

# OKI Semiconductor

## MSM538052E

524,288-Words x 16-bit or 1,048,576-Bytes x 8-bit MaskROM  
8Words x 16-Bit or 16Bytes x 8-Bit/Page Mode MASKROM

### ■ DESCRIPTION

The OKI MSM538052E is a 524,288-words x 16-bit or 1,048,576-Bytes x 8-bit CMOS Mask ROM with an asynchronous page read mode. Each page is organized 8 words x 16-bit or 16 words x 8-bit. It 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 MSM538052E is suited for use as large capacity fixed memory for microcomputers and data terminals.

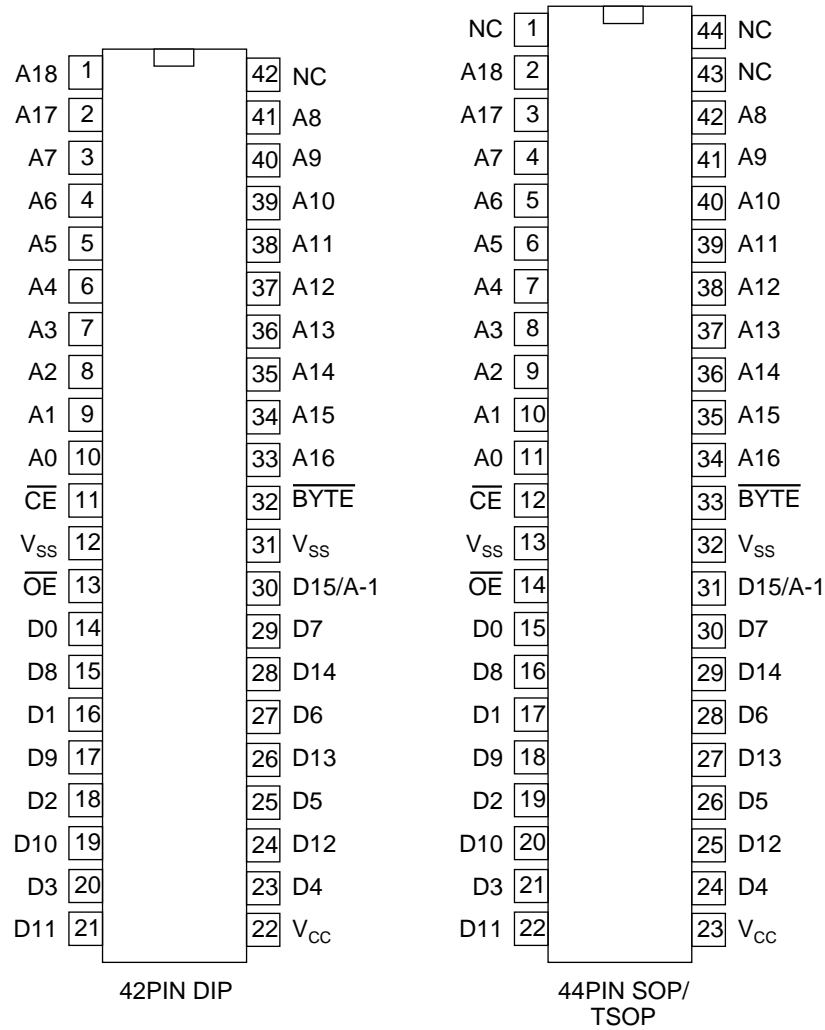
### ■ FEATURES

- Single 5.0V power supply
- 524,288-words x 16-bit / 1,048,576-Bytes x 8-bit
- 8-words(A2,A1,A0) or 16-Bytes(A2,A1,A0,A-1) / Page
- Access time
  - 100ns Max (Normal access)
  - 50ns Max (Page access)
- Input/Output TTL compatible
- Tri-State output configurations
- Internal powerdown function
- Packages:

42-PIN PLASTIC DIP	(DIP42-P-600-2.54)	(MSM538052E-xxRS)
44-PIN PLASTIC SOP	(SOP44-P-600-1.27-K)	(MSM538052E-xxGS-K)
44-PIN PLASTIC TSOP	(TSOP44-P-400-0.80-1K)	(MSM538052E-xxTS-AK)
- Pin compatible OTP available

