HM62V8512C Series

4 M SRAM (512-kword × 8-bit)

HITACHI

ADE-203-1210A (Z)
Rev. 1.0
Jan. 31, 2001

Description

The Hitachi HM62V8512C is a 4-Mbit static RAM organized 512-kword × 8-bit. It realizes higher density, higher performance and low power consumption by employing CMOS process technology (6-transistor memory cell). 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 HM62V8512C is suitable for battery backup system.

Features

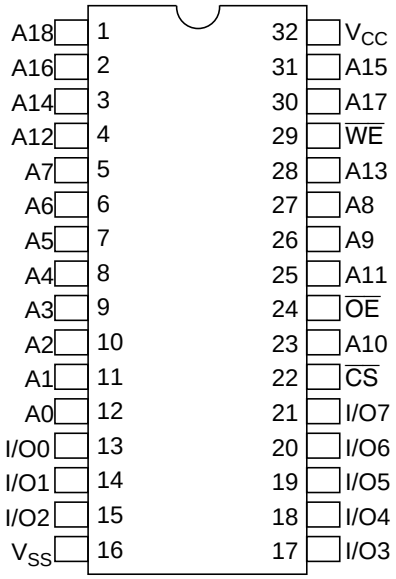
- Single 3.0 V supply: 2.7 V to 3.6 V
- Access time: 55/70 ns (max)
- Power dissipation
  - Active: 6.0 mW/MHz (typ)
  - Standby: 2.4 µW (typ)
- Completely static memory. No clock or timing strobe required
- Equal access and cycle times
- Common data input and output: Three state output
- Directly LV-TTL compatible: All inputs
- Battery backup operation

Ordering Information

Type No.	Access time	Package
HM62V8512CLFP-5	55 ns	525-mil 32-pin plastic SOP (FP-32D)
HM62V8512CLFP-7	70 ns	
HM62V8512CLFP-5SL	55 ns	
HM62V8512CLFP-7SL	70 ns	
HM62V8512CLTT-5	55 ns	400-mil 32-pin plastic TSOP II (TTP-32D)
HM62V8512CLTT-7	70 ns	
HM62V8512CLTT-5SL	55 ns	
HM62V8512CLTT-7SL	70 ns	
HM62V8512CLRR-5	55 ns	400-mil 32-pin plastic TSOP II reverse (TTP-32DR)
HM62V8512CLRR-7	70 ns	
HM62V8512CLRR-5SL	55 ns	
HM62V8512CLRR-7SL	70 ns	

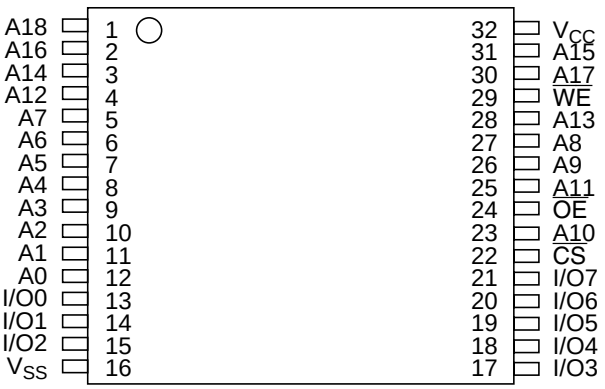
Pin Arrangement

32-pin SOP



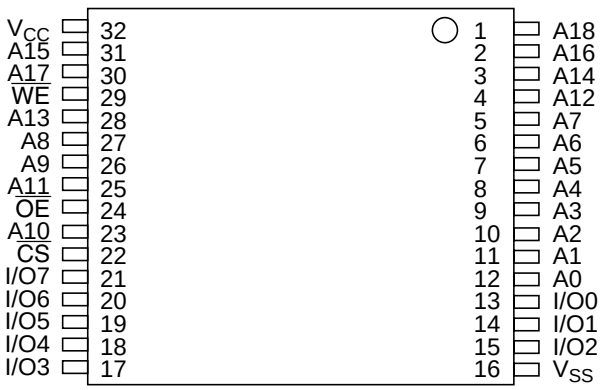
(Top view)

