

OKI Semiconductor

MSM533232E

2,097,152-Word x 16-Bit or 4,194,304-Word x 8-Bit MASKROM

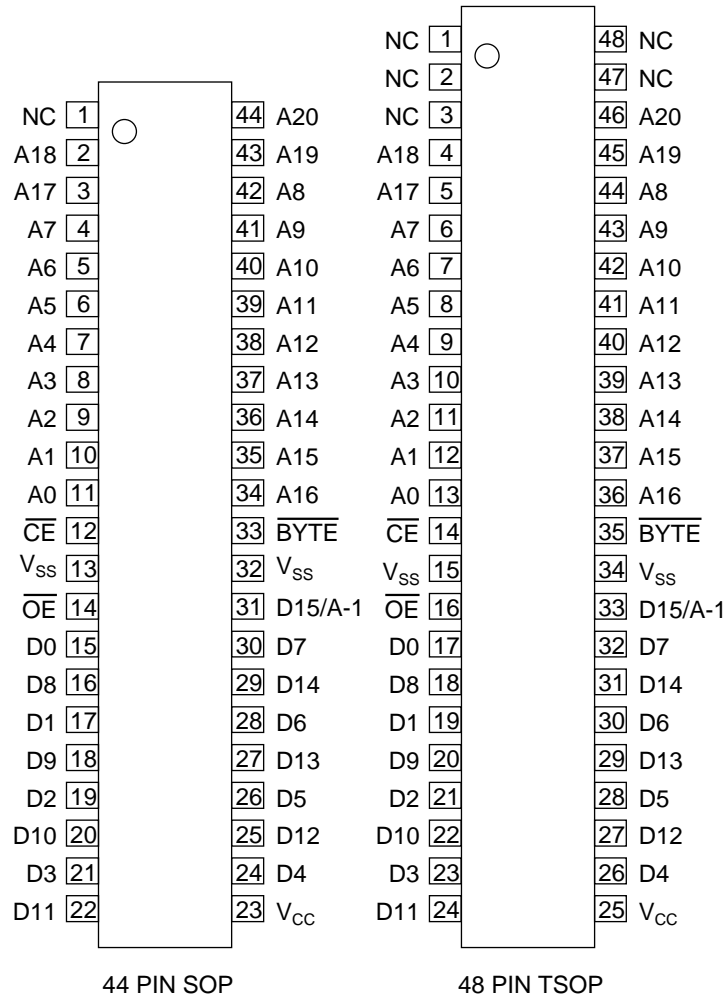
DESCRIPTION

The OKI MSM533232E is a high-speed CMOS Mask ROM that can electrically switch between 2,097,152-word x 16-bit or 4,194,304-word x 8-bit configurations. The MSM533232E operates on a single 3.0V or 3.3V power supply but offers the same fast access times as products operating at 5.0V. The MSM531622E make it suited as large capacity read-only memory for portable microcomputers and data terminal equipment.

