HM62W8128B Series

131,072-word × 8-bit High Speed CMOS Static RAM

HITACHI

ADE-203-656A (Z)
Rev. 1.0
Oct. 14, 1996

Description

The Hitachi HM62W8128B is a CMOS static RAM organized 131,072-word × 8-bit. It realizes higher density, higher performance and low power consumption by employing 0.8 μm Hi-CMOS shrink process technology. It offers low power standby power dissipation; therefore, it is suitable for battery backup systems. The device, packaged in a 525-mil SOP (460-mil body SOP) or a 8 mm × 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

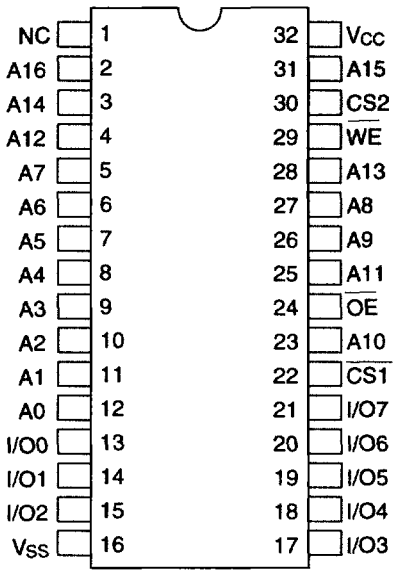
- Single 3.3 V supply
- Fast access time: 100/120 ns (max)
- Power dissipation:
  - — Active: 23 mW/MHz (typ)
  - — Standby: 4 μW (typ)
- Completely static memory. No clock or timing strobe required
- Equal access and cycle times
- Common data input and output. Three state output
- Directry CMOS compatible all inputs and outputs.
- Capability of battery backup operation. 2 chip selection for battery backup

Ordering Information

Type No.	Access time	Package
HM62W8128BLFP-10	100 ns	525-mil 32-pin plastic SOP (FP-32D)
HM62W8128BLFP-12	120 ns	
HM62W8128BLFP-10SL	100 ns	
HM62W8128BLFP-12SL	120 ns	
HM62W8128BLT-10	100 ns	8 mm × 20 mm 32-pin TSOP (normal-bend type) (TFP-32D)
HM62W8128BLT-12	120 ns	
HM62W8128BLT-10SL	100 ns	
HM62W8128BLT-12SL	120 ns	
HM62W8128BLR-10	100 ns	8 mm × 20 mm 32-pin TSOP (reverse-bend type) (TFP-32DR)
HM62W8128BLR-12	120 ns	
HM62W8128BLR-10SL	100 ns	
HM62W8128BLR-12SL	120 ns	

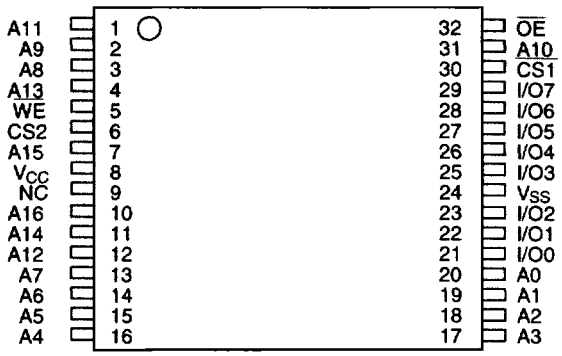
Pin Arrangement

HM62W8128BLFP Series



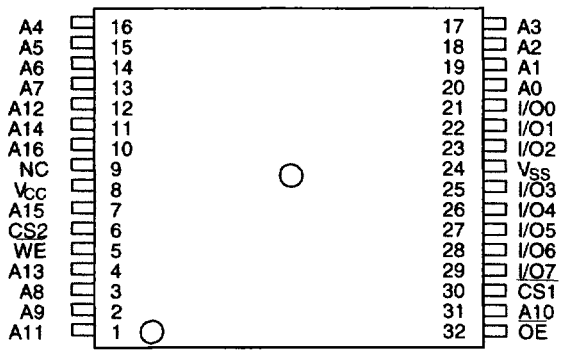
(Top view)

