

# HM62V8128 Series Product Preview

131072-Word × 8-Bit High Speed CMOS Static RAM

## Description

The Hitachi HM62V8128 is a CMOS static RAM organized 128 kword × 8 bit. It realizes higher density, higher performance and low power consumption by employing 0.8 μm Hi-CMOS process technology.

It offers low power standby power dissipation; therefore, it is suitable for battery back-up systems. The device, packaged in a 525-mil SOP (460-mil body SOP) or a 600-mil plastic DIP, or a 8 × 20 mm TSOP with thickness of 1.2 mm, is available for high density mounting. TSOP package is suitable for cards, and reverse type TSOP is also provided.

## Features

- High Speed  
Fast access time: 120/150 ns (max)
- Low power  
Active: 18 mW (typ)  
Standby: 3 μW (typ) (L-/L-L/L-SL version)
- Single 3 V supply
- Completely static memory  
No clock or timing strobe required
- Equal access and cycle times
- Common data input and output  
Three state output
- All inputs and outputs CMOS compatible.
- Capability of battery back up operation (L-/L-L/L-SL version)  
2 chip selection for battery back up

## Ordering Information

Type No.	Access time	Package
HM62V8128P-12	120 ns	
HM62V8128P-15	150 ns	
HM62V8128LP-12	120 ns	600-mil 32-pin plastic DIP (DP-32)
HM62V8128LP-15	150 ns	
HM62V8128LP-12SL	120 ns	
HM62V8128LP-15SL	150 ns	
HM62V8128FP-12	120 ns	
HM62V8128FP-15	150 ns	
HM62V8128LFP-12	120 ns	525-mil 32-pin plastic SOP (FP-32D)
HM62V8128LFP-15	150 ns	
HM62V8128LFP-12SL	120 ns	
HM62V8128LFP-15SL	150 ns	
HM62V8128T-12	120 ns	
HM62V8128T-15	150 ns	
HM62V8128LT-12	120 ns	8mm × 20mm 32-pin TSOP (normal type) (TFP-32D)
HM62V8128LT-15	150 ns	
HM62V8128LT-12L	120 ns	
HM62V8128LT-15L	150 ns	

Note: Product Preview: This document contains information on a product under development. Hitachi reserves the right to change or discontinue the product without notice.

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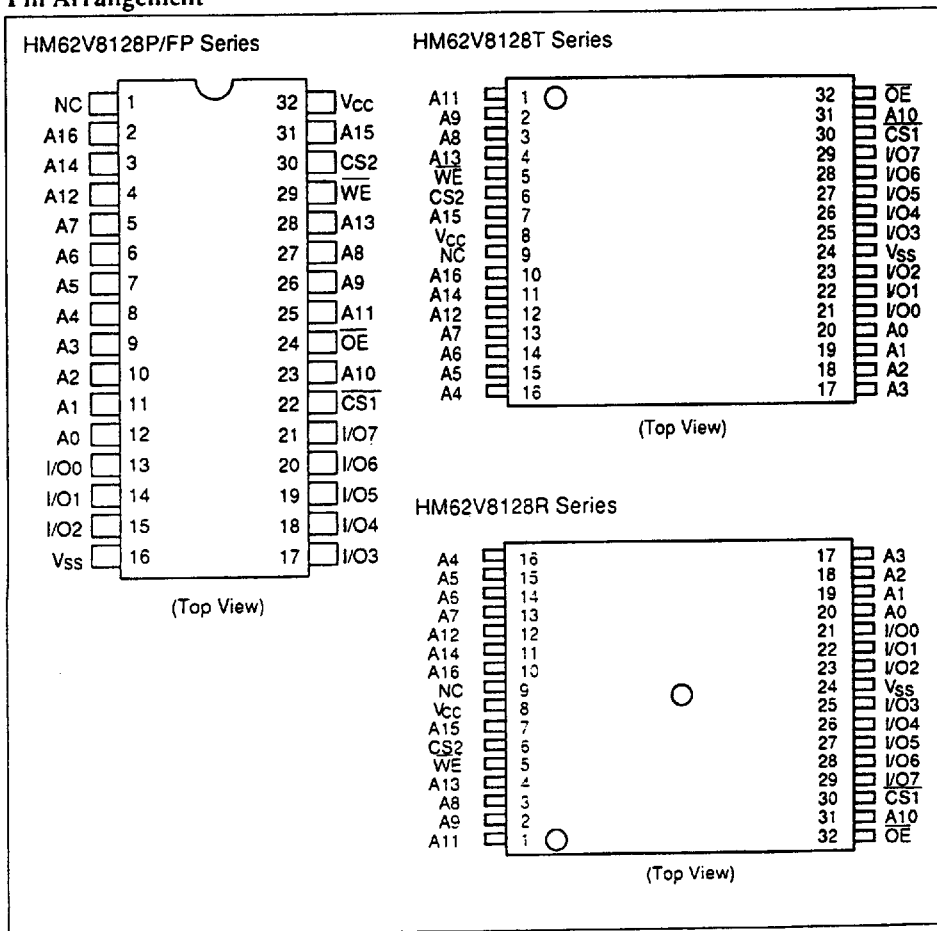
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# HM62V8128 Series