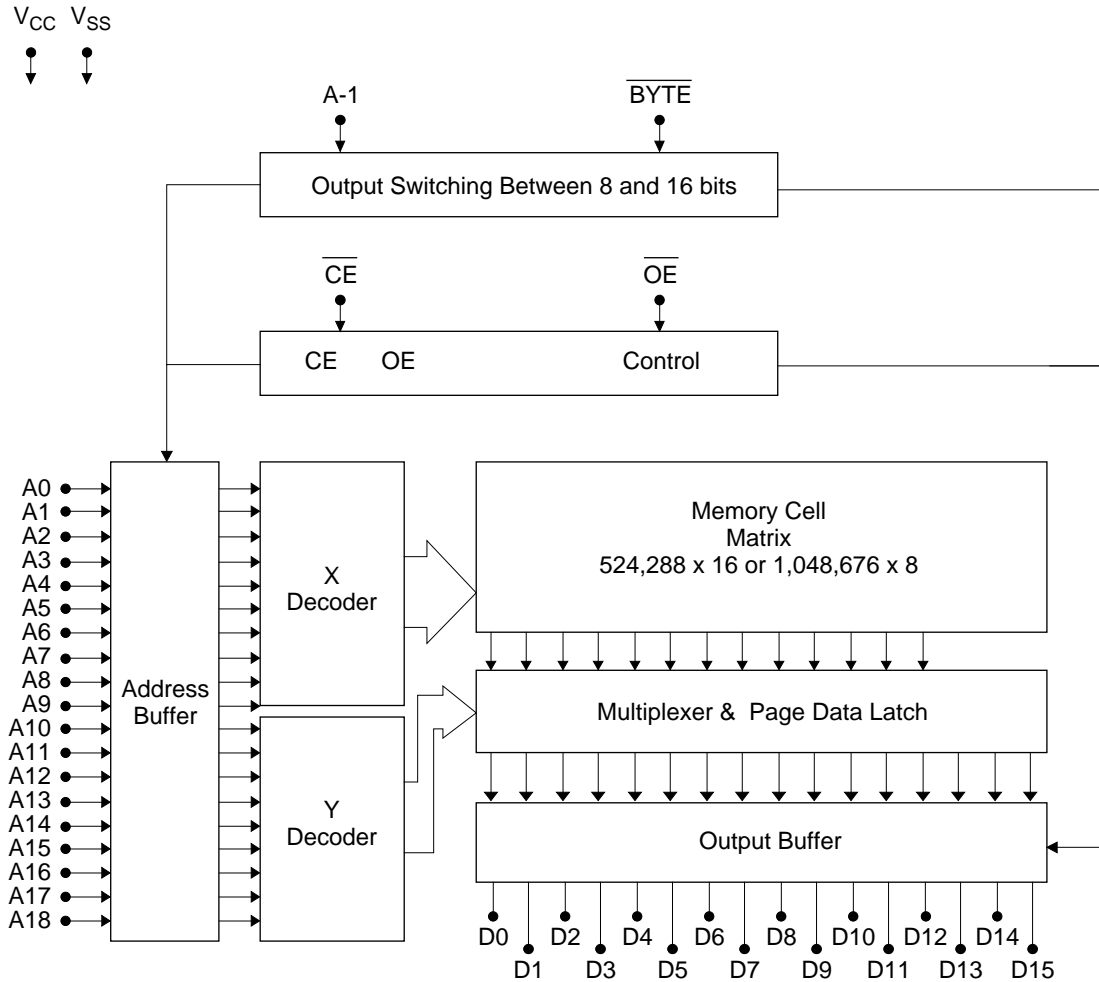
● MSM538052E

### 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—D7	D8—D15	$D_{OUT}$ 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	H	Input Inhibited (D15)	D0 to D7	D8 to D15	16 bit(Page Mode)	A0	A2
L	L	L	L	D0 to D7	Hi-Z	8 bit	A-1	A18
L	L	L	H	D8 to D15	Hi-Z			
L	L	L	L	D0 to D7	Hi-Z	8 bit(Page Mode)	A-1	A2
L	L	L	H	D8 to D15	Hi-Z			

