

Document Title

**128Kx8 Bit High Speed Static RAM(5V Operating), Evolutionary Pin out.
Operated at Commercial and Industrial Temperature Range.**

Revision History

<u>Rev.No.</u>	<u>History</u>	<u>Draft Data</u>	<u>Remark</u>
Rev. 0.0	Initial release with Design Target.	Feb. 1st, 1997	Design Target
Rev. 1.0	Release to Preliminary Data Sheet. 1. Replace Design Target to Preliminary.	Jun. 1st, 1997	Preliminary

The attached data sheets are prepared and approved by SAMSUNG Electronics. SAMSUNG Electronics CO., LTD. reserve the right to change the specifications. SAMSUNG Electronics will evaluate and reply to your requests and questions on the parameters of this device. If you have any questions, please contact the SAMSUNG branch office near your office, call or contact Headquarters.

KM681001B/BL, KM681001BI/BLI

128K x 8 Bit High-Speed CMOS Static RAM

FEATURES

- Fast Access Time 15, 17, 20ns(Max.)
- Low Power Dissipation
 - Standby (TTL) : 20mA(Max.)
 - (CMOS) : 5mA(Max.)
 - 0.5mA(Max.) - L-Ver. only
- Operating KM681001B/BL - 15 : 130mA(Max.)
- KM681001B/BL - 17 : 120mA(Max.)
- KM681001B/BL - 20 : 110mA(Max.)
- Single 5.0V±10% Power Supply
- TTL Compatible Inputs and Outputs
- I/O Compatible with 3.3V Device
- Fully Static Operation
 - No Clock or Refresh required
- Three State Outputs
- 2V Minimum Data Retention ; L-Ver. only
- Standard Pin Configuration
 - KM681001B/BLJ : 32-SOJ-400
 - KM681001B/BLSJ : 32-SOJ-300

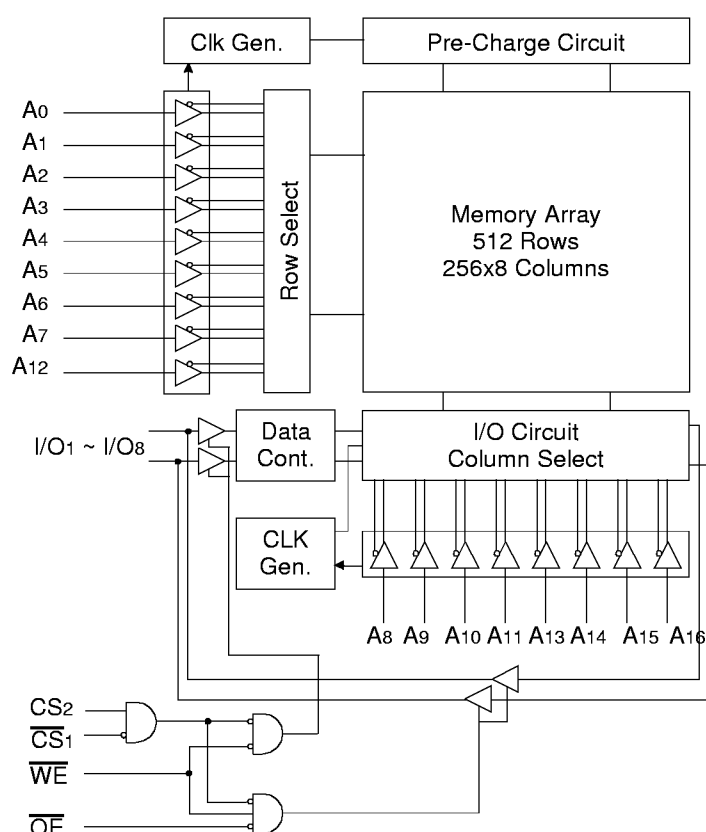
GENERAL DESCRIPTION

The KM681001B/BL is a 1,048,576-bit high-speed Static Random Access Memory organized as 131,072 words by 8 bits. The KM681001B/BL uses 8 common input and output lines and has an output enable pin which operates faster than address access time at read cycle. The device is fabricated using Samsung's advanced CMOS process and designed for high-speed circuit technology. It is particularly well suited for use in high-density high-speed system applications. The KM681001B/BL is packaged in a 400/300 mil 32-pin plastic SOJ and TSOP1.

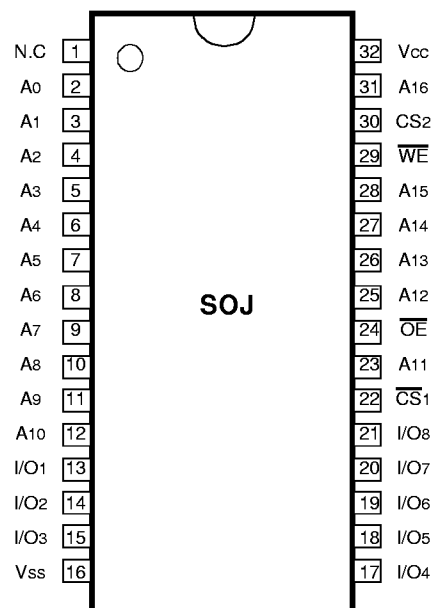
ORDERING INFORMATION

KM681001B/BL -15/17/20	Commercial Temp.
KM681001BI/BLI -15/17/20	Industrial Temp.