HM62W8128BLT Series (Normal Type TSOP)



(Top view)

HM62W8128BLR Series (Reverse Type TSOP)

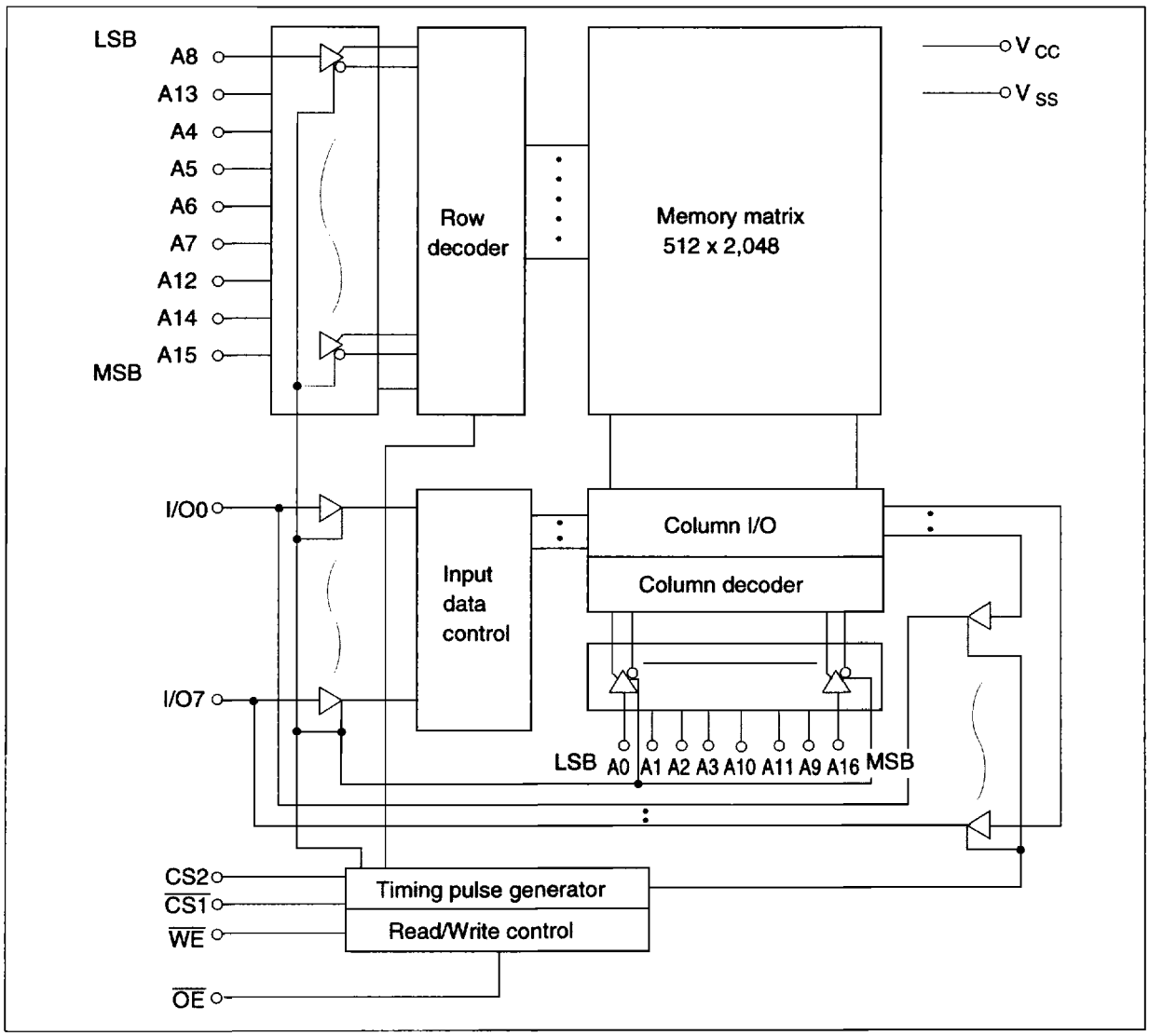


(Top view)

