

To all our customers

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April 1, 2003

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# HM62W8511HC Series

4M High Speed SRAM (512-kword × 8-bit)



ADE-203-1201C (Z)

Rev. 2.0  
Nov. 9, 2001

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## Description

The HM62W8511HC is a 4-Mbit high speed static RAM organized 512-kword × 8-bit. It has realized high speed access time by employing CMOS process (6-transistor memory cell) and high speed circuit designing technology. It is most appropriate for the application which requires high speed, high density memory and wide bit width configuration, such as cache and buffer memory in system. The HM62W8511HC is packaged in 400-mil 36-pin SOJ for high density surface mounting.

## Features

- Single supply : 3.3 V ± 0.3 V
- Access time : 10/12 ns (max)
- Completely static memory
  - No clock or timing strobe required
- Equal access and cycle times
- Directly TTL compatible
  - All inputs and outputs
- Operating current : 115/100 mA (max)
- TTL standby current : 40 mA (max)
- CMOS standby current: 5 mA (max)
  - : 1 mA (max) (L-version)
- Data retention current : 0.6 mA (max) (L-version)
- Data retention voltage : 2 V (min) (L-version)
- Center  $V_{CC}$  and  $V_{SS}$  type pin out

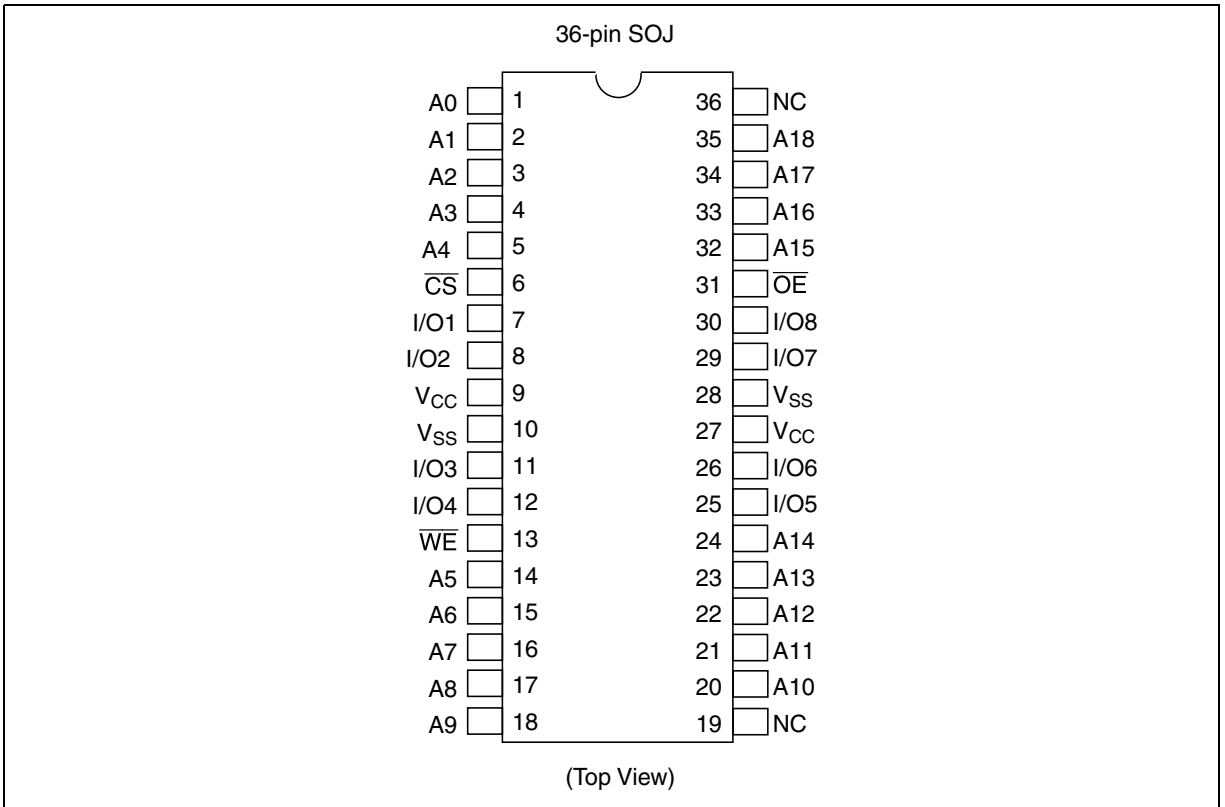
# HM62W8511HC Series

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## Ordering Information

Type No.	Access time	Device marking	Package
HM62W8511HCJP-10	10 ns	HM62W8511CJP10	400-mil 36-pin plastic SOJ (CP-36D)
HM62W8511HCJP-12	12 ns	HM62W8511CJP12	
HM62W8511HCLJP-10	10 ns	HM62W8511CLJP10	
HM62W8511HCLJP-12	12 ns	HM62W8511CLJP12	

