

To our customers,

Old Company Name in Catalogs and Other Documents

On April 1st, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

Renesas Electronics website: <http://www.renesas.com>

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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Renesas Technology Corp.
Customer Support Dept.
April 1, 2003

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HM62W8512B Series

4 M SRAM (512-kword × 8-bit)



ADE-203-904F (Z)
Rev. 5.0
Mar. 15, 2000

Description

The Hitachi HM62W8512B is a 4-Mbit static RAM organized 512-kword × 8-bit. It realizes higher density, higher performance and low power consumption by employing 0.35 μm Hi-CMOS process technology. The device, packaged in a 525-mil SOP (foot print pitch width) or 400-mil TSOP TYPE II is available for high density mounting. The HM62W8512B is suitable for battery backup system.

Features

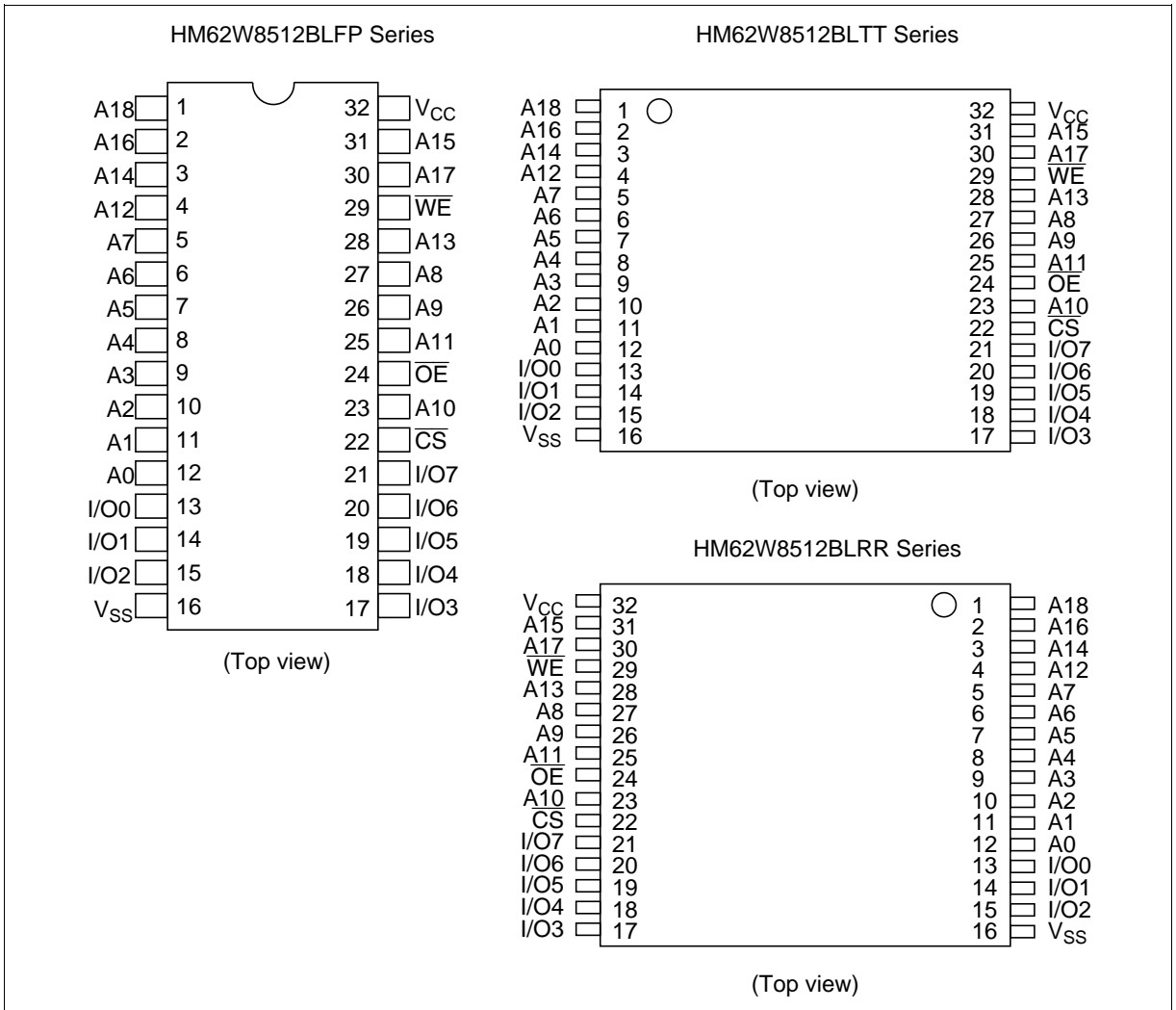
- Single 3.3 V supply: 3.3 V ± 0.3 V
- Access time: 55/70 ns (max)
- Power dissipation
 - Active: 16.5 mW/MHz (typ)
 - Standby: 3.3 μW (typ)
- Completely static memory. No clock or timing strobe required
- Equal access and cycle times
- Common data input and output: Three state output
- Directly LV-TTL compatible: All inputs and outputs
- Battery backup operation