## Ordering Information (cont)

Type No.	Access time	Package
HM62V8128R-12	120ns	
HM62V8128R-15	150ns	
HM62V8128LR-12	120 ns	8mm X 20mm
HM62V8128LR-15	150 ns	32-pin TSOP (reverse type) (TFP-32DR)
HM62V8128LR-12L	120 ns	
HM62V8128LR-15L	150 ns	

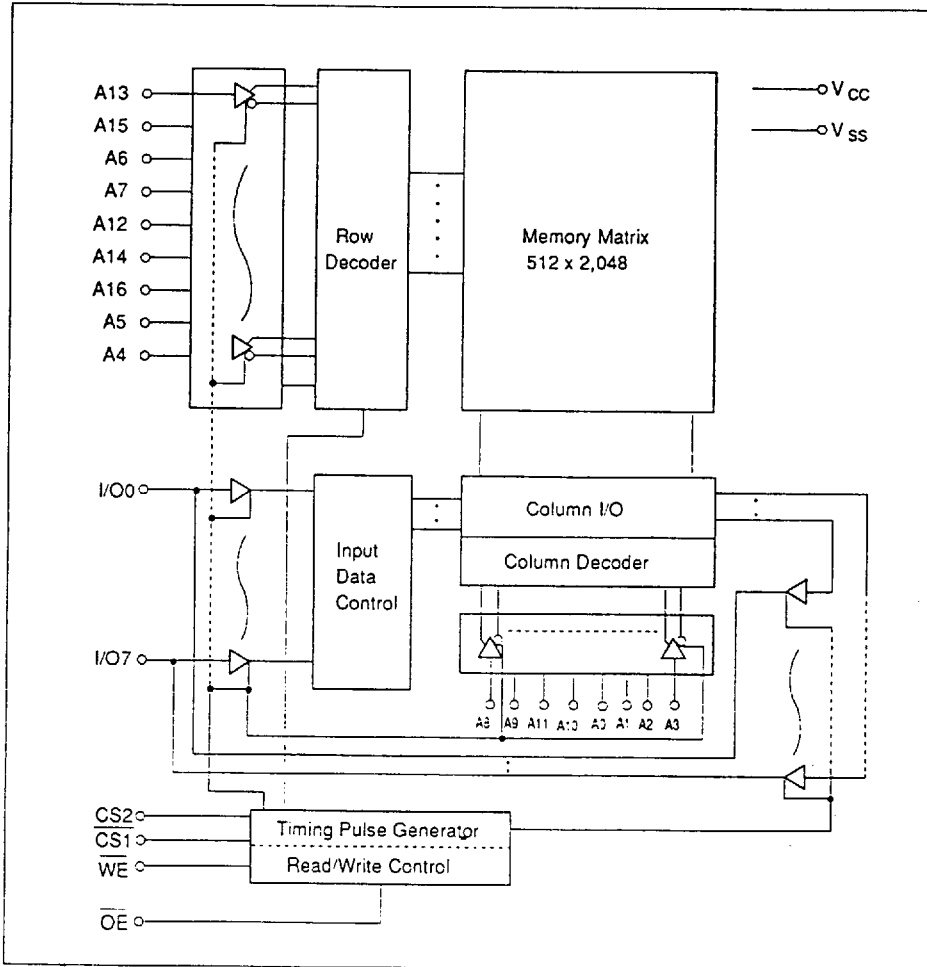
## Pin Arrangement



Pin Description

Pin name	Function	Pin name	Function
A0 – A16	Address	WE	Write enable
I/O0 – I/O7	Input/output	$\overline{OE}$	Output enable
CST	Chip select 1	NC	No connection
CS2	Chip select 2	V <sub>CC</sub>	Power supply
		V <sub>SS</sub>	Ground

