

## MSM38128ARS

16,384 WORD x 8 BIT MASK ROM (E3-S-028-32)

### GENERAL DESCRIPTION

The MSM38128ARS is an N-channel silicon gate MOS device MASK ROM with a 16,384 word x 8 bit capacity. It operates on a 5V single power supply and the all inputs and outputs are TTL compatible. The adoption of an asynchronous system in the circuit requires no external clock assuring extremely easy operation. The availability of power down mode contributes to the low power dissipation which is as low as 30mA (max) when the chip is not selected. The application of a byte system and the pin compatibility with standard UV EPROMs make the device most suitable for use as a large-capacity fixed memory for microcomputers and data terminals.

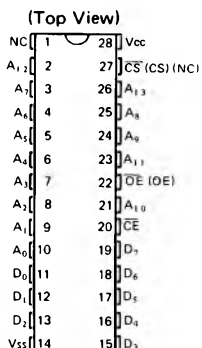
As it provides CE, OE, and CS as the control signal, the connection of output terminals of other chips with the wired OR is possible ensuring an easy expand operation of memory and bus line control.

### FEATURES

- 5V single power supply
- 16384 words x 8 bits
- Access time: 250 ns MAX
- Input/output TTL compatible
- 3-state output
- Power down mode
- 28-pin DIP



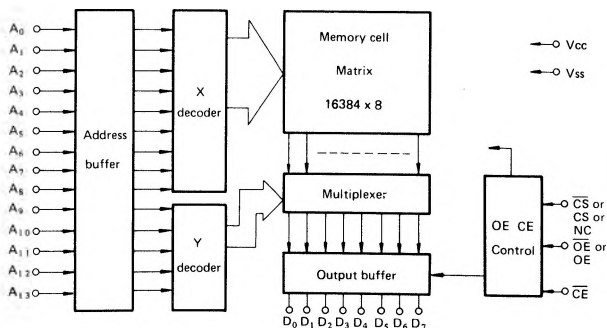
### PIN CONFIGURATION



OE : Output enable  
Vcc, Vss : Power supply  
A<sub>0</sub>~A<sub>12</sub> : Address input  
D<sub>0</sub>~D<sub>7</sub> : Data output  
CE : Chip enable  
CS : Chip select

**Note:** Please specify the OE active level and CS active level or open in ordering this IC.

### FUNCTIONAL BLOCK DIAGRAM



**ABSOLUTE MAXIMUM RATINGS**

(Ta = 25°C)

| Rating                | Symbol           | Value      | Unit | Conditions                 |
|-----------------------|------------------|------------|------|----------------------------|
| Power Supply Voltage  | V <sub>cc</sub>  | -0.5 to 7  | V    | Respect to V <sub>ss</sub> |
| Input Voltage         | V <sub>I</sub>   | -0.5 to 7  | V    | Respect to V <sub>ss</sub> |
| Output Voltage        | V <sub>O</sub>   | -0.5 to 7  | V    | Respect to V <sub>ss</sub> |
| Power Dissipation     | P <sub>D</sub>   | 1          | W    | Per package                |
| Operating Temperature | T <sub>opr</sub> | 0 to 70    | °C   |                            |
| Storage Temperature   | T <sub>stg</sub> | -55 to 150 | °C   |                            |

**OPERATING CONDITION AND DC CHARACTERISTICS**

| Parameter              | Symbol           | Measuring Condition                                                                     | Rating |      |                 | Unit |
|------------------------|------------------|-----------------------------------------------------------------------------------------|--------|------|-----------------|------|
|                        |                  |                                                                                         | Min.   | Typ. | Max.            |      |
| Power Supply Voltage   | V <sub>cc</sub>  | —                                                                                       | 4.5    | 5    | 5.5             | V    |
|                        | V <sub>ss</sub>  | —                                                                                       | 0      | 0    | 0               | V    |
| Input Signal Level     | V <sub>IH</sub>  | —                                                                                       | 2      | 5    | 6               | V    |
|                        | V <sub>IL</sub>  | —                                                                                       | -0.5   | 0    | 0.8             | V    |
| Output Signal Level    | V <sub>OH</sub>  | I <sub>OH</sub> = -400 μA                                                               | 2.4    | —    | V <sub>cc</sub> | V    |
|                        | V <sub>OL</sub>  | I <sub>OL</sub> = 2.1 mA                                                                | —      | —    | 0.4             | V    |
| Input Leakage Current  | I <sub>LI</sub>  | V <sub>I</sub> = 0V or V <sub>cc</sub>                                                  | -10    | —    | 10              | μA   |
| Output Leakage Current | I <sub>LO</sub>  | V <sub>O</sub> = 0V or V <sub>cc</sub><br>Chip not selected                             | -10    | —    | 10              | μA   |
| Power Supply Current   | I <sub>cc</sub>  | V <sub>cc</sub> = Max. I <sub>O</sub> = 0 mA                                            | —      | —    | 100             | mA   |
|                        | I <sub>ccs</sub> | V <sub>cc</sub> = Max.                                                                  | —      | —    | 30              | mA   |
| Peak Power ON Current  | I <sub>po</sub>  | V <sub>cc</sub> = GND ~ V <sub>cc</sub> Min.<br>CE = V <sub>cc</sub> or V <sub>IH</sub> | —      | —    | 60              | mA   |
| Operating Temperature  | T <sub>opr</sub> | —                                                                                       | 0      | —    | 70              | °C   |