HM62W8512B Series

Ordering Information

Type No.	Access time	Package
HM62W8512BLFP-5	55 ns	525-mil 32-pin plastic SOP (FP-32D)
HM62W8512BLFP-7	70 ns	
HM62W8512BLFP-5SL	55 ns	
HM62W8512BLFP-7SL	70 ns	
HM62W8512BLFP-5UL	55 ns	
HM62W8512BLFP-7UL	70 ns	
HM62W8512BLTT-5	55 ns	400-mil 32-pin plastic TSOP II (TTP-32D)
HM62W8512BLTT-7	70 ns	
HM62W8512BLTT-5SL	55 ns	
HM62W8512BLTT-7SL	70 ns	
HM62W8512BLTT-5UL	55 ns	
HM62W8512BLTT-7UL	70 ns	
HM62W8512BLRR-5	55 ns	400-mil 32-pin plastic TSOP II reverse (TTP-32DR)
HM62W8512BLRR-7	70 ns	
HM62W8512BLRR-5SL	55 ns	
HM62W8512BLRR-7SL	70 ns	
HM62W8512BLRR-5UL	55 ns	
HM62W8512BLRR-7UL	70 ns	

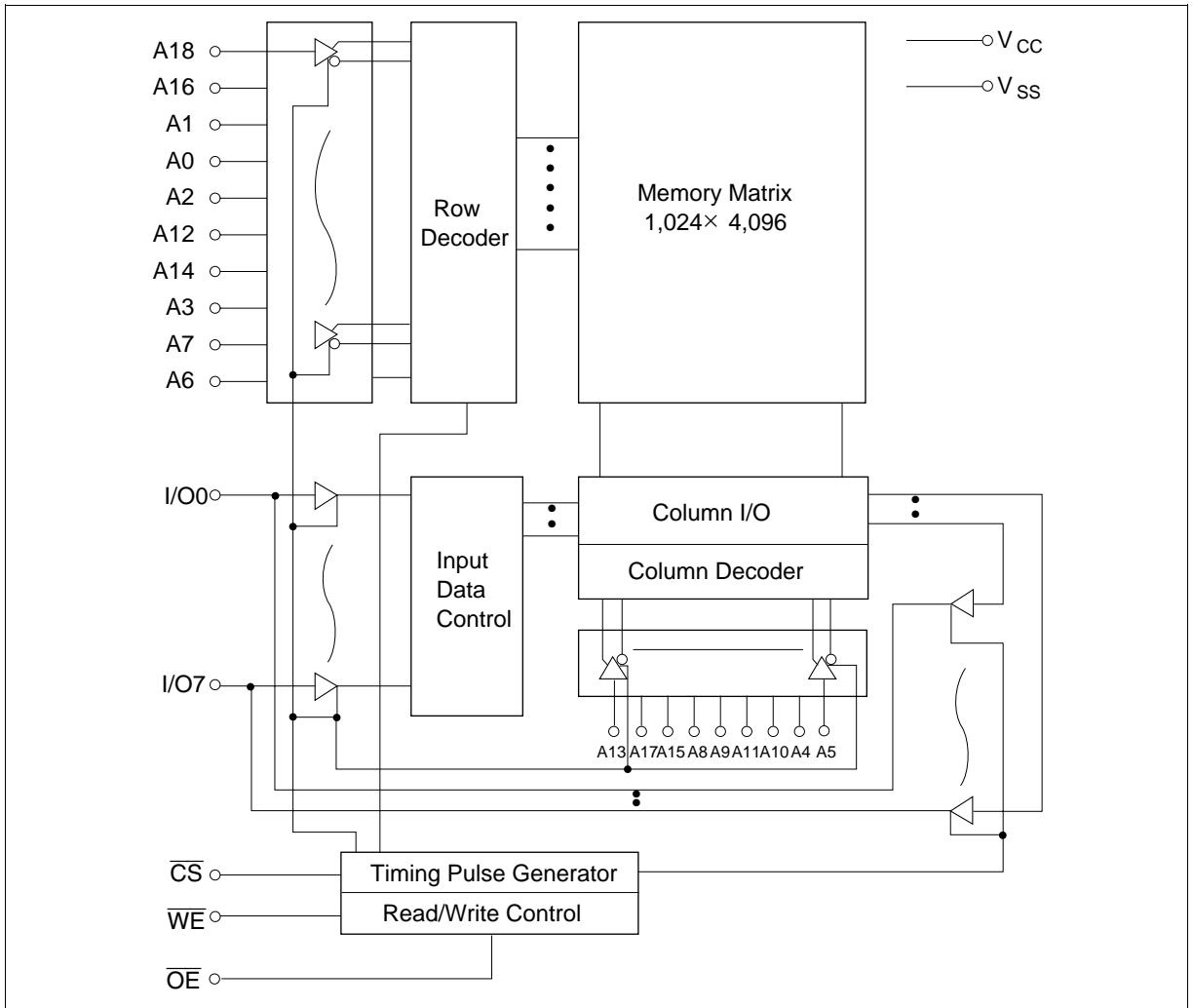
Pin Arrangement



Pin Description

Pin name	Function
A0 to A18	Address input
I/O0 to I/O7	Data input/output
CS	Chip select
OE	Output enable
WE	Write enable
V _{CC}	Power supply
V _{SS}	Ground

Block Diagram



Function Table

\overline{WE}	\overline{CS}	\overline{OE}	Mode	V_{CC} current	Dout pin	Ref. cycle
×	H	×	Not selected	I_{SB}, I_{SB1}	High-Z	—
H	L	H	Output disable	I_{CC}	High-Z	—
H	L	L	Read	I_{CC}	Dout	Read cycle
L	L	H	Write	I_{CC}	Din	Write cycle (1)
L	L	L	Write	I_{CC}	Din	Write cycle (2)

Note: ×: H or L

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Power supply voltage	V_{CC}	-0.5 to +4.6	V
Voltage on any pin relative to V_{SS}	V_T	-0.5* ¹ to $V_{CC} + 0.5$ * ²	V
Power dissipation	P_T	1.0	W
Operating temperature	T_{opr}	-20 to +70	°C
Storage temperature	T_{stg}	-55 to +125	°C
Storage temperature under bias	T_{bias}	-20 to +85	°C

Notes: 1. -3.0 V for pulse half-width ≤ 30 ns
 2. Maximum voltage is 4.6 V

Recommended DC Operating Conditions ($T_a = -20$ 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 high voltage	V_{IH}	2.0	—	$V_{CC} + 0.3$	V