FUNCTIONAL BLOCK DIAGRAM



PIN CONFIGURATION (Top View)



PIN FUNCTION

Pin Name	Pin Function
A0 - A16	Address Inputs
\overline{WE}	Write Enable
$\overline{CS1}$, CS2	Chip Selects
\overline{OE}	Output Enable
I/O1 ~ I/O8	Data Inputs/Outputs
Vcc	Power(+5.0V)
Vss	Ground
N.C	No Connection

ABSOLUTE MAXIMUM RATINGS*

Parameter	Symbol	Rating	Unit
Voltage on Any Pin Relative to Vss	VIN, VOUT	-0.5 to 7.0	V
Voltage on Vcc Supply Relative to Vss	Vcc	-0.5 to 7.0	V
Power Dissipation	PD	1.0	W
Storage Temperature	TSTG	-65 to 150	°C
Operating Temperature	Commercial	TA	0 to 70
	Industrial	TA	-40 to 85

* Stresses greater than those listed under "Absolute Maximum Rating" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operating sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

RECOMMENDED DC OPERATING CONDITIONS(TA=0 to 70°C)

Parameter	Symbol	Min	Typ	Max	Unit
Supply Voltage	Vcc	4.5	5.0	5.5	V
Ground	Vss	0	0	0	V
Input Low Voltage	VIH	2.2	-	Vcc+0.5**	V
Input Low Voltage	VIL	-0.5*	-	0.8	V

NOTE: Above parameters are also guaranteed at industrial temperature range.

* VIL(Min) = -2.0V a.c(Pulse Width ≤10ns) for I ≤20mA

** VIH(Max) = Vcc + 2.0V a.c (Pulse Width ≤10ns) for I ≤20mA

DC AND OPERATING CHARACTERISTICS(TA=0 to 70°C, Vcc=5.0V±10%, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Max	Unit
Input Leakage Current	ILI	VIN = Vss to Vcc	-2	2	μA
Output Leakage Current	ILO	CS1=VIH or CS2=VIL or OE=VIH or WE=VIL, VOUT = Vss to Vcc	-2	2	μA
Operating Current	ICC	Min. Cycle, 100% Duty CS1=VIL, CS2=VIH, VIN=VIH or VIL, IOUT=0mA	15ns	-	130
			17ns	-	120
			20ns	-	110
Standby Current	ISB	Min. Cycle, CS1=VIH or CS2=VIL	-	20	mA
	ISB1	f=0MHz, CS1≥Vcc-0.2V or CS2≤0.2V, VIN≥Vcc-0.2V or VIN≤0.2V	Normal	-	5
			L-Ver.	-	0.5
Output Low Voltage Level	VOL	IOL=8mA	-	0.4	V
Output High Voltage Level	VOH	IOH=-4mA	2.4	-	V
	VOH1*	IOH1=-0.1mA	-	3.95	V

NOTE: Above parameters are also guaranteed at industrial temperature range.

* Vcc=5.0V±5% Temp.=25°C

CAPACITANCE*(TA=25°C, f=1.0MHz)

Item	Symbol	Test Conditions	MIN	Max	Unit
Input/Output Capacitance	CI/O	VI/O=0V	-	8	pF
Input Capacitance	CIN	VIN=0V	-	6	pF

* NOTE : Capacitance is sampled and not 100% tested.

KM681001B/BL, KM681001BI/BLI

Preliminary
CMOS SRAM

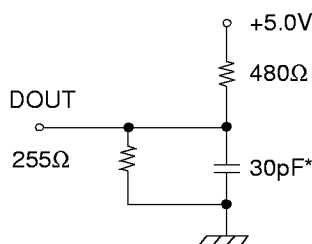
AC CHARACTERISTICS($T_A=0$ to 70°C , $V_{CC}=5.0\text{V}\pm 10\%$, unless otherwise noted.)

TEST CONDITIONS

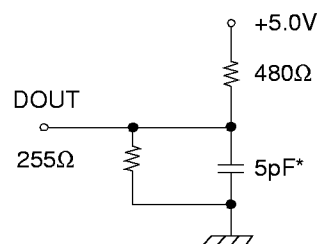
Parameter	Value
Input Pulse Levels	0V to 3V
Input Rise and Fall Times	3ns
Input and Output timing Reference Levels	1.5V
Output Loads	See below

NOTE: Above test conditions are also applied at industrial temperature range.

Output Loads(A)



Output Loads(B)
for tHZ, tLZ, tWHZ, tOW, tOLZ & tOHZ



* Including Scope and Jig Capacitance

READ CYCLE

Parameter	Symbol	KM681001B/BL-15		KM681001B/BL-17		KM681001B/BL-20		Unit
		Min	Max	Min	Max	Min	Max	
Read Cycle Time	t _{RC}	15	-	17	-	20	-	ns
Address Access Time	t _{AA}	-	15	-	17	-	20	ns
Chip Select to Output	t _{CO} *	-	15	-	17	-	20	ns
Output Enable to Valid Output	t _{OE}	-	8	-	9	-	10	ns
Chip Enable to Low-Z Output	t _{LZ} *	3	-	3	-	3	-	ns
Output Enable to Low-Z Output	t _{OLZ}	0	-	0	-	0	-	ns
Chip Disable to High-Z Output	t _{HZ} *	0	6	0	7	0	8	ns
Output Disable to High-Z Output	t _{OHZ}	0	6	0	7	0	8	ns
Output Hold from Address Change	t _{OH}	3	-	3	-	3	-	ns
Chip Selection to Power Up Time	t _{PU}	0	-	0	-	0	-	ns
Chip Selection to Power Down Time	t _{PD}	-	15	-	17	-	20	ns

NOTE 1: Above parameters are also guaranteed at industrial temperature range.