Block Diagram



## HM62V8128 Series

### Function Table

CS1	CS2	OE	WE	Mode	V <sub>CC</sub> current	I/O pin	Ref. cycle
H	X	X	X	Standby	I <sub>SB</sub> , I <sub>SB1</sub>	High-Z	—
X	L	X	X	Standby	I <sub>SB</sub> , I <sub>SB1</sub>	High-Z	—
L	H	H	H	Output disable	I <sub>CC</sub>	High-Z	—
L	H	L	H	Read	I <sub>CC</sub>	Dout	Read cycle
L	H	H	L	Write	I <sub>CC</sub>	Din	Write cycle (1)
L	H	L	L	Write	I <sub>CC</sub>	Din	Write cycle (2)

Note: 1. X: H or L

### Absolute Maximum Ratings

Item	Symbol	Value	Unit
Supply voltage relative to V <sub>SS</sub>	V <sub>CC</sub>	-0.5 to + 5.5	V
Voltage on any pin relative to V <sub>SS</sub>	V <sub>T</sub>	-0.5 <sup>1</sup> to V <sub>CC</sub> +0.3	V
Power dissipation	P <sub>T</sub>	1.0	W
Operating temperature	T <sub>opr</sub>	0 to + 70	°C
Storage temperature	T <sub>stg</sub>	-55 to + 125	°C
Storage temperature under bias	T <sub>bias</sub>	-10 to 85	°C

Notes: 1. -1.2 V for pulse half-width ≤ 30 ns

### Recommended DC Operating Conditions (T<sub>a</sub> = 0 to +70°C)

Parameter	Symbol	Min	Typ	Max	Unit
Supply voltage	V <sub>CC</sub>	2.7	3.0	3.3	V
	V <sub>SS</sub>	0	0	0	V
Input voltage	V <sub>IH</sub>	2.3	—	V <sub>CC</sub> +0.3	V
	V <sub>IL</sub>	-0.3 <sup>1</sup>	—	0.4	V

Note: 1. -1.2 V for pulse half-width ≤ 30 ns

DC Characteristics (Ta = 0 to +70°C, VCC = 3 V ±10%, VSS = 0 V)

Parameter	Symbol	Min	Typ*1	Max	Unit	Test conditions	Notes
Input leakage current	$I_{LI}$	—	—	1	μA	Vin = VSS to VCC	
Output leakage current	$I_{LO}$	—	—	1	μA	CS1 = VIH or CS2 = VIL or OE = VIH or WE = VIL. VIO = VSS to VCC	
Operating power supply current: DC	ICC	—	5	10	mA	CS1 = VIL, CS2 = VIH. Others = VIH/VIL IIO = 0 mA	
Operating power supply current	ICC1	—	15	20	mA	Min cycle, duty = 100%, CS1 = VIL, CS2 = VIH. Others = VIH/VIL IIO = 0 mA	
	ICC2	—	6	10	mA	Cycle time = 1 μs, duty = 100%, IIO = 0 mA, CS1 ≤ 0.2 V, CS2 ≥ VCC - 0.2 V VIH ≥ VCC - 0.2 V, VIL ≤ 0.2 V	
Standby power supply current: DC	ISB	—	0.5	2	mA	CS1 = VIH, CS2 = VIH or CS2 = VIL	
Standby power supply current (1): DC	ISB1	—	0.01	1	mA	0 V ≤ Vin ≤ VCC CS1 ≥ VCC - 0.2 V,	
		—	1	60	μA	CS2 ≥ VCC - 0.2 V or 0 V ≤ CS2 ≤ 0.2 V	L-version
		—	1	40	μA		L-L version
		—	1	20	μA		L-SL version
Output voltage	VOL	—	—	0.1	V	IOL = 100 μA	
	VOH	2.6	—	—	V	I OH = -100 μA	

Note: 1. Typical values are at VCC = 3.0 V, Ta = +25°C and specified loading.

