HM62A16100I Series

Wide Temperature Range Version
16 M SRAM (1-Mword × 16-bit)

REJ03C0053-0001Z
Preliminary
Rev. 0.01
Jun.02.2003

Description

The Renesas HM62A16100I Series is 16-Mbit static RAM organized 1-Mword × 16-bit. HM62A16100I Series has realized higher density, higher performance and low power consumption by employing CMOS process technology (6-transistor memory cell). It offers low power standby power dissipation; therefore, it is suitable for battery backup systems. It has the package variations of 48-bump chip size package with 0.75 mm bump pitch for high density surface mounting.

Features

- Single 1.8 V supply: 1.65 V to 2.2 V
- Fast access time: 70 ns (max)
- Power dissipation:
  - Active: 3.6 mW/MHz (typ)
  - Standby: 0.9 µW (typ)
- Completely static memory.
  - No clock or timing strobe required
- Equal access and cycle times
- Common data input and output.
  - Three state output
- Battery backup operation.
  - 2 chip selection for battery backup
- Temperature range: –40 to +85°C

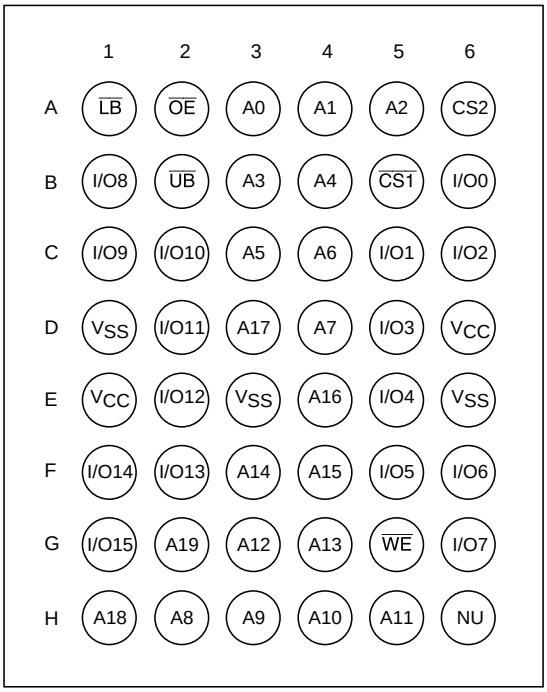
Preliminary: The specification of this device are subject to change without notice. Please contact your nearest Renesas Technology's Sales Dept. regarding specification.

Ordering Information

Type No.	Access time	Package
HM62A16100LBPI-7	70 ns	48-bump CSP with 0.75 mm bump pitch (TBP-48F)
HM62A16100LBPI-7SL	70 ns	

Pin Arrangement

48-bumps CSP



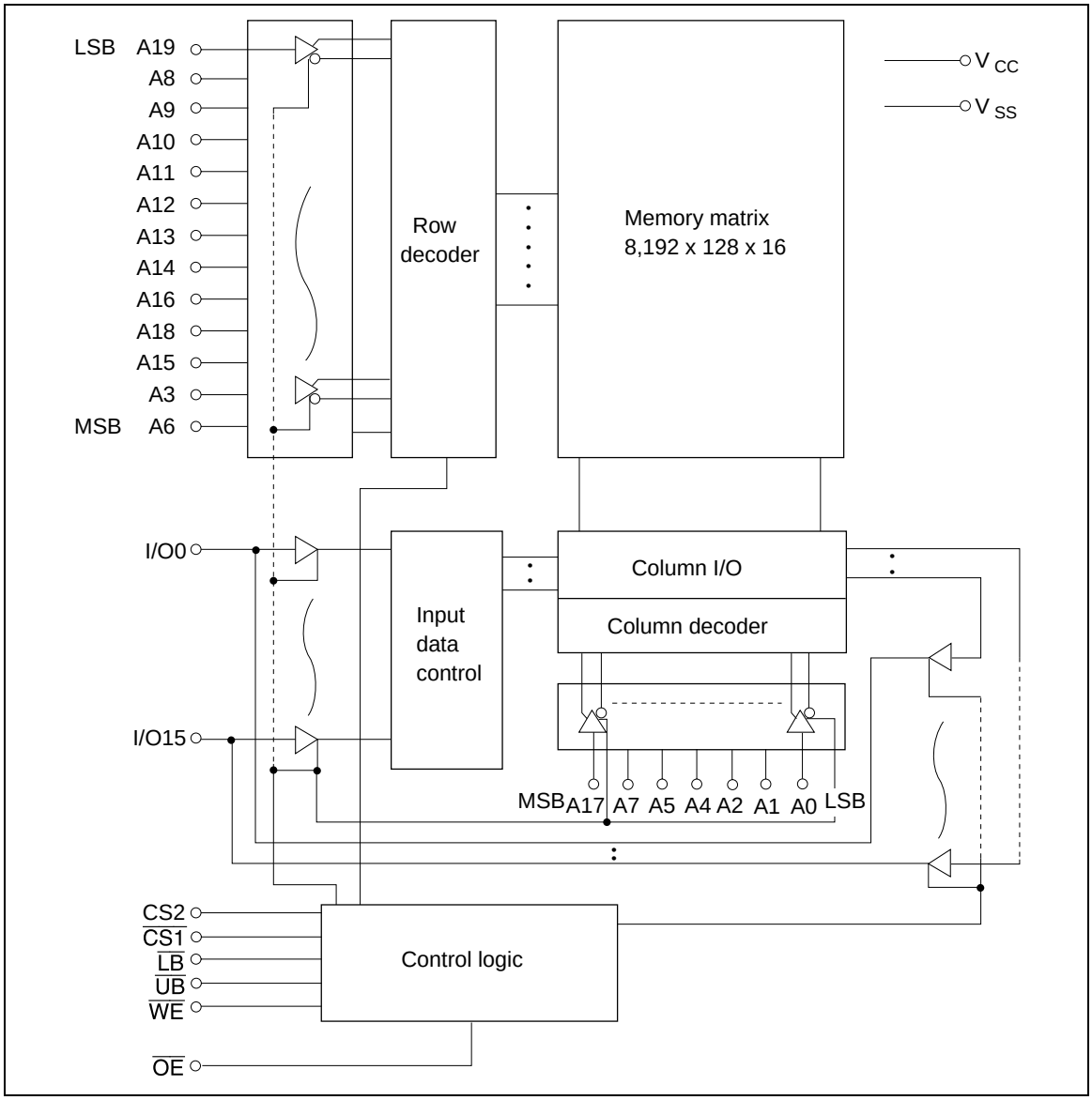
(Top view)

