HM62832UH Series

32768-word × 8-bit High Speed CMOS Static RAM

HITACHI

Rev. 0.0
Dec. 1, 1995

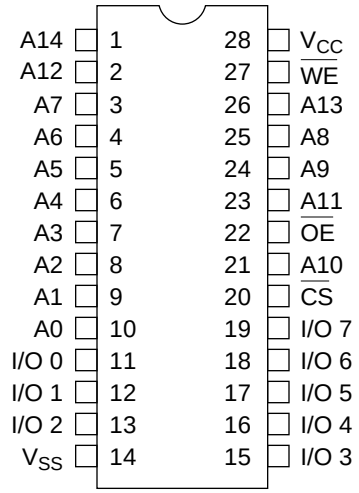
Features

- High speed: Fast access time 15/20 ns (max)
- Low Power
  Standby: 15 µW (typ) (L-version)
  Operation: 675/600 mW (typ)
- Single 5 V supply
- Completely static memory
  No clock or timing strobe required
- Equal access and cycle times
- Common data input and output: Three state output
- Directly TTL compatible: All inputs and outputs

Ordering Information

Type No.	Access Time	Package
HM62832UHP-15 HM62832UHP-20	15 ns 20 ns	300-mil 28-pin plastic DIP (DP-28NA)
HM62832UHLP-15 HM62832UHLP-20	15 ns 20 ns	
HM62832UHJP-15 HM62832UHJP-20	15 ns 20 n	300-mil 28-pin plastic SOJ (CP-28DN)
HM62832UHLJP-15 HM62832UHLJP-20	15 ns 20 ns	

