

# **OKI** Semiconductor

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## **MSM538002E**

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

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### DESCRIPTION

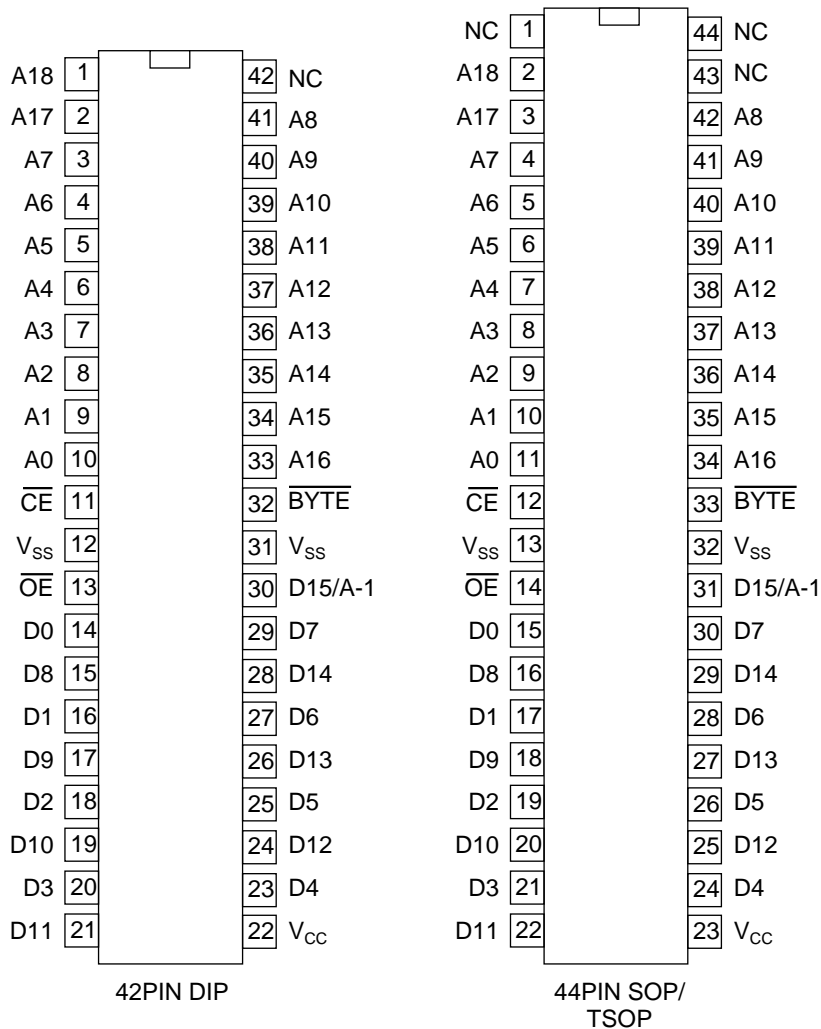
The OKI MSM538002E is a high-speed CMOS Mask ROM that can electrically switch between 524,288-word x 16-bit or 1,048,576-word x 8-bit configurations. The MSM538002E Operates on a single 5.0V power supply and is TTL compatible. The chip's asynchronous I/O requires no external clock assuring easy operation. 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 MSM538002E is suited for use as large capacity fixed memory for microcomputers and data terminals.

### FEATURES

- Single 5.0V power supply
- 524,288-words x 16-bit / 1,048,576-words x 8-bit
- Access time
  - 100ns MAX
- Input/Output TTL compatible
- Tri-State output configurations
- Internal powerdown function
- Packages:
  - 42-PIN PLASTIC DIP (DIP42-P-600-2.54) (MSM538002E-xxRS)
  - 44-PIN PLASTIC SOP (SOP44-P-600-1.27-K) (MSM538002E-xxGS-K)
  - 44-PIN PLASTIC TSOP (TSOPII44-P-400-0.80-K) (MSM538002E-xxTS-AK)
- 8MEPROM (42-PIN) pin compatible