Input low voltage	V_{IL}	-0.3* ¹	—	0.8	V

Note: 1. -3.0 V for pulse half-width ≤ 30 ns

HM62W8512B Series

DC Characteristics ($T_a = -20$ 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* ¹	Max	Unit	Test conditions
Input leakage current	$ I_{LI} $	—	—	1	μA	$V_{in} = V_{SS}$ to V_{CC}
Output leakage current	$ I_{LO} $	—	—	1	μA	$\overline{CS} = V_{IH}$ or $\overline{OE} = V_{IH}$ or $\overline{WE} = V_{IL}$, $V_{IO} = V_{SS}$ to V_{CC}
Operating power supply current: DC	I_{CC}	—	—	10	mA	$\overline{CS} = V_{IL}$, others = V_{IH}/V_{IL} , $I_{IO} = 0\text{ mA}$
Operating power supply current	HM62W8512B-5 I_{CC1}	—	—	45	mA	Min cycle, duty = 100% $\overline{CS} = V_{IL}$, others = V_{IH}/V_{IL} $I_{IO} = 0\text{ mA}$
	HM62W8512B-7 I_{CC1}	—	—	40	mA	
Operating power supply current	I_{CC2}	—	5	10	mA	Cycle time = 1 μs , duty = 100% $I_{IO} = 0\text{ mA}$, $\overline{CS} \leq 0.2\text{ V}$ $V_{IH} \geq V_{CC} - 0.2\text{ V}$, $V_{IL} \leq 0.2\text{ V}$
Standby power supply current: DC	I_{SB}	—	0.1	0.3	mA	$\overline{CS} = V_{IH}$
Standby power supply current (1): DC	I_{SB1}	—	1^{*2}	40^{*2}	μA	$V_{in} \geq 0\text{ V}$, $\overline{CS} \geq V_{CC} - 0.2\text{ V}$
		—	1^{*3}	20^{*3}	μA	
		—	1^{*4}	5^{*4}	μA	
Output low voltage	V_{OL}	—	—	0.4	V	$I_{OL} = 2.0\text{ mA}$
		—	—	0.2	V	$I_{OL} = 100\ \mu\text{A}$
Output high voltage	V_{OH}	$V_{CC} - 0.2$	—	—	V	$I_{OH} = -100\ \mu\text{A}$
		2.4	—	—	V	$I_{OH} = -2.0\text{ mA}$

- Notes: 1. Typical values are at $V_{CC} = 3.3\text{ V}$, $T_a = +25^\circ\text{C}$ and specified loading, and not guaranteed.
 2. This characteristics is guaranteed only for L version.
 3. This characteristics is guaranteed only for L-SL version.
 4. This characteristics is guaranteed only for L-UL version.

