

OKI semiconductor

MSM271000

131,072-Word x 8-Bit UV EPROM

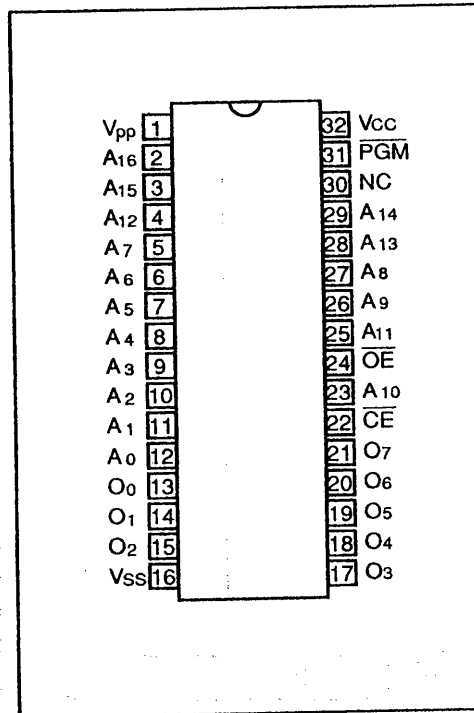
GENERAL DESCRIPTION

The MSM271000 is a 131,072-word x 8-bit ultraviolet erasable and electrically programmable read-only memory. The MSM271000 is manufactured by the N channel double silicon gate MOS technology and is contained in the 32-pin package.

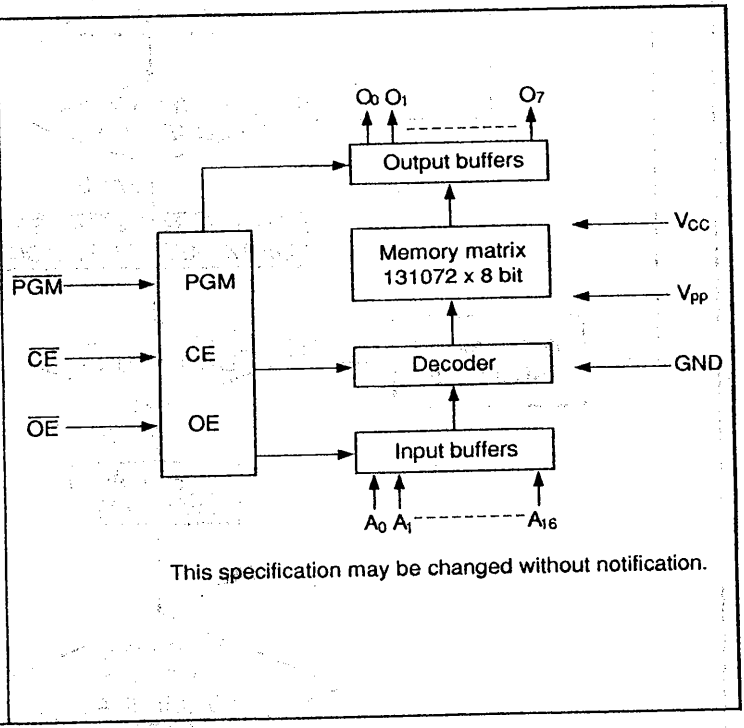
FEATURES

- +5V single power supply
- 131,072-word x 8-bit configuration
- Access time:
 - MAX 120 ns (MSM271000-12)
 - MAX 150 ns (MSM271000-15)
 - MAX 200 ns (MSM271000-20)
- Power consumption
 - MAX525 mW (during operation)
 - MAX184 mW (during standby)
- Completely static operation
- INPUT/OUTPUT TTL compatible (three state output)

PIN CONFIGURATION (TOP VIEW)



FUNCTIONAL BLOCK DIAGRAM



TRUTH TABLE

| Mode \ Pins | CE (22) | OE (24) | PGM (31) | V _{pp} (1) | V _{CC} (32) | Outputs |
|-----------------|-----------------|-----------------|-----------------|---------------------|----------------------|------------------|
| Read | V _{IL} | V _{IL} | — | — | +5V | D _{OUT} |
| Output Disable | V _{IL} | V _{IH} | — | — | +5V | High impedance |
| Standby | V _{IH} | — | — | — | +5V | High impedance |
| Program | V _{IL} | V _{IH} | V _{IL} | +12.75V | +6.25V | D _{IN} |
| Program Verify | V _{IL} | V _{IL} | V _{IH} | +12.75V | +6.25V | D _{OUT} |
| Program Inhibit | V _{IH} | — | — | +12.75V | +6.25V | High impedance |