FEATURES

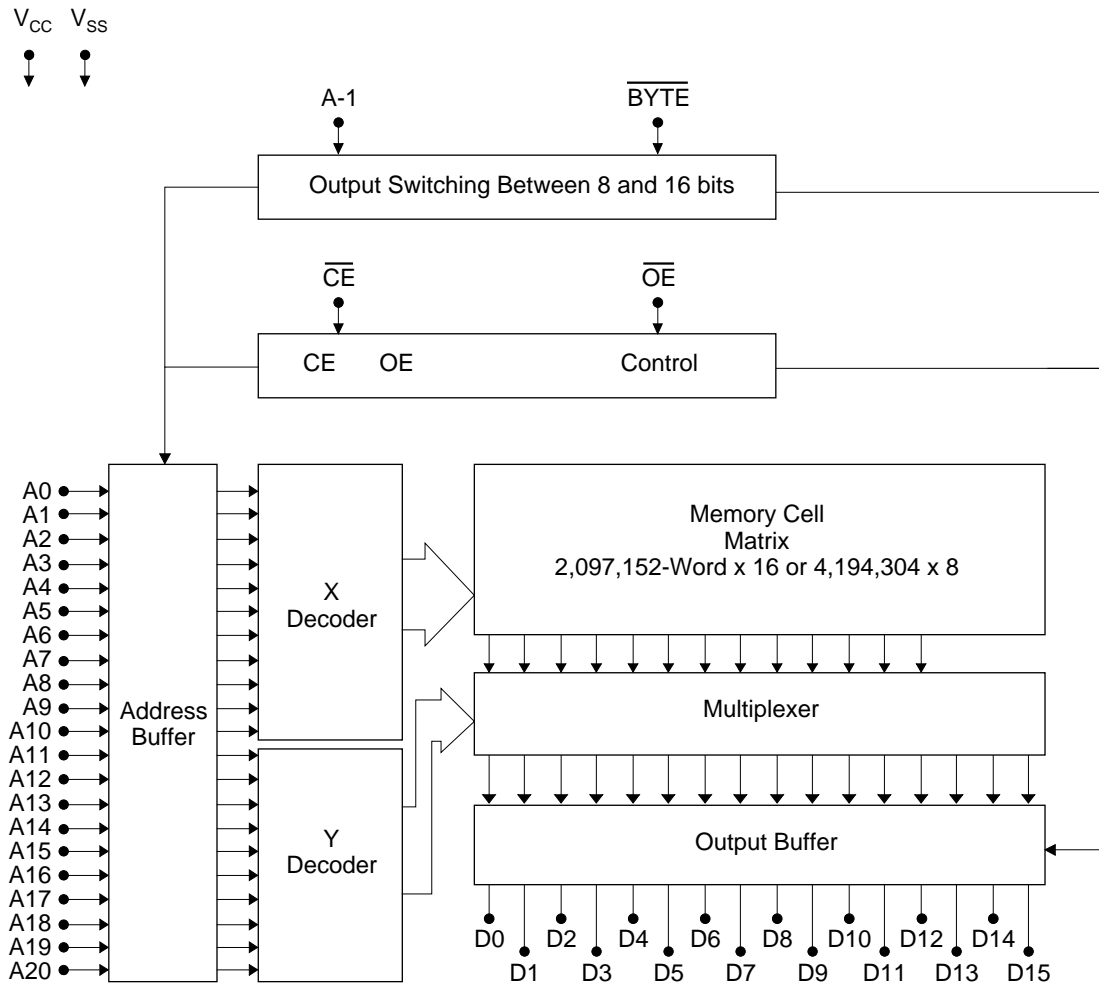
- 3.0V or 3.3V single power supply
- 2,097,152-word x 16-bit / 4,194,304-word x 8-bit
- Access Time—Current Consumption
 - 200ns—20mA @3.0V±10% operation
 - 150ns—30mA @3.0V±10% operation
- Tri-state output configurations
- Internal powerdown function
- Package:
 - 44-PIN PLASTIC SOP (SOP44-P-600-K)
 - 48-PIN PLASTIC TSOP (TSOP48-P-550-K)

PIN CONFIGURATION



Pin Name	Function
D15/A-1	Data output / address input
A0 to A20	Address input
D0 to D15	Data output
CE	Chip enable
OE	Output enable
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_{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	A20
L	L	L	L	D0 to D7	Hi-Z	8 bit	A-1	A20
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 ($V_{CC}=3.0\text{V}\pm 0.3\text{V}$)

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	0.8	V
Operating Temperature	T_{opr}	—	0	—	70	$^\circ\text{C}$

Recommended Operating Conditions ($V_{CC}=3.3\text{V}\pm 0.3\text{V}$)

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 ($V_{CC}=3.0V\pm 0.3V$)($V_{CC} = 5V\pm 10\%$, $T_a = 0$ to 70°C)

Parameter	Symbol	Conditions	Rated Value			Unit
			Min.	Typ.	Max.	
"H" Output Voltage	V_{OH1}	$I_{OH} = -100\mu\text{A}$	$V_{CC} - 0.1$	—	—	V
	V_{OH2}	$I_{OH} = -400\mu\text{A}$	$V_{CC} - 0.4$	—	—	V
"L" Output Voltage	V_{OL1}	$I_{OL} = 100\mu\text{A}$	—	—	0.1	V
	V_{OL2}	$I_{OI} = 1.0\text{mA}$	—	—	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} $\overline{CE} = V_{IH\text{MIN}}$	-10	—	10	μA
Power Supply Current (Operating)	I_{CC}	$\overline{CE} = V_{IL}, \overline{OE} = V_{IH}, t_C = 200\text{ns}$	—	—	20	mA
Power Supply Current (Standby)	I_{CCS^C}	$\overline{CE} = V_{CC} - 0.2\text{V}$	—	—	10	μA
	I_{CCS^T}	$\overline{CE} = V_{IH\text{MIN}}$	—	—	50	μA

DC CHARACTERISTICS ($V_{CC}=3.3V\pm 0.3V$)($V_{CC} = 5V\pm 10\%$, $T_a = 0$ to 70°C)