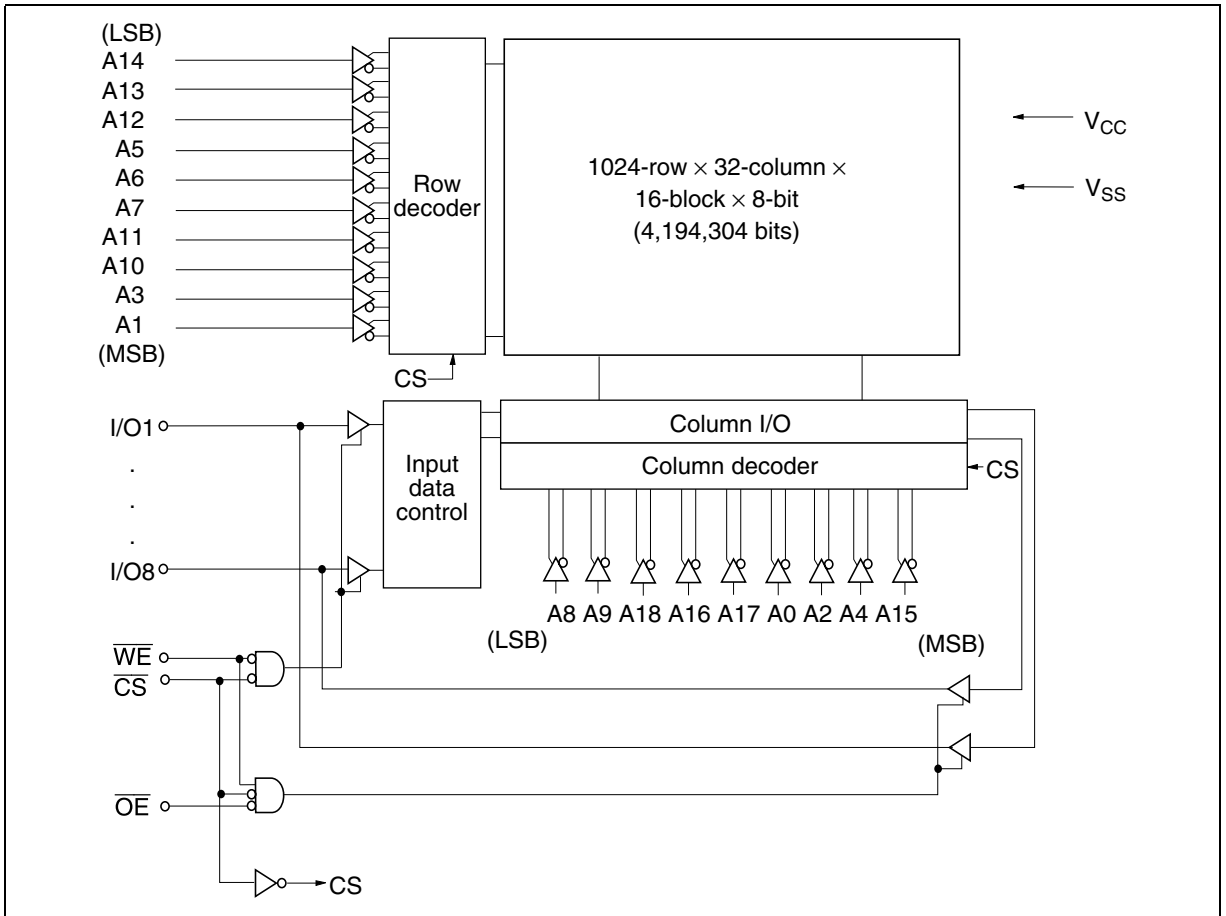
**Pin Arrangement**



**Pin Description**

Pin name	Function
A0 to A18	Address input
I/O1 to I/O8	Data input/output
$\overline{CS}$	Chip select
$\overline{OE}$	Output enable
$\overline{WE}$	Write enable
V <sub>cc</sub>	Power supply
V <sub>ss</sub>	Ground
NC	No connection