**AC CHARACTERISTICS****TIMING CONDITIONS**

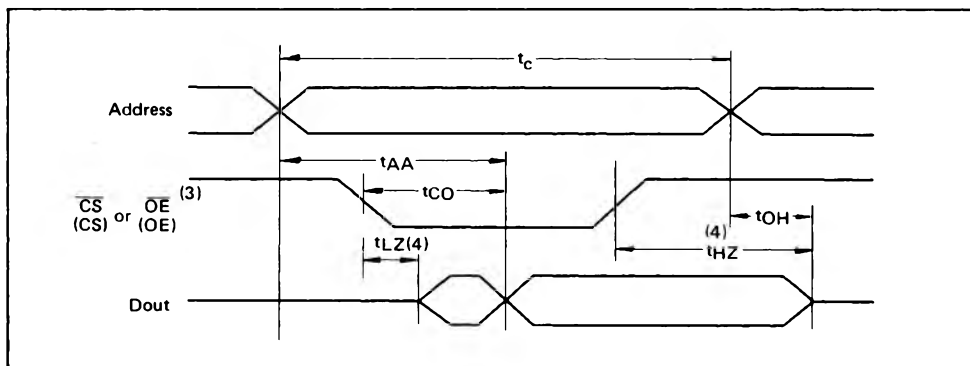
| Parameter                      | Conditions                                  |
|--------------------------------|---------------------------------------------|
| Input Signal Level             | V <sub>IH</sub> =2.4V V <sub>IL</sub> =0.6V |
| Input Rising, Falling Time     | t <sub>r</sub> =t <sub>f</sub> =15 ns       |
| Timing Measuring Point Voltage | Input Voltage=1.5V                          |
|                                | Output Voltage=0.8V & 2.0V                  |
| Loading Condition              | C <sub>L</sub> =100 pF + 1 TTL              |

## READ CYCLE

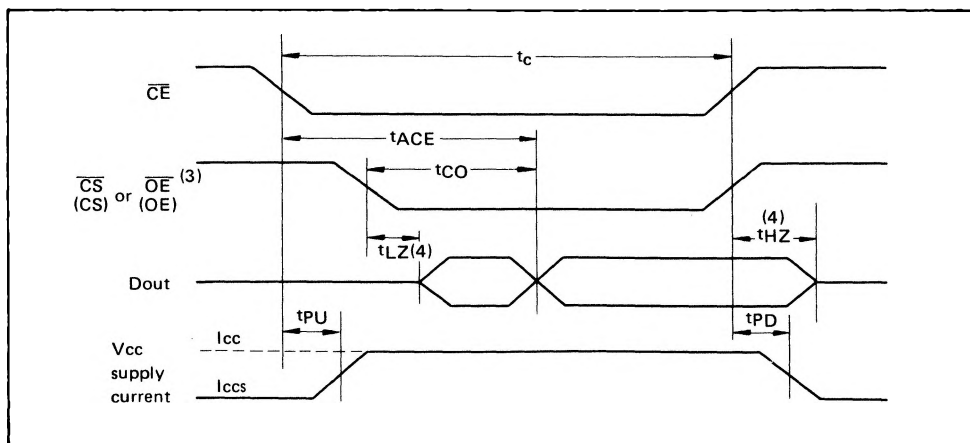
( $V_{CC} = 5V \pm 10\%$ ,  $V_{SS} = 0V$ ,  $T_a = 0^\circ C$  to  $+70^\circ C$ )

| Parameter               | Symbol    | Specification Value |      |      | Unit | Remarks |
|-------------------------|-----------|---------------------|------|------|------|---------|
|                         |           | Min.                | Typ. | Max. |      |         |
| Cycle Time              | $t_c$     | 250                 | —    |      | ns   |         |
| Address Access Time     | $t_{AA}$  | —                   | —    | 250  | ns   |         |
| Chip Enable Access Time | $t_{ACE}$ | —                   | —    | 250  | ns   |         |
| Output Delay Time       | $t_{CO}$  | —                   | —    | 100  | ns   |         |
| Output Setting Time     | $t_{LZ}$  | 10                  | —    | —    | ns   |         |
| Output Disable Time     | $t_{HZ}$  | 10                  | —    | 100  | ns   |         |
| Output Retaining Time   | $t_{OH}$  | 10                  | —    | —    | ns   |         |
| Power Up Time           | $t_{PU}$  | 0                   | —    |      | ns   |         |
| Power Down Time         | $t_{PD}$  | —                   | —    | 100  | ns   |         |

### 1) READ CYCLE-1<sup>(1)</sup>



### 2) READ CYCLE-2<sup>(2)</sup>



- Notes: (1)  $\overline{CE}$  is "L" level.  
 (2) The address is decided at the same time as or ahead of  $\overline{CE}$  "L" level.  
 (3) The  $\overline{OE}$  and  $\overline{CS}$  are shown in the negative logic here, however the active level is freely selected.  
 (4)  $t_{LZ}$  is determined by the later level,  $\overline{CE}$  "L"/ $\overline{CS}$  "L" or  $\overline{OE}$  "L".  
 $t_{HZ}$  is determined by the earlier  $\overline{CE}$  "H"/ $\overline{CS}$  "H" or  $\overline{OE}$  "H".  
 While,  $t_{HZ}$  shows the time until floating and it is therefore not determined by the output level.

## INPUT/OUTPUT CAPACITANCE

(Ta = 25°C, f = 1 MHz)

| Parameter          | Symbol | Specification Value |      | Unit | Remarks  |
|--------------------|--------|---------------------|------|------|----------|
|                    |        | Min.                | Max. |      |          |
| Input Capacitance  | $C_I$  |                     | 8    | pF   | $V_I=0V$ |
| Output Capacitance | $C_O$  |                     | 10   | pF   | $V_O=0V$ |