Pin Description

Pin name	Function
A0 to A19	Address input
I/O0 to I/O15	Data input/output
CS1	Chip select 1
CS2	Chip select 2
WE	Write enable
OE	Output enable
LB	Lower byte select
UB	Upper byte select
V_{CC}	Power supply
V_{SS}	Ground
NU*[1]	Not used (test mode pin)

Note: 1. This pin should be connected to a ground (V_{SS}), or not be connected (open).

Block Diagram



Operation Table

CS1	CS2	WE	OE	UB	LB	I/O0 to I/O7	I/O8 to I/O15	Operation
H	×	×	×	×	×	High-Z	High-Z	Standby
×	L	×	×	×	×	High-Z	High-Z	Standby
×	×	×	×	H	H	High-Z	High-Z	Standby
L	H	H	L	L	L	Dout	Dout	Read
L	H	H	L	H	L	Dout	High-Z	Lower byte read
L	H	H	L	L	H	High-Z	Dout	Upper byte read
L	H	L	×	L	L	Din	Din	Write
L	H	L	×	H	L	Din	High-Z	Lower byte write
L	H	L	×	L	H	High-Z	Din	Upper byte write
L	H	H	H	×	×	High-Z	High-Z	Output disable

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

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Power supply voltage relative to V_{SS}	V_{CC}	–0.3 to + 2.6	V
Terminal voltage on any pin relative to V_{SS}	V_T	–0.3[*1] to V_{CC} + 0.3[*2]	V
Power dissipation	P_T	1.0	W
Storage temperature range	Tstg	–55 to +125	°C
Storage temperature range under bias	Tbias	–40 to +85	°C

Notes: 1. V_T min: –2.0 V for pulse half-width ≤ 10 ns.
2. Maximum voltage is +2.6 V.

DC Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit	Note
Supply voltage	V_{CC}	1.65	1.8	2.2	V	
	V_{SS}	0	0	0	V	
Input high voltage	V_{IH}	0.75 × V_{CC}	—	V_{CC} + 0.3	V	
Input low voltage	V_{IL}	–0.3	—	0.25 × V_{CC}	V	1
Ambient temperature range	Ta	–40	—	85	°C	

Note: 1. V_{IL} min: –2.0 V for pulse half-width ≤ 10 ns.

DC Characteristics

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	CS1 = V_{IH} or CS2 = V_{IL} or OE = V_{IH} or WE = V_{IL} or LB = UB = V_{IH}, $V_{I/O}$ = V_{SS} to V_{CC}
Operating current	I_{CC}	—	—	8	mA	CS1 = V_{IL}, CS2 = V_{IH}, Others = V_{IH}/ V_{IL}, $I_{I/O}$ = 0 mA
Average operating current	I_{CC1}	—	20	30	mA	Min. cycle, duty = 100%, $I_{I/O}$ = 0 mA, CS1 = V_{IL}, CS2 = V_{IH}, Others = V_{IH}/V_{IL}
	I_{CC2}	—	2	5	mA	Cycle time = 1 µs, duty = 100%, $I_{I/O}$ = 0 mA, CS1 ≤ 0.2 V, CS2 ≥ V_{CC} – 0.2 V V_{IH} ≥ V_{CC} – 0.2 V, V_{IL} ≤ 0.2 V
Standby current	I_{SB}	—	0.1	0.5	mA	CS2 = V_{IL}
Standby current	I_{SB1}*[2]	—	0.5	25	µA	0 V ≤ Vin (1) 0 V ≤ CS2 ≤ 0.2 V or (2) CS1 ≥ V_{CC} – 0.2 V, CS2 ≥ V_{CC} – 0.2 V or (3) LB = UB ≥ V_{CC} – 0.2 V, CS2 ≥ V_{CC} – 0.2 V, CS1 ≤ 0.2 V Average value
	I_{SB1}*[3]	—	0.5	8	µA	
Output high voltage	V_{OH}	V_{CC} – 0.2	—	—	V	I_{OH} = –100 µA
Output low voltage	V_{OL}	—	—	0.2	V	I_{OL} = 100 µA