## Block Diagram



## Operation Table

$\overline{CS}$	$\overline{OE}$	$\overline{WE}$	Mode	$V_{CC}$ current	I/O	Ref. cycle
H	×	×	Standby	$I_{SB}^1, I_{SB1}$	High-Z	—
L	H	H	Output disable	$I_{CC}$	High-Z	—
L	L	H	Read	$I_{CC}$	Dout	Read cycle (1) to (3)
L	H	L	Write	$I_{CC}$	Din	Write cycle (1)
L	L	L	Write	$I_{CC}$	Din	Write cycle (2)

Note: H:  $V_{IH}$ , L:  $V_{IL}$ , ×:  $V_{IH}$  or  $V_{IL}$

## Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Supply voltage relative to $V_{SS}$	$V_{CC}$	-0.5 to +4.6	V
Voltage on any pin relative to $V_{SS}$	$V_T$	-0.5* <sup>1</sup> to $V_{CC}+0.5$ * <sup>2</sup>	V
Power dissipation	$P_T$	1.0	W
Operating temperature	$T_{opr}$	0 to +70	°C
Storage temperature	$T_{stg}$	-55 to +125	°C
Storage temperature under bias	$T_{bias}$	-10 to +85	°C

Notes: 1.  $V_T$  (min) = -2.0 V for pulse width (under shoot) ≤ 6 ns.

2.  $V_T$  (max) =  $V_{CC}+2.0$  V for pulse width (over shoot) ≤ 6 ns.

## Recommended DC Operating Conditions

( $T_a = 0$  to +70°C)

Parameter	Symbol	Min	Typ	Max	Unit
Supply voltage	$V_{CC}$ * <sup>3</sup>	3.0	3.3	3.6	V
	$V_{SS}$ * <sup>4</sup>	0	0	0	V
Input voltage	$V_{IH}$	2.0	—	$V_{CC} + 0.5$ * <sup>2</sup>	V
	$V_{IL}$	-0.5* <sup>1</sup>	—	0.8	V

Notes: 1.  $V_{IL}$  (min) = -2.0 V for pulse width (under shoot) ≤ 6 ns.

2.  $V_{IH}$  (max) =  $V_{CC}+2.0$  V for pulse width (over shoot) ≤ 6 ns.

3. The supply voltage with all  $V_{CC}$  pins must be on the same level.

4. The supply voltage with all  $V_{SS}$  pins must be on the same level.

# HM62W8511HC Series

## DC Characteristics

( $T_a = 0$  to  $+70^\circ\text{C}$ ,  $V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$ ,  $V_{SS} = 0\text{V}$ )

Parameter	Symbol	Min	Typ* <sup>1</sup>	Max	Unit	Test conditions	
Input leakage current	$I_{LI}$	—	—	2	$\mu\text{A}$	$V_{in} = V_{SS}$ to $V_{CC}$	
Output leakage current	$I_{LO}$	—	—	2	$\mu\text{A}$	$V_{in} = V_{SS}$ to $V_{CC}$	
Operation power supply current	10ns cycle	$I_{CC}$	—	—	115	$\text{mA}$	Min cycle $\overline{CS} = V_{IL}$ , $I_{out} = 0 \text{ mA}$ Other inputs = $V_{IH}/V_{IL}$
	12 ns cycle	$I_{CC}$	—	—	100	$\text{mA}$	
Standby power supply current		$I_{SB}$	—	—	40	$\text{mA}$	Min cycle $\overline{CS} = V_{IH}$ , Other inputs = $V_{IH}/V_{IL}$
		$I_{SB1}$	—	2.5	5	$\text{mA}$	$f = 0 \text{ MHz}$ $V_{CC} \geq \overline{CS} \geq V_{CC} - 0.2 \text{ V}$ , (1) $0 \text{ V} \leq V_{in} \leq 0.2 \text{ V}$ or (2) $V_{CC} \geq V_{in} \geq V_{CC} - 0.2 \text{ V}$
			—* <sup>2</sup>	0.5	1.0* <sup>2</sup>	$\text{mA}$	
Output voltage		$V_{OL}$	—	—	0.4	$\text{V}$	$I_{OL} = 8 \text{ mA}$
		$V_{OH}$	2.4	—	—	$\text{V}$	$I_{OH} = -4 \text{ mA}$

Notes: 1. Typical values are at  $V_{CC} = 3.3 \text{ V}$ ,  $T_a = +25^\circ\text{C}$  and not guaranteed.