Pin Arrangement

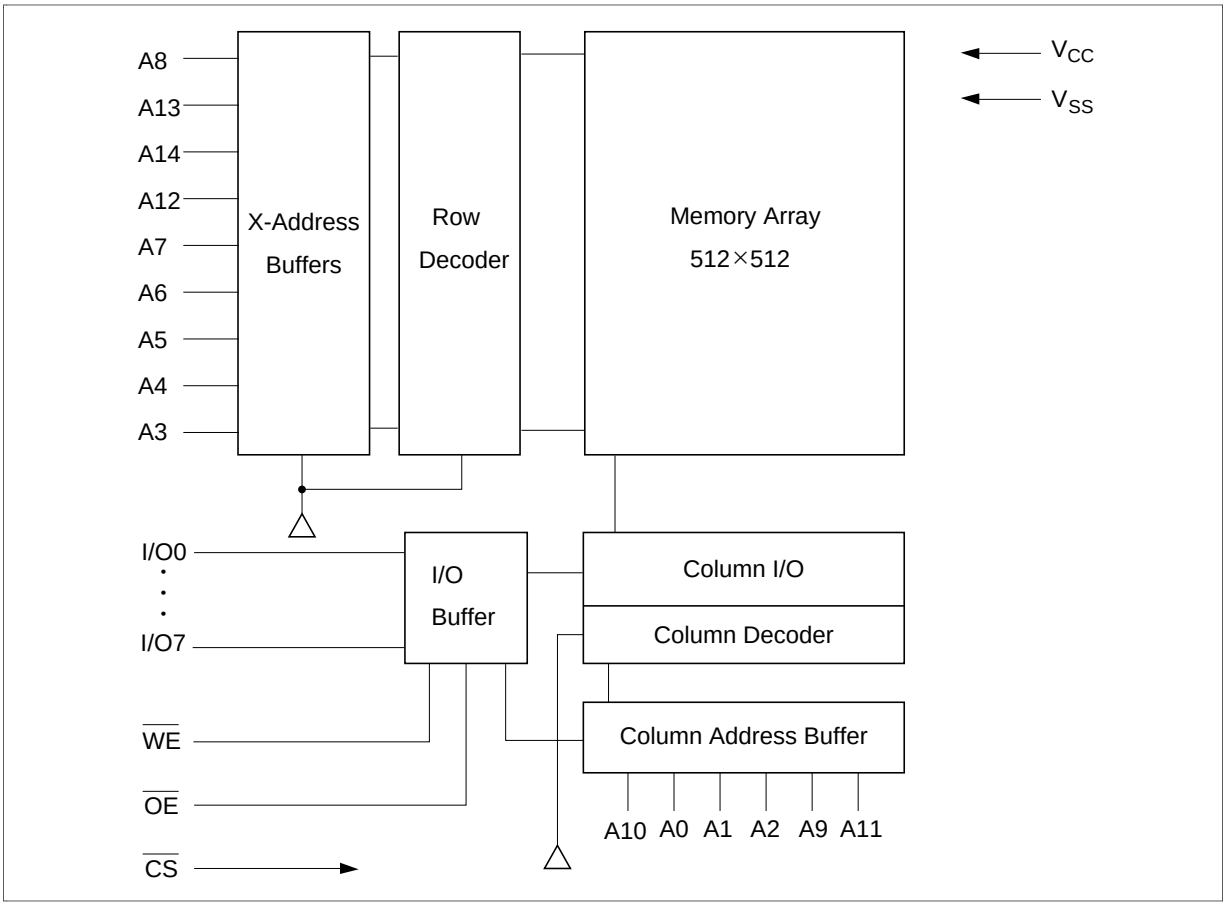


(Top view)

Pin Description

Pin name	Function
A0 – A14	Address
I/O0 – I/O7	Input/output
$\overline{CS}$	Chip select
$\overline{WE}$	Write enable
$\overline{OE}$	Output enable
V_{CC}	Power supply
V_{SS}	Ground

Block Diagram



Function Table

$\overline{CS}$	$\overline{OE}$	$\overline{WE}$	Mode	V_{CC} Current	I/O Pin	Ref. Cycle
H	X	X	Standby	I_{SB}, I_{SB1}	High-Z	
L	L	H	Read	I_{CC}	Dout	Read cycle 1, 2, 3
L	H	L	Write	I_{CC}	Din	Write cycle 1
L	L	L	Write	I_{CC}	Din	Write cycle 2

Note: X : H or L

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Supply voltage[*1]	V_{CC}	−0.5[*2] to +7.0	V
Voltage on any pin relative to V_{SS}[*1]	V_T	−0.5[*2] to V_{CC} + 0.5	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. With respect to V_{SS}
2. V_{CC} and V_T min = –2.5 V for pulse width ≤ 10 ns

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

Parameter	Symbol	Min	Typ	Max	Unit
Supply voltage	V_{CC}	4.5	5.0	5.5	V
	V_{SS}	0	0	0	V
Input high (logic 1) voltage	V_{IH}	2.2	—	V_{CC} + 0.5	V
Input low (logic 0) voltage	V_{IL}	−0.5[*1]	—	0.8	V

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

DC Characteristics (Ta = 0 to +70°C, V_{CC} = 5 V ± 10%, V_{SS} = 0 V)

Parameter	Symbol	Min	Typ[*1]	Max	Unit	Test Conditions
Input leakage current	$\|I_{LI}\|$	—	—	2.0	µA	V_{CC} = 5.5 V Vin = V_{SS} to V_{CC}
Output leakage current	$\|I_{LO}\|$	—	—	2.0	µA	$\overline{CS}$ = V_{IH} $V_{I/O}$ = V_{SS} to V_{CC}
Operating V_{CC} current	I_{CC1} (-15)[*3]	—	135	170	mA	min cycle[*2]
	I_{CC2} (-15)	—	100	120	mA	2x min cycle
	I_{CC1} (-20)	—	120	150	mA	min cycle
	I_{CC2} (-20)	—	90	110	mA	2x min cycle
Standby V_{CC} current	I_{SB} (-15)	—	40	60	mA	$\overline{CS}$ = V_{IH}, min cycle
	I_{SB} (-20)	—	30	50		
Standby V_{CC} current (1)	I_{SB1} (L-version)	—	0.02	2.0	mA	$\overline{CS}$ ≥ V_{CC} – 0.2 V 0 V ≤ Vin ≤ 0.2 V or V_{CC} – 0.2 V ≤ Vin
		—	0.003	0.1		
Output low voltage	V_{OL}	—	—	0.4	V	I_{OL} = 8 mA
Output high voltage	V_{OH}	2.4	—	—	V	I_{OH} = –4.0 mA

