OKI Semiconductor

MSM531655E

524,288-Double Words x 32-bit or 1,048,576-Words x 16-bit MaskROM
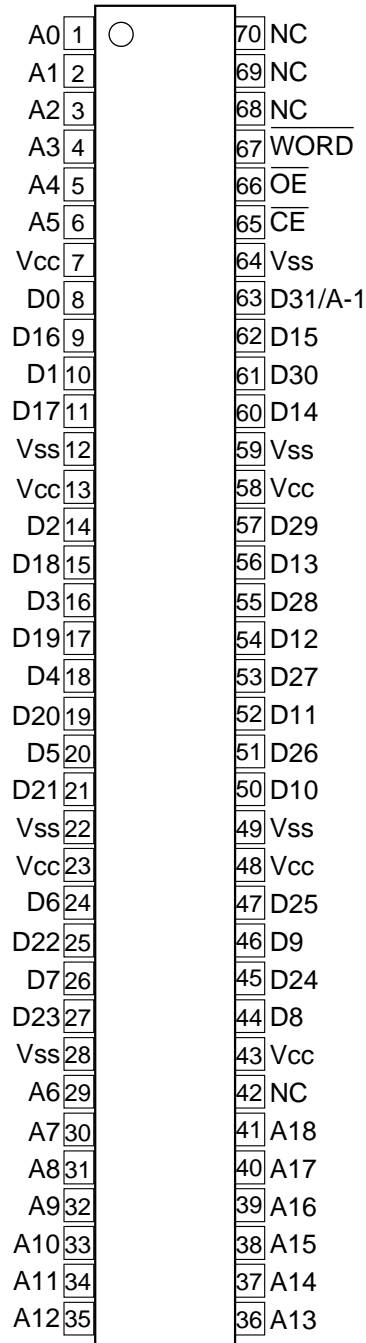8Double Word x 32-Bit or 16Word x 16-Bit/Page Mode MASKROM

■ DESCRIPTION

The OKI MSM531655E is a 524,288-double words x 32-bit or 1,048,576-words x 16-bit CMOS Mask ROM with an asynchronous page read mode. Each page is organized 8 double words x 32-bit or 16 words x 16-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 MSM531655E is suited for use as large capacity fixed memory for microcomputers and data terminals.

■ FEATURES
- ● Single 5.0V power supply
- ● 524,288-double words x 32-bit / 1,048,576-words x 16-bit
- ● 8-double words(A2,A1,A0) or 16-words(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:
     70-PIN PLASTIC SSOPP (SSOP70-P-500/0.8-K) (MSM531655E-xxGS-K)
     70-PIN PLASTIC TSOP(Type II) (TSOP70-P-400/0.65-K) (MSM531655E-xxTS-K)
- ● Pin compatible OTP available

1

PIN CONFIGURATION

A0	1	70	NC
A1	2	69	NC
A2	3	68	NC
A3	4	67	$\overline{WORD}$
A4	5	66	$\overline{OE}$
A5	6	65	$\overline{CE}$
Vcc	7	64	Vss
D0	8	63	D31/A-1
D16	9	62	D15
D1	10	61	D30
D17	11	60	D14
Vss	12	59	Vss
Vcc	13	58	Vcc
D2	14	57	D29
D18	15	56	D13
D3	16	55	D28
D19	17	54	D12
D4	18	53	D27
D20	19	52	D11
D5	20	51	D26
D21	21	50	D10
Vss	22	49	Vss
Vcc	23	48	Vcc
D6	24	47	D25
D22	25	46	D9
D7	26	45	D24
D23	27	44	D8
Vss	28	43	Vcc
A6	29	42	NC
A7	30	41	A18
A8	31	40	A17
A9	32	39	A16
A10	33	38	A15
A11	34	37	A14
A12	35	36	A13

Pin Name	Function
D31/A-1	Data output / address input
A0 to A18	Address input
D0 to D30	Data output
$\overline{CE}$	Chip enable
$\overline{OE}$	Output enable
$\overline{WORD}$	Mode switch (H:DW/L:W)
V_{CC}, V_{SS}	Power supply