2. This characteristics is guaranteed only for L-version.

## Capacitance

( $T_a = +25^\circ\text{C}$ ,  $f = 1.0 \text{ MHz}$ )

Parameter	Symbol	Min	Typ	Max	Unit	Test conditions
Input capacitance* <sup>1</sup>	$C_{in}$	—	—	6	$\text{pF}$	$V_{in} = 0 \text{ V}$
Input/output capacitance* <sup>1</sup>	$C_{I/O}$	—	—	8	$\text{pF}$	$V_{I/O} = 0 \text{ V}$

Note: 1. This parameter is sampled and not 100% tested.

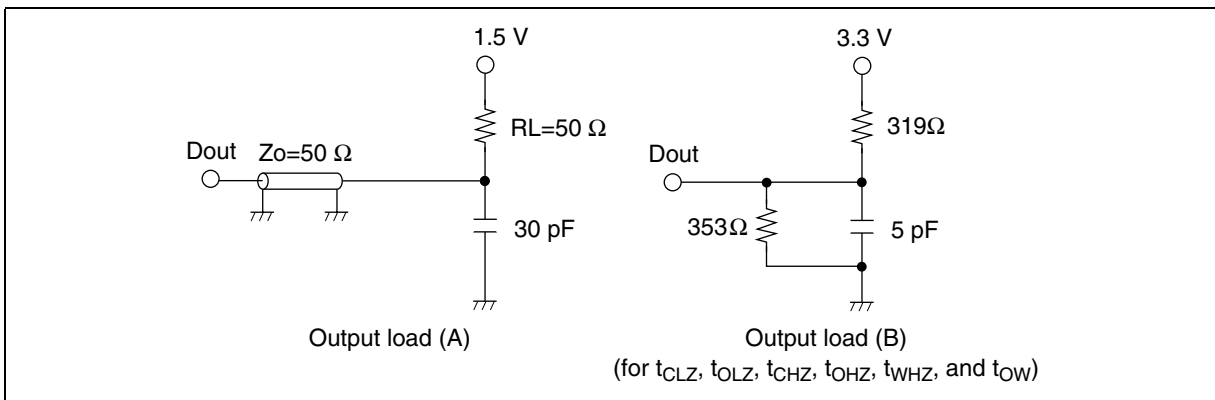


## AC Characteristics

( $T_a = 0$  to  $+70^\circ\text{C}$ ,  $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$ , unless otherwise noted.)

### Test Conditions

- Input pulse levels: 3.0 V/0.0 V
- Input rise and fall time: 3 ns
- Input and output timing reference levels: 1.5 V
- Output load: See figures (Including scope and jig)



### Read Cycle

#### HM62W8511HC

-10                      -12

Parameter	Symbol	-10		-12		Unit	Notes
		Min	Max	Min	Max		
Read cycle time	$t_{RC}$	10	—	12	—	ns	
Address access time	$t_{AA}$	—	10	—	12	ns	
Chip select access time	$t_{ACS}$	—	10	—	12	ns	
Output enable to output valid	$t_{OE}$	—	5	—	6	ns	
Output hold from address change	$t_{OH}$	3	—	3	—	ns	
Chip select to output in low-Z	$t_{CLZ}$	3	—	3	—	ns	1
Output enable to output in low-Z	$t_{OLZ}$	0	—	0	—	ns	1
Chip deselect to output in high-Z	$t_{CHZ}$	—	5	—	6	ns	1
Output disable to output in high-Z	$t_{OHZ}$	—	5	—	6	ns	1

