OKI Semiconductor

MSM538002E

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

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
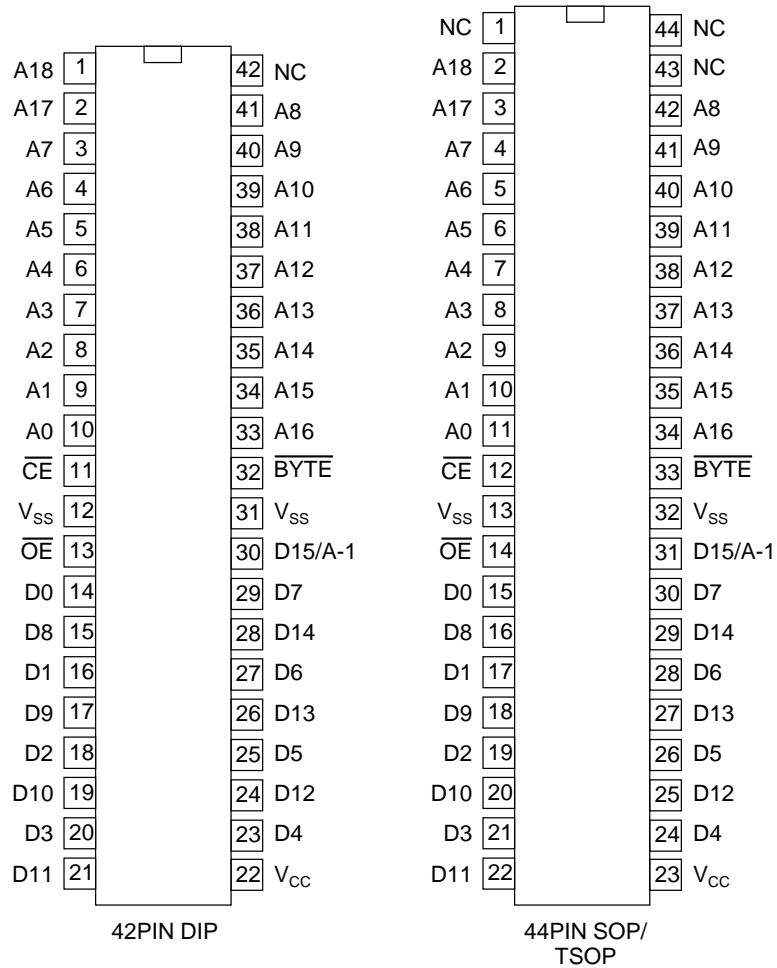Tri-State output configurations
Internal powerdown function
Packages:
 42-PIN PLASTIC DIP   (DIP42-P-600-2.54)   (MSM538002E-xxRS)
 44-PIN PLASTIC SOP   (SOP44-P-600-1.27-K)   (MSM538002E-xxGS-K)
 44-PIN PLASTIC TSOP (TSOPII44-P-400-0.80-K)   (MSM538002E-xxTS-AK)
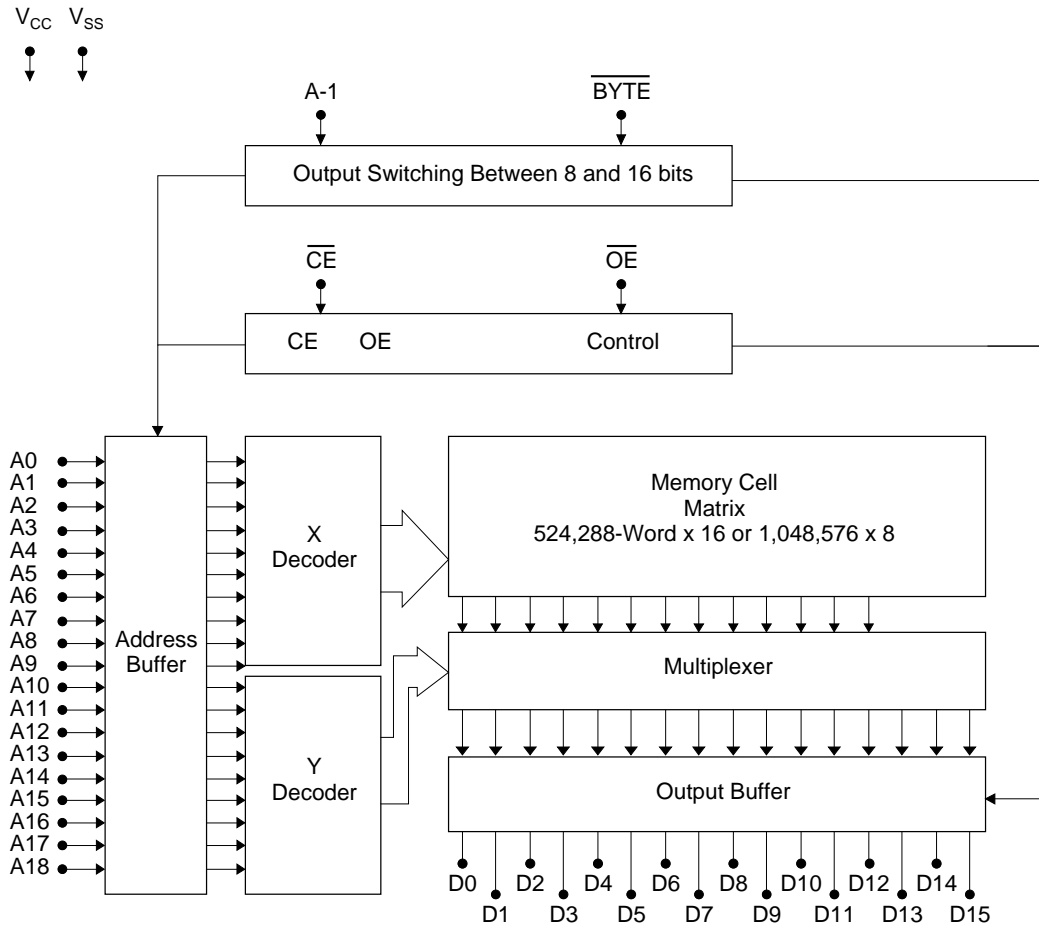8MEPROM (42-PIN) pin compatible