Notes: 1. Typical values are at V_{CC} = 5.0 V, Ta = 25°C and not guaranteed.
2. $\overline{CS}$ = V_{IL}, Iout = 0 mA
3. Access time version

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

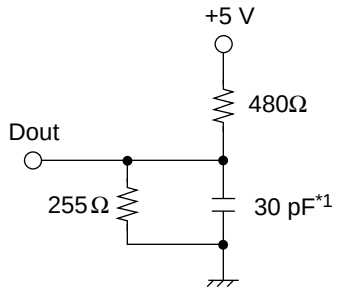
Parameter	Symbol	Min	Typ	Max	Unit	Test Conditions
Input capacitance	Cin	—	—	6	pF	Vin = 0 V
Output capacitance	Cout	—	—	10	pF	$V_{I/O}$ = 0 V

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

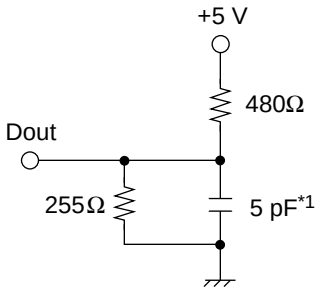
AC Characteristics (Ta = 0 to +70°C, V_{CC} = 5 V ± 10%, unless otherwise noted.)

Test Conditions

- Input pulse levels: V_{SS} to 3.0 V
- Input rise and fall time: 4 ns
- Input and Output timing reference levels: 1.5 V
- Output load: See figures



Output load (A)



Output load (B)
(for t_{CLZ}, t_{OLZ}, t_{CHZ}, t_{OHZ}, t_{WHZ} and t_{OW})

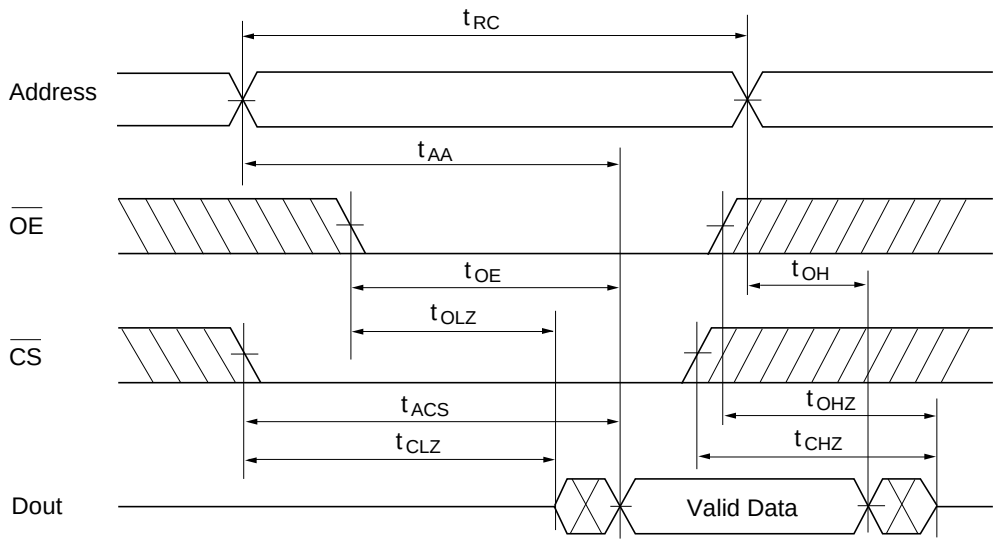
Note: 1. Including scope and jig

Read Cycle

		HM62832UH-15		HM62832UH-20		
Parameter	**Symbol**	**Min**	**Max**	**Min**	**Max**	**Unit**
Read cycle time	t_{RC}	15	—	20	—	ns
Address access time	t_{AA}	—	15	—	20	ns
Chip select access time	t_{ACS}	—	15	—	20	ns
Chip selection to output in low-Z	t_{CLZ}*1	3	—	3	—	ns
Output enable to output valid	t_{OE}	—	8	—	10	ns
Output enable to output in low-Z	t_{OLZ}*1	0	—	0	—	ns
Chip deselection to output in high-Z	t_{CHZ}*1	0	7	0	10	ns
Chip disable to output in high-Z	t_{OHZ}*1	0	7	0	10	ns
Output hold from address change	t_{OH}	3	—	3	—	ns

