

# **OKI** Semiconductor

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## **MSM538032E**

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524,288-Word x 16-Bit or 1,048,576-Word x 8-Bit MASKROM

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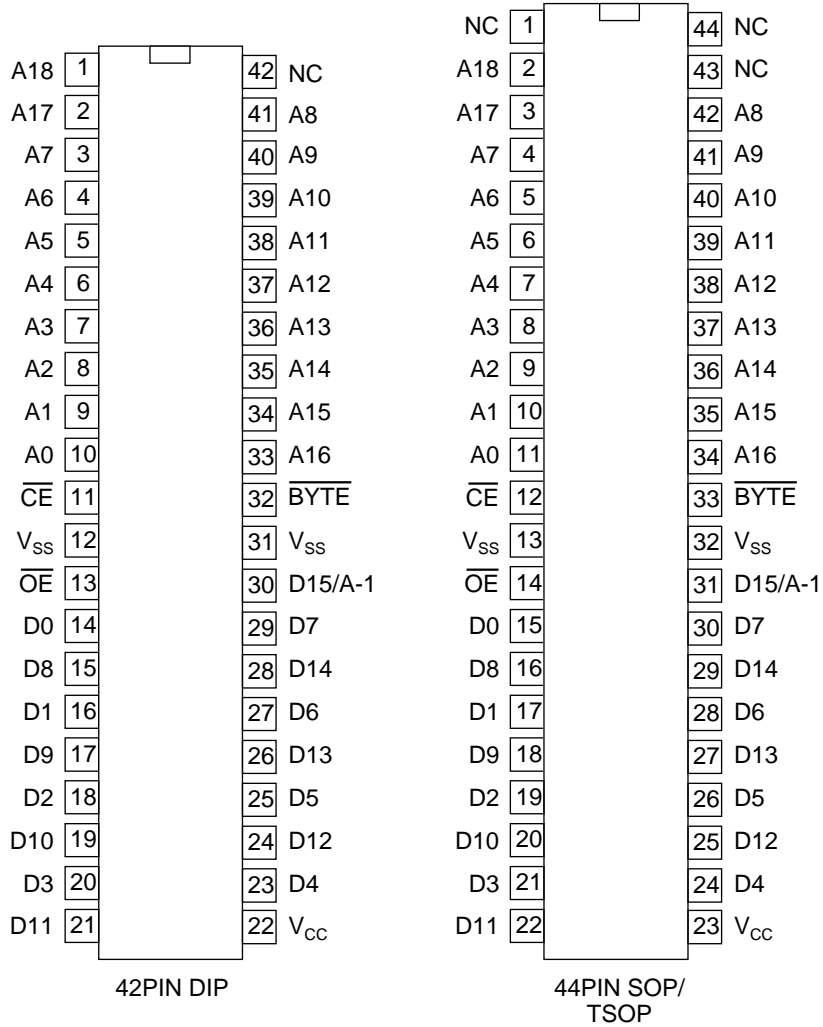
### DESCRIPTION

The OKI MSM538032E is a high-speed CMOS Mask ROM that can electrically switch between 524,288-word x 16-bit and 1,048,576-word x 8-bit configurations. The MSM538032E operates on a single 3.0V or 3.3V power supply but offers access times equivalent to products operating at 5.0V. The MSM538032E's applied byte system and pin compatibility with UV erasable EPROMs, make it ideally suited as large capacity read-only memory for portable microcomputers and data terminal equipment. Optional products with 2.7~5.5V operating parameters are also available.