—: Can be either V_{IL} or V_{IH}

ELECTRICAL CHARACTERISTICS
ABSOLUTE MAXIMUM RATINGS

| Rating | Symbol | Conditions | Value | Unit |
|--------------------------------|------------------|------------|-------------|------|
| Temperature Under Bias | T _a | — | 0 ~ 70 | °C |
| Storage Temperature | T _{stg} | — | -55 ~ 125 | °C |
| Input Voltage | V _{IN} | — | -0.6 ~ 13.5 | V |
| Output voltage | V _{OUT} | — | -0.6 ~ 7 | V |
| V _{CC} Supply Voltage | V _{CC} | — | -0.6 ~ 7 | V |
| Program Voltage | V _{pp} | — | -0.6 ~ 14 | V |

The voltage referenced to GND.

Note: Permanent device damage may occur if ABSOLUTE MAXIMUM RATINGS are exceeded. Functional operation should be restricted to the conditions as detailed in the operational sections of this data sheet. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

READ OPERATION
RECOMMENDED OPERATING CONDITIONS

(T_a = 0 ~ 70°C)

| Parameter | Symbol | Conditions | Value | | | Unit |
|-------------------------|-----------------|---------------------------|-------|------|---------------------|------|
| | | | Min. | Typ. | Max. | |
| Supply Voltage | V _{CC} | V _{CC} = 5V ± 5% | 4.75 | 5.0 | 5.25 | V |
| V _{pp} Voltage | V _{pp} | | -0.1 | — | V _{CC} + 1 | V |
| "H" Level Input Voltage | V _{IH} | | 2.0 | — | 6.25 | V |
| "L" Level Input Voltage | V _{IL} | | -0.1 | — | 0.8 | V |

The voltage referenced to GND.

DC CHARACTERISTICS

($V_{CC} = 5V \pm 5\%$, $T_a = 0 \sim 70^\circ C$)

| Parameter | Symbol | Conditions | MSM271000 | | | Unit | Notes |
|------------------------------------|-----------|--------------------------|-----------|------|--------------|---------|-------|
| | | | Min. | Typ. | Max. | | |
| Input Leakage Current | I_{LI} | $V_{IN} = 5.25V$ | - | - | 10 | μA | |
| Output Leakage Current | I_{LO} | $V_{OUT} = 5.25V$ | - | - | 10 | μA | |
| V_{CC} Power Current (Standby) | I_{CC1} | $\overline{CE} = V_{IH}$ | - | - | 35 | mA | |
| V_{CC} Power Current (Operation) | I_{CC2} | $\overline{CE} = V_{IL}$ | - | - | 100 | mA | |
| Program Power Current | I_{pp} | $V_{pp} = V_{CC}$ | - | - | 10 | μA | |
| Input Voltage "H" Level | V_{IH} | - | 2.0 | - | $V_{CC} + 1$ | V | |
| Input Voltage "L" Level | V_{IL} | - | -0.1 | - | 0.8 | V | |
| Output Voltage "H" Level | V_{OH} | $I_{OH} = -400 \mu A$ | 2.4 | - | - | V | |
| Output Voltage "L" Level | V_{OL} | $I_{OL} = 2.1 mA$ | - | - | 0.45 | V | |

AC CHARACTERISTICS

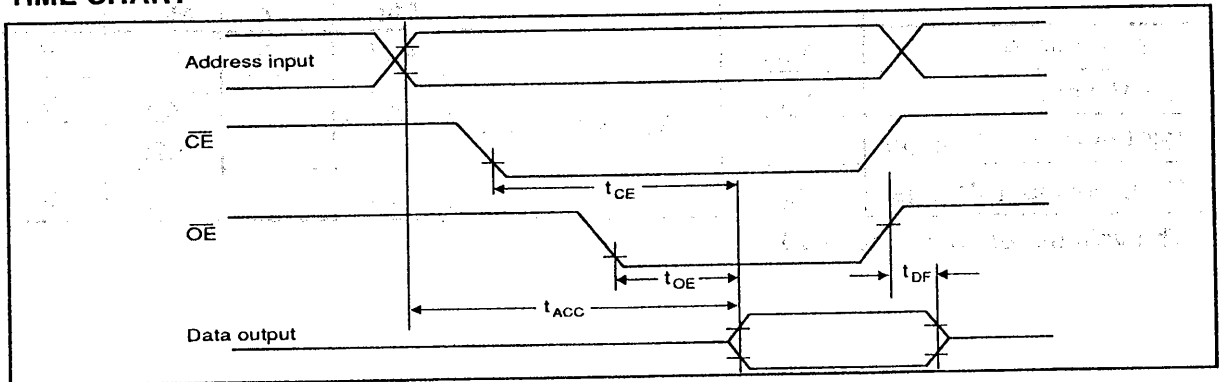
($V_{CC} = 5V \pm 5\%$, $T_a = 0 \sim 70^\circ C$)