Parameter	Symbol	Conditions	Rated Value			Unit
			Min.	Typ.	Max.	
"H" Output Voltage	V_{OH1}	$I_{OH} = -100\mu\text{A}$	$V_{CC} - 0.1$	—	—	V
	V_{OH2}	$I_{OH} = -400\mu\text{A}$	$V_{CC} - 0.4$	—	—	V
"L" Output Voltage	V_{OL1}	$I_{OL} = 100\mu\text{A}$	—	—	0.1	V
	V_{OL2}	$I_{OI} = 1.0\text{mA}$	—	—	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} $\overline{CE} = V_{IH\text{MIN}}$	-10	—	10	μA
Power Supply Current (Operating)	I_{CC}	$\overline{CE} = V_{IL}, \overline{OE} = V_{IH}, t_C = 150\text{ns}$	—	—	30	mA
Power Supply Current (Standby)	I_{CCS^C}	$\overline{CE} = V_{CC} - 0.2\text{V}$	—	—	10	μA
	I_{CCS^T}	$\overline{CE} = V_{IH\text{MIN}}$	—	—	50	μA

AC CHARACTERISTICS

Timing conditions

Parameter	Conditions
Input Signal Level	$V_{IH}=2.4V, V_{IL}=0.6V$
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 ($V_{CC}=3.0V\pm 0.3V$)

(Ta = 0 to 70°C)

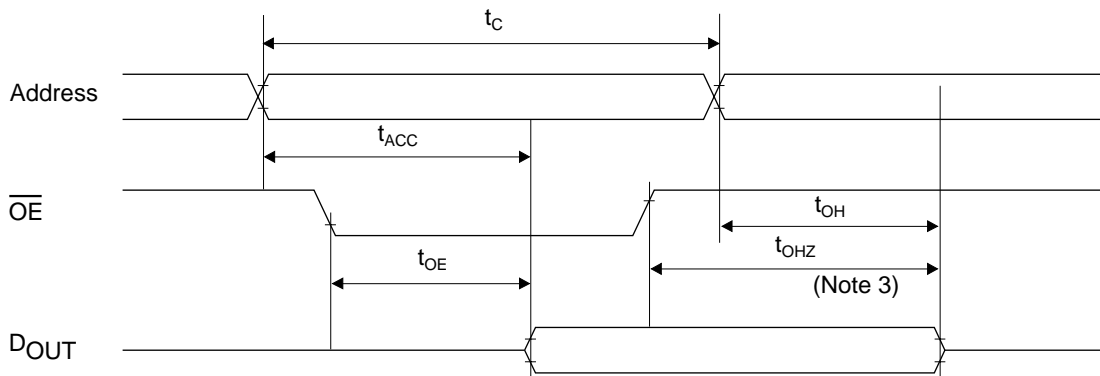
Parameter	Symbol	Conditions	Rated Value			Unit
			Min.	Typ.	Max.	
Cycle time	t_C	—	200	—	—	ns
Address Access time	t_{ACC}	—	—	—	200	ns
\overline{CE} Access time	t_{CE}	—	—	—	200	ns
\overline{OE} Access time	t_{OE}	—	—	—	100	ns
\overline{CE} Output Disable time	t_{CHZ}	—	0	—	70	ns
\overline{OE} Output Disable time	t_{OHZ}	—	0	—	60	ns
Output Hold time	t_{OH}	—	0	—	—	ns

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

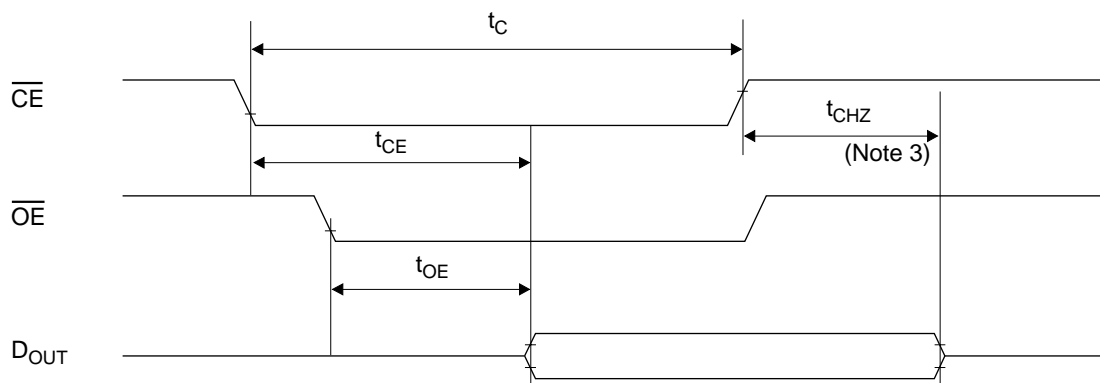
(Ta = 0 to 70°C)

Parameter	Symbol	Conditions	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	—	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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