32-pin TSOP



(Top view)

32-pin TSOP (reverse)

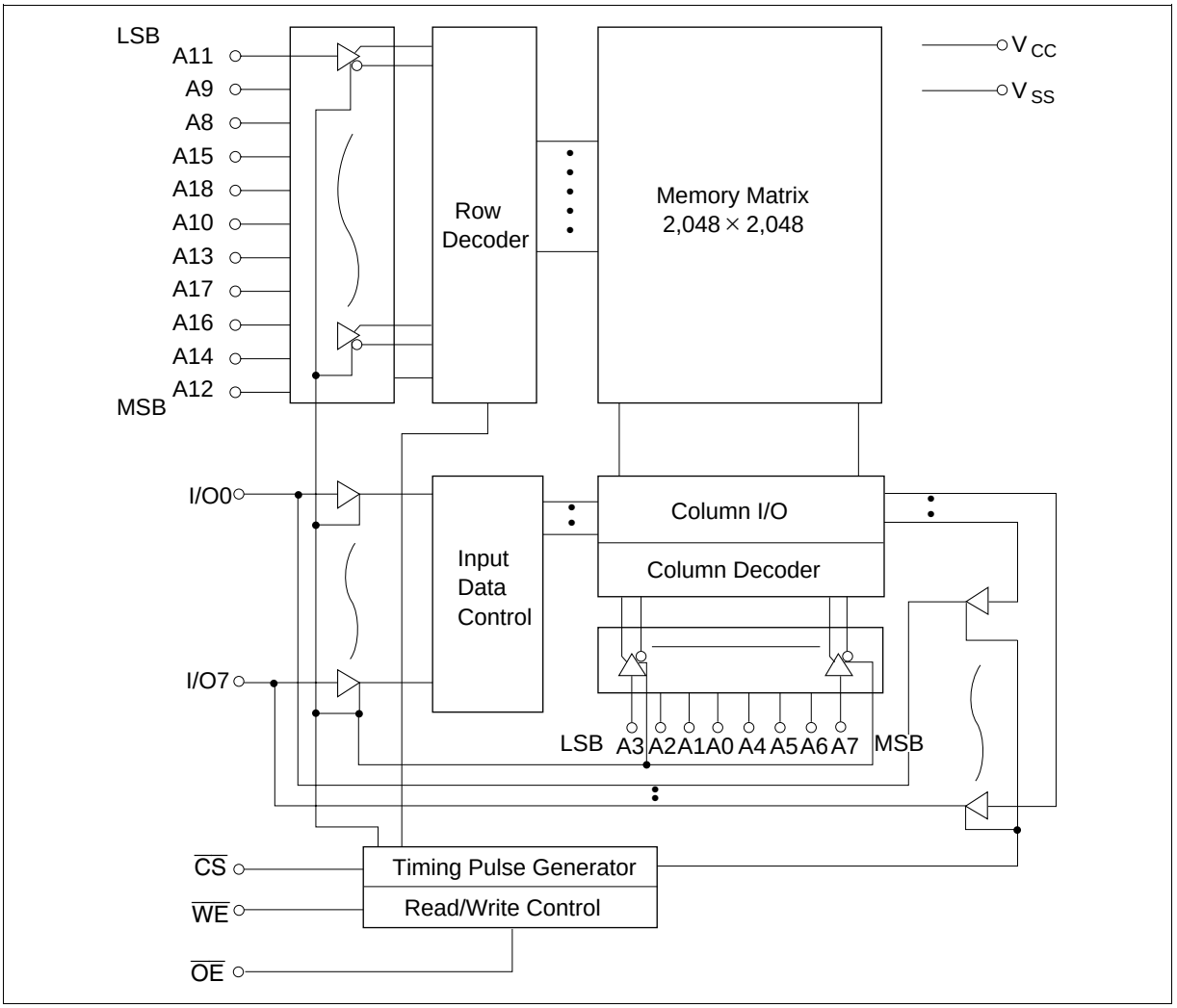


(Top view)