Notes: 1. Typical values are at V_{CC} = 1.8 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	Note
Input capacitance	Cin	—	—	8	pF	Vin = 0 V	1
Input/output capacitance	$C_{I/O}$	—	—	10	pF	$V_{I/O}$ = 0 V	1

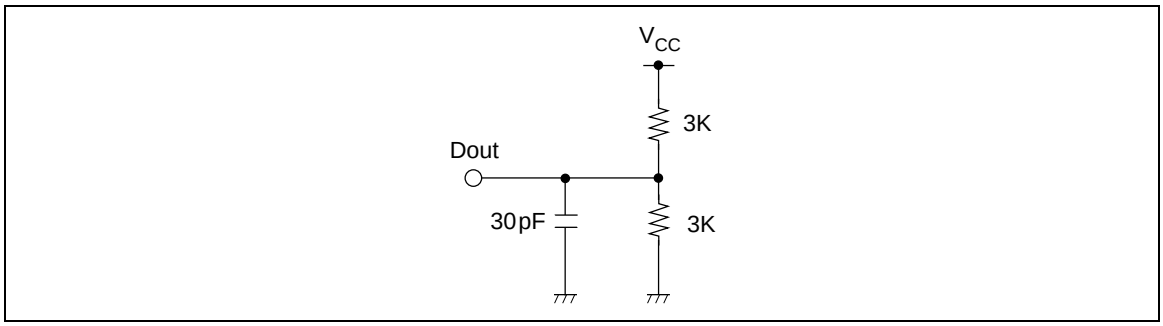
Note: 1. This parameter is sampled and not 100% tested.

AC Characteristics

(Ta = –40 to +85°C, V_{CC} = 1.65 V to 2.2 V, unless otherwise noted.)

Test Conditions

- Input pulse levels: V_{IL} = 0.2 V, V_{IH} = V_{CC} – 0.2 V
- Input rise and fall time: 3 ns
- Input and output timing reference levels: $0.5 \times V_{CC}$
- Output load: See figures (Including scope and jig)



Read Cycle

		HM62A16100I			
		-7			
Parameter	**Symbol**	**Min**	**Max**	**Unit**	**Notes**
Read cycle time	t_{RC}	70	—	ns	
Address access time	t_{AA}	—	70	ns	
Chip select access time	t_{ACS1}	—	70	ns	
	t_{ACS2}	—	70	ns	
Output enable to output valid	t_{OE}	—	35	ns	
Output hold from address change	t_{OH}	10	—	ns	
LB, UB access time	t_{BA}	—	70	ns	
Chip select to output in low-Z	t_{CLZ1}	10	—	ns	2, 3
	t_{CLZ2}	10	—	ns	2, 3
LB, UB enable to low-Z	t_{BLZ}	5	—	ns	2, 3
Output enable to output in low-Z	t_{OLZ}	5	—	ns	2, 3
Chip deselect to output in high-Z	t_{CHZ1}	0	25	ns	1, 2, 3
	t_{CHZ2}	0	25	ns	1, 2, 3
LB, UB disable to high-Z	t_{BHZ}	0	25	ns	1, 2, 3
Output disable to output in high-Z	t_{OHZ}	0	25	ns	1, 2, 3

