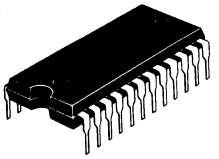


M58725P, -15

16 384-BIT (2048-WORD BY 8-BIT) STATIC RAM

DESCRIPTION

This is a family of 2048-word by 8-bit static RAMs, fabricated with the N-channel silicon-gate MOS process and designed for simple interfacing. These devices operate on a single 5V supply, as does TTL, and are directly TTL-compatible.

The input and output terminals are common, and an $\overline{OE}$ terminal is provided. $\overline{S}$ controls the power-down feature.

FEATURES

- Fast access time:
  - M58725P 200ns (max)
  - M58725 P-15 150ns (max)
- Low power dissipation:
  - Active: 250mW (typ)
  - Stand by: 25mW (typ)
- Power down by $\overline{S}$
- Single 5V supply voltage (±10% tolerance)
- Requires neither external clock nor refreshing
- All inputs and outputs are directly TTL compatible
- All outputs are three-state, with OR-tie capability
- Easy memory expansion by chip-select ($\overline{S}$) input
- Common data DQ terminals.
- Same pin configuration as M5L2716K 16 384-bit EPROM

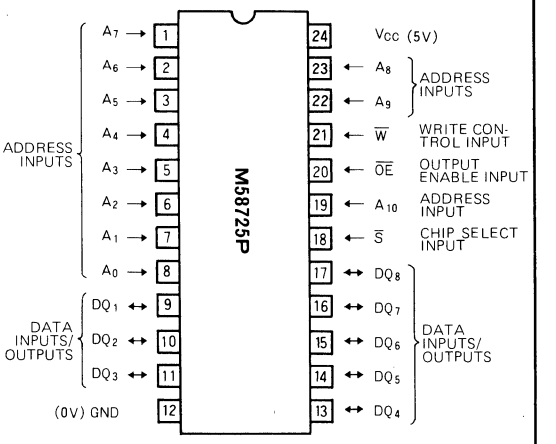
APPLICATION

- Small-capacity memory units

FUNCTION

These devices provide common data input and output terminals. During a write cycle, when a location is designated by address signals $A_0 \sim A_{10}$ the $\overline{OE}$ signal is kept high to keep the DQ terminals in the input mode, signal $\overline{W}$ goes low, and the data of the DQ signal at that time is written.

PIN CONFIGURATION (TOP VIEW)