2

BLOCK DIAGRAM
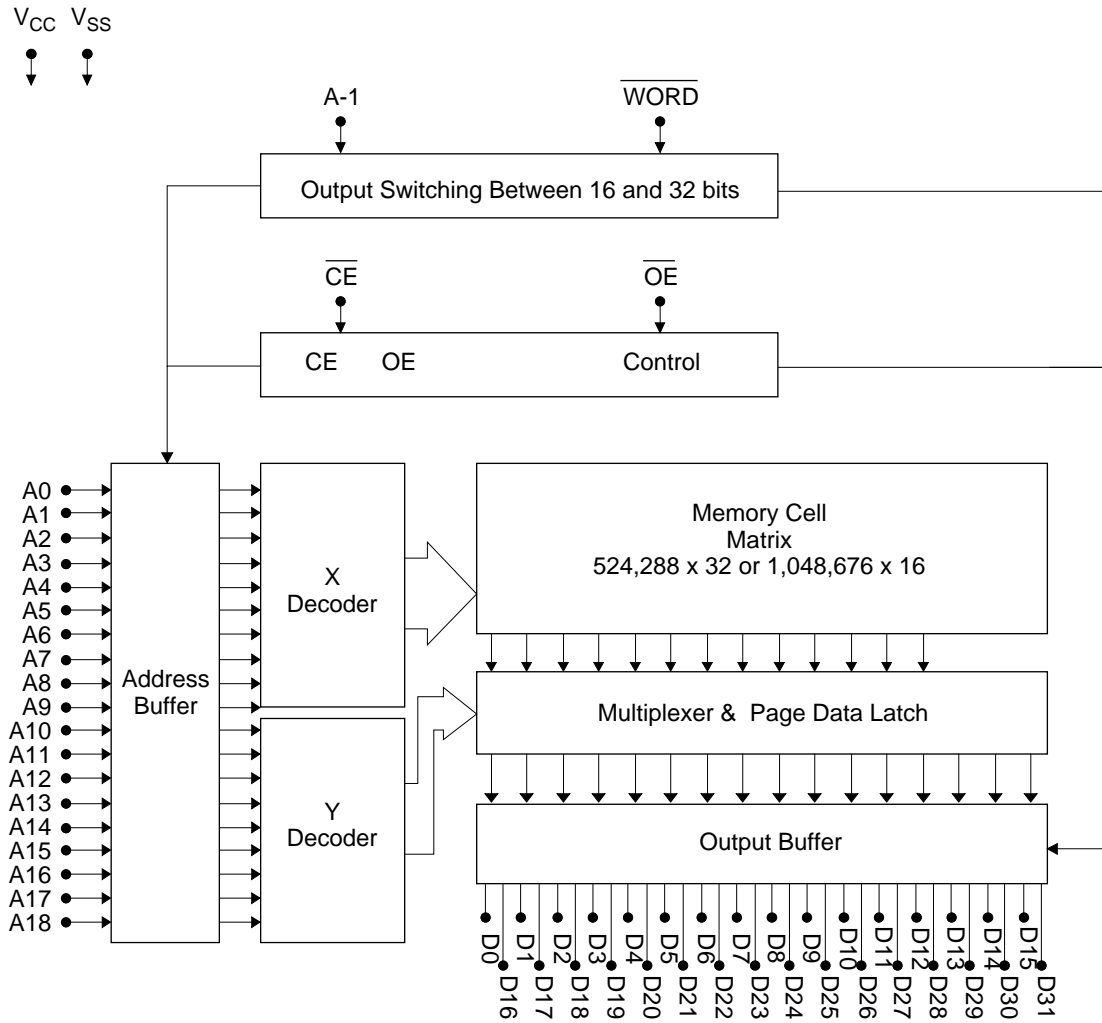
FUNCTION TABLE

$\overline{CE}$	$\overline{OE}$	$\overline{BYTE}$	A-1/D31	D0—D15	D16—D31	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 (D31)	D0 to D15	D16 to D31	32 bit	A0	A18
L	L	H	Input Inhibited (D31)	D0 to D15	D16 to D31	32 bit(Page Mode)	A0	A2
L	L	L	L	D0 to D15	Hi-Z	16 bit	A-1	A18
L	L	L	H	D16 to D31	Hi-Z			
L	L	L	L	D0 to D15	Hi-Z	16 bit(Page Mode)	A-1	A2
L	L	L	H	D16 to D31	Hi-Z			

ABSOLUTE MAXIMUM LIMITS

Parameter	Symbol	Conditions	Limits	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	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	°C

n DC CHARACTERISTICS

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

Parameter	Symbol	Conditions	Limits			Unit
			Min.	Typ.	Max.	
"H" Output Voltage	V_{OH}	$I_{OH} = -400uA$	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}	$\overline{CE} = V_{IL,}\ \overline{OE} = V_{IH},\ t_C = 100ns$	—	—	120	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