| Parameter | Symbol | Conditions | MSM 271000-12 | | MSM 271000-15 | | MSM 271000-20 | | Unit | Notes |
|-----------------------------|-----------|--|---------------|------|---------------|------|---------------|------|------|-------|
| | | | Min. | Max. | Min. | Max. | Min. | Max. | | |
| Address Access Time | t_{ACC} | $\overline{CE} = \overline{OE} = V_{IL}$ | - | 120 | - | 150 | - | 200 | ns | |
| \overline{CE} Access Time | t_{CE} | $\overline{OE} = V_{IL}$ | - | 120 | - | 150 | - | 200 | ns | |
| \overline{OE} Access Time | t_{OE} | $\overline{CE} = V_{IL}$ | - | 50 | - | 60 | - | 70 | ns | |
| Output Disable Time | t_{DF} | $\overline{CE} = V_{IL}$ | 0 | 40 | 0 | 50 | 0 | 55 | ns | |

Measurement Conditions

- Input pulse level 0.45V and 2.4V
- Input timing reference level 0.8V and 2.0V
- Output load 1 TTL GATE + 100 pF
- Output timing reference level 0.8V and 2.0V

TIME CHART



**PROGRAMMING OPERATION
DC CHARACTERISTICS**

($V_{CC} = 6.25V \pm 0.25V$, $V_{pp} = 12.75V \pm 0.25V$, $T_a = 25^{\circ}C \pm 5^{\circ}C$)