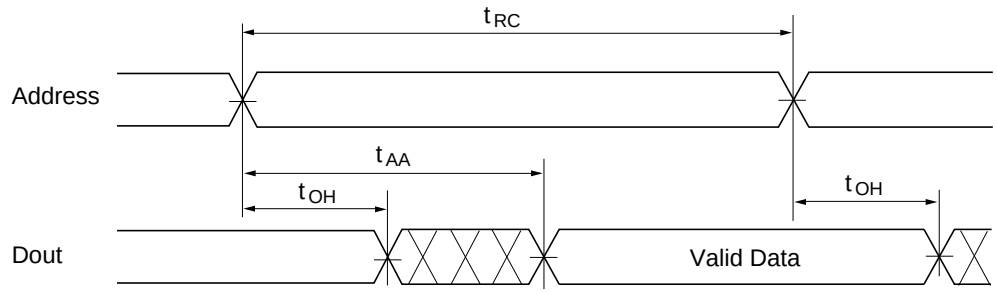
Note: 1. Transition is measured ±200 mV from steady state voltage with Load (B). This parameter is sampled and not 100% tested.

Read Timing Waveform (1)[*1] ($\overline{WE}$ = V_{IH})



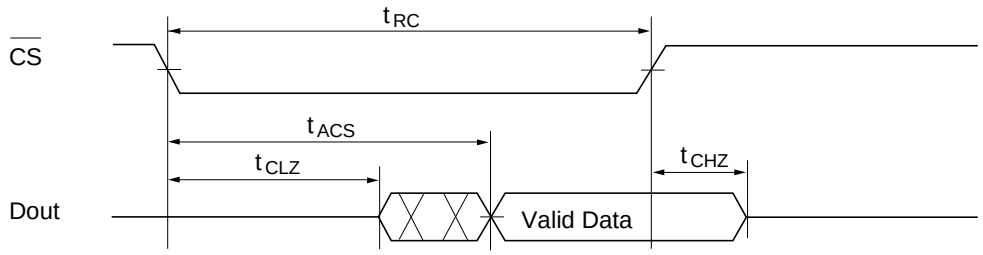
Note: 1. Transition is measured ±200 mV from steady state voltage with Load (B). This parameter is sampled and not 100% tested.

Read Timing Waveform (2) [*1] ($\overline{WE}$ = V_{IH}, $\overline{CS}$ = V_{IL}, $\overline{OE}$ = V_{IL})



Note: 1. Transition is measured ±200 mV from steady state voltage with Load (B). This parameter is sampled and not 100% tested.

Read Timing Waveform (3) [*1, *2] ($\overline{WE}$ = V_{IH}, $\overline{OE}$ = V_{IL})