Capacitance ($T_a = +25^\circ\text{C}$, $f = 1\text{ MHz}$)

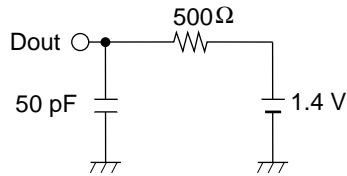
Parameter	Symbol	Typ	Max	Unit	Test conditions
Input capacitance* ¹	C_{in}	—	8	pF	$V_{in} = 0\text{ V}$
Input/output capacitance* ¹	C_{IO}	—	10	pF	$V_{IO} = 0\text{ V}$

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

AC Characteristics (Ta = -20 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 level: 1.4 V/1.4 V(HM62W8512B-5)
0.8 V/2.0 V(HM62W8512B-7)
- Output load (Including scope & jig)



Read Cycle

HM62W8512B

		-5	-7
--	--	----	----

Parameter	Symbol	HM62W8512B				Unit	Notes
		Min	Max	Min	Max		
Read cycle time	t _{RC}	55	—	70	—	ns	
Address access time	t _{AA}	—	55	—	70	ns	
Chip select access time	t _{CO}	—	55	—	70	ns	
Output enable to output valid	t _{OE}	—	30	—	35	ns	
Chip selection to output in low-Z	t _{LZ}	10	—	10	—	ns	2
Output enable to output in low-Z	t _{OLZ}	5	—	5	—	ns	2
Chip deselection to output in high-Z	t _{HZ}	0	20	0	30	ns	1, 2
Output disable to output in high-Z	t _{OZH}	0	20	0	30	ns	1, 2
Output hold from address change	t _{OH}	10	—	10	—	ns	

Write Cycle

Parameter	Symbol	HM62W8512B				Unit	Notes
		-5		-7			
		Min	Max	Min	Max		
Write cycle time	t_{WC}	55	—	70	—	ns	
Chip selection to end of write	t_{CW}	50	—	60	—	ns	4
Address setup time	t_{AS}	0	—	0	—	ns	5
Address valid to end of write	t_{AW}	50	—	60	—	ns	
Write pulse width	t_{WP}	40	—	50	—	ns	3, 12
Write recovery time	t_{WR}	0	—	0	—	ns	6
\overline{WE} to output in high-Z	t_{WHZ}	0	20	0	30	ns	1, 2, 7
Data to write time overlap	t_{DW}	25	—	30	—	ns	
Data hold from write time	t_{DH}	0	—	0	—	ns	
Output active from output in high-Z	t_{OW}	5	—	5	—	ns	2
Output disable to output in high-Z	t_{OHZ}	0	20	0	30	ns	1, 2, 7

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. A write occurs during the overlap (t_{WP}) of a low \overline{CS} and a low \overline{WE} . A write begins at the later transition of \overline{CS} going low or \overline{WE} going low. A write ends at the earlier transition of \overline{CS} going high or \overline{WE} going high. t_{WP} is measured from the beginning of write to the end of write.

4. t_{CW} is measured from \overline{CS} going low to the end of write.

5. t_{AS} is measured from the address valid to the beginning of write.

6. t_{WR} is measured from the earlier of \overline{WE} or \overline{CS} going high to the end of write cycle.

7. During this period, I/O pins are in the output state so that the input signals of the opposite phase to the outputs must not be applied.

8. If the \overline{CS} low transition occurs simultaneously with the \overline{WE} low transition or after the \overline{WE} transition, the output remain in a high impedance state.