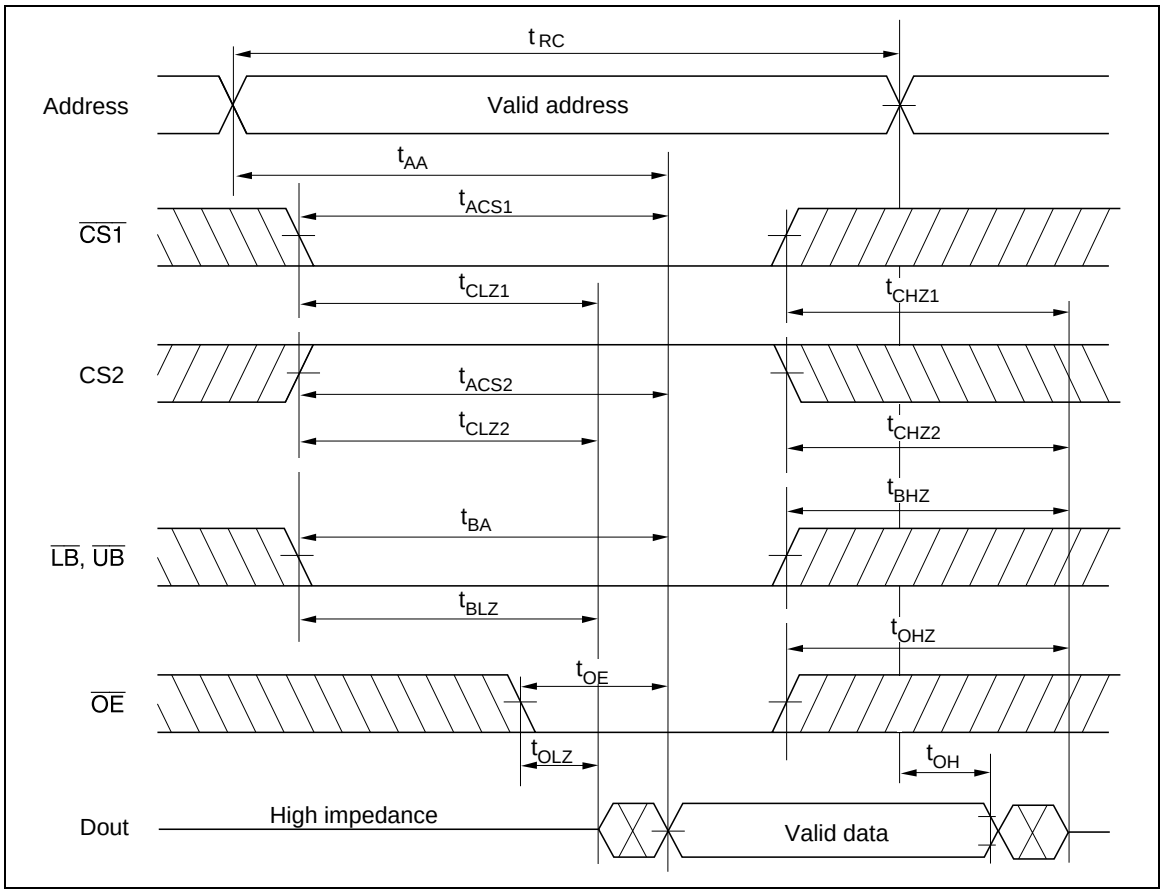
Write Cycle

		HM62A16100I			
		-7			
Parameter	**Symbol**	**Min**	**Max**	**Unit**	**Notes**
Write cycle time	t_{WC}	70	—	ns	
Address valid to end of write	t_{AW}	60	—	ns	
Chip selection to end of write	t_{CW}	60	—	ns	5
Write pulse width	t_{WP}	50	—	ns	4
LB, UB valid to end of write	t_{BW}	60	—	ns	
Address setup time	t_{AS}	0	—	ns	6
Write recovery time	t_{WR}	0	—	ns	7
Data to write time overlap	t_{DW}	30	—	ns	
Data hold from write time	t_{DH}	0	—	ns	
Output active from end of write	t_{OW}	5	—	ns	2
Output disable to output in high-Z	t_{OHZ}	0	25	ns	1, 2
Write to output in high-Z	t_{WHZ}	0	25	ns	1, 2