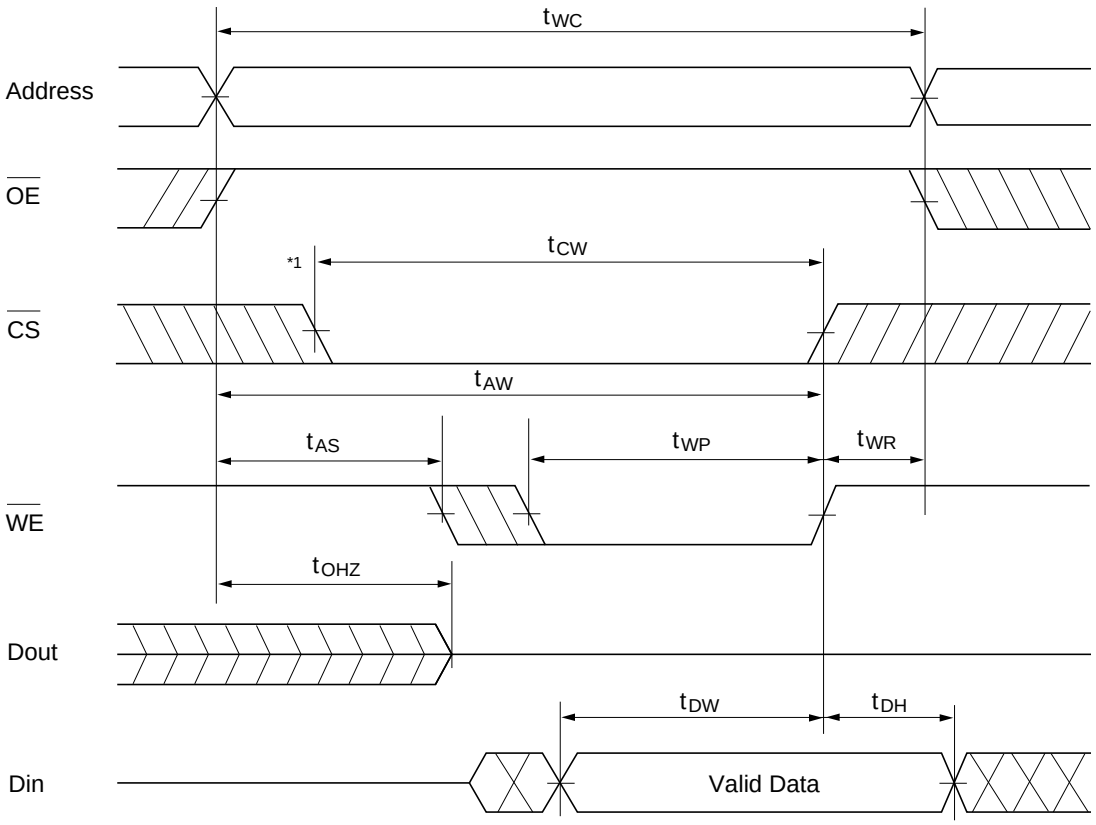
Notes: 1. Transition is measured ±200 mV from steady state voltage with Load (B). This parameter is sampled and not 100% tested.
2. Address valid prior to or coincident with $\overline{CS}$ transition low.

Write Cycle

		HM62832UH-15		HM62832UH-20		
Parameter	**Symbol**	**Min**	**Max**	**Min**	**Max**	**Unit**
Write cycle time	t_{WC}	15	—	20	—	ns
Chip selection to end of write	t_{CW}	10	—	12	—	ns
Address valid to end of write	t_{AW}	13	—	15	—	ns
Address setup time	t_{AS}	0	—	0	—	ns
Write pulse width[*2]	t_{WP}	10	—	12	—	ns
Write recovery time[*3]	t_{WR}	0	—	0	—	ns
Output disable to output in high-Z[*1, 4]	t_{OHZ}	0	7	0	10	ns
Write to output in high-Z[*1, 4]	t_{WHZ}	0	7	0	10	ns
Data to write time overlap	t_{DW}	8	—	10	—	ns
Data hold from write time[*6]	t_{DH}	0	—	0	—	ns
Output active from end of write[*1, 6]	t_{OW}	3	—	3	—	ns
Output hold from address change[*5]	t_{OH}	3	—	3	—	ns