## Write Cycle

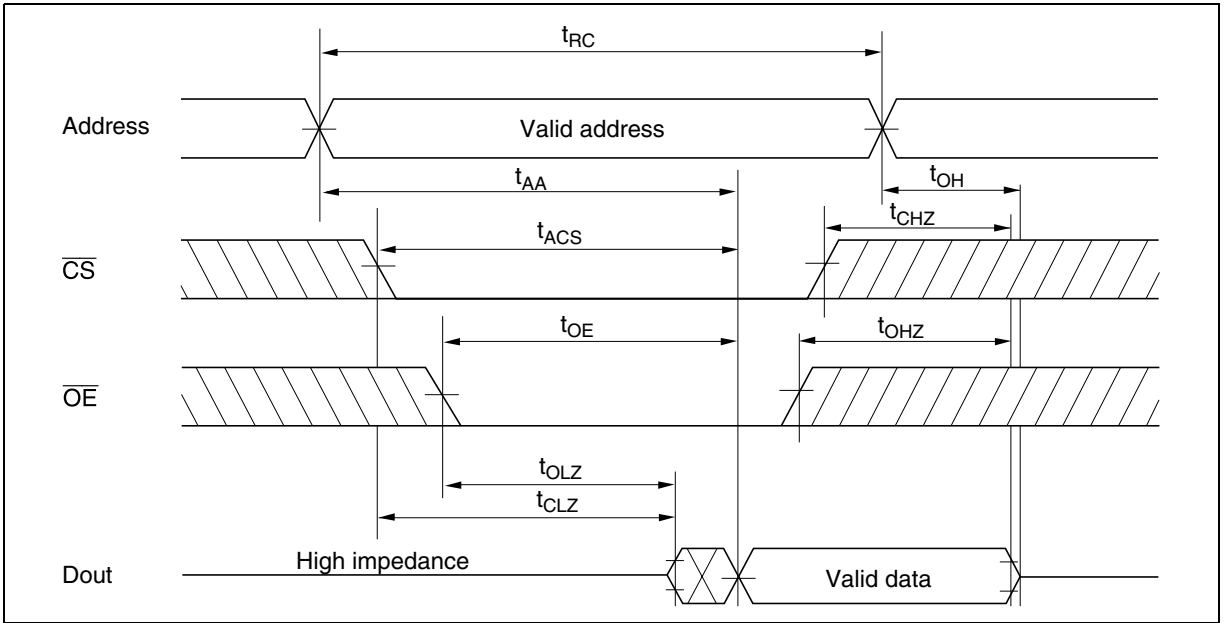
Parameter	Symbol	HM62W8511HC				Unit	Notes
		-10		-12			
		Min	Max	Min	Max		
Write cycle time	$t_{WC}$	10	—	12	—	ns	
Address valid to end of write	$t_{AW}$	7	—	8	—	ns	
Chip select to end of write	$t_{CW}$	7	—	8	—	ns	9
Write pulse width	$t_{WP}$	7	—	8	—	ns	8
Address setup time	$t_{AS}$	0	—	0	—	ns	6
Write recovery time	$t_{WR}$	0	—	0	—	ns	7
Data to write time overlap	$t_{DW}$	5	—	6	—	ns	
Data hold from write time	$t_{DH}$	0	—	0	—	ns	
Write disable to output in low-Z	$t_{OW}$	3	—	3	—	ns	1
Output disable to output in high-Z	$t_{OHZ}$	—	5	—	6	ns	1
Write enable to output in high-Z	$t_{WHZ}$	—	5	—	6	ns	1

Notes: 1. Transition is measured  $\pm 200$  mV from steady voltage with output load (B). This parameter is sampled and not 100% tested.

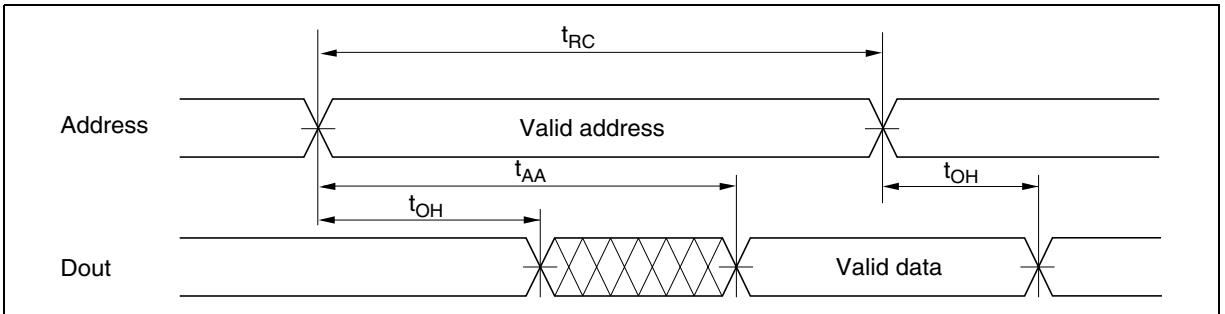
2. Address should be valid prior to or coincident with  $\overline{CS}$  transition low.
3.  $\overline{WE}$  and/or  $\overline{CS}$  must be high during address transition time.
4. If  $\overline{CS}$  and  $\overline{OE}$  are low during this period, I/O pins are in the output state. Then, the data input signals of opposite phase to the outputs must not be applied to them.
5. If the  $\overline{CS}$  low transition occurs simultaneously with the  $\overline{WE}$  low transition or after the  $\overline{WE}$  transition, output remains a high impedance state.
6.  $t_{AS}$  is measured from the latest address transition to the later of  $\overline{CS}$  or  $\overline{WE}$  going low.
7.  $t_{WR}$  is measured from the earlier of  $\overline{CS}$  or  $\overline{WE}$  going high to the first address transition.
8. A write occurs during the overlap of a low  $\overline{CS}$  and a low  $\overline{WE}$ . A write begins at the latest transition among  $\overline{CS}$  going low and  $\overline{WE}$  going low. A write ends at the earliest transition among  $\overline{CS}$  going high and  $\overline{WE}$  going high.  $t_{WP}$  is measured from the beginning of write to the end of write.
9.  $t_{CW}$  is measured from the later of  $\overline{CS}$  going low to the end of write.