9. Dout is the same phase of the write data of this write cycle.

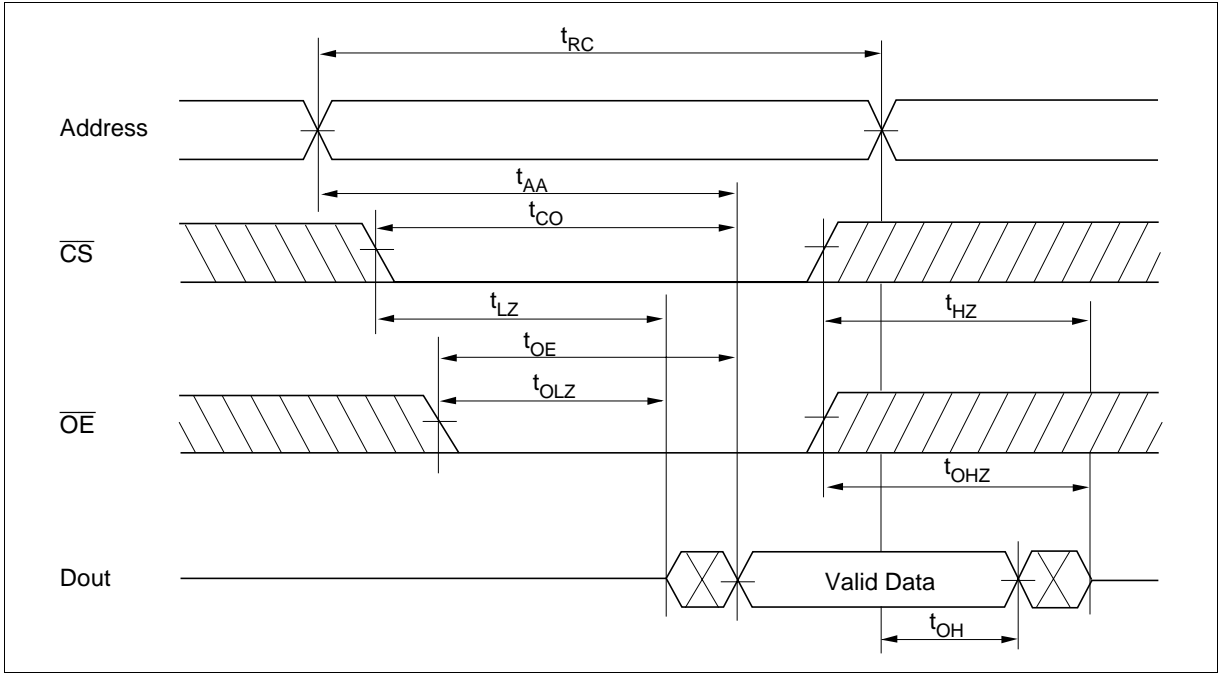
10. Dout is the read data of next address.

11. If \overline{CS} is low 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.

12. In the write cycle with \overline{OE} low fixed, t_{WP} must satisfy the following equation to avoid a problem of data bus contention. $t_{WP} \geq t_{DW} \text{ min} + t_{WHZ} \text{ max}$