Pin Description

Pin name	Function
A0 to A18	Address input
I/O0 to I/O7	Data input/output
$\overline{CS}$	Chip select
$\overline{OE}$	Output enable
$\overline{WE}$	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	Topr	–20 to +70	°C
Storage temperature	Tstg	–55 to +125	°C
Storage temperature under bias	Tbias	–20 to +85	°C

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

Recommended DC Operating Conditions (Ta = –20 to +70°C)

Parameter	Symbol	Min	Typ	Max	Unit
Supply voltage	V_{CC}	2.7	3.0	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. V_{IL} min: –3.0 V for pulse half-width ≤ 30 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	$\overline{CS}$ = V_{IH} 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}	—	5	10	mA	$\overline{CS}$ = V_{IL}, others = V_{IH}/V_{IL}, $I_{I/O}$ = 0 mA
Operating power supply current	HM62V8512C-5	I_{CC1}	—	18	35	mA	Min cycle, duty = 100% $\overline{CS}$ = V_{IL}, others = V_{IH}/V_{IL} $I_{I/O}$ = 0 mA
	HM62V8512C-7	I_{CC1}	—	15	30	mA	
Operating power supply current		I_{CC2}	—	2	10	mA	Cycle time = 1 µs, duty = 100% $I_{I/O}$ = 0 mA, $\overline{CS}$ ≤ 0.2 V V_{IH} ≥ V_{CC} – 0.2 V, V_{IL} ≤ 0.2 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}	—	0.8*[2]	20*[2]	µA	Vin ≥ 0 V, $\overline{CS}$ ≥ V_{CC} – 0.2 V
			—	0.8*[3]	10*[3]	µA	
Output low voltage		V_{OL}	—	—	0.4	V	I_{OL} = 2.1 mA
			—	—	0.2	V	I_{OL} = 100 µA
Output high voltage		V_{OH}	V_{CC} – 0.2	—	—	V	I_{OH} = –100 µA
			2.4	—	—	V	I_{OH} = –1.0 mA

Notes: 1. Typical values are at V_{CC} = 3.0 V, Ta = +25°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.

Capacitance (Ta = +25°C, f = 1 MHz)

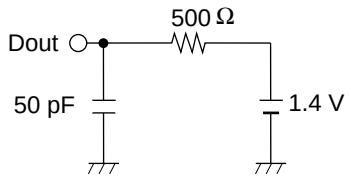
Parameter	Symbol	Typ	Max	Unit	Test conditions
Input capacitance*[1]	Cin	—	8	pF	Vin = 0 V
Input/output capacitance*[1]	$C_{I/O}$	—	10	pF	$V_{I/O}$ = 0 V

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

AC Characteristics (Ta = –20 to +70°C, V_{CC} = 2.7 V to 3.6 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(HM62V8512C-5)
  0.8 V/2.0 V(HM62V8512C-7)
- Output load: See figure (Including scope & jig)



Read Cycle

		HM62V8512C					
		-5		-7			
Parameter	Symbol	Min	Max	Min	Max	Unit	Notes
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_{OHZ}	0	20	0	30	ns	1, 2
Output hold from address change	t_{OH}	10	—	10	—	ns	