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PIN CONFIGURATION

```
42PIN DIP

A18   1          42  NC
A17   2          41  A8
A7    3          40  A9
A6    4          39  A10
A5    5          38  A11
A4    6          37  A12
A3    7          36  A13
A2    8          35  A14
A1    9          34  A15
A0   10          33  A16
CE   11          32  BYTE
Vss  12          31  Vss
OE   13          30  D15/A-1
D0   14          29  D7
D8   15          28  D14
D1   16          27  D6
D9   17          26  D13
D2   18          25  D5
D10  19          24  D12
D3   20          23  D4
D11  21          22  Vcc
```

42PIN DIP

```
44PIN SOP/TSOP

NC    1          44  NC
A18   2          43  NC
A17   3          42  A8
A7    4          41  A9
A6    5          40  A10
A5    6          39  A11
A4    7          38  A12
A3    8          37  A13
A2    9          36  A14
A1   10          35  A15
A0   11          34  A16
CE   12          33  BYTE
Vss  13          32  Vss
OE   14          31  D15/A-1
D0   15          30  D7
D8   16          29  D14
D1   17          28  D6
D9   18          27  D13
D2   19          26  D5
D10  20          25  D12
D3   21          24  D4
D11  22          23  Vcc
```

44PIN SOP/TSOP

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

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BLOCK DIAGRAM

V_CC V_SS

A-1 $\overline{\text{BYTE}}$

| Output Switching Between 8 and 16 bits |

$\overline{\text{CE}}$ $\overline{\text{OE}}$

| CE   OE   Control |

A0
A1
A2
A3
A4
A5
A6
A7
A8   Address Buffer
A9
A10
A11
A12
A13
A14
A15
A16
A17
A18

X Decoder

Y Decoder

Memory Cell
Matrix
524,288-Word x 16 or 1,048,576 x 8

Multiplexer

Output Buffer

D0   D2   D4   D6   D8   D10   D12   D14
  D1   D3   D5   D7   D9   D11   D13   D15

FUNCTION TABLE

$\overline{\text{CE}}$	$\overline{\text{OE}}$	$\overline{\text{BYTE}}$	A-1/D15	D0 to D7	D8 to 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	L	L	D0 to D7	Hi-Z	8 bit	A-1	A18
L	L	L	H	D8 to D15	Hi-Z			

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ELECTRICAL CHARACTERISTICS
Absolute Maximum Ratings