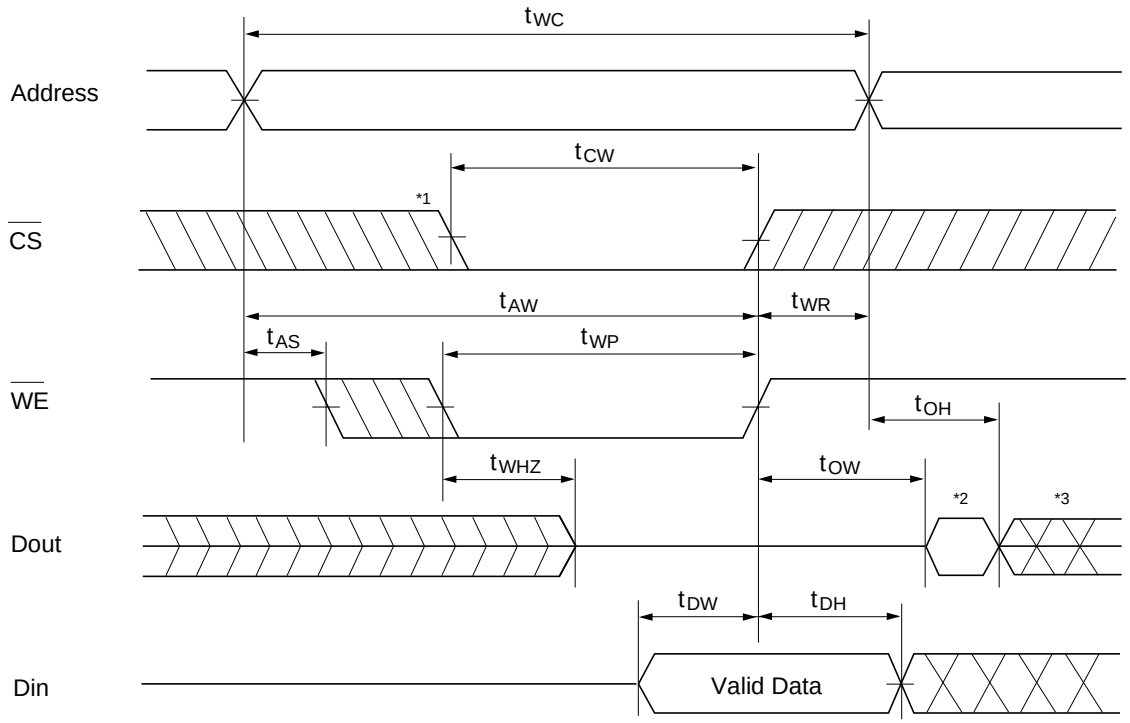
Notes: 1. Transition is measured ±200 mV from high impedance voltage with Load (B). This parameter is sampled and not 100% tested.
2. A write occurs during the overlap (t_{WP}) to a low $\overline{CS}$ and a low $\overline{WE}$.
3. t_{WR} is measured from the earlied or $\overline{CS}$ or $\overline{WE}$ going high to the end of write cycle.
4. 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.
5. Dout is the same phase of write data of this write cycle.
6. If $\overline{CS}$ is low during this priod, I/O pins are in the output state. Then the data input signals of opposite phase to the outputs must not be applied to them.

Write Timing Waveform (1)



Note: 1. If the $\overline{CS}$ low transition occurs simultaneously with the $\overline{WE}$ low transition or after the opposite phase to the outputs must not be applied.

Write Timing Waveform (2) ($\overline{OE}$ low Fixed)[*4]



Notes:
1. If the $\overline{CS}$ low transition occurs simultaneously with the $\overline{WE}$ low transitions or after the $\overline{WE}$ transition, output remain in a high impedance state.
2. Dout is the same phase of write data of this write cycle.
3. Dout is the read data of next address.
4. $\overline{WE}$ must be high during all address transition except when device is disable with $\overline{CS}$.