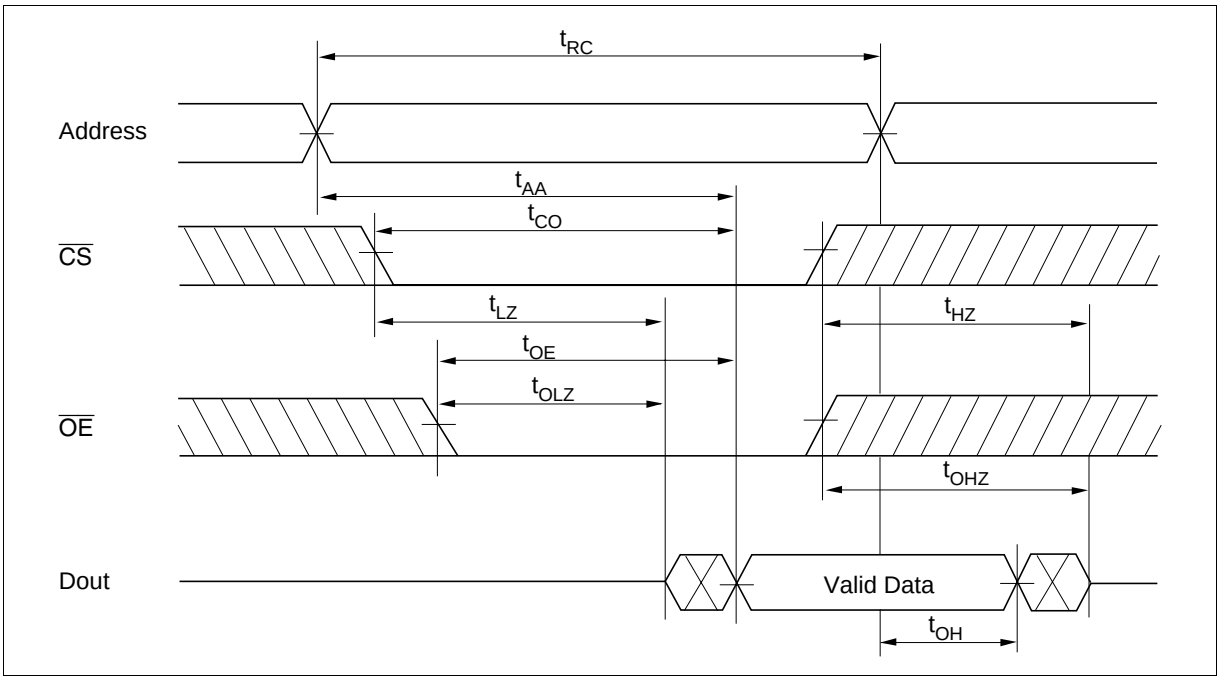
Write Cycle

		HM62V8512C					
		-5		-7			
Parameter	**Symbol**	**Min**	**Max**	**Min**	**Max**	**Unit**	**Notes**
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

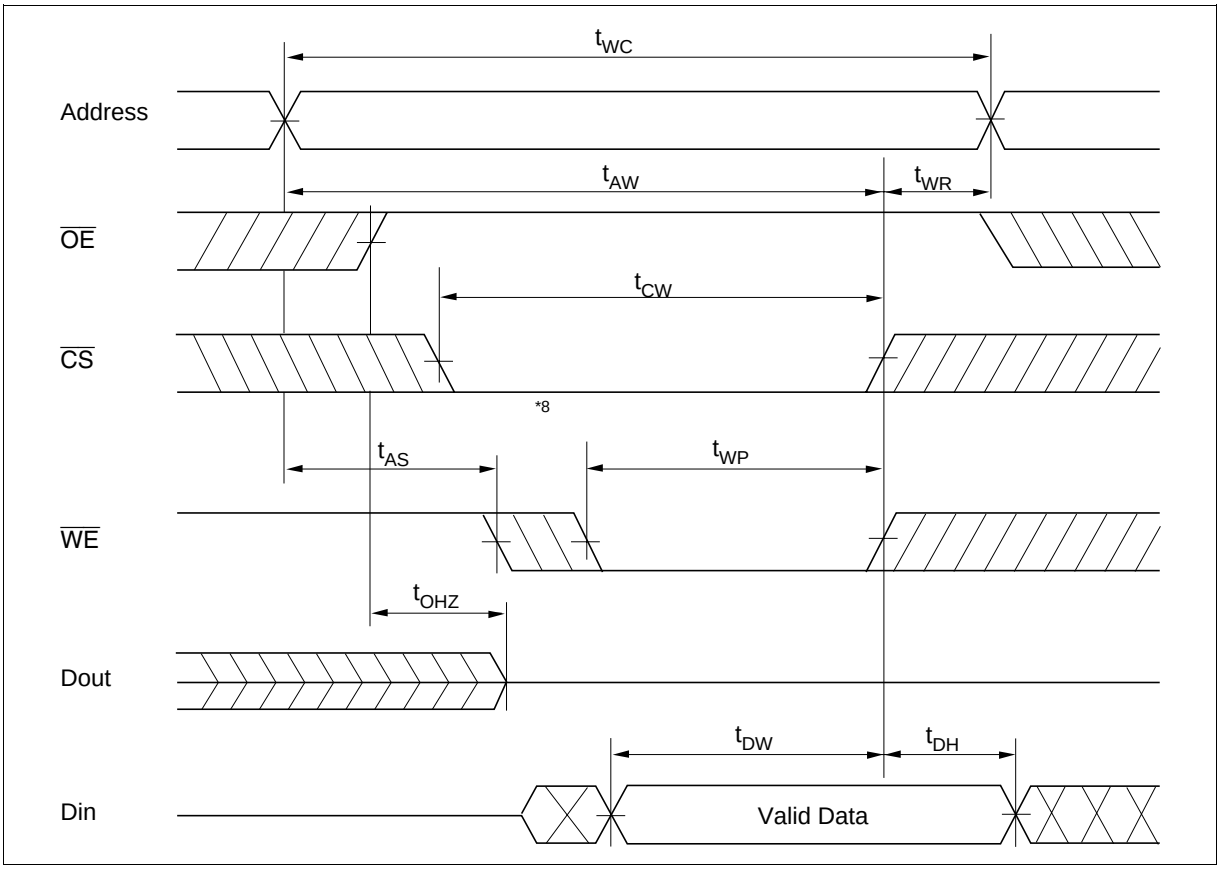
Notes:
1. t_{HZ}, t_{OHZ} and t_{WHZ} are defined as the time at which the outputs achieve the open circuit conditions and are not referred to output voltage levels.
2. This parameter is sampled and not 100% tested.
3. A write occurs during the overlap (t_{WP}) of a low $\overline{CS}$ and a low $\overline{WE}$. 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. $t_{WP} \geq t_{DW}$ min + t_{WHZ} max