Pin Description

Pin name	Function
A0 to A16	Address input
I/O0 to I/O7	Data input/output
$\overline{CS1}$	Chip select 1
CS2	Chip select 2
$\overline{WE}$	Write enable
$\overline{OE}$	Output enable
NC	No connection
V_{CC}	Power supply
V_{SS}	Ground

Block Diagram



Function Table

$\overline{WE}$	$\overline{CS1}$	CS2	$\overline{OE}$	Mode	V_{CC} current	I/O pin	Ref. cycle
×	H	×	×	Standby	I_{SB}, I_{SB1}	High-Z	—
×	×	L	×	Standby	I_{SB}, I_{SB1}	High-Z	—
H	L	H	H	Output disable	I_{CC}	High-Z	—
H	L	H	L	Read	I_{CC}	Dout	Read cycle
L	L	H	H	Write	I_{CC}	Din	Write cycle (1)
L	L	H	L	Write	I_{CC}	Din	Write cycle (2)

Note: ×: H or L

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Power supply voltage*1	V_{CC}	–0.5 to + 4.6	V
Terminal voltage*1	V_T	–0.5*2 to V_{CC} + 0.3*3	V
Power dissipation	P_T	1.0	W
Operating temperature	Topr	0 to +70	°C
Storage temperature	Tstg	–55 to +125	°C
Storage temperature under bias	Tbias	–10 to 85	°C

Notes: 1. Relative to V_{SS}
2. V_T min: –3.0 V for pulse half-width ≤ 30 ns
3. Maximum voltage is 4.6 V

Recommended DC Operating Conditions (Ta = 0 to +70°C)

Parameter	Symbol	Min	Typ	Max	Unit
Supply voltage	V_{CC}	3.0	3.3	3.6	V
	V_{SS}	0	0	0	V
Input voltage	V_{IH}	2.0	—	V_{CC} + 0.3	V
	V_{IL}	–0.3 *1	—	0.8	V

Note: 1. V_{IL} min: –3.0 V for pulse half-width ≤ 30 ns

DC Characteristics (Ta = 0 to +70°C, V_{CC} = 3.3 V ± 0.3 V, V_{SS} = 0 V)

Parameter		Symbol	Min	Typ*1	Max	Unit	Test conditions
Input leakage current		$\|I_{LI}\|$	—	—	1	µA	Vin = V_{SS} to V_{CC}
Output leakage current		$\|I_{LO}\|$	—	—	1	µA	$\overline{CS1}$ = V_{IH} or CS2 = V_{IL} or $\overline{OE}$ = V_{IH} or $\overline{WE}$ = V_{IL}, $V_{I/O}$ = V_{SS} to V_{CC}
Operating power supply current: DC		I_{CC}	—	6	10	mA	$\overline{CS1}$ = V_{IL}, CS2 = V_{IH}, Others = V_{IH}/V_{IL}, $I_{I/O}$ = 0 mA
Operating power supply current	HM62W8128B-10	I_{CC1}	—	22	30	mA	Min. cycle, duty = 100%, $I_{I/O}$ = 0 mA, $\overline{CS1}$ = V_{IL}, CS2 = V_{IH}, Others = V_{IH}/V_{IL}
	HM62W8128B-12	I_{CC1}	—	20	25		
		I_{CC2}	—	7	10	mA	Cycle time = 1 µs, duty = 100%, $I_{I/O}$ = 0 mA, $\overline{CS1}$ ≤ 0.2 V, CS2 ≥ V_{CC} − 0.2 V, V_{IH} ≥ V_{CC} − 0.2 V, V_{IL} ≤ 0.2 V
Standby power supply current: DC		I_{SB}	—	0.5	1	mA	(1) $\overline{CS1}$ = V_{IH}, CS2 = V_{IH} or (2) CS2 = V_{IL}
Standby power supply current (1): DC		I_{SB1}	—	1.2*2	70*2	µA	0 V ≤ Vin (1) 0 V ≤ CS2 ≤ 0.2 V or (2) $\overline{CS1}$ ≥ V_{CC} − 0.2 V, CS2 ≥ V_{CC} − 0.2 V
		I_{SB1}	—	1.2*3	30*3	µA	
Output voltage		V_{OL}	—	—	0.4	V	I_{OL} = 2 mA
			—	—	0.2	V	I_{OL} = 100 µA
		V_{OH}	2.4	—	—	V	I_{OH} = −2 mA
			V_{CC} − 0.2	—	—	V	I_{OH} = −100 µA