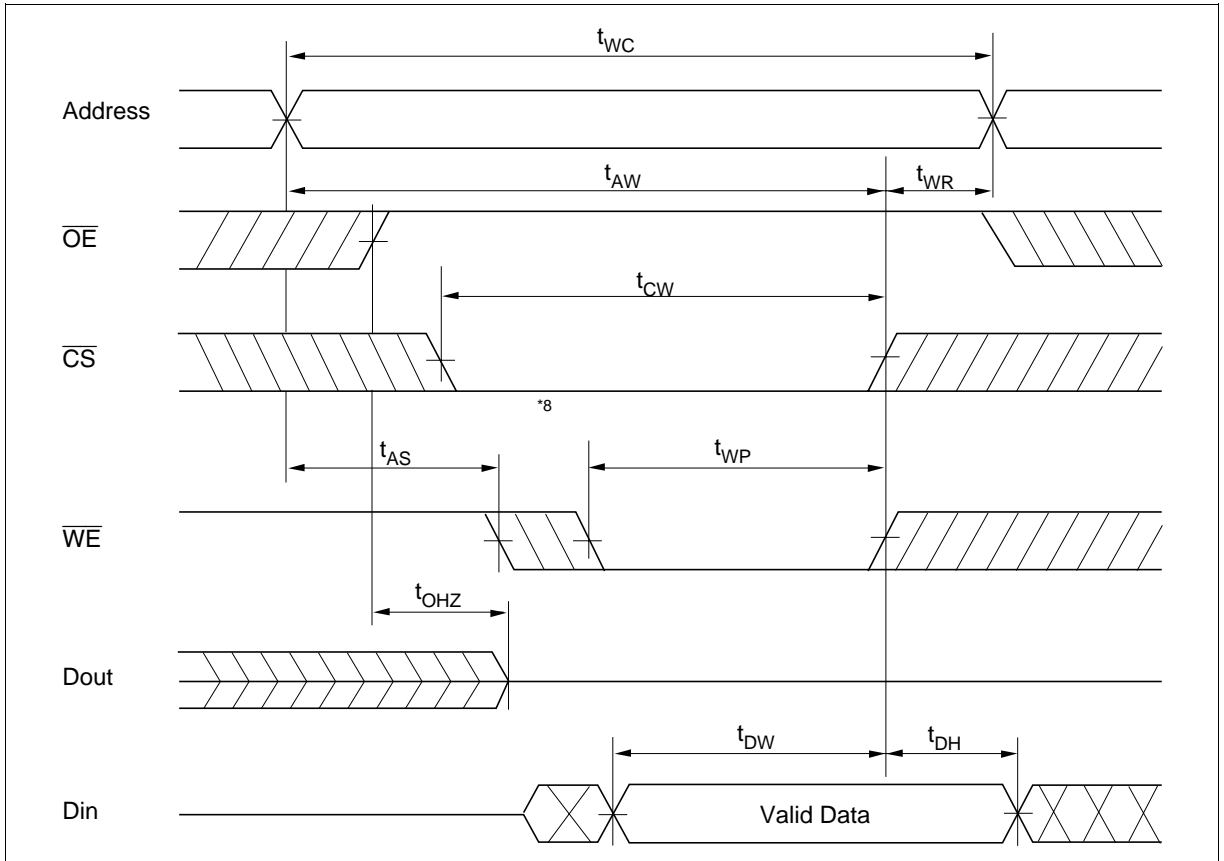
Timing Waveforms

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

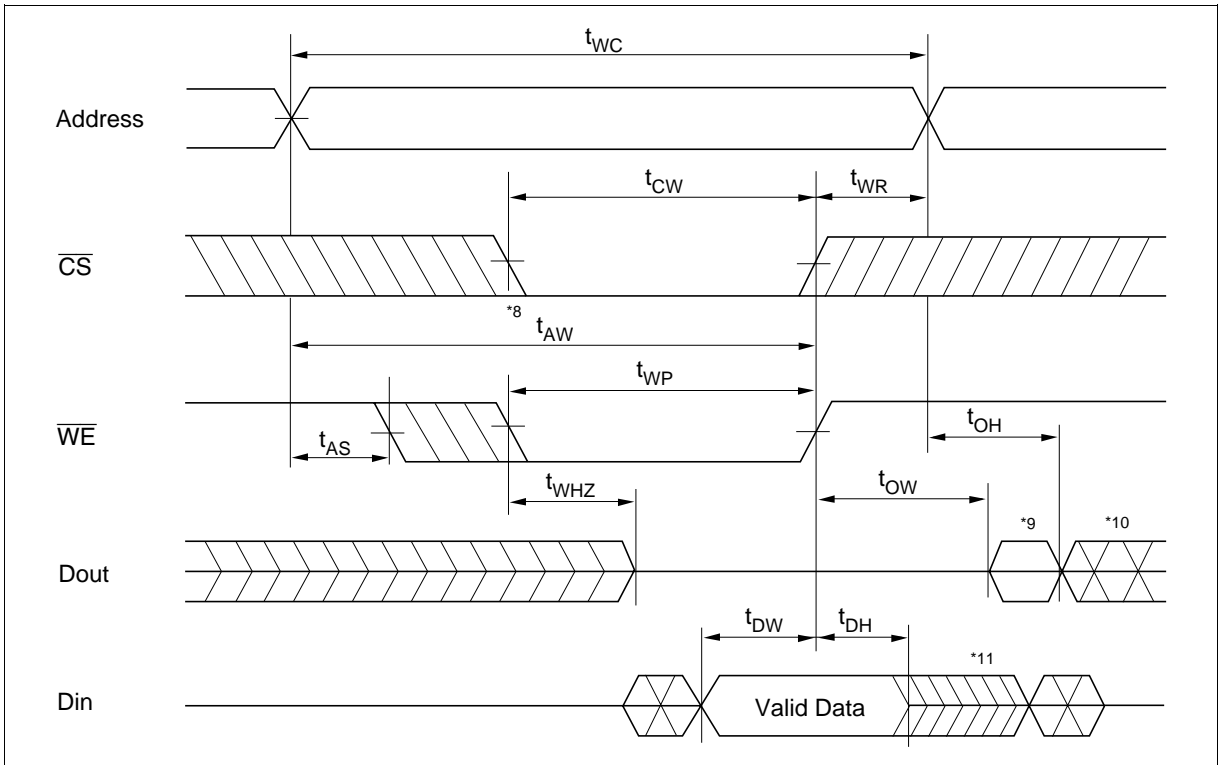


HM62W8512B Series

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



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

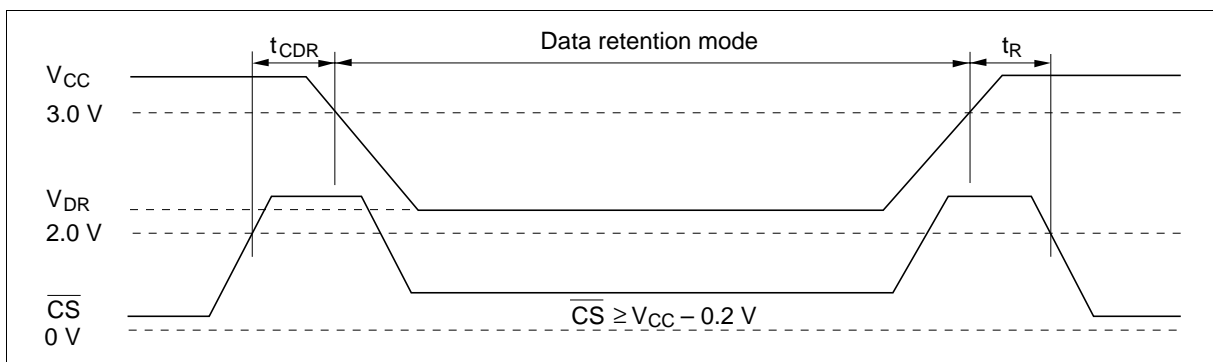


Low V_{CC} Data Retention Characteristics ($T_a = -20$ to $+70^\circ\text{C}$)

Parameter	Symbol	Min	Typ	Max	Unit	Test conditions**4
V_{CC} for data retention	V_{DR}	2	—	—	V	$\overline{CS} \geq V_{CC} - 0.2\text{ V}$, $V_{in} \geq 0\text{ V}$
Data retention current	I_{CCDR}	—	0.8^{*5}	20^{*1}	μA	$V_{CC} = 3.0\text{ V}$, $V_{in} \geq 0\text{ V}$ $\overline{CS} \geq V_{CC} - 0.2\text{ V}$
		—	0.8^{*5}	10^{*2}	μA	
		—	0.8^{*5}	2^{*3}	μA	
Chip deselect to data retention time	t_{CDR}	0	—	—	ns	See retention waveform
Operation recovery time	t_R	t_{RC}^{*6}	—	—	ns	