Capacitance (Ta = 25°C, f = 1.0 MHz)\*1

Parameter	Symbol	Min	Typ	Max	Unit	Test conditions
Input capacitance	Cin	—	—	8	pF	Vin = 0 V
Input/output capacitance	C <sub>I/O</sub>	—	—	10	pF	V <sub>I/O</sub> = 0 V

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

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AC Characteristics ( $T_a = 0$  to  $+70^\circ\text{C}$ ,  $V_{CC} = 3\text{ V} \pm 10\%$ , unless otherwise noted.)

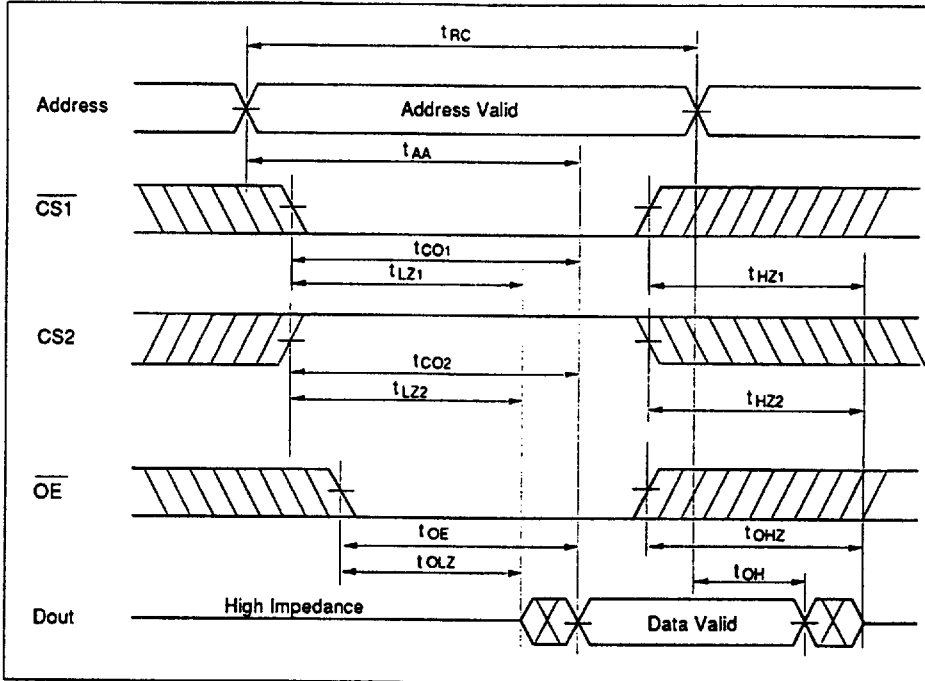
### Test Conditions

- Input pulse levels: 0.4 V to 2.4 V
  - Input rise and fall times: 5 ns
  - Input and output timing reference levels: 1.5 V
  - Output load:
    - HM62V8128-12 1 TTL Gate and  $C_L$  (50 pF)
    - HM62V8128-15 1 TTL Gate and  $C_L$  (100 pF)
- (Including scope & jig)

### Read Cycle

Parameter	Symbol	HM62V8128-12		HM62V8128-15		Unit	Notes
		Min	Max	Min	Max		
Read cycle time	$t_{RC}$	120	—	150	—	ns	
Address access time	$t_{AA}$	—	120	—	150	ns	
Chip selection to output valid	$t_{CO1}$	—	120	—	150	ns	
	$t_{CO2}$	—	120	—	150	ns	
Output enable to output valid	$t_{OE}$	—	90	—	100	ns	
Chip selection to output in low-Z	$t_{LZ1}$	15	—	20	—	ns	1, 2, 3
	$t_{LZ2}$	15	—	20	—	ns	1, 2, 3
Output enable to output in low-Z	$t_{OLZ}$	10	—	10	—	ns	1, 2, 3
Chip deselection to output in high-Z	$t_{HZ1}$	0	50	0	60	ns	1, 2, 3
	$t_{HZ2}$	0	50	0	60	ns	1, 2, 3
Output disable to output in high-Z	$t_{OHZ}$	0	50	0	60	ns	1, 2, 3
Output hold from address change	$t_{OH}$	15	—	20	—	ns	1, 2, 3

Read Timing Waveform \*4



- Notes:
1.  $t_{HZ}$  and  $t_{OHZ}$  are defined as the time at which the outputs achieve the open circuit conditions and are not referred to output voltage levels.
  2. At any given temperature and voltage condition,  $t_{HZ}$  max is less than  $t_{LZ}$  min both for a given device and from device to device.
  3. This parameter is sampled and not 100% tested.
  4.  $\overline{WE}$  is high for read cycle.