Notes: 1. Typical values are at V_{CC} = 3.3 V, Ta = +25°C and not guaranteed.
2. This characteristic is guaranteed only for L version.
3. This characteristic is guaranteed only for L-SL version.

Capacitance (Ta = 25°C, f = 1.0 MHz)

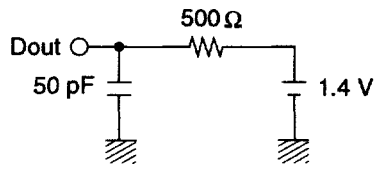
Parameter	Symbol	Min	Typ	Max	Unit	Test conditions
Input capacitance*1	Cin	—	—	8	pF	Vin = 0 V
Input/output capacitance*1	$C_{I/O}$	—	—	10	pF	$V_{I/O}$ = 0 V

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

AC Characteristics (Ta = 0 to +70°C, V_{CC} = 3.3 V ±0.3 V, unless otherwise noted.)

Test Conditions

- Input pulse levels: 0.4 V to 2.4 V
- Input rise and fall time: 5 ns
- Input timing reference levels: 1.4 V
- output timing reference levels: 2.0 V/0.8 V
- Output load (Including scope and jig)



Read Cycle

		HM62W8128B					
		-10		-12			
Parameter	Symbol	Min	Max	Min	Max	Unit	Notes
Read cycle time	t_{RC}	100	—	120	—	ns	
Address access time	t_{AA}	—	100	—	120	ns	
Chip selection to output valid	t_{CO1}	—	100	—	120	ns	
	t_{CO2}	—	100	—	120	ns	
Output enable to output valid	t_{OE}	—	50	—	60	ns	
Chip selection to output in low-Z	t_{LZ1}	10	—	10	—	ns	2, 3
	t_{LZ2}	10	—	10	—	ns	
Output enable to output in low-Z	t_{OLZ}	5	—	5	—	ns	2, 3
Chip deselection to output in high-Z	t_{HZ1}	0	35	0	40	ns	1, 2, 3
	t_{HZ2}	0	35	0	40	ns	
Output disable to output in high-Z	t_{OHZ}	0	35	0	40	ns	1, 2, 3
Output hold from address change	t_{OH}	10	—	10	—	ns	