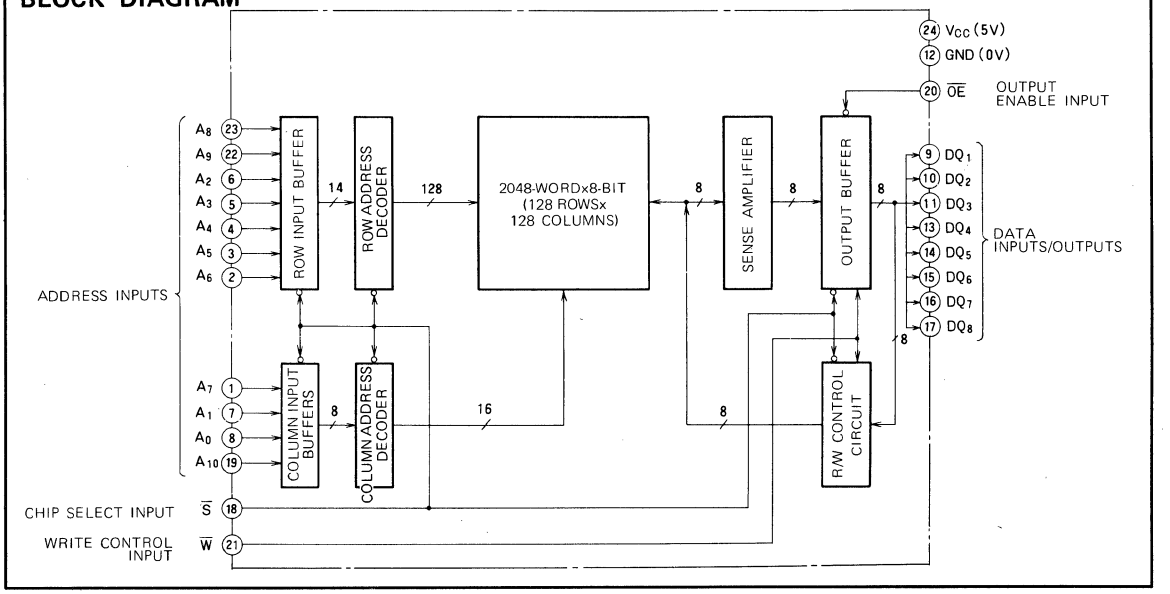
Outline 24P4

During a read cycle, when a location is designated by address signals $A_0 \sim A_{10}$ the $\overline{OE}$ signal is kept low to keep the DQ terminals in the output mode, signal $\overline{W}$ goes high, and the data of the designated address is available at the I/O terminals.

When signal $\overline{S}$ is high, the chip is in the non-selectable state, disabling both reading and writing. In this case the output is in the floating (high-impedance) state, useful for OR-ties with other output terminals.

Signal $\overline{S}$ controls the power down feature. When $\overline{S}$ goes high power dissipation is reduced to 1/10 of active power. The access time from $\overline{S}$ is equivalent to the address access time.

BLOCK DIAGRAM



FUNCTION TABLE

$\overline{S}$	$\overline{OE}$	$\overline{W}$	$DQ_1 \sim DQ_8$	Mode
H	X	X	Hi-Z	Deselect
L	X	L	D_{IN}	Write
L	L	H	D_{OUT}	Read
L	H	H	Hi-Z	—

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Test conditions	Limits	Unit
V_{CC}	Supply voltage	With respect to GND	−0.5～7	V
V_I	Input voltage		−0.5～7	V
V_O	Output voltage		−0.5～7	V
P_d	Maximum power dissipation	Ta＝25°C	1000	mW
Topr	Operating free-air ambient temperature range		0～70	°C
Tstg	Storage temperature range		−65～150	°C

RECOMMENDED OPERATING CONDITIONS (Ta＝0～70°C、unless otherwise noted.)

Symbol	Parameter	Limits			Unit
		Min	Nom	Max	
V_{CC}	Supply voltage	4.5	5	5.5	V
V_{IL}	Low-level input voltage	−1		0.8	V
V_{IH}	High-level input voltage	2		6	V

ELECTRICAL CHARACTERISTICS (Ta＝0～70°C, V_{CC}＝5V±10%, unless otherwise noted.)

Symbol	Parameter	Test conditions		Limits			Unit
				Min	Typ	Max	
V_{IH}	High-level input voltage			2		6	V
V_{IL}	Low-level input voltage			−1		0.8	V
V_{OH}	High-level output voltage	I_{OH}＝−1mA, V_{CC}＝4.5V		2.4			V
V_{OL}	Low-level output voltage	I_{OL}＝3.2mA				0.4	V
I_I	Input current	V_I＝0～5.5V				10	μA
I_{OZH}	Off-state high-level output current	$V_{I(\overline{S})}$＝2V, V_O＝2.4V～V_{CC}				10	μA
I_{OZL}	Off-state low-level output current	$V_{I(\overline{S})}$＝2V, V_O＝0.4V				−10	μA
I_{CC1}	Supply current from V_{CC}	V_I＝5.5V, $V_{I(\overline{S})}$＝0.8V, outputs open	Ta＝25°C		50	80	mA
			Ta＝0°C			90	mA
I_{CC2}	Stand by current	V_I＝5.5V, $V_{I(\overline{S})}$＝2V outputs open	Ta＝25°C		5	10	mA
			Ta＝70°C		7	15	mA
C_i	Input capacitance, all inputs	V_I＝GND, Vi＝25mVrms, f＝1MHz			3	5	pF
C_o	Output capacitance	V_O＝GND, V_O＝25mVrms, f＝1MHz			5	8	pF

Note 1: Current flowing into an IC is positive, out is negative.

16384-BIT (2048-WORD BY 8-BIT) STATIC RAM

SWITCHING CHARACTERISTICS (For Read Cycle) ($T_a = 0 \sim 70°C$, $V_{CC} = 5V \pm 10\%$, unless otherwise noted.)