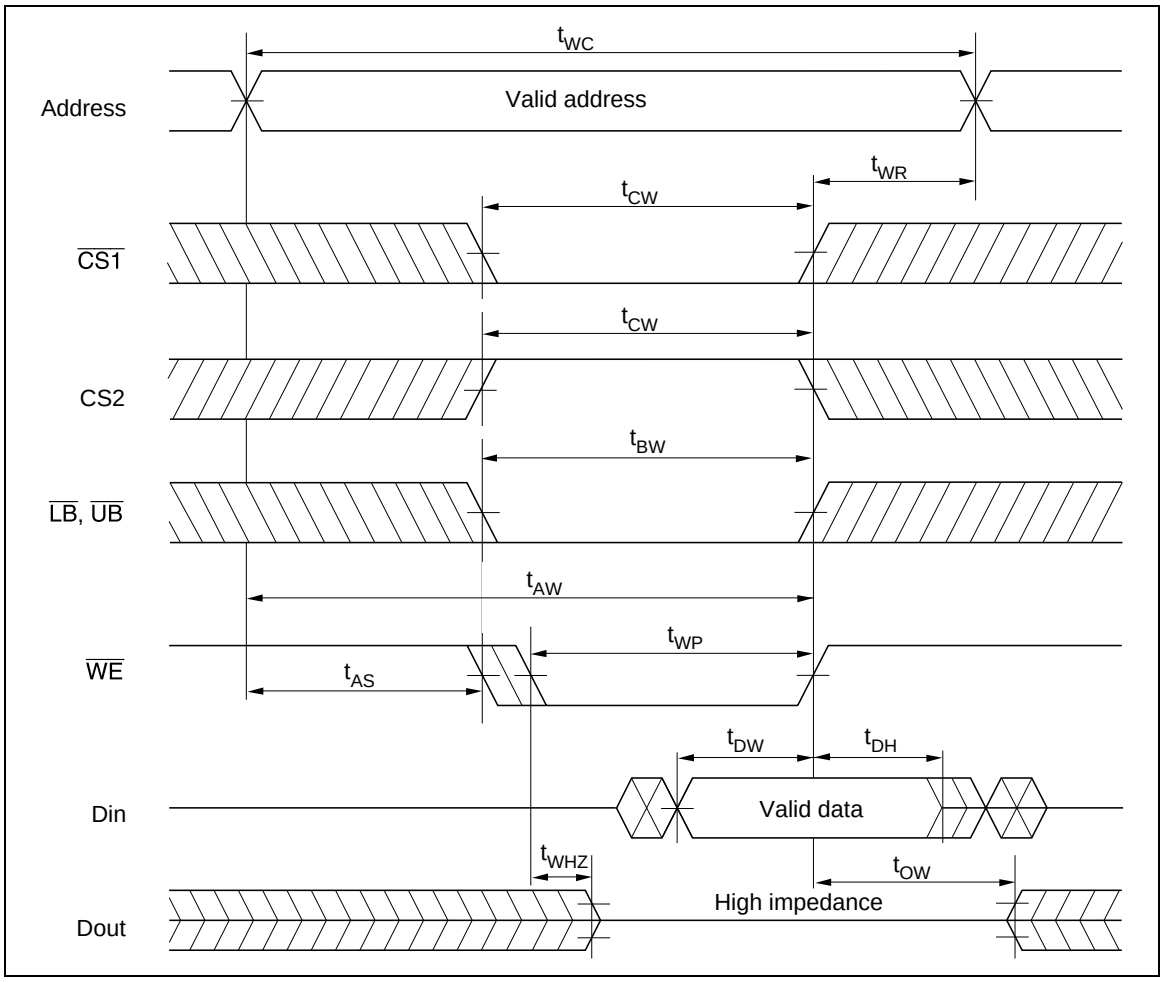
Notes: 1. t_{CHZ}, t_{OHZ}, t_{WHZ} and t_{BHZ} are defined as the time at which the outputs achieve the open circuit conditions and are not referred to output voltage levels.
2. This parameter is sampled and not 100% tested.
3. At any given temperature and voltage condition, t_{HZ} max is less than t_{LZ} min both for a given device and from device to device.
4. A write occurs during the overlap of a low CS1, a high CS2, a low WE and a low LB or a low UB. A write begins at the latest transition among CS1 going low, CS2 going high, WE going low and LB going low or UB going low. A write ends at the earliest transition among CS1 going high, CS2 going low, WE going high and LB going high or UB 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 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 CS1 or WE going high or CS2 going low to the end of write cycle.