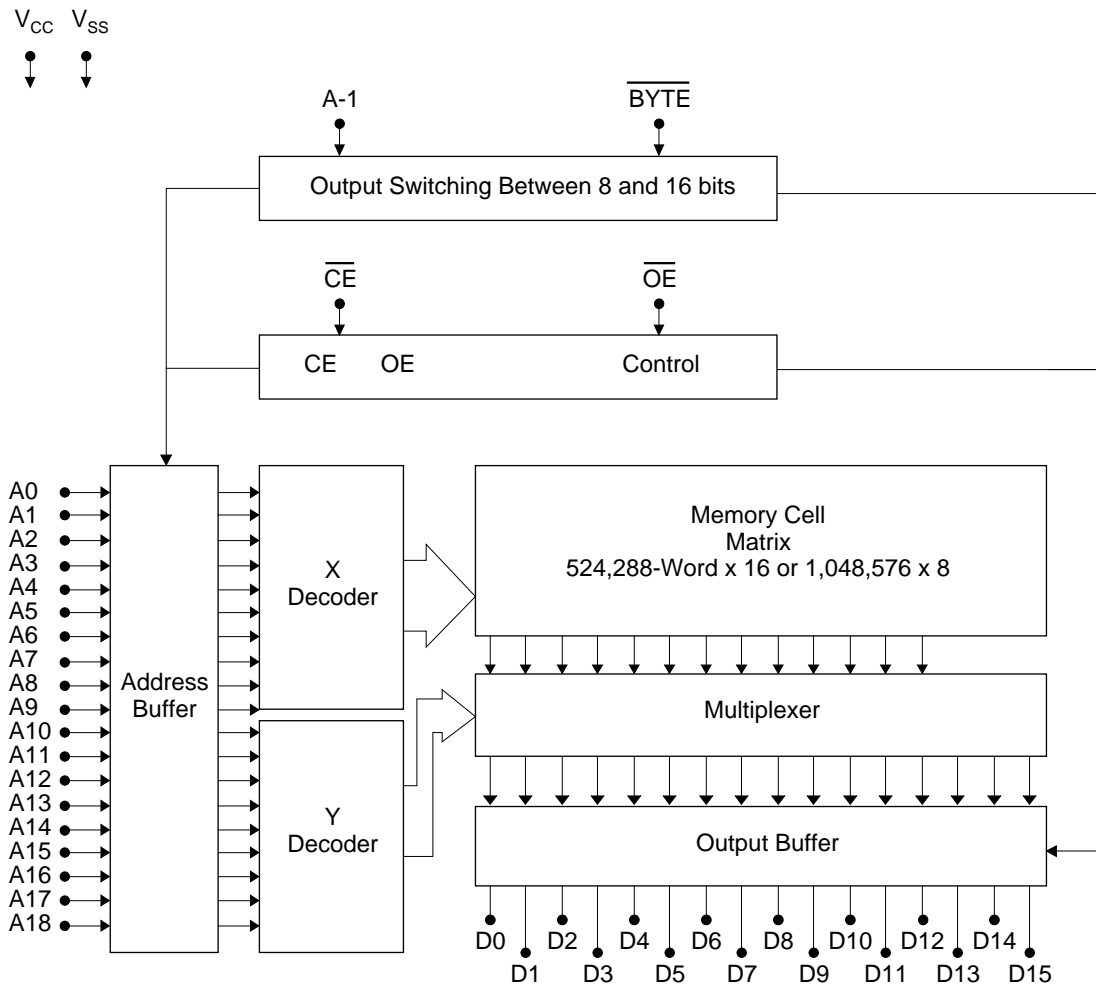
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## PIN CONFIGURATION



Pin Name	Function
D15/A-1	Data output / address input
A0 to A18	Address input
D0 to D15	Data output
CE	Chip enable
OE	Output enable
BYTE	Mode switch
V <sub>CC</sub> , V <sub>SS</sub>	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		16 bit	A0	A18
L	L	H	Input Inhibited (D15)	D0 to D7	D8 to D15	8 bit	A-1	A18	
L	L	L	L	D0 to D7	Hi-Z		8 bit	A-1	A18
L	L	L	H	D8 to D15	Hi-Z		8 bit	A-1	A18

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## 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

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

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	$I_{LI}$	$V_I = 0 \text{ to } V_{CC}$	-10	—	10	$\mu\text{A}$
Output Leakage Current	$I_{LO}$	$\frac{V_O = 0 \text{ to } V_{CC}}{CE} = V_{IH\text{MIN}}$	-10	—	10	$\mu\text{A}$
Power Supply Current (Operating)	$I_{CC}$	$\overline{CE} = V_{IL}, \overline{OE} = V_{IH}, t_C = 100\text{ns}$	—	—	50	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	$V_{IH}=3.0V, V_{IL}=0.0V$
Transition Time	$t_r=t_f=5ns$
Timing Reference Level	Input Voltage=1.5V Output Voltage=0.8V&2.0V
Load Condition	$CL=100pF+1TTL$