MSM538052E

## ABSOLUTE MAXIMUM LIMITS

Parameter	Symbol	Conditions	Limits	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	Limits			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	5.5	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	Limits			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	$I_{LO}$	$V_O = 0 \text{ to } V_{CC}$ $CE = V_{IH\text{MIN}}$	-10	—	10	$\mu\text{A}$
Power Supply Current (Operating)	$I_{CC}$	$CE = V_{IL}, OE = V_{IH}, t_C = 100\text{ns}$	—	—	80	mA
Power Supply Current (Standby)	$I_{CCS1}$	$CE = V_{CC} - 0.2\text{V}$	—	—	50	$\mu\text{A}$
	$I_{CCS}$	$CE = V_{IH\text{MIN}}$	—	—	500	$\mu\text{A}$

## AC CHARACTERISTICS

Test conditions

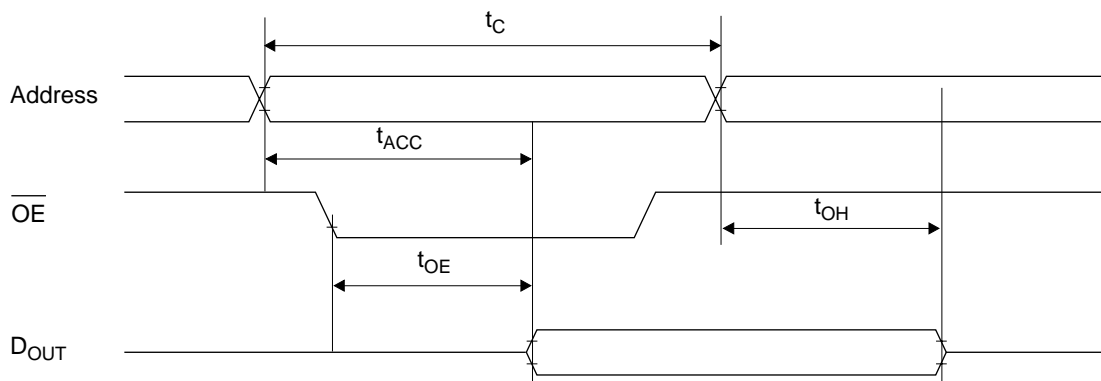
Parameter	Conditions
Input Signal Level	$V_{IH}=3.0V, V_{IL}=0.0V$
Transtion Time	$t_r=t_f=5ns$
Timing Reference Level	Input Voltage=1.5V Output Voltage=0.8V&2.0V
Load Condition	CL=100pF+1TTL

### Read Cycle

(Ta = 0 to 70°C)

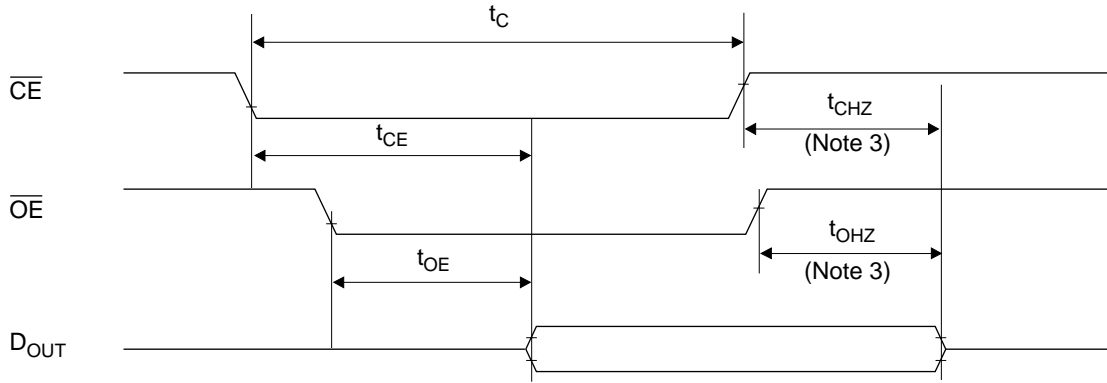
Parameter	Symbol	Conditions	Limits			Unit
			Min.	Typ.	Max.	
Random Access Cycle time	$t_C$	—	100	—	—	ns
Random Address Access time	$t_{ACC}$	—	—	—	100	ns
Page Set up time	$t_{PSET}$	—	120	—	—	ns
Page Access Cycle time	$t_{PC}$	—	50	—	—	ns
Page Access time	$t_{PAC}$	—	—	—	50	ns
$\overline{CE}$ Access 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 (Note1)