Timing Waveforms

Read Timing Waveform (1) ( $\overline{WE} = V_{IH}$ )

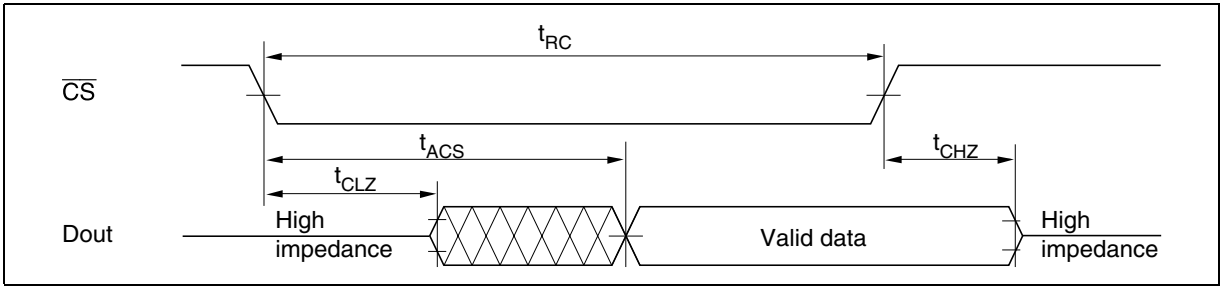


Read Timing Waveform (2) ( $\overline{WE} = V_{IH}, \overline{CS} = V_{IL}, \overline{OE} = V_{IL}$ )