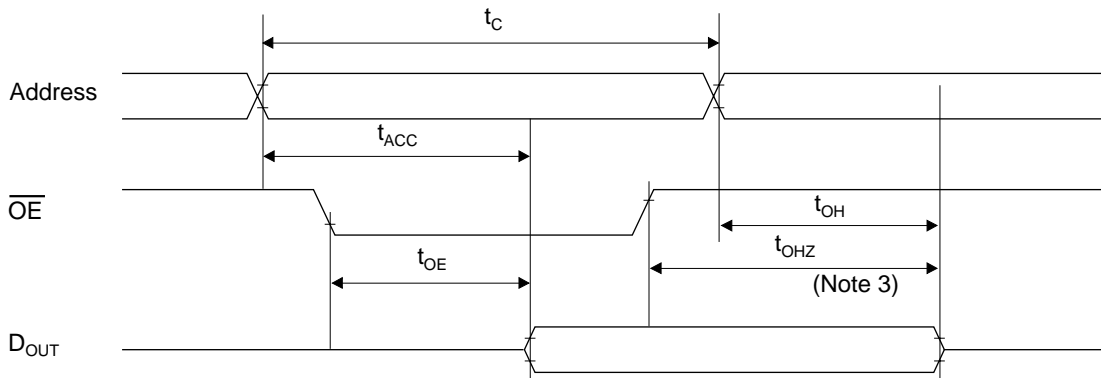
## Read Cycle

(Ta = 0 to 70°C)

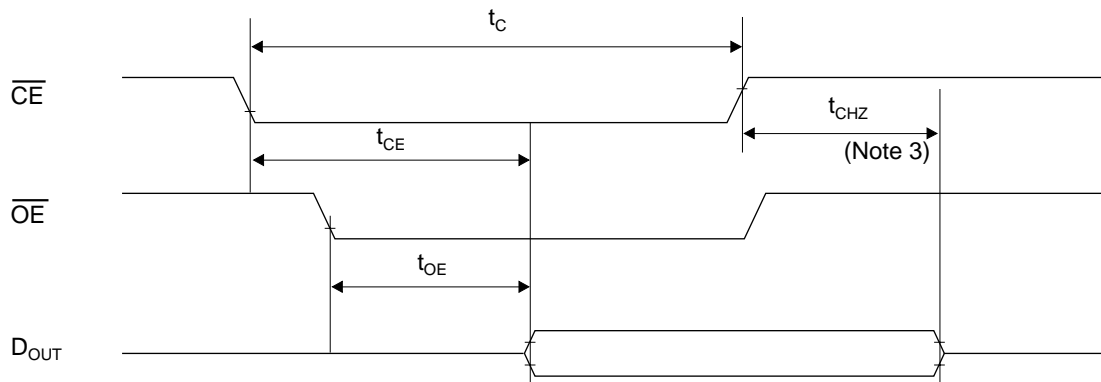
Parameter	Symbol	Conditions	Rated Value			Unit
			Min.	Typ.	Max.	
Cycle time	$t_C$	—	100	—	—	ns
Address Access time	$t_{ACC}$	—	—	—	100	ns
$\overline{CE}$ Access time	$t_{CE}$	—	—	—	100	ns
$\overline{OE}$ Access time	$t_{OE}$	—	—	—	50	ns
$\overline{CE}$ Output Disable time	$t_{CHZ}$	—	0	—	40	ns
$\overline{OE}$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

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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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## ADDRESSES & SEMICONDUCTOR WEB SITES

### **OKI Electric Industry Co., Ltd.,**

Device Business Group,  
10-3, Shibaura, 4-chome,  
Minato-ku, Tokyo 108, Japan,  
Tel.: +81-(0)3-5445-6327,  
Fax.: +81-(0)3-5445-6328,  
<http://www.oki.co.jp/OKI/DBG/english/index.htm>  
(NOTE: URL is case sensitive)

### **OKI Semiconductor Group,**

785 North Mary Avenue,  
Sunnyvale, CA 94086, U.S.A.,  
Tel.: +1-408-720-1900,  
Fax.: +1-408-720-1918,  
<http://www.okisemi.com/>

### **OKI Electric Europe GmbH,**

Head Office Europe,  
Hellersbergstrasse 2,  
D-41460 Neuss, Germany,  
Tel: +49-2131-15960,  
Fax: +49-2131-103539,  
<http://www.oki-europe.de/>

### **OKI Electronics (Hong Kong) Ltd.,**

Suite 1901-1&19, Tower 3,  
China Hong Kong City,  
33 Canton Road, Tsimshatsui,  
Kowloon, Hong Kong,  
Tel.: +852-2-736-2336,  
Fax.: +852-2-736-2395

### **OKI Semiconductor (Asia) Pte. Ltd.,**

78 Shenton Way 09-01,  
Singapore 0207,  
Tel.: +65-221-3722,  
Fax.: +65-323-5376

### **OKI Semiconductor (Asia) Pte. Ltd.,**

Taipei Branch,  
7th Fl. No.260, Tun Hwa North Road,  
Taipei, Taiwan, R.O.C.,  
Sumitomo-Flysun Building,  
Tel.: +886-2-2719-2561,  
Fax.: +886-2-2715-2892  
<http://www.oki.net.tw/>

*For further information, please contact:*

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