Parameter	Symbol	Conditions	Rated Value	Unit
Power Supply Voltage	V_{CC}		−0.3 to 7	V
Input Voltage	V_I	to V_{SS}	−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°C	1.0	W
Operating Temperature	T_{opr}	—	0 to 70	°C
Storage Temperature	T_{stg}	—	−55 to 150	°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	°C

DC Characteristics

(V_{CC} = 5V±10%, Ta = 0 to 70°C)

Parameter	Symbol	Conditions	Rated Value			Unit
			Min.	Typ.	Max.	
"H" Output Voltage	V_{OH}	I_{OH} = −400µA	2.4	—	—	V
"L" Output Voltage	V_{OL}	I_{OH} = 2.1mA	—	—	0.4	V
Input Leakage Current	I_{LI}	V_I = 0 to V_{CC}	−10	—	10	µA
Output Leakage Current	I_{LO}	V_O = 0 to V_{CC} $\overline{CE}$ = $V_{IH\ MIN}$	−10	—	10	µA
Power Supply Current (Operating)	I_{CC}	$\overline{CE}$ = V_{IL}, $\overline{OE}$ = V_{IH}, t_C = 100ns	—	—	50	mA
Power Supply Current (Standby)	$I_{CCS}1$	$\overline{CE}$ = V_{CC}−0.2V	—	—	50	µA
	I_{CCS}	$\overline{CE}$ = $V_{IH\ MIN}$	—	—	500	µA

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AC CHARACTERISTICS
### Timing conditions

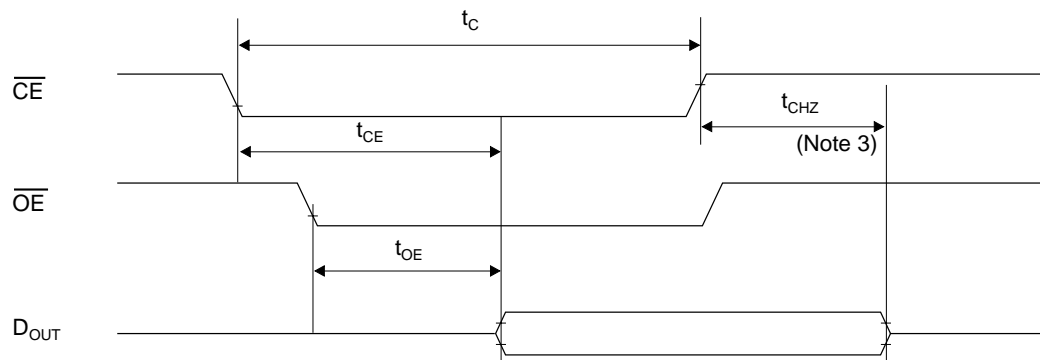| Parameter	Conditions
Input Signal Level	V_{IH}=3.0V, V_{IL}=0.0V
Transtion Time	t_r=t_f=5ns
Timing Reference Level	Input Voltage=1.5V Output Voltage=0.8V&2.0V
Load Condition	CL=100pF+1TTL

Read Cycle

(Ta = 0 to 70°C)

Parameter	Symbol	Conditions	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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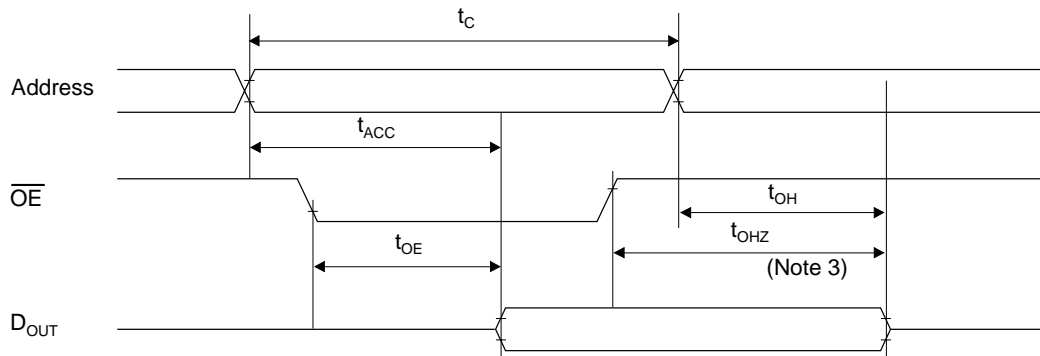
Read Cycle (Note 1)

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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