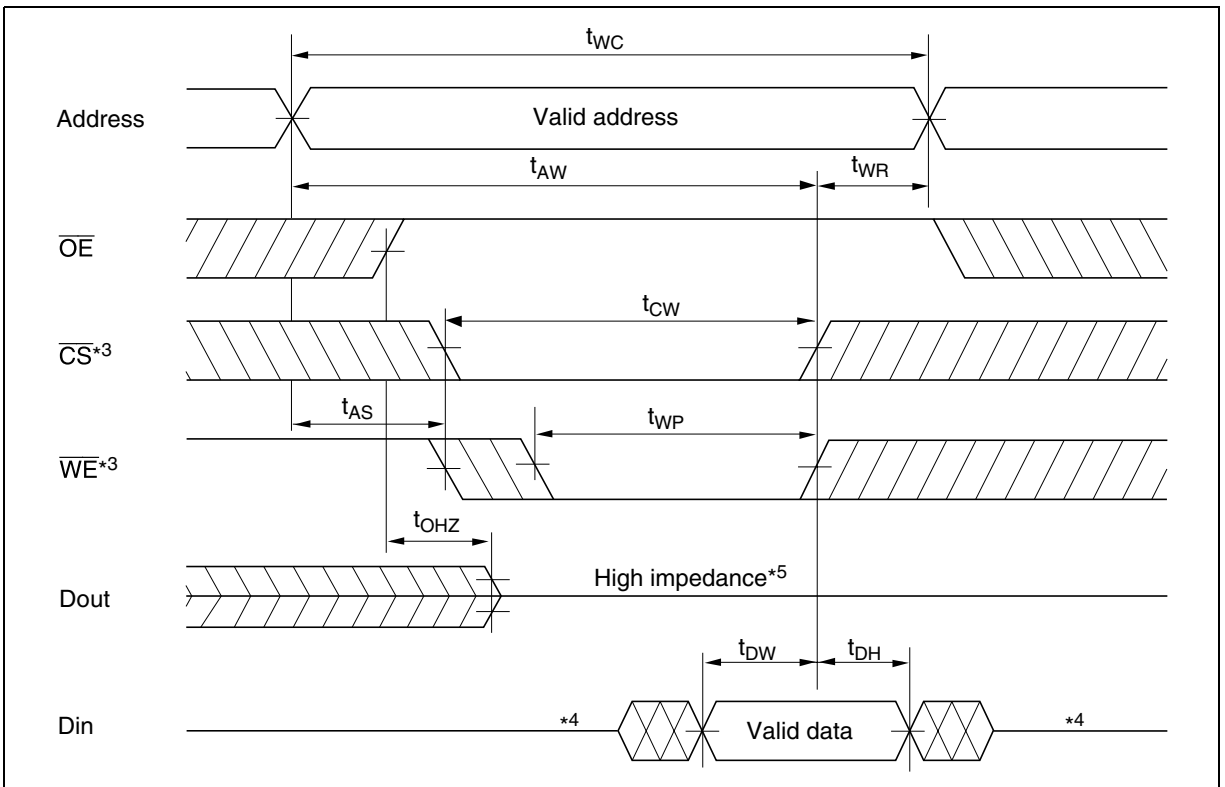


# HM62W8511HC Series

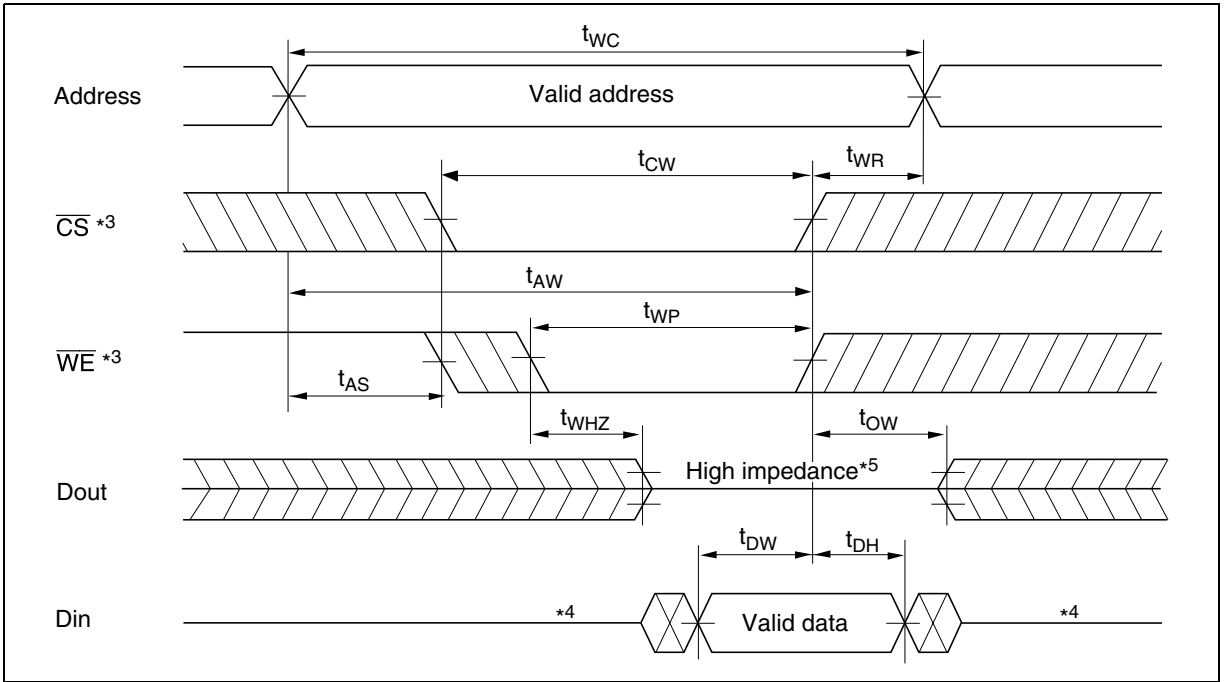
Read Timing Waveform (3) ( $\overline{WE} = V_{IH}$ ,  $\overline{CS} = V_{IL}$ ,  $\overline{OE} = V_{IL}$ )\*<sup>2</sup>



Write Timing Waveform (1) ( $\overline{WE}$  Controlled)



Write Timing Waveform (2) ( $\overline{CS}$  Controlled)