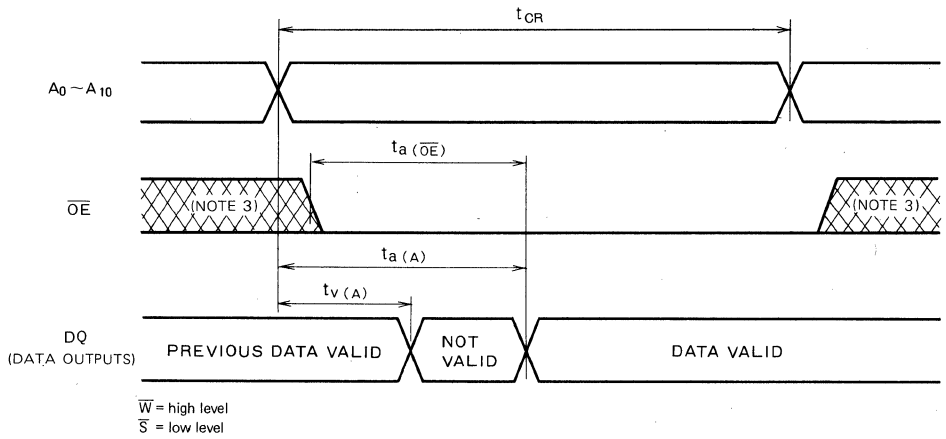
Symbol	Parameter	M58725P-15			M58725P			Unit
		Limits						
		Min	Typ	Max	Min	Typ	Max	
t_{CR}	Read cycle time	150			200			ns
t_a (A)	Address access time			150			200	ns
t_a ($\overline{S}$)	Chip select access time			150			200	ns
t_a ($\overline{OE}$)	Output enable access time			50			60	ns
t_v (A)	Data valid time after address	20			20			ns
t_{PXZ} ($\overline{S}$)	Output disable time after chip select			50			60	ns
t_{PZX} ($\overline{S}$)	Output active time after chip select	10			20			ns
t_{PU}	Power up time after chip selection	0			0			ns
t_{PD}	Power down time after chip deselection			60			80	ns

TIMING REQUIREMENTS (For Write Cycle) ($T_a = 0 \sim 70°C$, $V_{CC} = 5V \pm 10\%$, unless otherwise noted.)

Symbol	Parameter	M58725P-15			M58725P			Unit
		Limits						
		Min	Typ	Max	Min	Typ	Max	
t_{CW}	Write cycle time	150			200			ns
t_{su} ($\overline{S}$)	Chip select setup time	100			120			ns
t_{su} (A)	Address setup time	20			20			ns
t_w ($\overline{W}$)	Write pulse width	80			100			ns
t_{wr}	Write recovery time	10			10			ns
t_{su} ($\overline{OE}$)	Output enable setup time	40			40			ns
t_{su} (D)	Data setup time	60			60			ns
t_h (D)	Data hold time	10			10			ns
t_{PXZ} ($\overline{OE}$)	Output disable time after output enable			40			40	ns
t_{PXZ} ($\overline{W}$)	Output disable time after write enable			40			40	ns

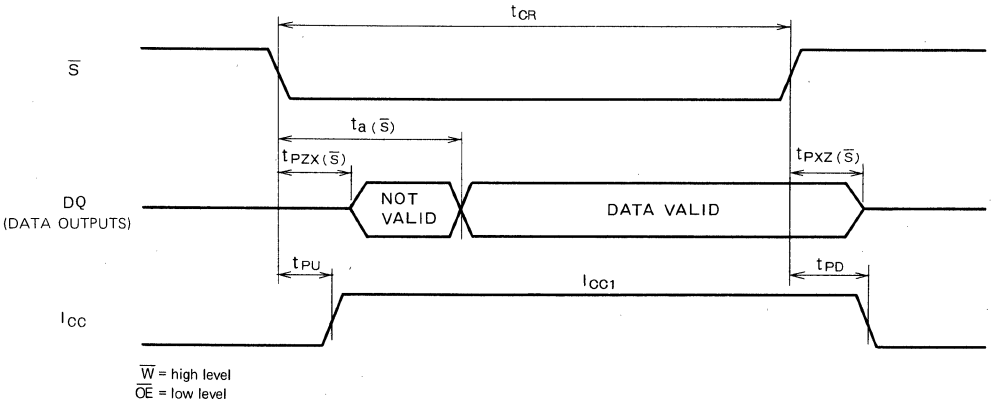
TIMING DIAGRAMS (Note 2)