Timing Waveform

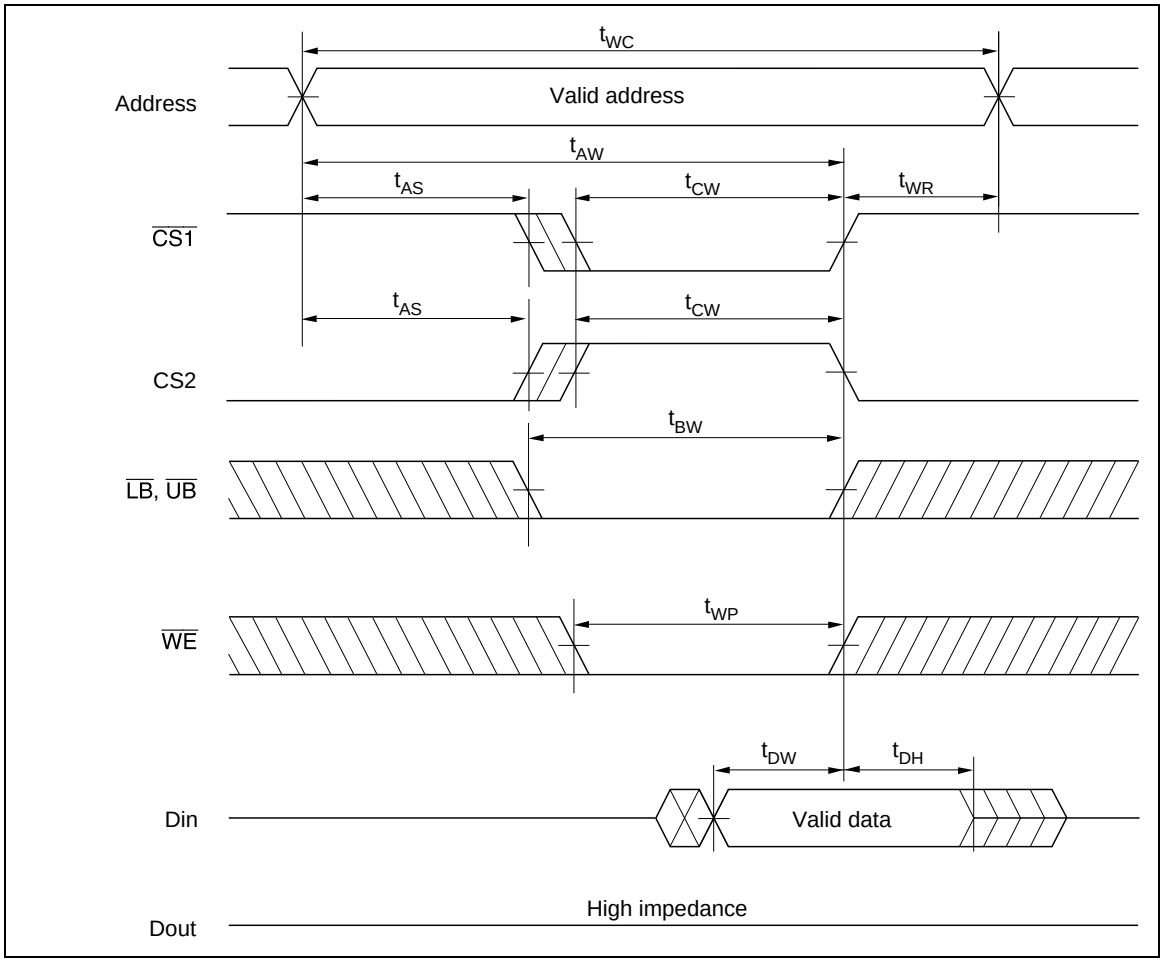
Read Cycle



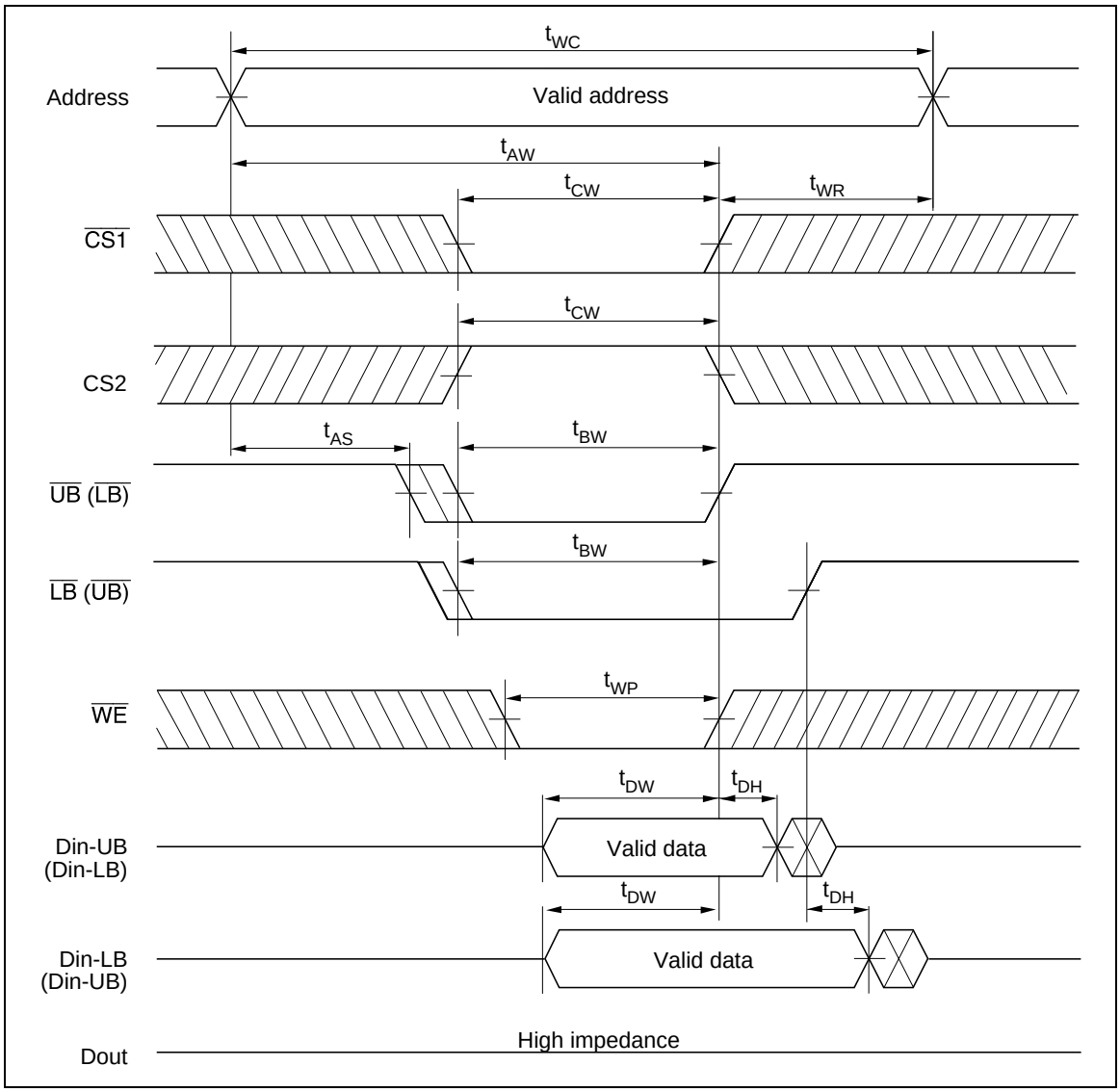
Write Cycle (1) (WE Clock)