NOTE 2: t_{CO} = t_{CO1}, t_{CO2} / t_{LZ} = t_{LZ1}, t_{LZ2} / t_{HZ} = t_{HZ1}, t_{HZ2}

WRITE CYCLE

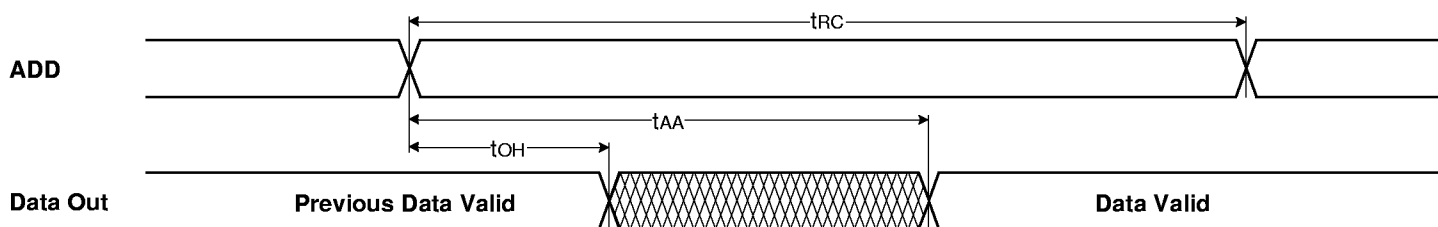
Parameter	Symbol	KM681001B/BL-15		KM681001B/BL-17		KM681001B/BL-20		Unit
		Min	Max	Min	Max	Min	Max	
Write Cycle Time	t _{WC}	15	-	17	-	20	-	ns
Chip Select to End of Write	t _{CW}	10	-	11	-	12	-	ns
Address Set-up Time	t _{AS}	0	-	0	-	0	-	ns
Address Valid to End of Write	t _{AW}	10	-	11	-	12	-	ns
Write Pulse Width(\overline{OE} High)	t _{WP}	10	-	11	-	12	-	ns
Write Pulse Width(\overline{OE} Low)	t _{WP1}	15	-	17	-	20	-	ns
Write Recovery Time	t _{WR*}	0	-	0	-	0	-	ns
Write to Output High-Z	t _{WHZ}	0	8	0	9	0	10	ns
Data to Write Time Overlap	t _{DW}	7	-	8	-	9	-	ns
Data Hold from Write Time	t _{DH}	0	-	0	-	0	-	ns
End Write to Output Low-Z	t _{OW}	3	-	3	-	3	-	ns

NOTE 1: Above parameters are also guaranteed at industrial temperature range.

