                              | -0.8 | -1.2 |                              | -0.8 | -1.2 | V       |
| $C_I$    | Input Capacitance                               | $V_{CC} = 5.0V, V_{IN} = 2.0V$<br>$T_A = 25^\circ C, 1 \text{ MHz}$                  |                              | 4.0  |      |                              | 4.0  |      | pF      |
| $C_O$    | Output Capacitance                              | $V_{CC} = 5.0V, V_O = 2.0V$<br>$T_A = 25^\circ C, 1 \text{ MHz}, \text{Outputs Off}$ |                              | 6.0  |      |                              | 6.0  |      | pF      |
| $I_{CC}$ | Power Supply Current                            | $V_{CC} = \text{Max}, \text{Input Grounded}$<br>All Outputs Open                     |                              | 120  | 175  |                              | 120  | 175  | mA      |

**TRI-STATE Parameters**

|          |                                 |                                                                      |     |     |     |     |     |     |         |
|----------|---------------------------------|----------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|---------|
| $I_{OS}$ | Short Circuit<br>Output Current | $V_O = 0V, V_{CC} = \text{Max}$<br>(Note 2)                          | -20 |     | -70 | -20 |     | -70 | mA      |
| $I_{OZ}$ | Output Leakage<br>(TRI-STATE)   | $V_{CC} = \text{Max}, V_O = 0.45V \text{ to } 2.4V$<br>Chip Disabled | -50 |     | 50  | -50 |     | 50  | $\mu A$ |
| $V_{OH}$ | Output Voltage High             | $I_{OH} = -2.0 \text{ mA}$                                           | 2.4 | 3.2 |     |     |     |     | V       |
|          |                                 | $I_{OH} = -6.5 \text{ mA}$                                           |     |     |     | 2.4 | 3.2 |     | V       |

Note 1: These limits apply over the entire operating range unless otherwise noted. All typical values are for  $V_{CC} = 5.0V$  and  $T_A = 25^\circ C$ .

Note 2: During  $I_{OS}$  measurement, only one output at a time should be grounded. Permanent damage may otherwise result.

**AC Electrical Characteristics** With Standard Load and Operating Conditions

| Symbol   | JEDEC Symbol | Parameter            | DM77S190/191<br>DM77S290/291 |     |     | DM87S190/191<br>DM87S290/291 |     |     | Units |
|----------|--------------|----------------------|------------------------------|-----|-----|------------------------------|-----|-----|-------|
|          |              |                      | Min                          | Typ | Max | Min                          | Typ | Max |       |
| $t_{AA}$ | TAVQV        | Address Access Time  |                              | 35  | 80  |                              | 35  | 65  | ns    |
| $t_{EA}$ | TEVQV        | Enable Access Time   |                              | 15  | 40  |                              | 15  | 30  | ns    |
| $t_{ER}$ | TEXQX        | Enable Recovery Time |                              | 15  | 40  |                              | 15  | 30  | ns    |
| $t_{ZX}$ | TEVQX        | Output Enable Time   |                              | 15  | 40  |                              | 15  | 30  | ns    |
| $t_{XZ}$ | TEXQZ        | Output Disable Time  |                              | 15  | 40  |                              | 15  | 30  | ns    |

**AC Electrical Characteristics** With Standard Load and Operating Conditions

| Symbol   | JEDEC Symbol |           | Parameters           | DM77S191A/B<br>DM77S291A/B |     |     | DM87S191A/B<br>DM87S291A/B |     |     | Units |
|----------|--------------|-----------|----------------------|----------------------------|-----|-----|----------------------------|-----|-----|-------|
|          |              |           |                      | Min                        | Typ | Max | Min                        | Typ | Max |       |
| $t_{AA}$ | TAVQV        | 191A/291A | Address Access Time  |                            | 30  | 60  |                            | 30  | 45  | ns    |
|          |              | 191B/291B |                      |                            | 30  | 50  |                            | 30  | 35  |       |
| $t_{EA}$ | TEVQV        |           | Enable Access Time   |                            | 15  | 30  |                            | 15  | 25  | ns    |
| $t_{ER}$ | TEXQX        |           | Enable Recovery Time |                            | 15  | 30  |                            | 15  | 25  | ns    |
| $t_{ZX}$ | TEVQX        |           | Output Enable Time   |                            | 15  | 30  |                            | 15  | 25  | ns    |
| $t_{XZ}$ | TEXQZ        |           | Output Disable Time  |                            | 15  | 30  |                            | 15  | 25  | ns    |