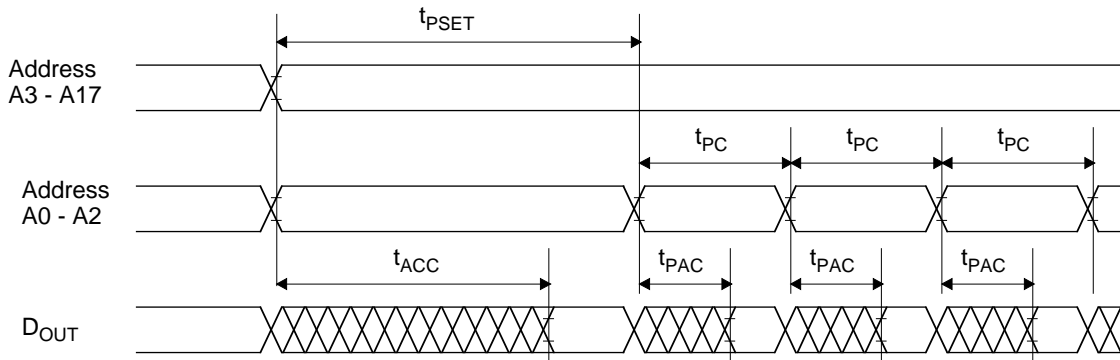


MSM538052E

Read Cycle (Note2)



Page Mode Read Cycle (Note4)



- 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.
  4.  $\overline{CE}$  is low level and  $\overline{OE}$  is low 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

## NOTICE

The information contained herein can change without notice owing to product and/or technical improvements. Before using the product, please make sure that the information being referred to is up-to-date.

The outline of action and examples for application circuits described herein have been chosen as an explanation for the standard action and performance of the product. When planning to use the product, please ensure that the external conditions are reflected in the actual circuit, assembly, and program designs.

When designing your product, please use our product below the specified maximum ratings and within the specified operating ranges including, but not limited to, operating voltage, power dissipation, and operating temperature.

Oki assumes no responsibility or liability whatsoever for any failure or unusual or unexpected operation resulting from misuse, neglect, improper installation, repair, alteration or accident, improper handling, or unusual physical or electrical stress including, but not limited to, exposure to parameters beyond the specified maximum ratings or operation outside the specified operating range.

Neither indemnity against nor license of a third party's industrial and intellectual property right, etc. is granted by us in connection with the use of the product and/or the information and drawings contained herein. No responsibility is assumed by us for any infringement of a third party's right which may result from the use thereof.

The products listed in this document are intended for use in general electronics equipment for commercial applications (e.g., office automation, communication equipment, measurement equipment, consumer electronics, etc.). These products are not authorized for use in any system or application that requires special or enhanced quality and reliability characteristics nor in any system or application where the failure of such system or application may result in the loss or damage of property, or death or injury to humans. Such applications include, but are not limited to, traffic and automotive equipment, safety devices, aerospace equipment, nuclear power control, medical equipment, and life-support systems.

Certain products in this document may need government approval before they can be exported to particular countries. The purchaser assumes the responsibility of determining the legality of export of these products and will take appropriate and necessary steps at their own expense for these.

No part of the contents contained herein may be reprinted or reproduced without our prior permission.

All brand, company and product names are the trademarks or registered trademarks of their respective owners.

Copyright 1998 Oki Electric Industry Co., Ltd.  
Marketing Communications Team (RB)

# OKI

People To People Technology

## 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/semi/>

### **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:*