

## MSM538002C

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

### DESCRIPTION

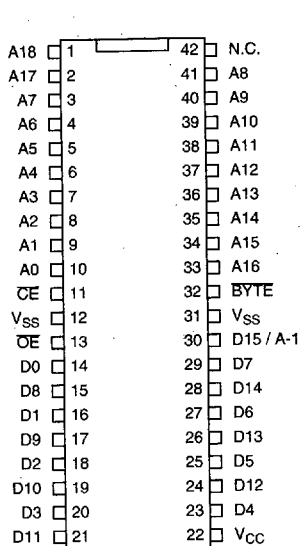
The OKI MSM538002C is a high-speed CMOS Mask ROM that can electrically switch between 524,288-word x 16-bit and 1,048,576-word x 8-bit configurations. The MSM538002C operates on a single 5.0 V power supply and is TTL compatible. The chip's asynchronous I/O requires no external clock assuring easy operation. A power-down mode provides low power dissipation when the chip is not selected. The  $\overline{CE}$  and  $\overline{OE}$  pins are provided as control signals that permit three-stated output allowing easy memory expansion on a system bus. The MSM538002C is suited for use as large capacity fixed memory for micro-computers and data terminals.

### FEATURES

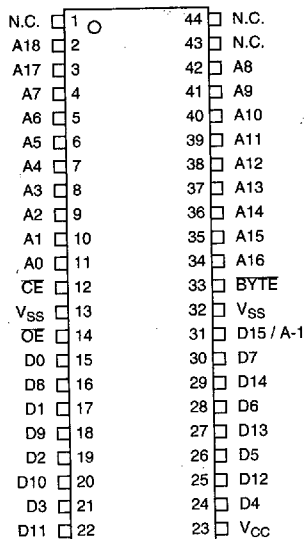
- Dual, electrically switchable configurations
  - 512K x 16 bits
  - 1 Meg x 8 bits
- Single 5.0 V power supply
- 120 ns access time (max.)
- Input/Output TTL compatible
- Pin compatible OTP available
- Three-state output
- Packages
  - 42-Pin plastic DIP
  - 44-Pin plastic SOP