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)
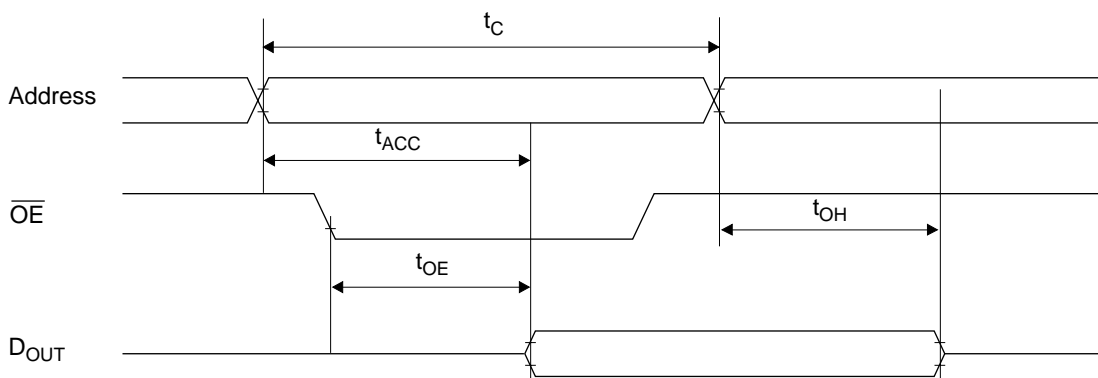
Read Cycle (Note2)
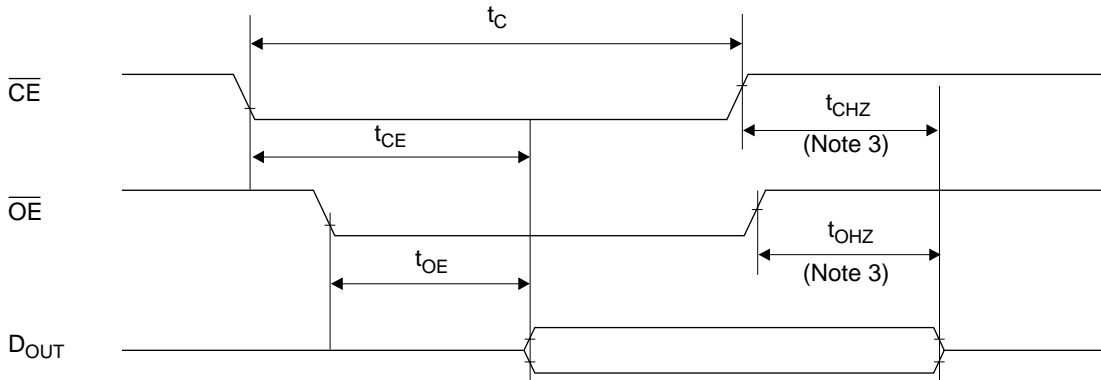
Page Mode Read Cycle (Note4)
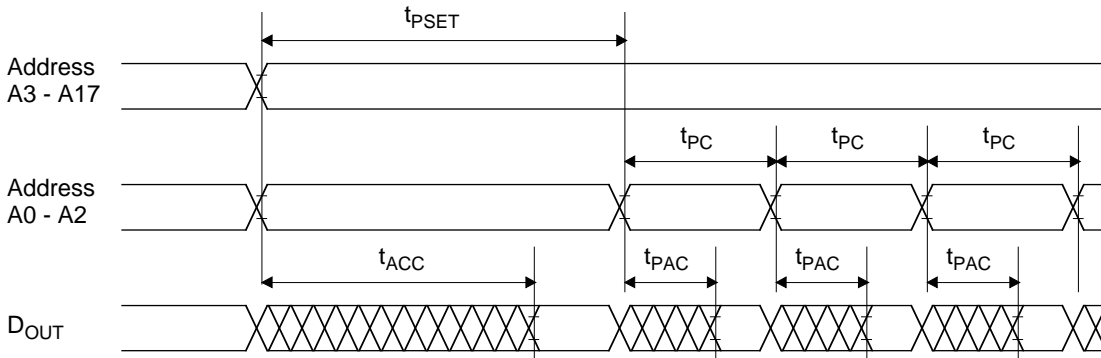
Note)
1. $\overline{CE}$ is low level.
2. Address is fixed before or at the same time when $\overline{CE}$ level falls.
3. t_{CHZ} & t_{OHZ} indicate the time until floating. They are not determined by the output level.
4. $\overline{CE}$ is low level and $\overline{OE}$ is low level.

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

6

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