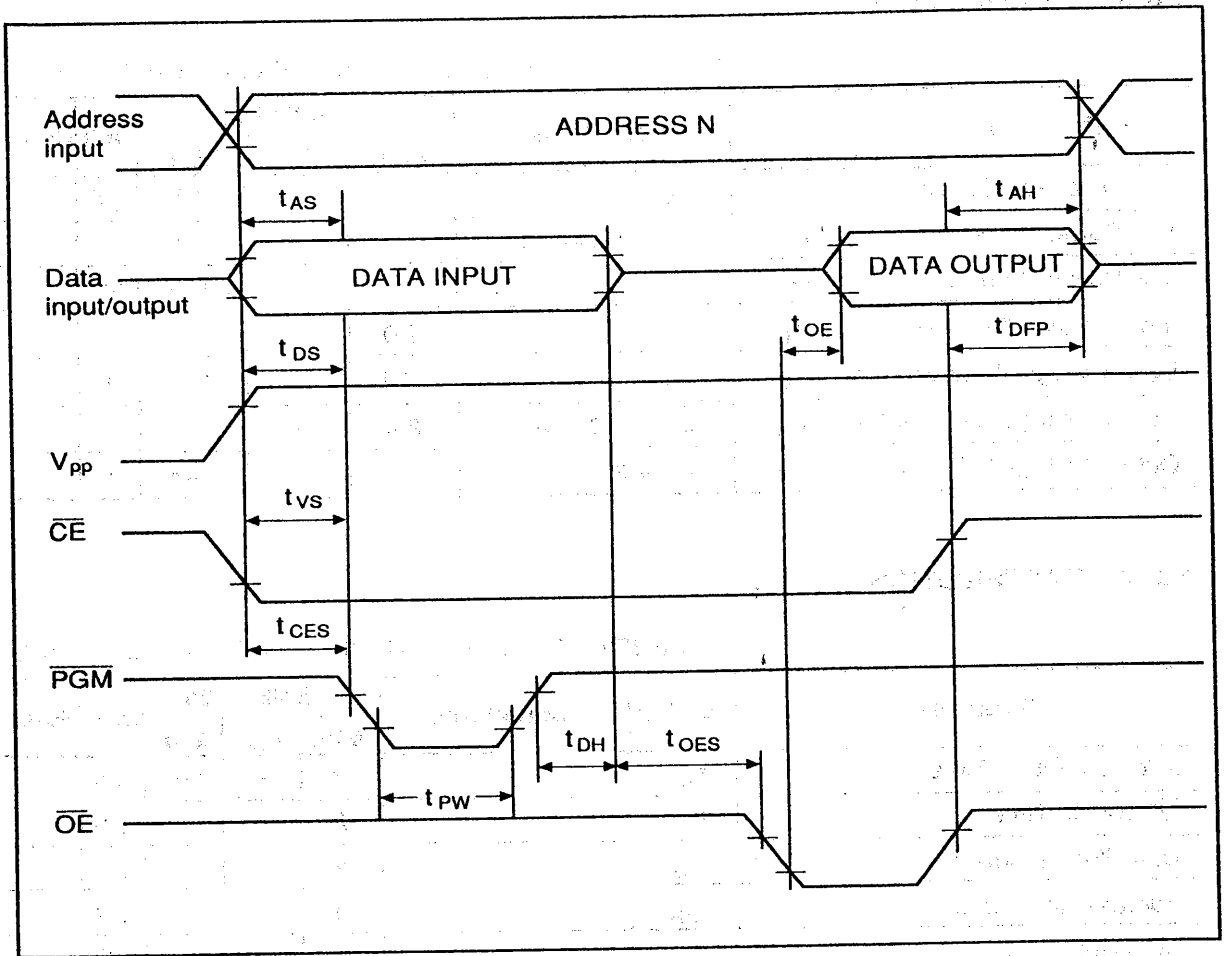
| Parameter | Symbol | Conditions | MSM271000 | | | Unit | Notes |
|--------------------------|-----------|---|-----------|------|------------|---------|-------|
| | | | Min. | Typ. | Max. | | |
| Input Leakage Current | I_{LI} | $V_{IN} = 5.25V$ | - | - | 10 | μA | |
| V_{pp} Power Current | I_{pp2} | $\overline{CE} = \overline{PGM} = V_{IL}$ | - | - | 50 | mA | |
| V_{CC} Power Current | I_{CC} | - | - | - | 100 | mA | |
| Input Voltage "H" Level | V_{IH} | - | 2.0 | - | $V_{CC}+1$ | V | |
| Input Voltage "L" Level | V_{IL} | - | -0.1 | - | 0.8 | V | |
| Output Voltage "H" Level | V_{OH} | $I_{OH} = -400 \mu A$ | 2.4 | - | - | V | |
| Output Voltage "L" Level | V_{OL} | $I_{OL} = 2.1 mA$ | - | - | 0.45 | V | |

AC CHARACTERISTICS

($V_{CC} = 6.25V \pm 0.25V$, $V_{pp} = 12.75V \pm 0.25V$, $T_a = 25^{\circ}C \pm 5^{\circ}C$)

| Parameter | Symbol | Conditions | MSM271000 | | | Unit | Notes |
|-------------------------------------|-----------|------------|-----------|------|------|---------|-------|
| | | | Min. | Typ. | Max. | | |
| Address Set-up Time | t_{AS} | - | 2 | - | - | μS | |
| \overline{OE} Set-up Time | t_{OES} | - | 2 | - | - | μS | |
| Data Set-up Time | t_{DS} | - | 2 | - | - | μS | |
| Address Hold Time | t_{AH} | - | 0 | - | - | μS | |
| Data Hold Time | t_{DH} | - | 2 | - | - | μS | |
| Output Enable to Output Float Delay | t_{DFP} | - | 0 | - | 130 | ns | |
| V_{pp} Power Set-up Time | t_{VS} | - | 2 | - | - | μS | |
| Program Pulse Width | t_{PW} | - | 95 | 100 | 105 | μS | |
| \overline{CE} Set-up Time | t_{CES} | - | 2 | - | - | μS | |
| Data Valid from \overline{OE} | t_{OE} | - | - | - | 150 | ns | |

TIME CHART



CAPACITANCE

(T_a = 25°C, f = 1 MHz, V_{cc} = 5V)

| Parameter | Symbol | Conditions | Min. | Typ | Max. | Unit |
|--------------------|------------------|-----------------------|------|-----|------|------|
| Input Capacitance | C _{IN} | V _{IN} = 0V | - | - | 12 | pF |
| Output Capacitance | C _{OUT} | V _{OUT} = 0V | - | - | 15 | pF |