## HM62V8128 Series

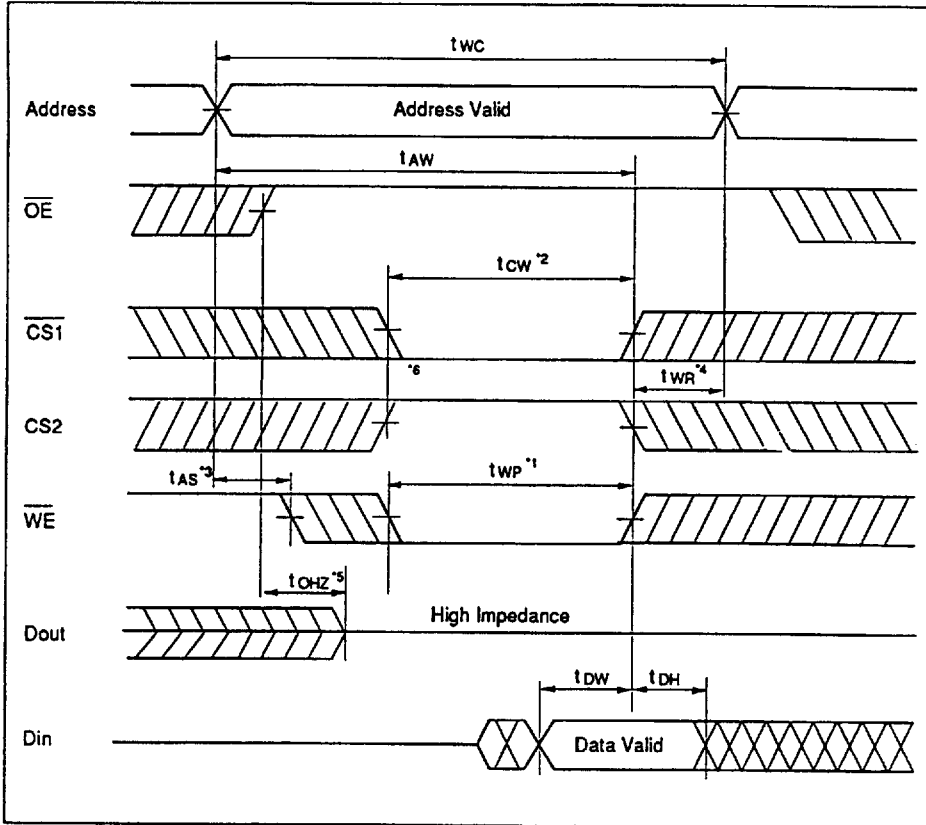
### Write Cycle

Parameter	Symbol	HM62V8128-12		HM62V8128-15		Unit	Notes
		Min	Max	Min	Max		
Write cycle time	$t_{WC}$	120	—	150	—	ns	
Chip selection to end of write	$t_{CW}$	110	—	140	—	ns	
Address setup time	$t_{AS}$	0	—	0	—	ns	
Address valid to end of write	$t_{AW}$	110	—	140	—	ns	
Write pulse width	$t_{WP}$	100	—	130	—	ns	
Write recovery time	$t_{WR}$	0	—	0	—	ns	
		0	—	0	—	ns	11
Write to output in high-Z	$t_{WHZ}$	0	50	0	60	ns	10
Data to write time overlap	$t_{DW}$	60	—	80	—	ns	
Write hold from write time	$t_{DH}$	0	—	0	—	ns	
Output active from end of write	$t_{OW}$	15	—	20	—	ns	10