Timing Waveforms

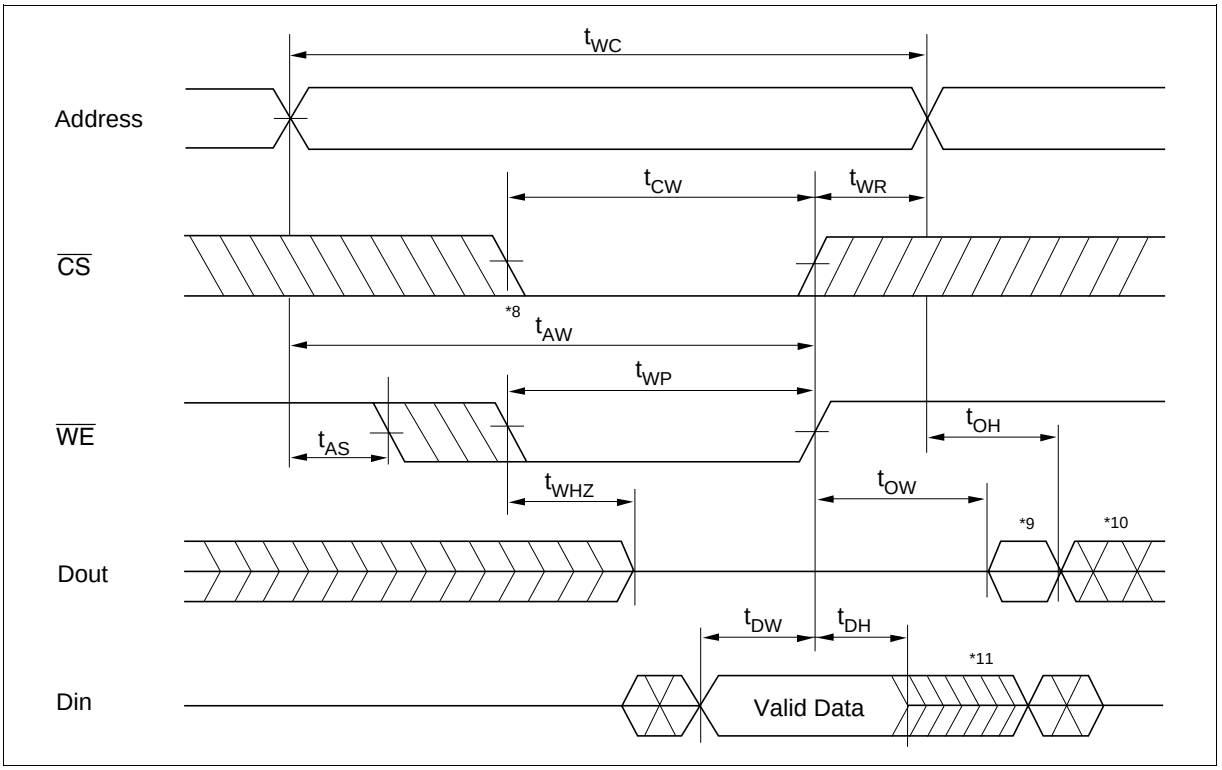
Read Timing Waveform ($\overline{WE}$ = V_{IH})



