

# OKI Semiconductor

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## MSM538001E

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1,048,576-Word x 8-Bit MASKROM

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### DESCRIPTION

The OKI MSM538001E is a high-speed silicon gate CMOS Mask ROM with 1,048,576-word x 8-bit capacity. The MSM538001C operates on a single 5.0V power supply and is TTL compatible. The chip's asynchronous I/O requires no external clock assuring easy operation. A power-down mode provides low power dissipation when the chip is not selected. The CE and OE pins are provided as control signals that permit three-stated output allowing easy memory expansion on a system bus. The MSM538001E is suited for use as large capacity fixed memory for microcomputers and data terminals.

### FEATURES

- Single 5.0V power supply

- 1,048,576 words x 8-bit

- Access time

  - 100ns MAX

- Input/Output TTL compatible

- Tri-State output configurations

- Internal powerdown function

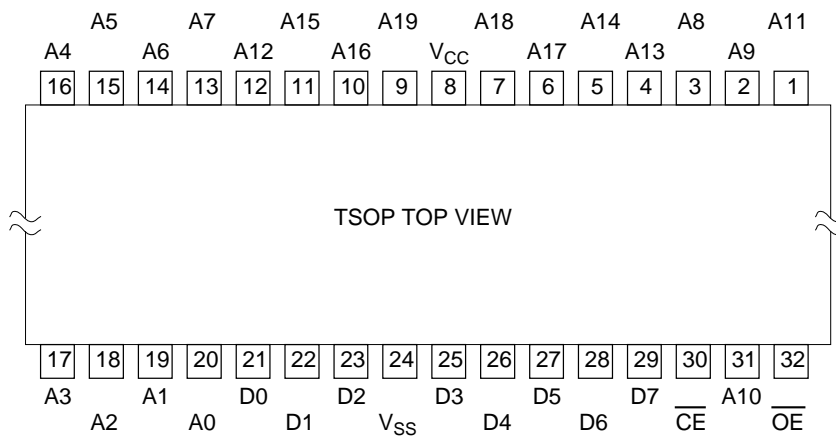
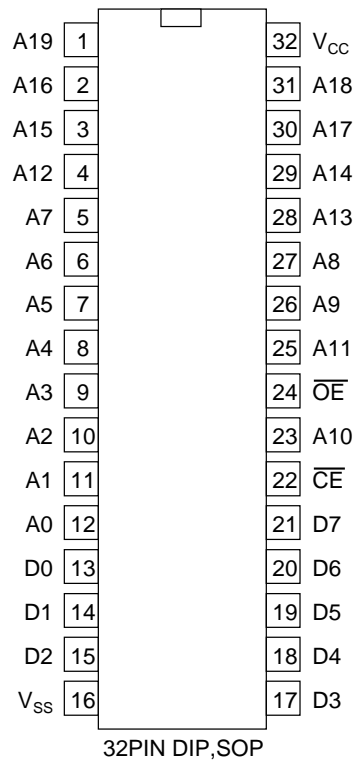
- Packages

  - 32-Pin plastic DIP (DIP32-P-600-2.54) (MSM538001E-XXRS)

  - 32-Pin plastic SOP (SOP32-P-525-1.27-K) (MSM538001E-XXGS-K)