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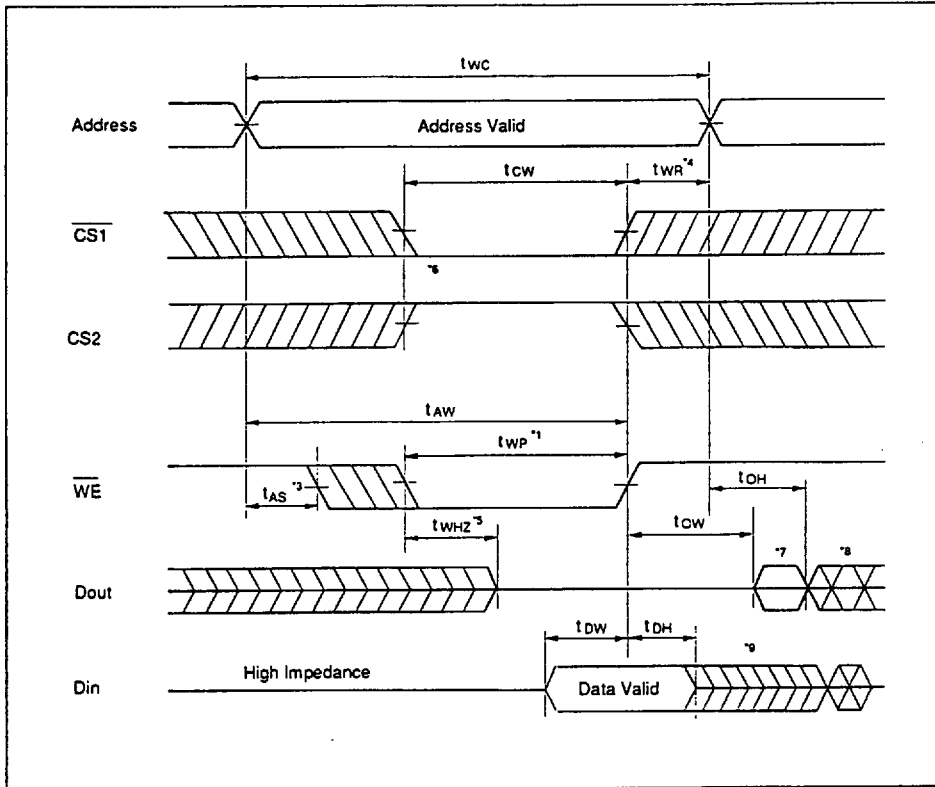


Write Timing Waveform (1) ( $\overline{OE}$  Clock)



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## Write Timing Waveform (2) ( $\overline{OE}$ Low Fixed)



- Notes:
1. A write occurs during the overlap of a low  $\overline{CS1}$ , a high CS2, and a low  $\overline{WE}$ . A write begins at the latest transition among  $\overline{CS1}$  going low, CS2 going high, and  $\overline{WE}$  going low. A write ends at the earliest transition among  $\overline{CS1}$  going high, CS2 going low, and  $\overline{WE}$  going high.  $t_{wp}$  is measured from the beginning of write to the end of write.
  2.  $t_{cw}$  is measured from the later of  $\overline{CS1}$  going low or CS2 going high to the end of write.
  3.  $t_{as}$  is measured from the address valid to the beginning of write.
  4.  $t_{wr}$  is measured from the earliest of  $\overline{CS1}$  or  $\overline{WE}$  going high or CS2 going low to the end of write cycle.
  5. During this period, I/O pins are in the output state; therefore, the input signals of the opposite phase to the outputs must not be applied.
  6. If  $\overline{CS1}$  goes low simultaneously with  $\overline{WE}$  going low or after  $\overline{WE}$  going low, the outputs remain in a high impedance state.
  7.  $D_{out}$  is the same phase of the latest written data in this write cycle.
  8.  $D_{out}$  is the read data of next address.
  9. If  $\overline{CS1}$  is low and CS2 high during this period, I/O pins are in the output state. Therefore, the input signals of the opposite phase to the outputs must not be applied to them.
  10. This parameter is sampled and not 100% tested.
  11. This value is measured from CS2 going low to the end of write cycle.