Read Cycle 1



W = high level
S = low level

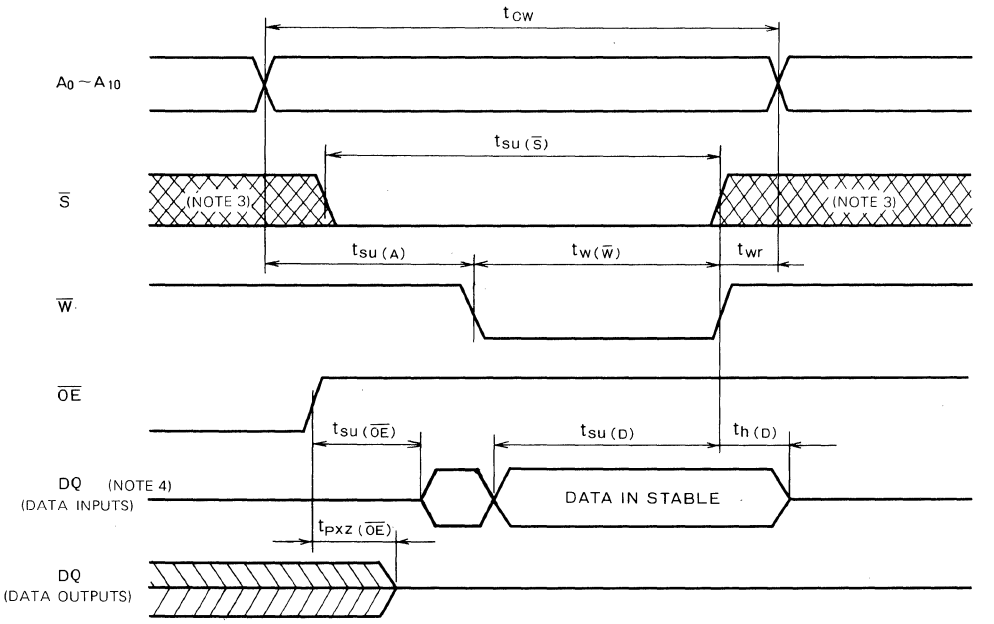
Read Cycle 2



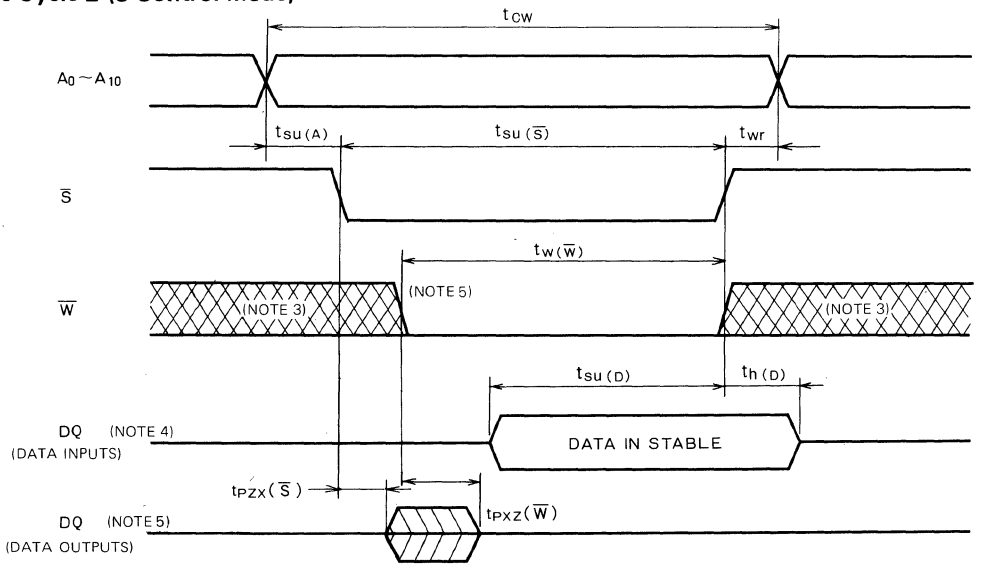
W = high level
OE = low level

MITSUBISHI ELECTRIC

Write Cycle 1 ($\overline{W}$ Control Mode)