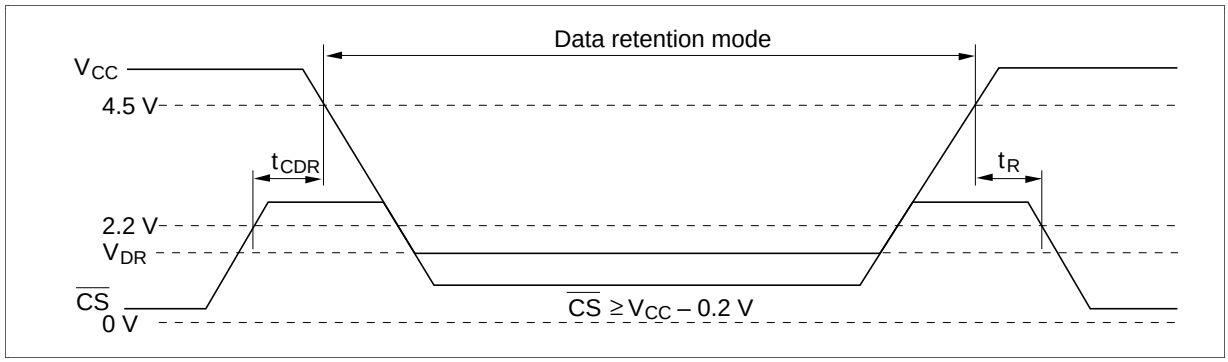
Low V_{CC} Data Retention Characteristics (Ta = 0 to +70°C)

This characteristics is guaranteed only for L-version.

Parameter	Symbol	Min	Typ	Max	Unit	Test Conditions
V_{CC} for data retention	V_{DR}	2	—	—	V	$\overline{CS} \geq V_{CC} - 0.2V$, Vin $\geq V_{CC} - 0.2$ V or 0 V < Vin ≤ 0.2 V
Data retention current	I_{CCDR}	—	2	50*1	µA	
Chip deselect to data retention time	t_{CDR}	0	—	—	ns	
Operation recovery time	t_R	5	—	—	ms	

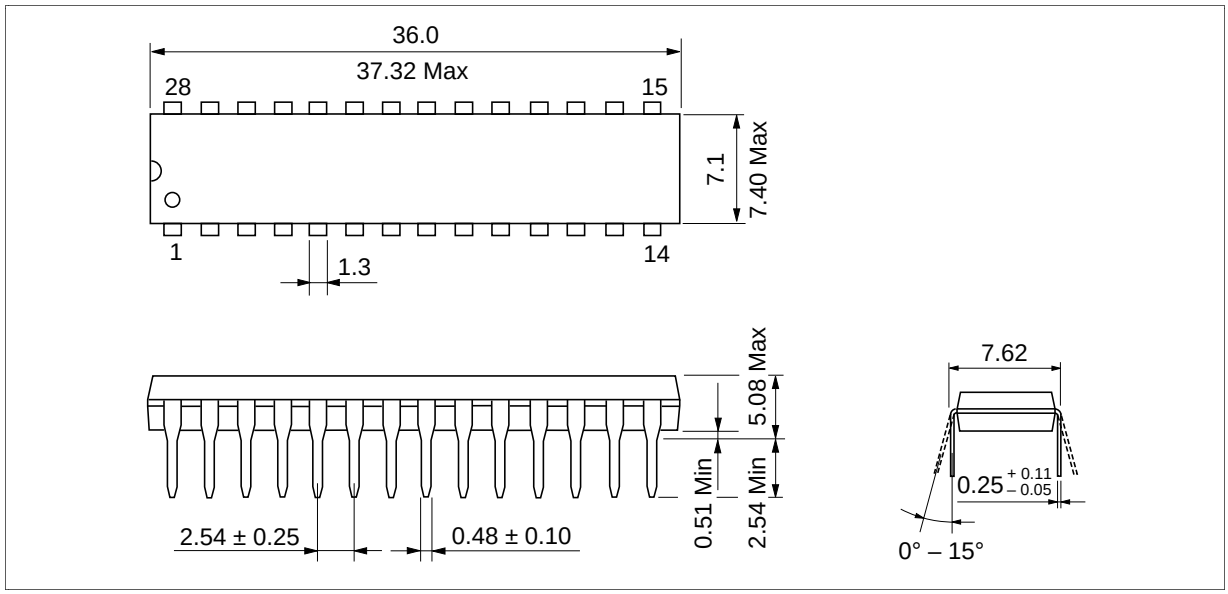
Note: 1. V_{CC} = 3.0 V

Low V_{CC} Data Retention Timing Waveform



Package Dimensions

HM62832UHP/UHLP Series (DP-28NA) Unit: mm



HM62832UHJP/UHLJP Series (CP-28DN) Unit: mm