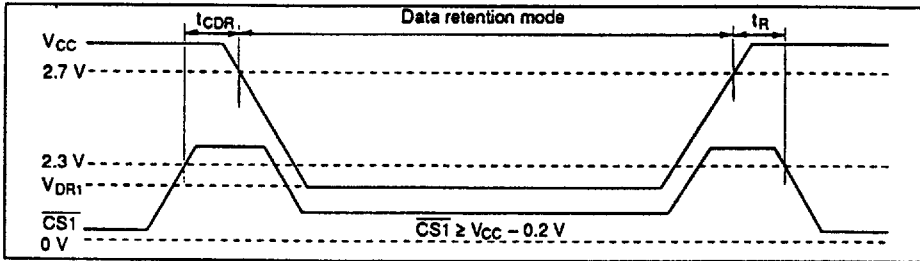
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**Low  $V_{CC}$  Data Retention Characteristics ( $T_a = 0$  to  $+70^\circ\text{C}$ )**

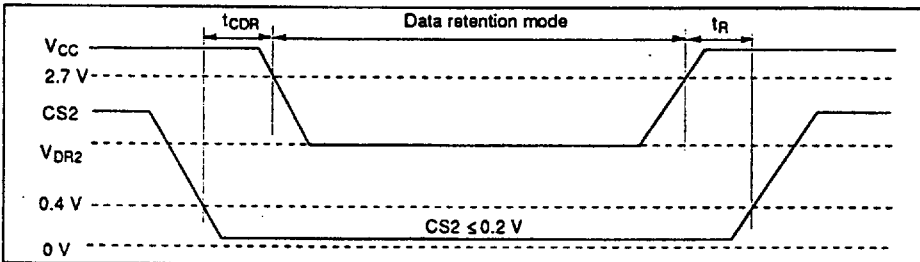
This characteristics is guaranteed only for L-, L-L, and L-SL version.

Parameter	Symbol	Min	Typ	Max	Unit	Test conditions	Notes
$V_{CC}$ for data retention	$V_{DR}$	2.0	—	—	V	$\overline{CS1} \geq V_{CC} - 0.2\text{ V}$ , $CS2 \geq V_{CC} - 0.2\text{ V}$ or $0\text{ V} \leq CS2 \leq 0.2\text{ V}$ $V_{in} \geq 0\text{ V}$	
Data retention current	$I_{CDR}$	—	1	$50^1$	$\mu\text{A}$	$V_{CC} = 3.0\text{ V}$ , $V_{in} \geq 0\text{ V}$	Lversion
		—	1	$30^2$	$\mu\text{A}$	$\overline{CS1} \geq V_{CC} - 0.2\text{ V}$ , $CS2 \geq V_{CC} - 0.2\text{ V}$ or $0\text{ V} \leq CS2 \leq 0.2\text{ V}$	L-Lversion
		—	1	$15^3$	$\mu\text{A}$		L-SLversion
Chip deselect to data retention time	$t_{CDR}$	0	—	—	ns	See retention waveform	
Operation recovery time	$t_R$	5	—	—	ms		

Low  $V_{CC}$  Data Retention Timing Waveform (1) ( $\overline{CS1}$  Controlled)



Low  $V_{CC}$  Data Retention Timing Waveform (2) ( $CS2$  Controlled)



- Notes:
1.  $20\ \mu\text{A}$  max at  $T_a = 0$  to  $40^\circ\text{C}$  (Lversion).
  2.  $6\ \mu\text{A}$  max at  $T_a = 0$  to  $40^\circ\text{C}$  (L-Lversion).
  3.  $3\ \mu\text{A}$  max at  $T_a = 0$  to  $40^\circ\text{C}$  (L-SLversion).
  4.  $CS2$  controls address buffer,  $\overline{WE}$  buffer,  $\overline{CS1}$  buffer,  $\overline{OE}$  buffer, and  $D_{in}$  buffer. If  $CS2$  controls data retention mode,  $V_{in}$  levels (address,  $\overline{WE}$ ,  $\overline{OE}$ ,  $\overline{CS1}$ , I/O) can be in the high impedance state. If  $\overline{CS1}$  controls data retention mode,  $CS2$  must be  $CS2 \geq V_{CC} - 0.2\text{ V}$  or  $0\text{ V} \leq CS2 \leq 0.2\text{ V}$ . The other input levels (address,  $\overline{WE}$ ,  $\overline{OE}$ , I/O) can be in the high impedance state.