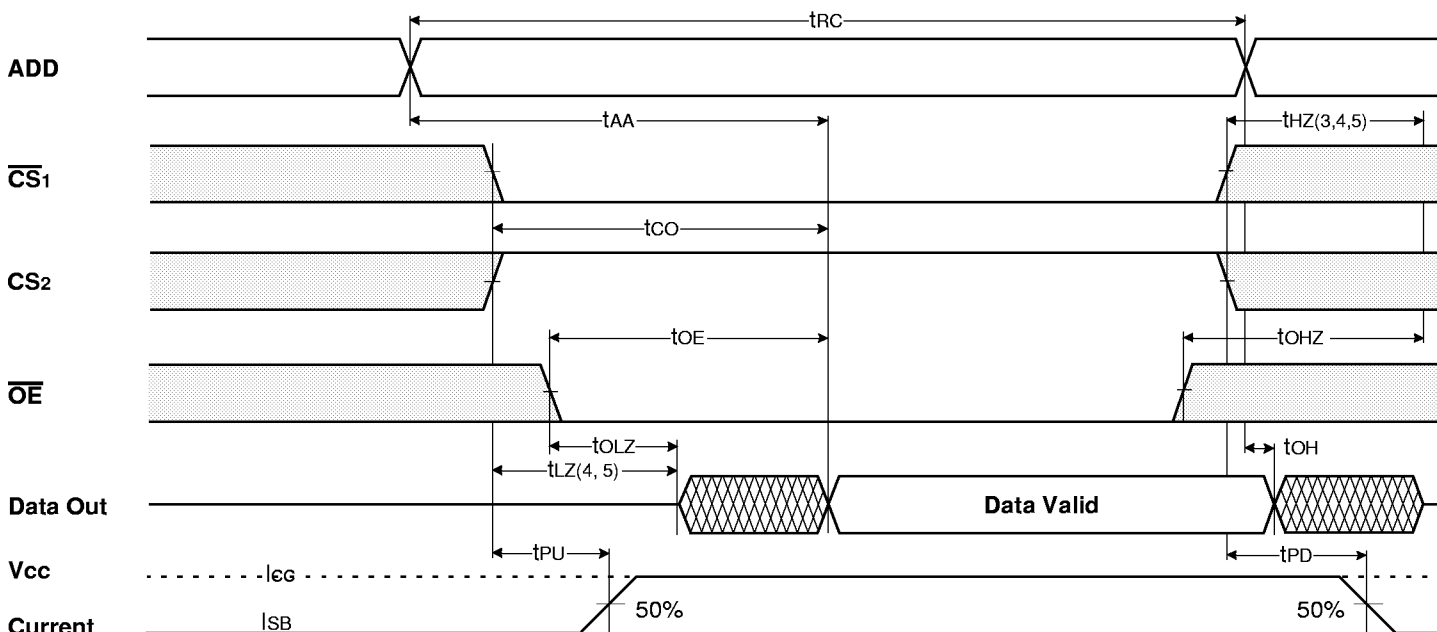
NOTE 2: t_{WR} = t_{WR1}, t_{WR2}

TIMING DIAGRAMS

TIMING WAVE FORM OF READ CYCLE(1) (Address Controlled, $\overline{CS}=\overline{OE}=V_{IL}$, $\overline{WE}=V_{IH}$)



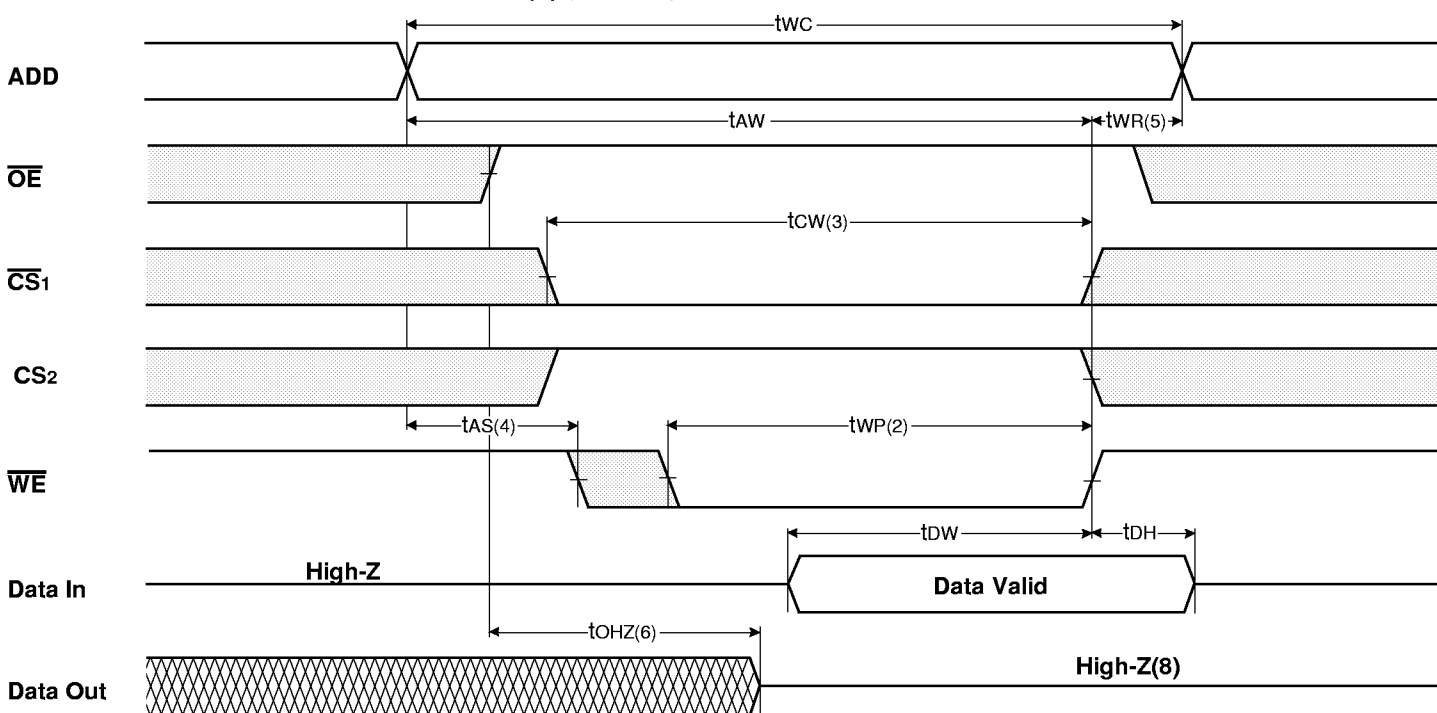
TIMING WAVE FORM OF READ CYCLE(2) ($\overline{WE}=V_{IH}$)