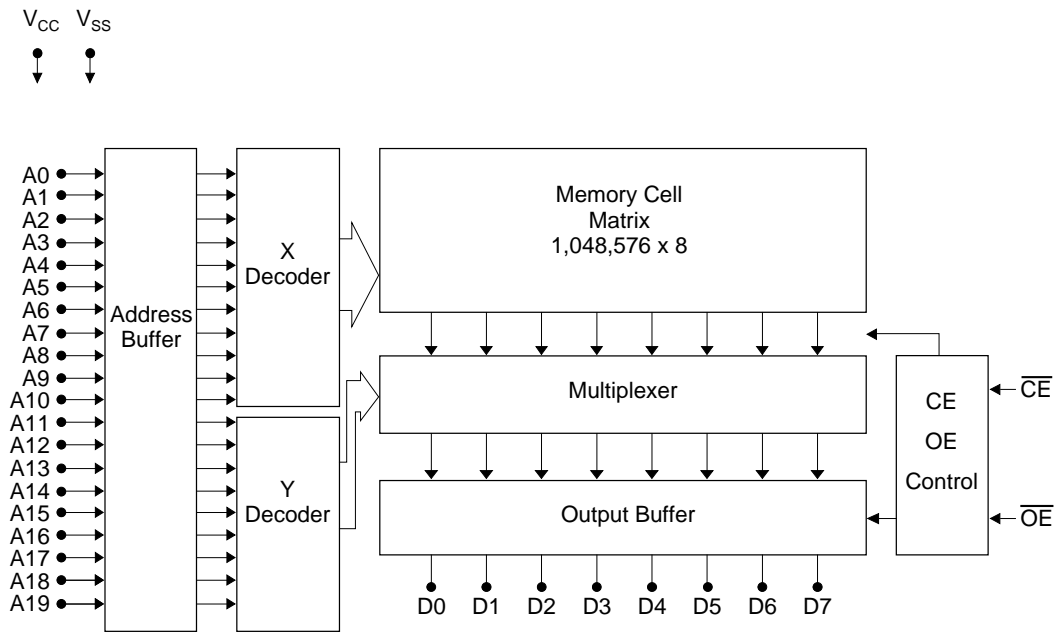
  - 32-Pin plastic TSOP (TSOP32-P-814-0.50-1K) (MSM538001E-XXTS-K)

## PIN CONFIGURATION



Pin Name	Function
A0 to A19	Address input
D0 to D7	Data output
$\overline{CE}$	Chip enable
$\overline{OE}$	Output enable
$V_{CC}, V_{SS}$	Power supply

## BLOCK DIAGRAM



## ELECTRICAL CHARACTERISTICS

### Absolute Maximum Ratings

Parameter	Symbol	Conditions	Rated Value	Unit
Power Supply Voltage	$V_{CC}$	to $V_{SS}$	-0.3 to 7	V
Input Voltage	$V_I$		-0.3 to $V_{CC} + 0.5$	V
Output Voltage	$V_O$		-0.3 to $V_{CC} + 0.5$	V
Power Dissipation	$P_D$	Per Package $T_{opr} = 25^\circ\text{C}$	1.0	W
Operating Temperature	$T_{opr}$	—	0 to 70	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	—	-55 to 150	$^\circ\text{C}$

### Recommended Operating Conditions

Parameter	Symbol	Conditions	Rated Value			Unit
			Min.	Typ.	Max.	
Power Supply Voltage	$V_{CC}$	—	4.5	5.0	5.5	V
	$V_{SS}$	—	0.0	0.0	0.0	V
"H" Input Voltage	$V_{IH}$	—	2.2	5.0	$V_{CC} + 0.5$	V
"L" Input Voltage	$V_{IL}$	—	-0.3	0.0	0.8	V
Operating Temperature	$T_{opr}$	—	0	—	70	$^\circ\text{C}$

### DC Characteristics

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

Parameter	Symbol	Conditions	Rated Value			Unit
			Min.	Typ.	Max.	
"H" Output Voltage	$V_{OH}$	$I_{OH} = -400\mu\text{A}$	2.4	—	—	V
"L" Output Voltage	$V_{OL}$	$I_{OH} = 2.1\text{mA}$	—	—	0.4	V
Input Leakage Current	$I_{LI}$	$V_I = 0$ to $V_{CC}$	-10	—	10	$\mu\text{A}$
Output Leakage Current	$I_{LO}$	$V_O = 0$ to $V_{CC}$ $\overline{CE} = V_{IH\text{MIN}}$	-10	—	10	$\mu\text{A}$
Power Supply Current (Operating)	$I_{CC}$	$\overline{CE} = V_{IL}$ , $\overline{OE} = V_{IH}$ , $t_C = 100\text{ns}$	—	—	40	mA
Power Supply Current (Standby)	$I_{CCS1}$	$\overline{CE} = V_{CC} - 0.2\text{V}$	—	—	50	$\mu\text{A}$
	$I_{CCS}$	$\overline{CE} = V_{IH\text{MIN}}$	—	—	500	$\mu\text{A}$