### FEATURES

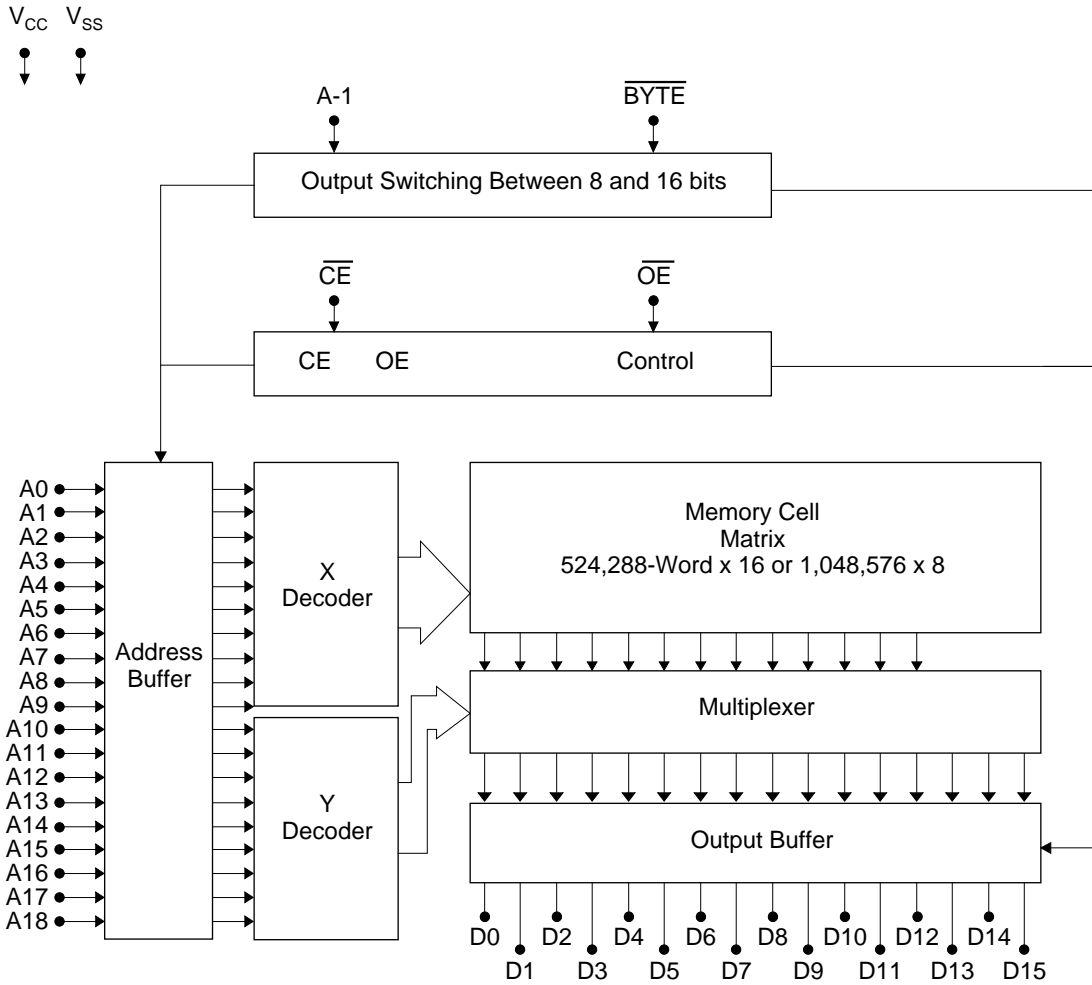
- 3.0V or 3.3V single power supply
- 524,288-word x 16-bit / 1,048,576-word x 8-bit
- Access time—Current consumption
  - 150ns—20mA (When power supply is 3.0V±0.3V)
  - 120ns—30mA (When power supply is 3.3V±0.3V)
- Tri-state output configurations
- Internal powerdown function
- Package:
  - 42-PIN PLASTIC DIP (DIP42-P-600-2.54)
  - 44-PIN PLASTIC SOP (SOP44-P-600-1.27-K)
  - 44-PIN PLASTIC TSOP (TSOP48-P-550-0.80-K)
- 8MEPROM (42-PIN) pin compatible

## PIN CONFIGURATION



Pin Name	Function
D15/A-1	Data output / address input
A0 to A18	Address input
D0 to D15	Data output
$\overline{CE}$	Chip enable
$\overline{OE}$	Output enable
$\overline{BYTE}$	Mode switch
$V_{CC}, V_{SS}$	Power supply

BLOCK DIAGRAM



FUNCTION TABLE

$\overline{CE}$	$\overline{OE}$	$\overline{BYTE}$	A-1/D15	D0 to D7	D8 to D15	D <sub>OUT</sub> Mode	LSB	MSB
H	X	X	X	Hi-Z	Hi-Z	Hi-Z	—	—
L	H	X	X	Hi-Z	Hi-Z			
L	L	H	Input Inhibited (D15)	D0 to D7	D8 to D15	16 bit	A0	A18
L	L	L	L	D0 to D7	Hi-Z	8 bit	A-1	A18
L	L	L	H	D8 to D15	Hi-Z			

## ELECTRICAL CHARACTERISTICS

### Absolute Maximum Ratings

Parameter	Symbol	Conditions	Rating	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 ( $V_{CC}=3.0\text{V}$ )