- Notes:
1. For L-version and $10\ \mu\text{A}$ (max.) at $T_a = -20$ to $+40^\circ\text{C}$.
 2. For L-SL-version and $3\ \mu\text{A}$ (max.) at $T_a = -20$ to $+40^\circ\text{C}$.
 3. For L-UL-version and $2\ \mu\text{A}$ (max.) at $T_a = -20$ to $+40^\circ\text{C}$.
 4. \overline{CS} controls address buffer, \overline{WE} buffer, \overline{OE} buffer, and D_{in} buffer. In data retention mode, V_{in} levels (address, \overline{WE} , \overline{OE} , I/O) can be in the high impedance state.
 5. Typical values are at $V_{CC} = 3.0\text{ V}$, $T_a = +25^\circ\text{C}$ and specified loading, and not guaranteed.
 6. t_{RC} = read cycle time.

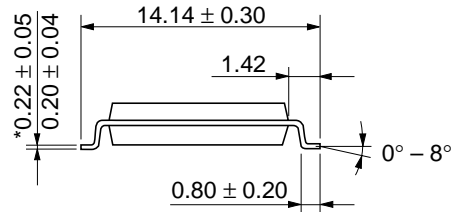
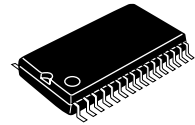
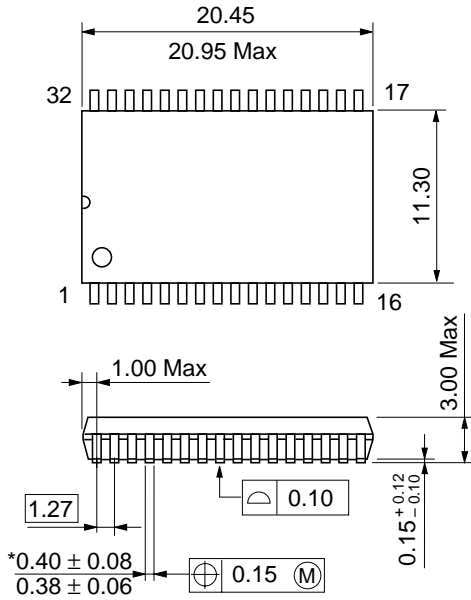
Low V_{CC} Data Retention Timing Waveform (\overline{CS} Controlled)



Package Dimensions

HM62W8512BLFP Series (FP-32D)