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## PIN CONFIGURATION



42-Pin DIP

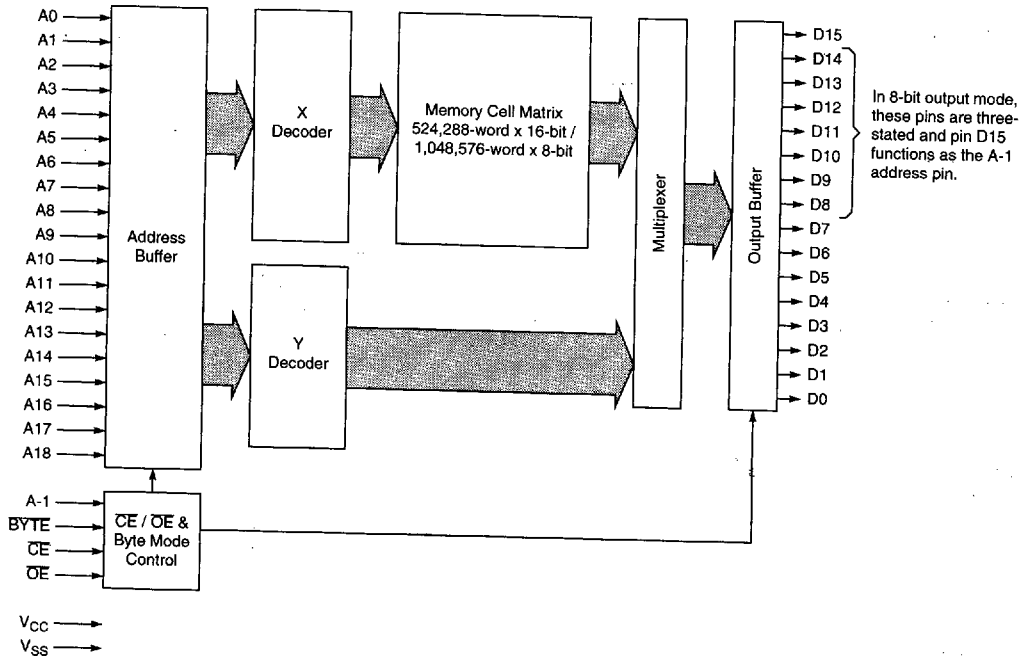


44-Pin SOP

### Pin Configuration

Pin Name	Function
A0 ~ A18	Address input
D0 ~ D14	Data output
D15 / A-1	Data output / address input
CE	Chip enable
OE	Output enable
BYTE	Mode switch
V <sub>CC</sub> , V <sub>SS</sub>	Power supply

**BLOCK DIAGRAM**



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**Function Table**

CE	OE	BYTE	D15 / A-1	D0 - D7	D8 - D15	Output 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	D0 - D7	D8 - D15	16-Bit	A0	A18
L	L	L	L	D0 - D7	Hi-Z	8-Bit	A-1	A18
L	L	L	H	D8 - D15	Hi-Z			

## ELECTRICAL CHARACTERISTICS

### Absolute Maximum Ratings <sup>[1]</sup>

Parameter	Symbol	Value	Unit
Power supply voltage $V_{CC}$ relative to $V_{SS}$	$V_{CC}$	-0.3 ~ +7.0	V
Input voltage relative to $V_{SS}$	$V_{IN}$	-0.3 ~ $V_{CC} + 0.5$	V
Output voltage relative to $V_{SS}$	$V_{OUT}$	-0.3 ~ $V_{CC} + 0.5$	V
Power dissipation	$P_D$	1.0	W
Operating temperature	$T_{OPR}$	-0 ~ +70	°C
Storage temperature	$T_{STG}$	-55 ~ +150	°C

1. Permanent device damage may occur if ABSOLUTE MAXIMUM RATINGS are exceeded. Functional operation should be restricted to the conditions as detailed in the operational sections of this data sheet. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

### Recommended Operating Conditions ( $V_{CC} = 5.0$ V, $T_a = 0$ to +70°C)

Parameter	Symbol	Rated Value			Unit
		Min	Typ	Max	
Power supply voltage	$V_{CC}$	4.5	5.0	5.5	V
	$V_{SS}$	0	0	0	V
Input high voltage	$V_{IH}$	2.2	5.0	$V_{CC} + 0.5$	V
Input low voltage	$V_{IL}$	-0.3	0	0.8	V

### Capacitance ( $T_a = 25^\circ\text{C}$ , $f = 1$ MHz)

Parameter	Symbol	Conditions	Rated Value			Unit
			Min	Typ	Max	
Input capacitance	$C_I$	$V_{IN} = 0$ V	-	-	15	pF
Output capacitance	$C_O$	$V_{OUT} = 0$ V	-	-	15	pF

### DC Characteristics ( $V_{CC} = 5.0$ V $\pm 10\%$ , $T_a = 0^\circ\text{C} \sim +70^\circ\text{C}$ )

Parameter	Symbol	Condition	Rated Value			Unit
			Min	Typ	Max	
Output high voltage	$V_{OH}$	$I_{OH} = -400$ $\mu\text{A}$	2.4	-	-	V
Output low voltage	$V_{OL}$	$I_{OL} = 2.1$ mA	-	-	0.4	V
Input leakage current	$I_{LI}$	$V_{IN} = 0$ V, $-V_{CC}$	-10	-	10	$\mu\text{A}$
Output leakage current	$I_{LO}$	$V_{OUT} = 0$ V, $-V_{CC}$ , $CE = V_{IH}(\text{MIN})$	-10	-	10	$\mu\text{A}$
Average power supply current (Operating)	$I_{CC}$	$CE = V_{IL}$ , $OE = V_{IH}$ , $t_C = 120$ ns	-	-	40	mA
		$CE = V_{IL}$ , $OE = V_{IH}$ , $t_C = 1$ $\mu\text{s}$	-	-	30	mA
Power supply current (Standby)	$I_{CCS}$	$OE = V_{CC} - 0.2$ V	-	-	50	$\mu\text{A}$
	$I_{CCS1}$	$CE = V_{IH}(\text{MIN})$	-	-	500	$\mu\text{A}$