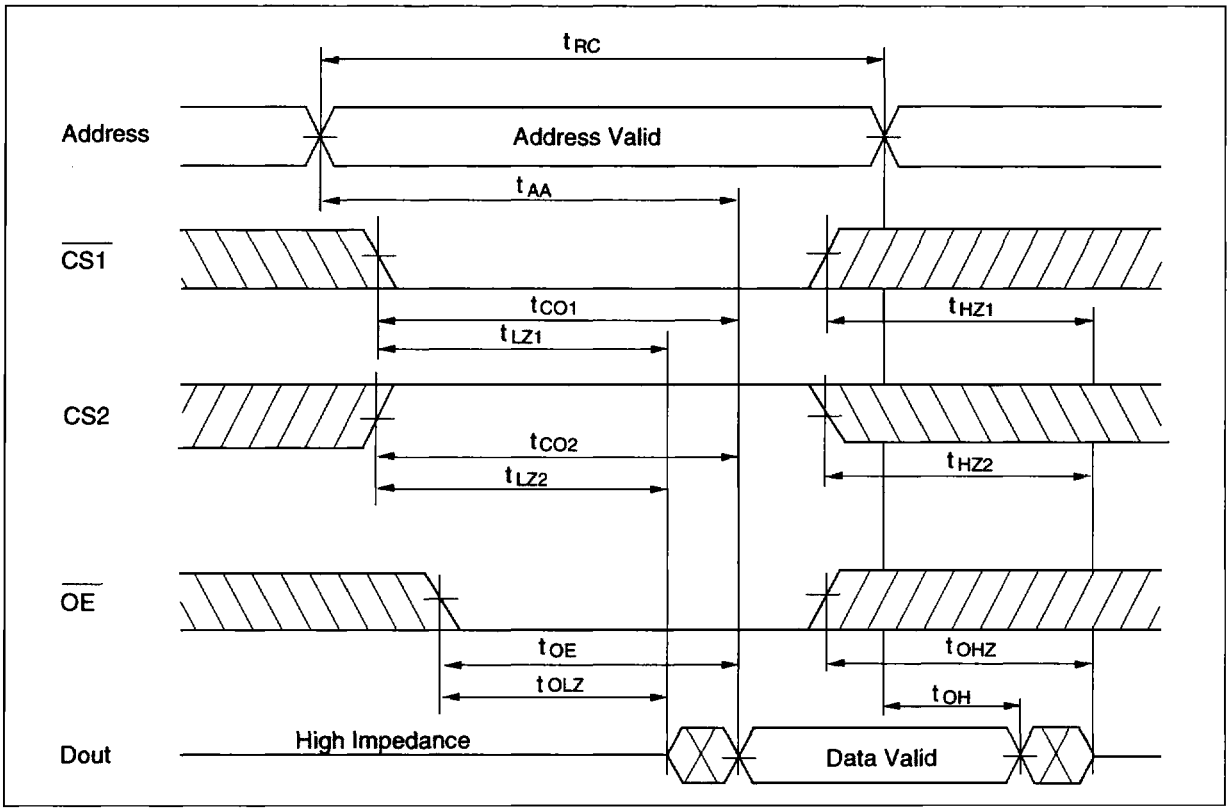
Write Cycle

		HM62W8128B					
		-10		-12			
Parameter	Symbol	Min	Max	Min	Max	Unit	Notes
Write cycle time	t_{WC}	100	—	120	—	ns	
Chip selection to end of write	t_{CW}	80	—	85	—	ns	5
Address setup time	t_{AS}	0	—	0	—	ns	6
Address valid to end of write	t_{AW}	80	—	85	—	ns	
Write pulse width	t_{WP}	60	—	65	—	ns	4, 13
Write recovery time	t_{WR}	0	—	0	—	ns	7
Write to output in high-Z	t_{WHZ}	0	35	0	40	ns	1, 2, 8
Data to write time overlap	t_{DW}	40	—	45	—	ns	
Data hold from write time	t_{DH}	0	—	0	—	ns	
Output active from end of write	t_{OW}	5	—	5	—	ns	2
Output disable to output in High-Z	t_{OHZ}	0	35	0	40	ns	1, 2, 8