## AC CHARACTERISTICS

## Timing conditions

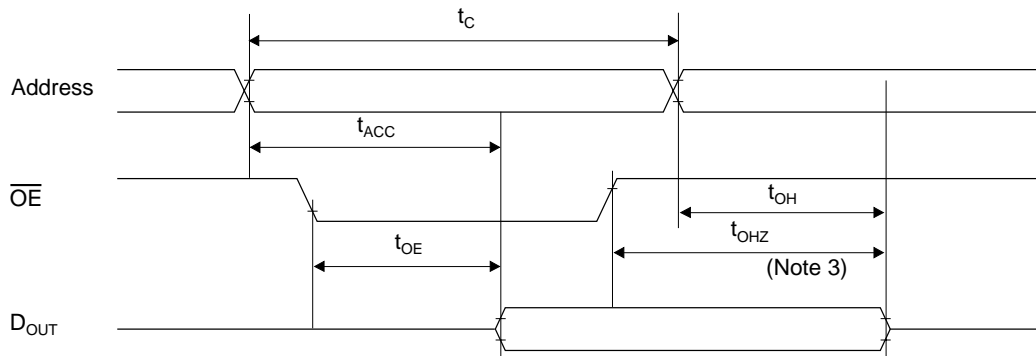
Parameter	Conditions
Input Signal Level	$V_{IH}=2.4V$ , $V_{IL}=0.6V$
Transition Time	$t_r=t_f=5ns$
Timing Reference Level	Input Voltage=1.5V Output Voltage=0.8V&2.0V
Load Condition	CL=100pF+1TTL

## Read Cycle

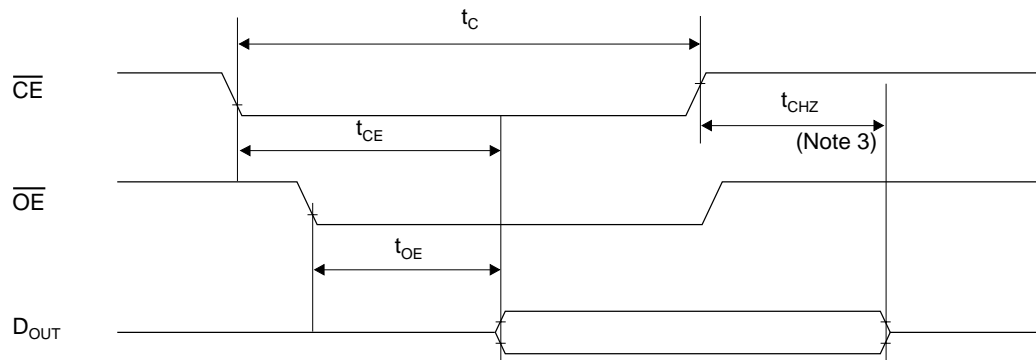
(Ta = 0 to 70°C)

Parameter	Symbol	Conditions	Rated Value			Unit
			Min.	Typ.	Max.	
Cycle time	$t_C$	—	100	—	—	ns
Address Access time	$t_{ACC}$	—	—	—	100	ns
$\overline{CE}$ Access time	$t_{CE}$	—	—	—	100	ns
$\overline{OE}$ Access time	$t_{OE}$	—	—	—	50	ns
$\overline{CE}$ Output Disable time	$t_{CHZ}$	—	0	—	40	ns
$\overline{OE}$ Output Disable time	$t_{OHZ}$	—	0	—	30	ns
Output Hold time	$t_{OH}$	—	0	—	—	ns

## Read Cycle (Note 1)



## Read Cycle (Note 2)



- Note)
1.  $\overline{CE}$  is low level.
  2. Address is fixed before or at the same time when  $\overline{CE}$  level falls.
  3.  $t_{CHZ}$  &  $t_{OHZ}$  indicate the time until floating. They are not determined by the output level.

## I/O CAPACITANCE

Parameter	Symbol	Conditions	Rated Value			Unit
			Min.	Typ.	Max.	
Input Capacitance	$C_I$	$V_I=0V$	—	—	8	pF
Output Capacitance	$C_O$	$V_O=0V$	—	—	10	pF

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