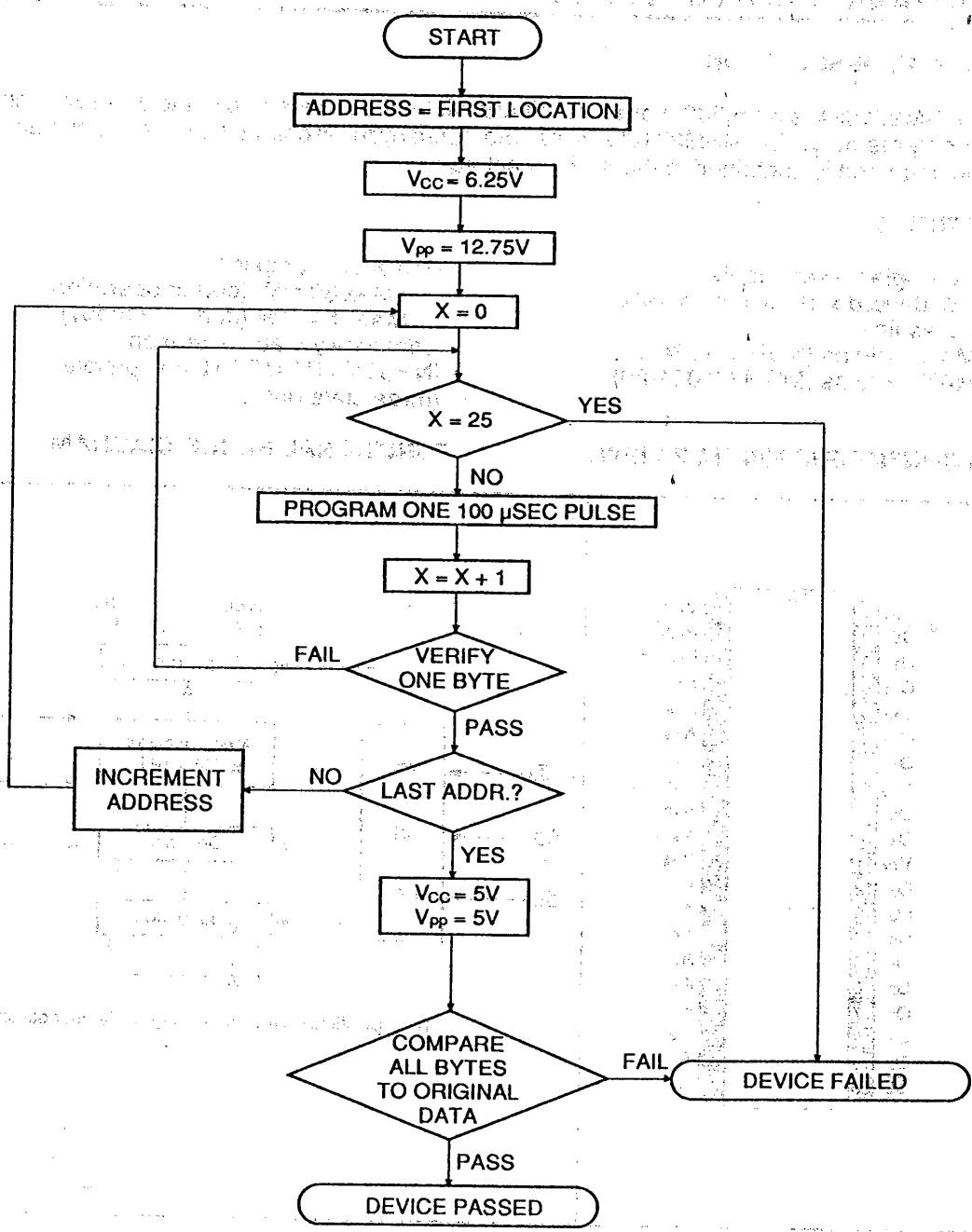
MSM271000

IDENTIFIER BYTES

| Code | Pins | A ₀ (12) | D ₇ (21) | D ₆ (20) | D ₅ (19) | D ₄ (18) | D ₃ (17) | D ₂ (15) | D ₁ (14) | D ₀ (13) | Hex Data |
|-------------------|-----------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|----------|
| Manufacturer Code | V _{IL} | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | AE |
| Device Code | V _{IH} | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 85 |

Note: A₉ = 12.0 ± 0.5V

A₁ ~ A₈, A₁₀ ~ A₁₆, \overline{CE} , \overline{OE} = V_{IL}, \overline{PGM} = V_{IH} or V_{IL}, V_{pp} = V_{IH} or V_{IL}



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Programming Flowchart Example