## Low $V_{CC}$ Data Retention Characteristics

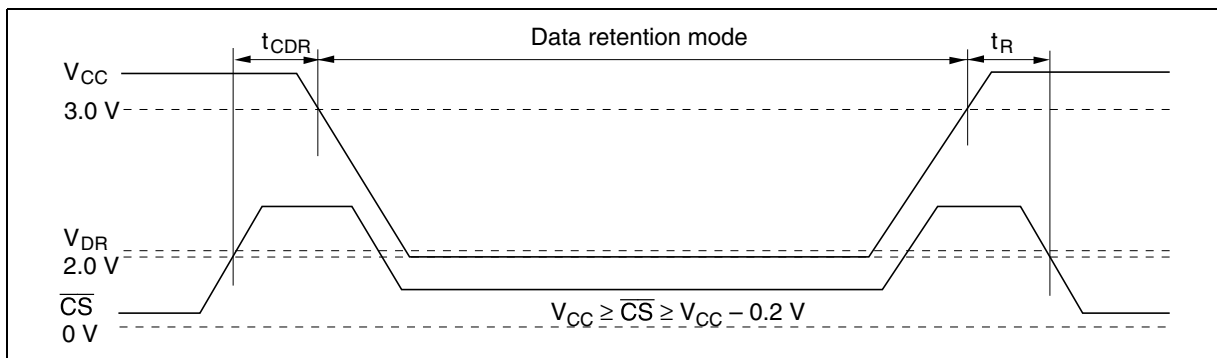
( $T_a = 0$  to  $+70^\circ\text{C}$ )

This characteristics is guaranteed only for L-version.

Parameter	Symbol	Min	Typ* <sup>1</sup>	Max	Unit	Test conditions
$V_{CC}$ for data retention	$V_{DR}$	2.0	—	—	V	$V_{CC} \geq \overline{CS} \geq V_{CC} - 0.2$ V (1) $0$ V $\leq$ $V_{in} \leq 0.2$ V or (2) $V_{CC} \geq V_{in} \geq V_{CC} - 0.2$ V
Data retention current	$I_{CCDR}$	—	300	600	$\mu\text{A}$	$V_{CC} = 3$ V, $V_{CC} \geq \overline{CS} \geq V_{CC} - 0.2$ V (1) $0$ V $\leq$ $V_{in} \leq 0.2$ V or (2) $V_{CC} \geq V_{in} \geq V_{CC} - 0.2$ V
Chip deselect to data retention time	$t_{CDR}$	0	—	—	ns	See retention waveform
Operation recovery time	$t_R$	5	—	—	ms	

Note: 1. Typical values are at  $V_{CC} = 3.0$  V,  $T_a = +25^\circ\text{C}$ , and not guaranteed.

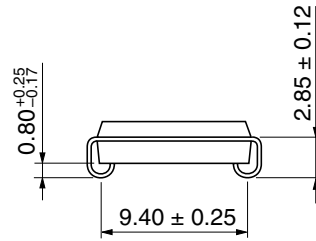
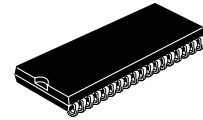
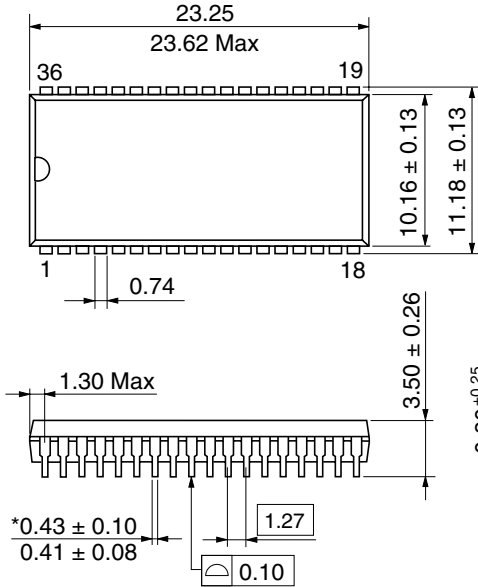
## Low $V_{CC}$ Data Retention Timing Waveform



Package Dimensions

HM62W8511HCJP/HCLJP Series (CP-36D)

As of January, 2001  
Unit: mm



\*Dimension including the plating thickness  
Base material dimension

Hitachi Code	CP-36D
JEDEC	Conforms
EIAJ	Conforms
Mass (reference value)	1.4 g

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