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



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

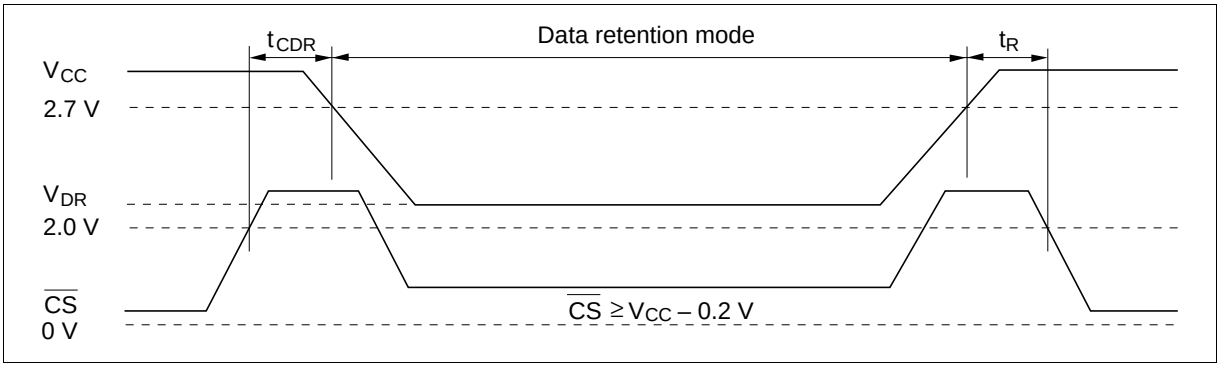


Low V_{CC} Data Retention Characteristics (Ta = –20 to +70°C)

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

Notes: 1. For L-version and 10 µA (max.) at Ta = –20 to +40°C.
2. For L-SL-version and 5 µA (max.) at Ta = –20 to +40°C.
3. $\overline{CS}$ controls address buffer, $\overline{WE}$ buffer, $\overline{OE}$ buffer, and Din buffer. In data retention mode, Vin 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 specified loading, and not guaranteed.
5. t_{RC} = read cycle time.