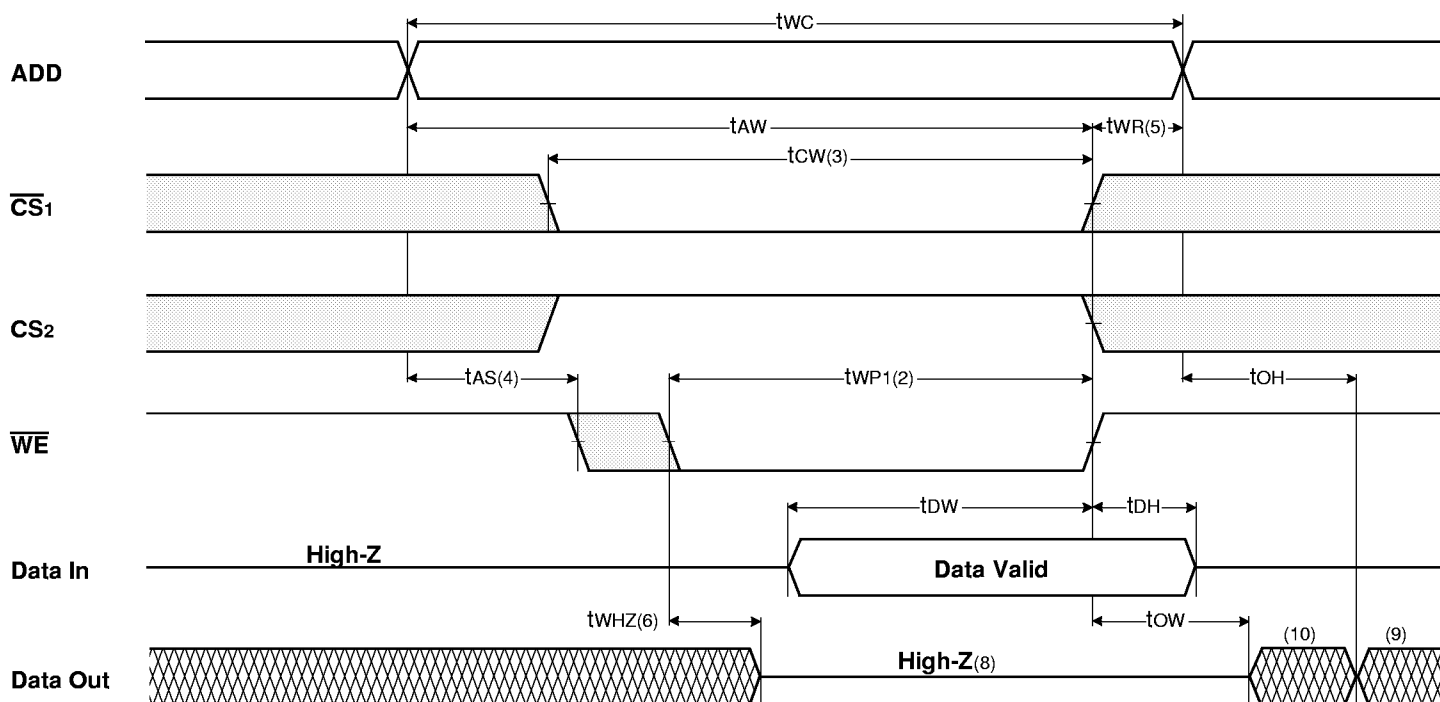
NOTES(READ CYCLE)

1. \overline{WE} is high for read cycle.
2. All read cycle timing is referenced from the last valid address to the first transition address.
3. t_{HZ} and t_{OHZ} are defined as the time at which the outputs achieve the open circuit condition and are not referenced to V_{OH} or V_{OL} Levels.
4. At any given temperature and voltage condition, $t_{HZ}(\text{Max.})$ is less than $t_{LZ}(\text{Min.})$ both for a given device and from device to device.
5. Transition is measured $\pm 200\text{mA}$ from steady state voltage with Load(B). This parameter is sampled and not 100% tested.
6. Device is continuously selected with $\overline{CS1}=V_{IL}$ and $CS2=V_{IH}$.
7. Address valid prior to coincident with $\overline{CS1}$ transition low and $CS2$ transition high.
8. For common I/O applications, minimization or elimination of bus contention conditions is necessary during read and write cycle.