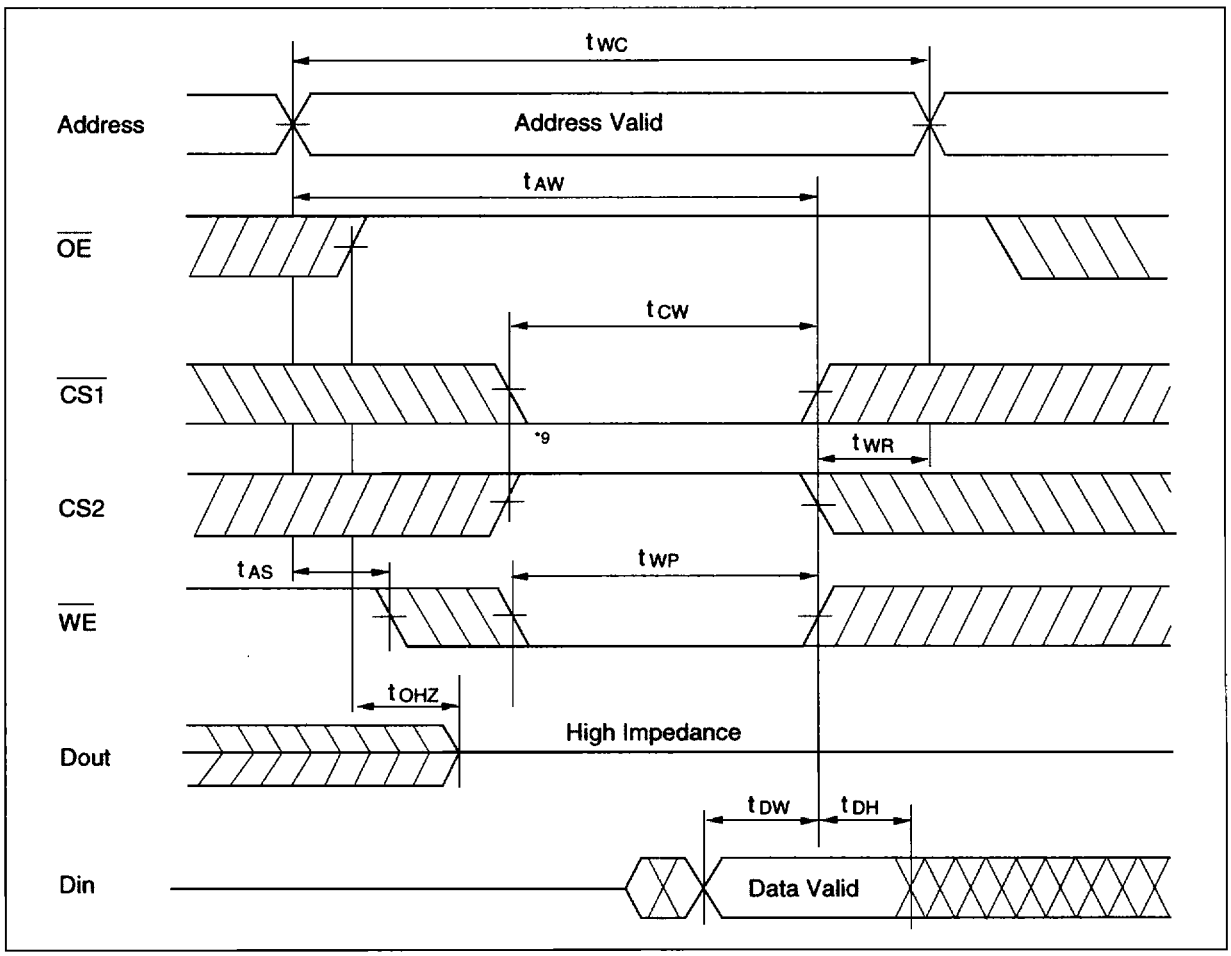
Notes:
1. t_{HZ}, t_{OHZ} and t_{WHZ} are defined as the time at which the outputs achieve the open circuit conditions and are not referred to output voltage levels.
2. This parameter is sampled and not 100% tested.
3. At any given temperature and voltage condition, t_{HZ} max is less than t_{LZ} min both for a given device and from device to device.
4. A write occures 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.
5. t_{CW} is measured from the later of $\overline{CS1}$ going low or CS2 going high to the end of write.
6. t_{AS} is measured from the address valid to the beginning of write.
7. 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.
8. 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.
9. 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.
10. Dout is the same phase of the latest written data in this write cycle.
11. Dout is the read data of next address.
12. 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.
13. In the write cycle with $\overline{OE}$ low fixed, t_{WP} must satisfy the following equation to avoid a problem of data bus contention.
    $t_{WP} \geq t_{DW}$ min + t_{WHZ} max