Parameter	Symbol	Conditions	Rated Value			Unit
			Min.	Typ.	Max.	
Power Supply Voltage	$V_{CC}$	—	2.7	3.0	3.3	V
	$V_{SS}$	—	0.0	0.0	0.0	V
"H" Input Voltage	$V_{IH}$	—	2.0	3.0	6.0	V
"L" Input Voltage	$V_{IL}$	—	-0.3	0.0	0.6	V
Operating Temperature	$T_{opr}$	—	0	—	70	$^\circ\text{C}$

### Recommended Operating Conditions ( $V_{CC}=3.3\text{V}$ )

Parameter	Symbol	Conditions	Rated Value			Unit
			Min.	Typ.	Max.	
Power Supply Voltage	$V_{CC}$	—	3.0	3.3	3.6	V
	$V_{SS}$	—	0.0	0.0	0.0	V
"H" Input Voltage	$V_{IH}$	—	2.0	3.3	6.0	V
"L" Input Voltage	$V_{IL}$	—	-0.3	0.0	0.6	V
Operating Temperature	$T_{opr}$	—	0	—	70	$^\circ\text{C}$

DC CHARACTERISTICS ( $V_{CC}=3.0V\pm 0.3V$ )

(Ta = 0 to 70°C)

Parameter	Symbol	Conditions	Rated Value			Unit
			Min.	Typ.	Max.	
"H" Output Voltage	$V_{OH1}$	$I_{OH} = -100\mu A$	$V_{CC} - 0.1$	—	—	V
	$V_{OH2}$	$I_{OH} = -1.0mA$	$V_{CC} - 0.4$	—	—	V
"L" Output Voltage	$V_{OL1}$	$I_{OL} = 100\mu A$	—	—	0.1	V
	$V_{OL2}$	$I_{OI} = 1.0mA$	—	—	0.4	V
Input Leakage Current	$I_{LI}$	$V_I = 0 \text{ to } V_{CC}$	-10	—	10	$\mu A$
Output Leakage Current	$I_{LO}$	$V_O = 0 \text{ to } V_{CC}$ $CE = V_{IH \text{ MIN}}$	-10	—	10	$\mu A$
Power Supply Current (Operating)	$I_{CC}$	$\overline{CE} = V_{IL}, \overline{OE} = V_{IH}, t_C = 200ns$	—	—	20	mA
Power Supply Current (Standby)	$I_{CCS^C}$	$\overline{CE} = V_{CC} - 0.2V$	—	—	10	$\mu A$
	$I_{CCS^T}$	$\overline{CE} = V_{IH \text{ MIN}}$	—	—	50	$\mu A$

DC CHARACTERISTICS ( $V_{CC}=3.3V\pm 0.3V$ )

(Ta = 0 to 70°C)

Parameter	Symbol	Conditions	Rated Value			Unit
			Min.	Typ.	Max.	
"H" Output Voltage	$V_{OH1}$	$I_{OH} = -100\mu A$	$V_{CC} - 0.1$	—	—	V
	$V_{OH2}$	$I_{OH} = -1.0mA$	$V_{CC} - 0.4$	—	—	V
"L" Output Voltage	$V_{OL1}$	$I_{OL} = 100\mu A$	—	—	0.1	V
	$V_{OL2}$	$I_{OI} = 1.0mA$	—	—	0.4	V
Input Leakage Current	$I_{LI}$	$V_I = 0 \text{ to } V_{CC}$	-10	—	10	$\mu A$
Output Leakage Current	$I_{LO}$	$V_O = 0 \text{ to } V_{CC}$ $CE = V_{IH \text{ MIN}}$	-10	—	10	$\mu A$
Power Supply Current (Operating)	$I_{CC}$	$\overline{CE} = V_{IL}, \overline{OE} = V_{IH}, t_C = 150ns$	—	—	30	mA
Power Supply Current (Standby)	$I_{CCS^C}$	$\overline{CE} = V_{CC} - 0.2V$	—	—	10	$\mu A$
	$I_{CCS^T}$	$\overline{CE} = V_{IH \text{ MIN}}$	—	—	50	$\mu A$

## AC CHARACTERISTICS

## Timing conditions

Parameter	Conditions
Input Signal Level	$V_{IH}=2.7V, V_{IL}=0.0V$
Transtion Time	$t_r=t_f=5ns$
Timing Reference Level	Input Voltage=1.5V Output Voltage=0.8V&2.0V
Load Condition	CL=50pF