AC Characteristics Read Cycle ( $V_{CC} = 5.0\text{ V} \pm 10\%$ ,  $C_L = 100\text{ pF} + 1\text{TTL}$ ,  $T_a = 0^\circ\text{C} \sim +70^\circ\text{C}$ ) [1]

Parameter	Symbol	Conditions	Rated Value			Unit
			Min	Typ	Max	
Address access time	$t_{ACC}$		-	-	120	ns
CE access time	$t_{CE}$		-	-	120	ns
OE access time	$t_{OE}$		-	-	60	ns
CE output disable time [2]	$t_{CHZ}$		0	-	50	ns
OE output disable time [2]	$t_{OHZ}$		0	-	40	ns
Output hold time	$t_{OH}$		0	-	-	ns

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1. Input signal level:  $V_{IH} = 2.4\text{ V}$ ,  $V_{IL} = 0.6\text{ V}$ . AC measurements assume  $t_r = t_f = 5\text{ ns}$ . Timing reference level:  $V_{IN} = 1.5\text{ V}$ ,  $V_{OUT} = 0.8\text{ V} \text{ \& } 2.0\text{ V}$ .
2.  $t_{CHZ}$  and  $t_{OHZ}$  define the time at which the output achieves an open circuit condition and are not referenced to output voltage levels.

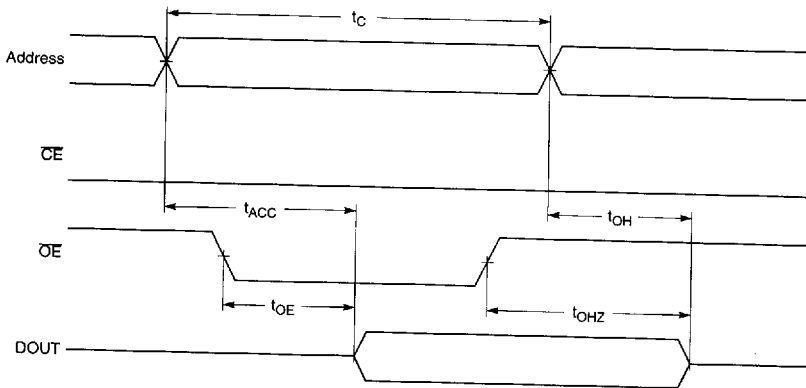


Figure 1. Read Cycle 1

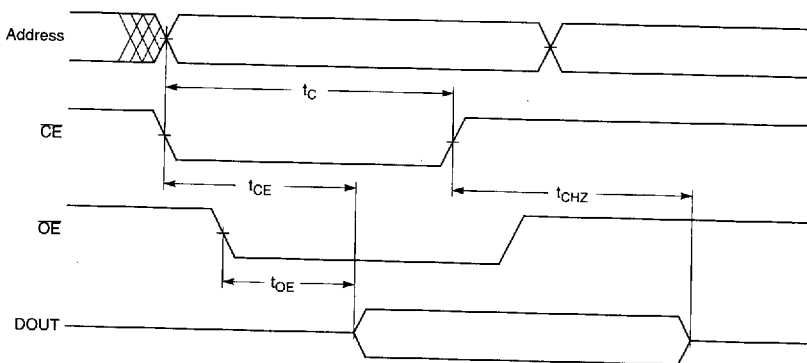


Figure 2. Read Cycle 2