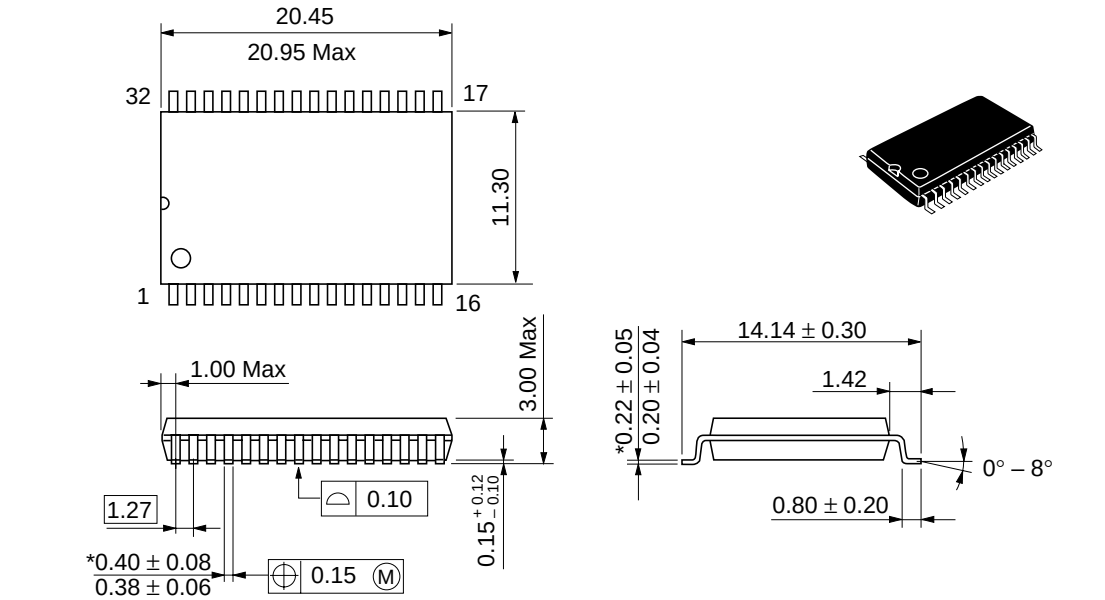
Low V_{CC} Data Retention Timing Waveform ($\overline{CS}$ Controlled)



Package Dimensions

HM62V8512CLFP Series (FP-32D)

Unit: mm



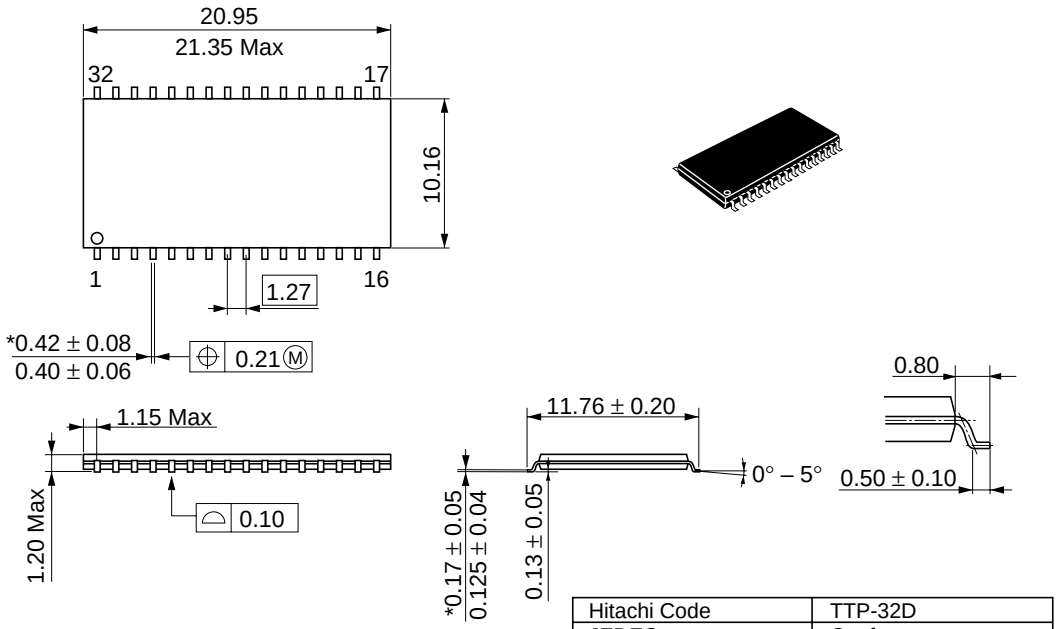
*Dimension including the plating thickness
Base material dimension

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

Package Dimensions (cont.)