Timing Waveform

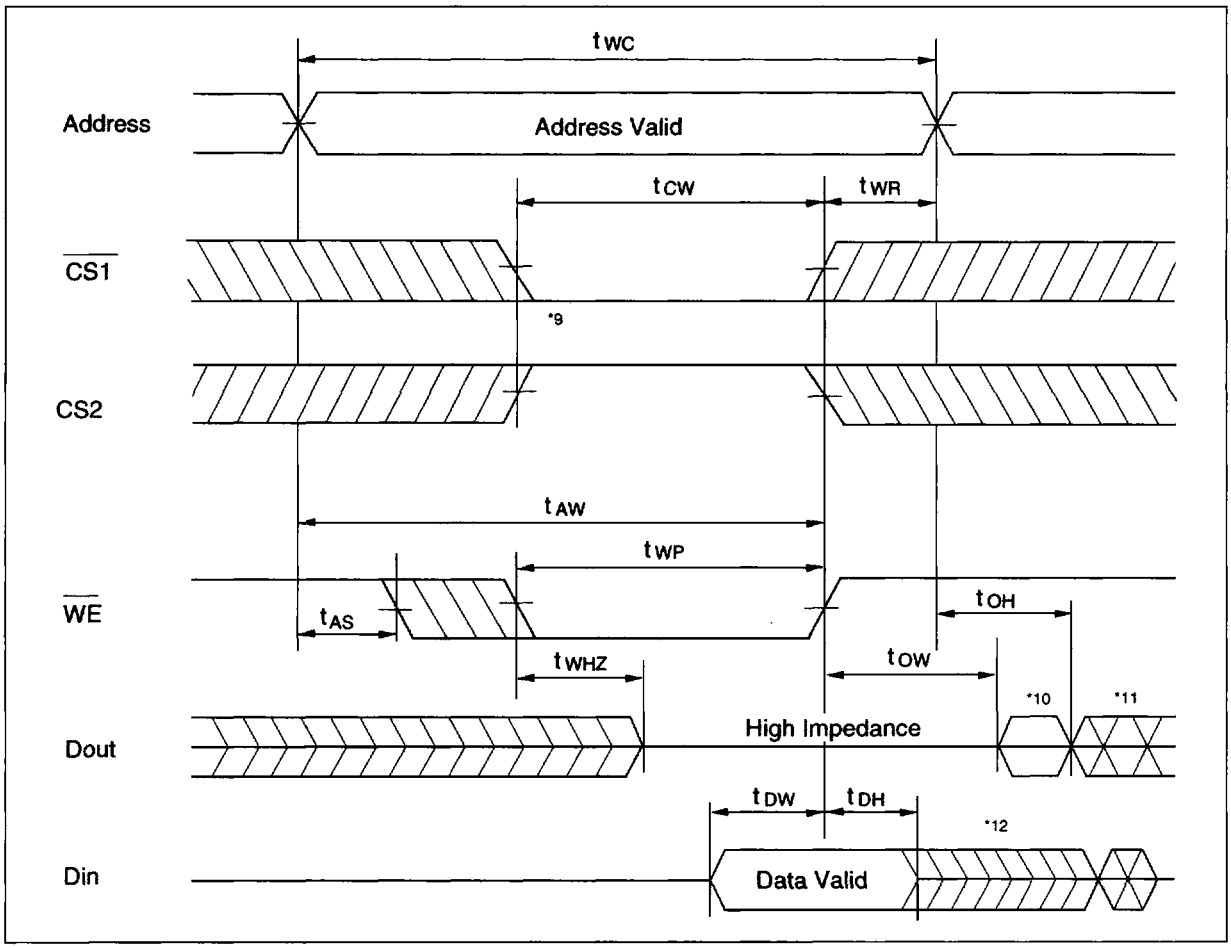
Read Timing Waveform ($\overline{WE}$ = V_{IH})