Read Cycle ( $V_{CC}=3.0V\pm 0.3V$ )

(Ta = 0 to 70°C)

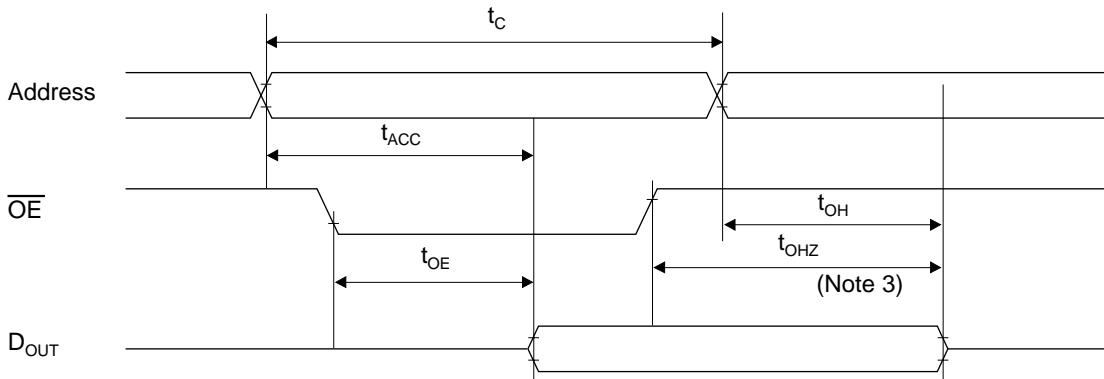
Parameter	Symbol	Conditions	Rated Value			Unit
			Min.	Typ.	Max.	
Cycle time	$t_C$	—	150	—	—	ns
Address Access time	$t_{ACC}$	—	—	—	150	ns
$\overline{CE}$ Access time	$t_{CE}$	—	—	—	150	ns
$\overline{OE}$ Access time	$t_{OE}$	—	—	—	80	ns
$\overline{CE}$ Output Disable time	$t_{CHZ}$	—	0	—	70	ns
$\overline{OE}$ Output Disable time	$t_{OHZ}$	—	0	—	60	ns
Output Hold time	$t_{OH}$	—	0	—	—	ns

Read Cycle ( $V_{CC}=3.3V\pm 0.3V$ )

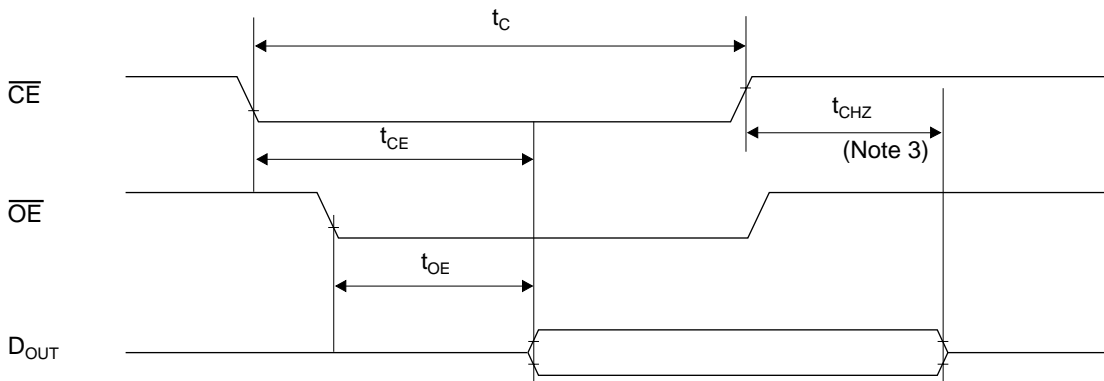
(Ta = 0 to 70°C)

Parameter	Symbol	Conditions	Rated Value			Unit
			Min.	Typ.	Max.	
Cycle time	$t_C$	—	120	—	—	ns
Address Access time	$t_{ACC}$	—	—	—	120	ns
$\overline{CE}$ Access time	$t_{CE}$	—	—	—	120	ns
$\overline{OE}$ Access time	$t_{OE}$	—	—	—	70	ns
$\overline{CE}$ Output Disable time	$t_{CHZ}$	—	0	—	60	ns
$\overline{OE}$ Output Disable time	$t_{OHZ}$	—	0	—	50	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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