Unit: mm



*Dimension including the plating thickness
Base material dimension

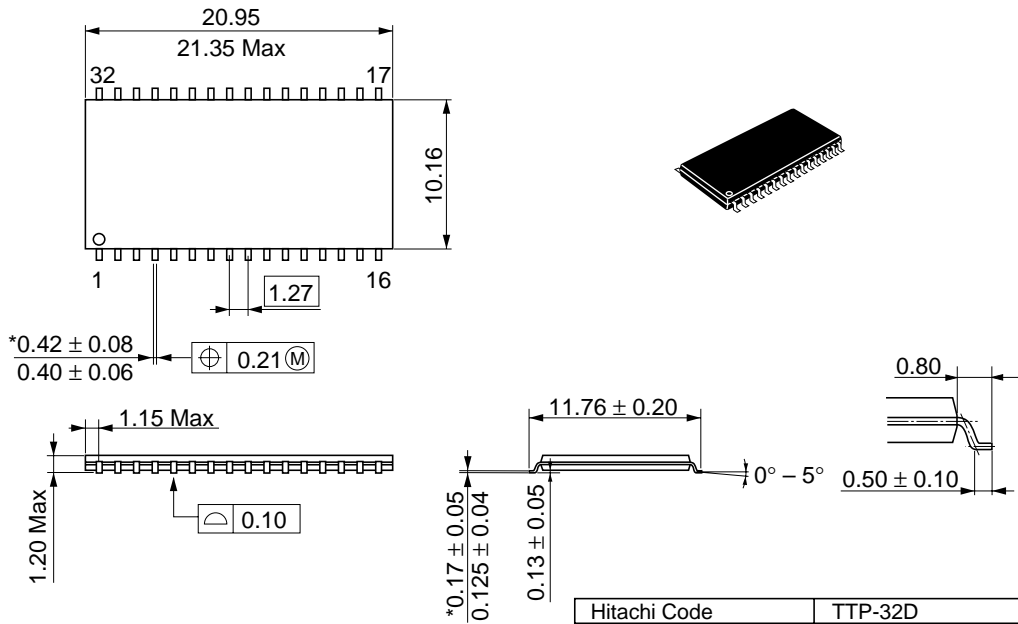
Hitachi Code	FP-32D
JEDEC	Conforms
EIAJ	—
Weight (reference value)	1.3 g

HM62W8512B Series

Package Dimensions (cont.)

HM62W8512BLTT Series (TTP-32D)

Unit: mm



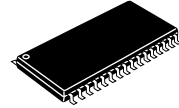
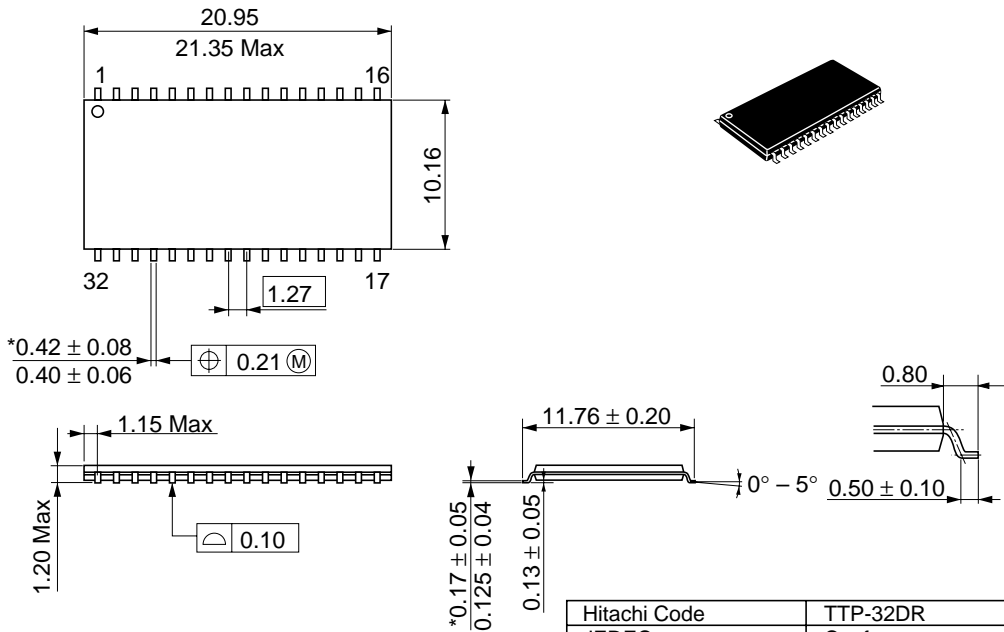
*Dimension including the plating thickness
Base material dimension

Hitachi Code	TTP-32D
JEDEC	Conforms
EIAJ	—
Weight (reference value)	0.51 g

Package Dimensions (cont.)

HM62W8512BLRR Series (TTP-32DR)

Unit: mm



*Dimension including the plating thickness
Base material dimension

Hitachi Code	TTP-32DR
JEDEC	Conforms
EIAJ	—
Weight (reference value)	0.51 g

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