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



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

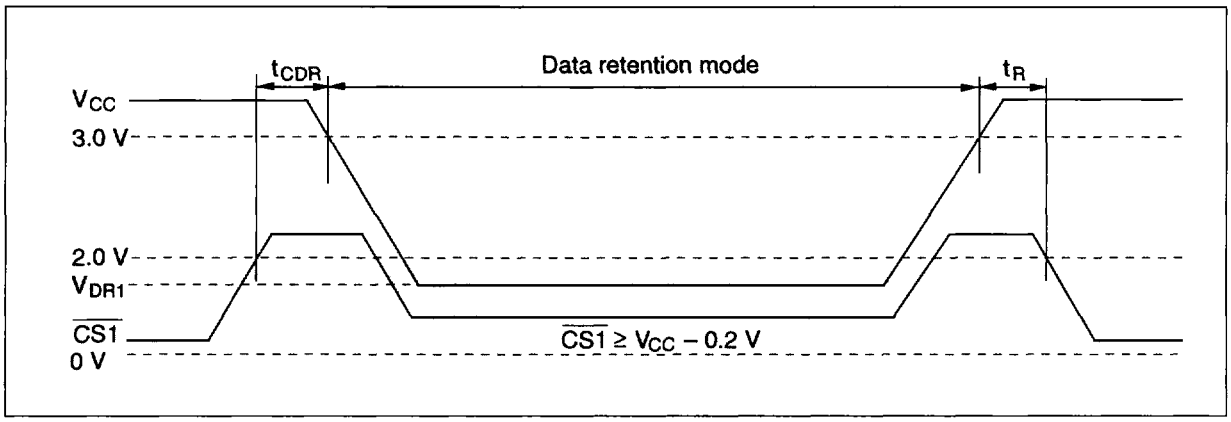


Low V_{CC} Data Retention Characteristics (Ta = 0 to +70°C)

Parameter	Symbol	Min	Typ*4	Max	Unit	Test conditions*3
V_{CC} for data retention	V_{DR}	2.0	—	—	V	Vin ≥ 0V (1) 0 V ≤ CS2 ≤ 0.2 V or (2) CS2 ≥ V_{CC} – 0.2 V $\overline{CS1}$ ≥ V_{CC} – 0.2 V
Data retention current	I_{CCDR} (L version)	—	1	50*1	µA	V_{CC} = 3.0 V, Vin ≥ 0V (1) 0 V ≤ CS2 ≤ 0.2 V or (2) CS2 ≥ V_{CC} – 0.2 V, $\overline{CS1}$ ≥ V_{CC} – 0.2 V
	I_{CCDR} (L-SL version)	—	1	15*2	µA	
Chip deselect to data retention time	t_{CDR}	0	—	—	ns	See retention waveform
Operation recovery time	t_R	5	—	—	ms	

Notes: 1. This characteristic is guaranteed only for L version, 20 µA max. at Ta = 0 to 40°C.
2. This characteristic is guaranteed only for L-SL version, 3 µA max. at Ta = 0 to 40°C.
3. CS2 controls address buffer, $\overline{WE}$ buffer, $\overline{CS1}$ buffer, $\overline{OE}$ buffer, and Din buffer. If CS2 controls data retention mode, Vin 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 ≥ V_{CC} – 0.2 V or 0 V ≤ CS2 ≤ 0.2 V. The other input levels (address, $\overline{WE}$, $\overline{OE}$, I/O) can be in the high impedance state.
4. Typical values are at V_{CC} = 3.0 V, Ta = +25°C and not guaranteed.

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



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