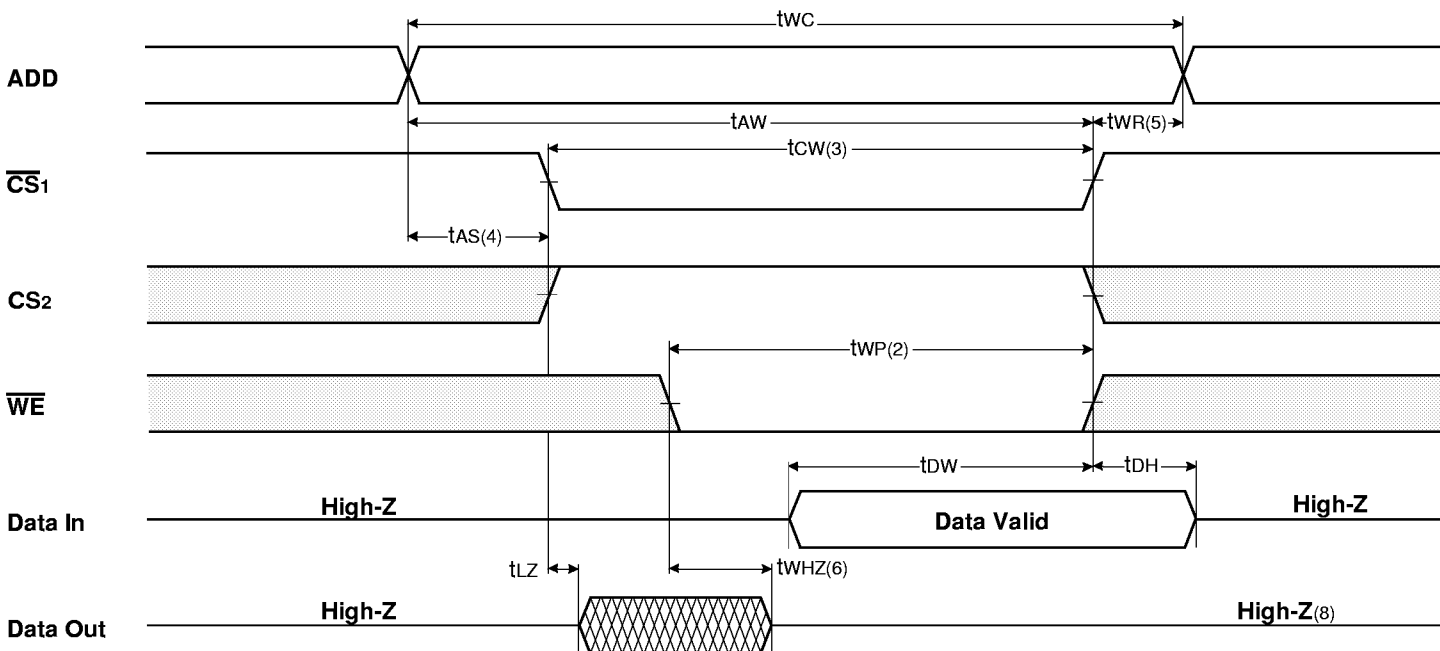
TIMING WAVE FORM OF WRITE CYCLE(1) ($\overline{OE}=\text{Clock}$)



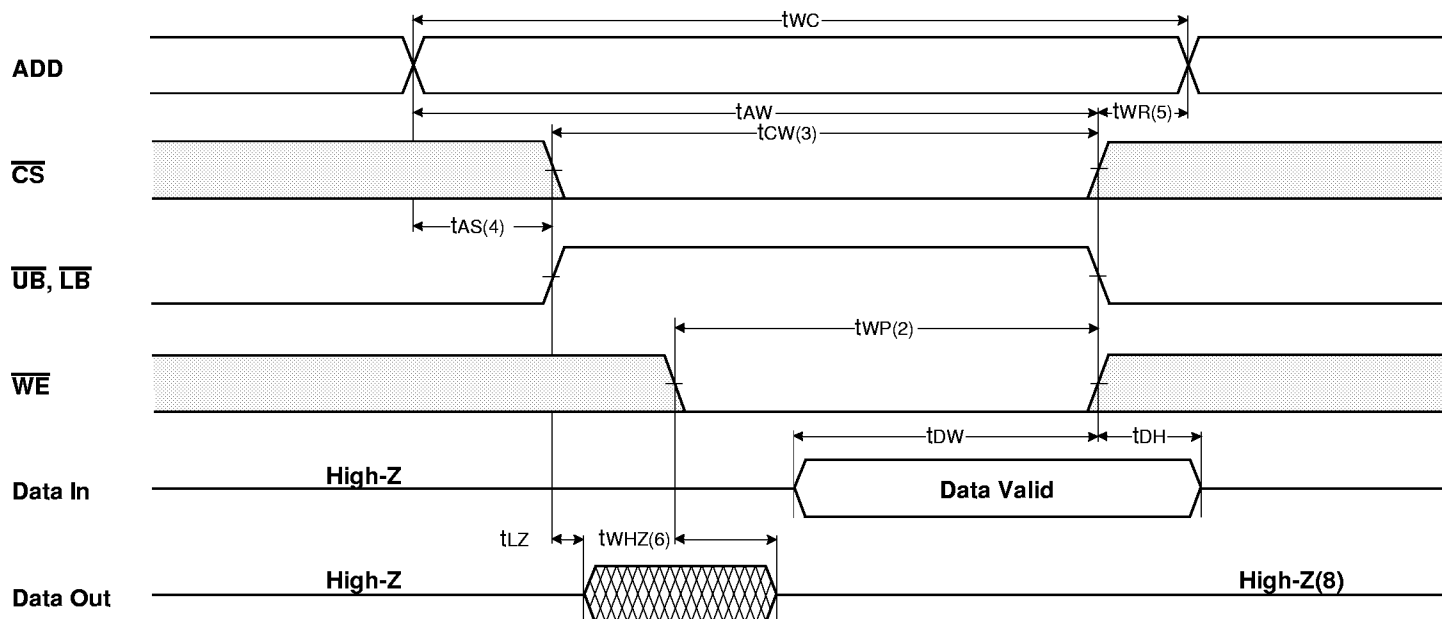
TIMING WAVE FORM OF WRITE CYCLE(2) (\overline{OE} =Low Fixed)



TIMING WAVE FORM OF WRITE CYCLE(3) ($\overline{CS1}$ =Controlled)



TIMING WAVE FORM OF WRITE CYCLE(4) (\overline{UB} , \overline{LB} Controlled)



NOTES(WRITE CYCLE)