Write Cycle 2 ($\overline{S}$ Control Mode)



$\overline{OE}$ = low level

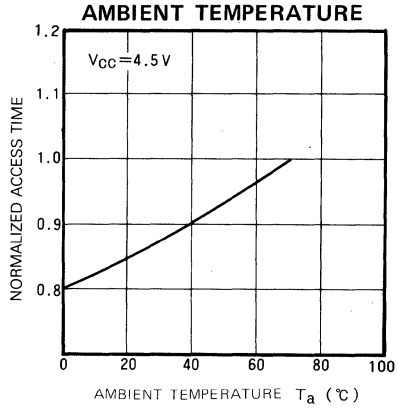
Note 2. Testconditions

Input pulse level	0.4 ~ 2.4V
Input pulse rise time	10ns
Input pulse fall time	10ns
Reference level	1.5 V
Load	1TTL, C_L = 100pF

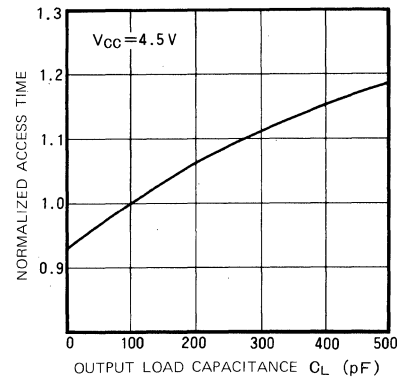
Note 3. Either the high or low state is possible.
4. When the DQ pin is in the output state, a reverse phase signal should not be applied externally.
5. When the falling edge of $\overline{W}$ is simultaneous to or prior to the falling edge of $\overline{S}$, the output is maintained in the high-impedance state.

TYPICAL CHARACTERISTICS

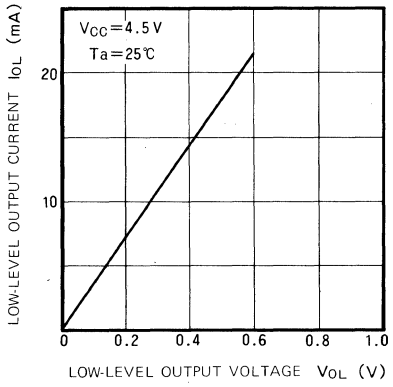
NORMALIZED ACCESS TIME VS. AMBIENT TEMPERATURE



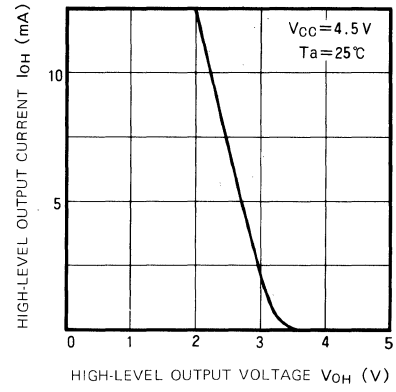
NORMALIZED ACCESS TIME VS. OUTPUT LOAD CAPACITANCE



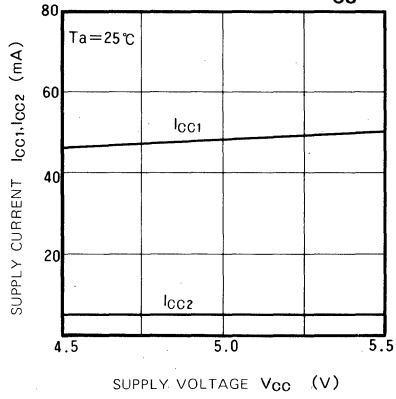
LOW-LEVEL OUTPUT CURRENT VS. LOW-LEVEL OUTPUT VOLTAGE



HIGH-LEVEL OUTPUT CURRENT VS. HIGH-LEVEL OUTPUT VOLTAGE



SUPPLY CURRENT VS. SUPPLY VOLTAGE Vcc



SUPPLY CURRENT VS. AMBIENT TEMPERATURE