Write Cycle (2) (CS1, CS2 Clock, OE = V_{IH})



Write Cycle (3) (LB, UB Clock, OE = V_{IH})



Low V_{CC} Data Retention Characteristics

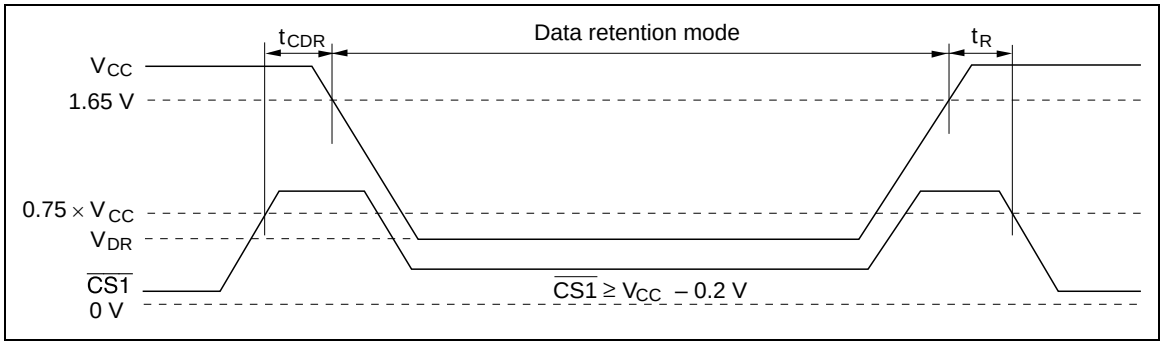
(Ta = –40 to +85°C)

Parameter	Symbol	Min	Typ*[4]	Max	Unit	Test conditions*[3]
V_{CC} for data retention	V_{DR}	1.0	—	2.2	V	Vin ≥ 0 V (1) 0 V ≤ CS2 ≤ 0.2 V or (2) CS2 ≥ V_{CC} – 0.2 V, CS1 ≥ V_{CC} – 0.2 V or (3) LB = UB ≥ V_{CC} – 0.2 V, CS2 ≥ V_{CC} – 0.2 V, CS1 ≤ 0.2 V
Data retention current	I_{CCDR}*[1]	—	0.5	25	µA	V_{CC} = 1.5 V, Vin ≥ 0 V (1) 0 V ≤ CS2 ≤ 0.2 V or (2) CS2 ≥ V_{CC} – 0.2 V, CS1 ≥ V_{CC} – 0.2 V or (3) LB = UB ≥ V_{CC} – 0.2 V, CS2 ≥ V_{CC} – 0.2 V, CS1 ≤ 0.2 V Average value
	I_{CCDR}*[2]	—	0.5	8	µA	
Chip deselect to data retention time	t_{CDR}	0	—	—	ns	See retention waveforms
Operation recovery time	t_R	5	—	—	ms	

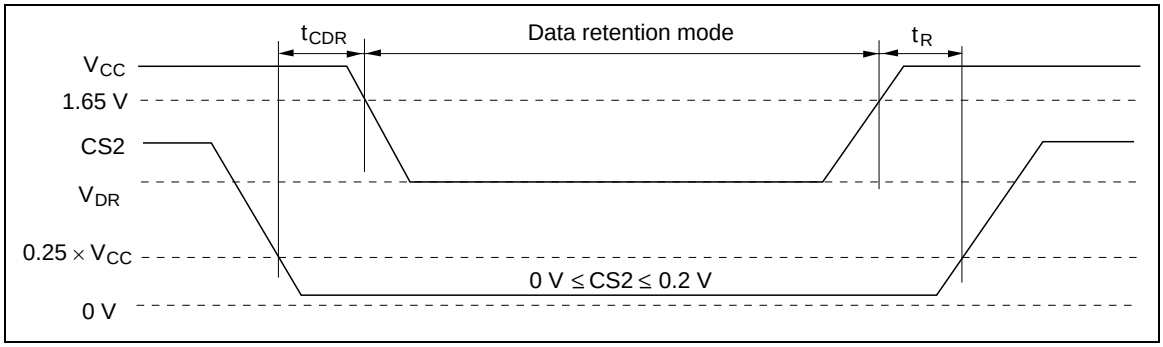
Notes: 1. This characteristic is guaranteed only for L-version.