1. All write cycle timing is referenced from the last valid address to the first transition address.
2. A write occurs during the overlap of a low $\overline{CS_1}$, a high CS_2 and a low \overline{WE} . A write begins at the latest transition $\overline{CS_1}$ going low, CS_2 going high and \overline{WE} going low ; A write ends at the earliest transition $\overline{CS_1}$ going high or CS_2 going low or \overline{WE} going high. t_{WP} is measured from the beginning of write to the end of write.
3. t_{WC} is measured from the later of $\overline{CS_1}$ going low or CS_2 going high to end of write.
4. t_{AS} is measured from the address valid to the beginning of write.
5. t_{WR} is measured from the end of write to the address change. t_{WR1} applied in case a write ends as $\overline{CS_1}$ or \overline{WE} going high. t_{WR2} applied in case a write ends as CS_2 going low.
6. If \overline{OE} , $\overline{CS_1}$, CS_2 and \overline{WE} are in the Read Mode during this period, the I/O pins are in the output low-Z state. Inputs of opposite phase of the output must not be applied because bus contention can occur.
7. For common I/O applications, minimization or elimination of bus contention conditions is necessary during read and write cycle.
8. If $\overline{CS_1}$ goes low and CS_2 goes high simultaneously with \overline{WE} going or after \overline{WE} going low, the outputs remain high impedance state.
9. DOUT is the read data of the new address.
10. When $\overline{CS_1}$ is low and CS_2 is high : I/O pins are in the output state. The input signals in the opposite phase leading to the output should not be applied.

FUNCTIONAL DESCRIPTION

$\overline{CS_1}$	CS_2	\overline{WE}	\overline{OE}	Mode	I/O Pin	Supply Current
H	X	X	X*	Not Select	High-Z	I_{SB} , I_{SB1}
X	L	X	X	Not Select	High-Z	I_{SB} , I_{SB1}
L	H	H	H	Output Disable	High-Z	I_{CC}
L	H	H	L	Read	DOUT	I_{CC}
L	H	L	X	Write	DIN	I_{CC}

* NOTE : X means Don't Care.

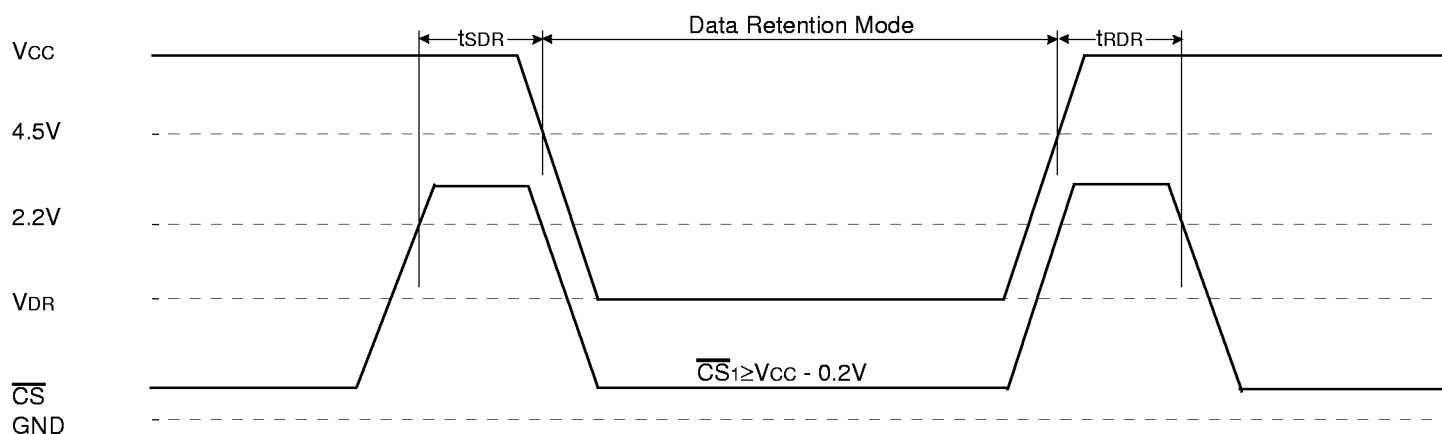
DATA RETENTION CHARACTERISTICS*(TA=0 to 70°C)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
VCC for Data Retention	VDR	$\overline{CS}_1 \geq V_{CC} - 0.2V$ or $CS_2 \leq 0.2V$	2.0	-	5.5	V
Data Retention Current	IDR	$V_{CC}=3.0V$, $\overline{CS}_1 \geq V_{CC} - 0.2V$ or $CS_2 \leq 0.2V$ $V_{IN} \geq V_{CC} - 0.2V$ or $V_{IN} \leq 0.2V$	-	-	0.40	mA
		$V_{CC}=2.0V$, $\overline{CS}_1 \geq V_{CC} - 0.2V$ or $CS_2 \leq 0.2V$ $V_{IN} \geq V_{CC} - 0.2V$ or $V_{IN} \leq 0.2V$	-	-	0.35	
Data Retention Set-Up Time	tSDR	See Data Retention Wave form(below)	0	-	-	ns
Recovery Time	tRDR		5	-	-	ms