HM62V8512CLTT Series (TTP-32D**)**

Unit: mm



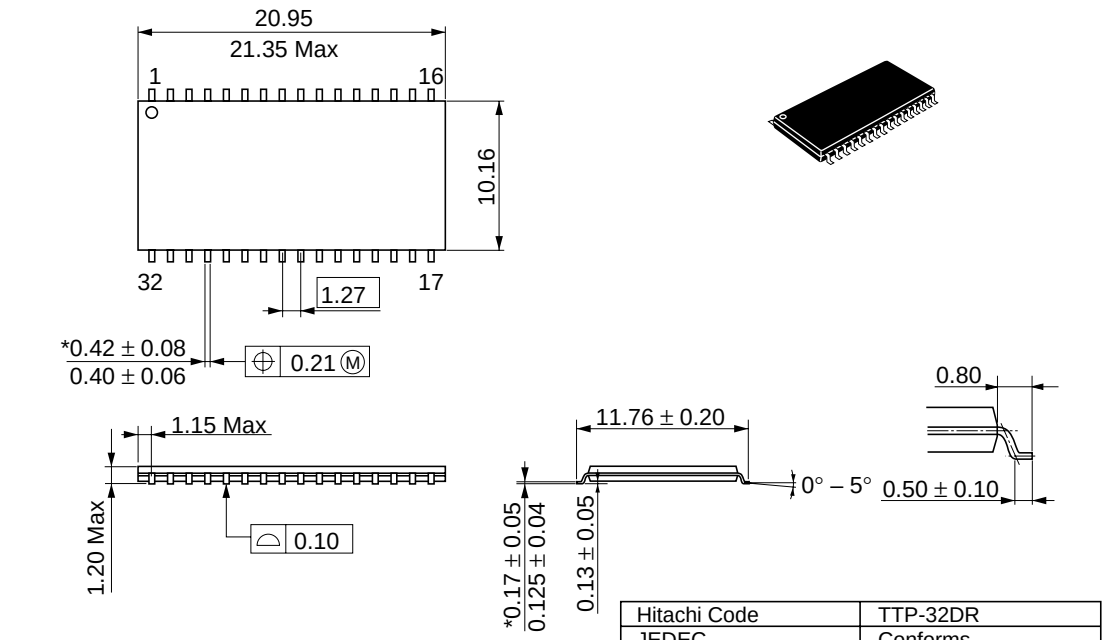
*Dimension including the plating thickness
Base material dimension

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

Package Dimensions (cont.)

HM62V8512CLRR Series (TTP-32DR)

Unit: mm



*Dimension including the plating thickness
Base material dimension

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

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HITACHI

Hitachi, Ltd.
Semiconductor & Integrated Circuits.
Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan
Tel: Tokyo (03) 3270-2111 Fax: (03) 3270-5109

URL NorthAmerica : http://semiconductor.hitachi.com/
Europe : http://www.hitachi-eu.com/hel/ecg
Asia : http://sicapac.hitachi-asia.com
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For further information write to:

Hitachi Semiconductor (America) Inc.
179 East Tasman Drive,
San Jose,CA 95134
Tel: <1> (408) 433-1990
Fax: <1>(408) 433-0223

Hitachi Europe GmbH
Electronic Components Group
Dornacher Straße 3
D-85622 Feldkirchen, Munich
Germany
Tel: <49> (89) 9 9180-0
Fax: <49> (89) 9 29 30 00

Hitachi Europe Ltd.
Electronic Components Group.
Whitebrook Park
Lower Cookham Road
Maidenhead
Berkshire SL6 8YA, United Kingdom
Tel: <44> (1628) 585000
Fax: <44> (1628) 585160

Hitachi Asia Ltd.
Hitachi Tower
16 Collyer Quay #20-00,
Singapore 049318
Tel : <65>-538-6533/538-8577
Fax : <65>-538-6933/538-3877
URL : http://www.hitachi.com.sg

Hitachi Asia Ltd.
(Taipei Branch Office)
4/F, No. 167, Tun Hwa North Road,
Hung-Kuo Building,
Taipei (105), Taiwan
Tel : <886>-(2)-2718-3666
Fax : <886>-(2)-2718-8180
Telex : 23222 HAS-TP
URL : http://www.hitachi.com.tw

Hitachi Asia (Hong Kong) Ltd.
Group III (Electronic Components)
7/F., North Tower,
World Finance Centre,
Harbour City, Canton Road
Tsim Sha Tsui, Kowloon,
Hong Kong
Tel : <852>-(2)-735-9218
Fax : <852>-(2)-730-0281
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