2. This characteristic is guaranteed only for L-SL version.
3. CS2 controls address buffer, WE buffer, CS1 buffer, OE buffer, LB, UB buffer and Din buffer. If CS2 controls data retention mode, Vin levels (address, WE, OE, CS1, LB, UB, I/O) can be in the high impedance state. If 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, WE, OE, LB, UB, I/O) can be in the high impedance state.
4. Typical values are at V_{CC} = 1.5 V, Ta = +25°C and not guaranteed.

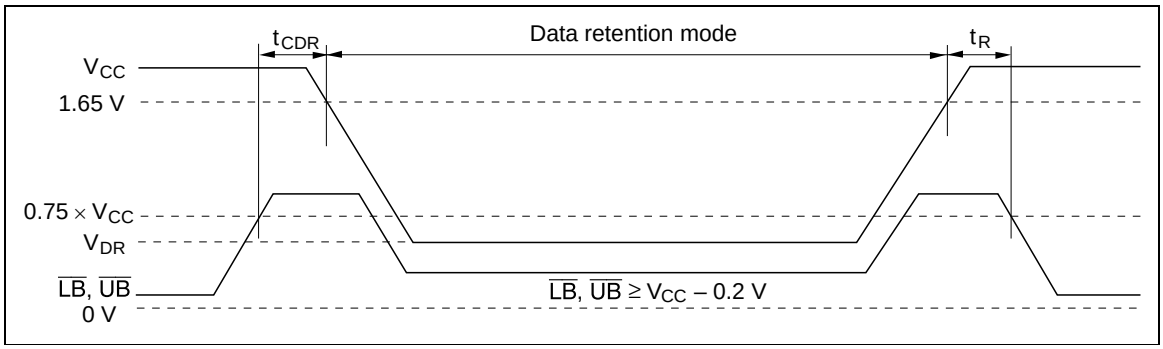
Low V_{cc} Data Retention Timing Waveform (1) (CS1 Controlled)



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



Low V_{cc} Data Retention Timing Waveform (3) (LB, UB Controlled)

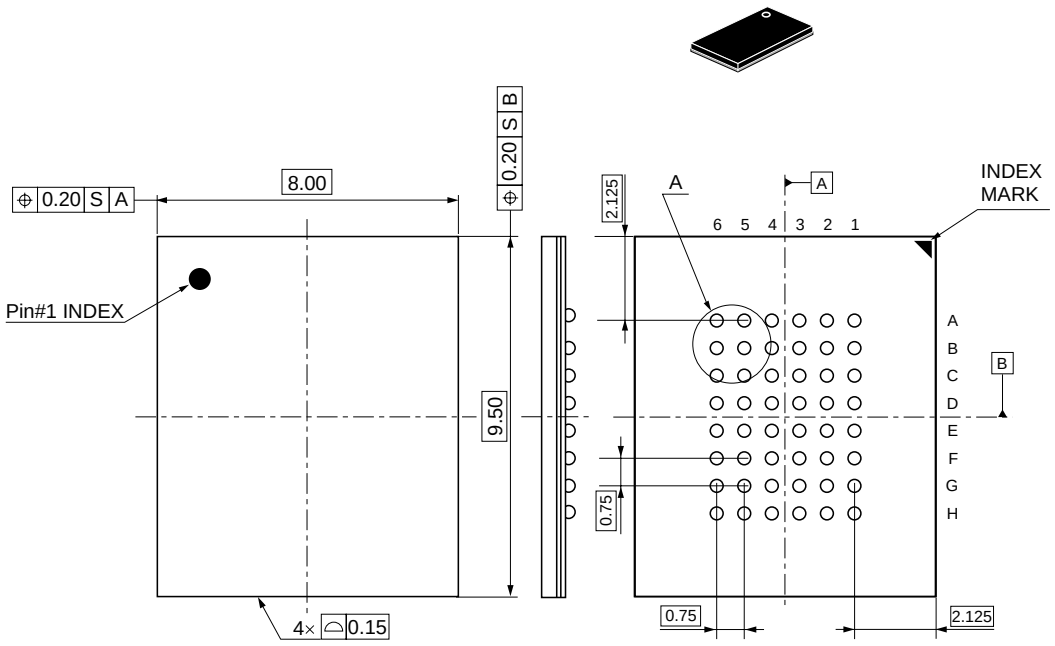


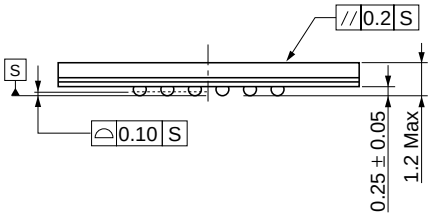
Package Dimensions

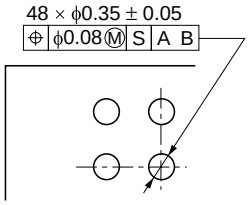
HM62A16100LBPI Series (TBP-48F)

As of January, 2003

Unit: mm







Details of the part A

Package Code	TBP-48F
JEDEC	–
JEITA	–
Mass (reference value)	0.15 g

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