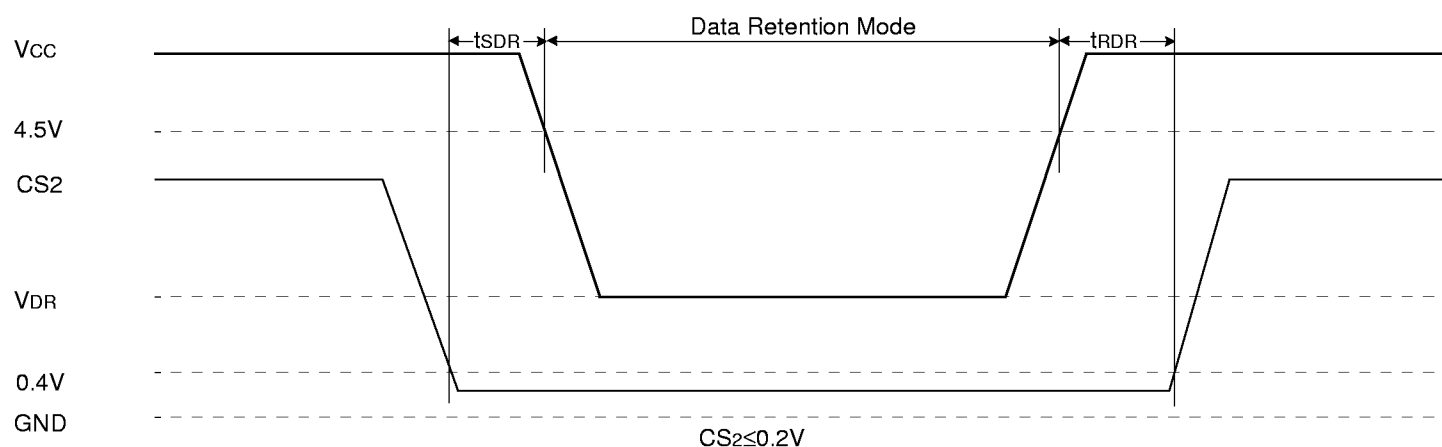
NOTE: Above parameters are also guaranteed at industrial temperature range.

* : L-Ver only.

DATA RETENTION WAVE FORM 1 (\overline{CS}_1 Controlled)



DATA RETENTION WAVE FORM 2 (CS2 Controlled)



32-SOJ-300

Technical drawing of a rectangular component with dimensions and tolerances. The drawing includes a top view, a side view, and a cross-sectional view.

Top View Dimensions:

- Overall width: 8.51 ± 0.12
- Overall height: 0.335 ± 0.005
- Pin #1 to Pin #16: 21.36 MAX
- Pin #1 to Pin #17: 20.95 ± 0.12
- Pin #1 to Pin #18: 0.825 ± 0.005
- Pin #1 to Pin #19: $0.43 \text{ }^{+0.10}_{-0.05}$
- Pin #1 to Pin #20: $0.017 \text{ }^{+0.004}_{-0.002}$
- Pin #1 to Pin #21: $1.27 \text{ }^{+0.10}_{-0.05}$
- Pin #1 to Pin #22: $0.71 \text{ }^{+0.10}_{-0.05}$
- Pin #1 to Pin #23: $0.028 \text{ }^{+0.004}_{-0.002}$
- Pin #1 to Pin #24: $0.95 \text{ }^{+0.10}_{-0.05}$
- Pin #1 to Pin #25: 0.0375
- Pin #1 to Pin #26: 0.017
- Pin #1 to Pin #27: 0.017
- Pin #1 to Pin #28: 0.017
- Pin #1 to Pin #29: 0.017
- Pin #1 to Pin #30: 0.017
- Pin #1 to Pin #31: 0.017
- Pin #1 to Pin #32: 0.017
- Pin #1 to Pin #33: 0.017
- Pin #1 to Pin #34: 0.017
- Pin #1 to Pin #35: 0.017
- Pin #1 to Pin #36: 0.017
- Pin #1 to Pin #37: 0.017
- Pin #1 to Pin #38: 0.017
- Pin #1 to Pin #39: 0.017
- Pin #1 to Pin #40: 0.017
- Pin #1 to Pin #41: 0.017
- Pin #1 to Pin #42: 0.017
- Pin #1 to Pin #43: 0.017
- Pin #1 to Pin #44: 0.017
- Pin #1 to Pin #45: 0.017
- Pin #1 to Pin #46: 0.017
- Pin #1 to Pin #47: 0.017
- Pin #1 to Pin #48: 0.017
- Pin #1 to Pin #49: 0.017
- Pin #1 to Pin #50: 0.017
- Pin #1 to Pin #51: 0.017
- Pin #1 to Pin #52: 0.017
- Pin #1 to Pin #53: 0.017
- Pin #1 to Pin #54: 0.017
- Pin #1 to Pin #55: 0.017
- Pin #1 to Pin #56: 0.017
- Pin #1 to Pin #57: 0.017
- Pin #1 to Pin #58: 0.017
- Pin #1 to Pin #59: 0.017
- Pin #1 to Pin #60: 0.017
- Pin #1 to Pin #61: 0.017
- Pin #1 to Pin #62: 0.017
- Pin #1 to Pin #63: 0.017
- Pin #1 to Pin #64: 0.017
- Pin #1 to Pin #65: 0.017
- Pin #1 to Pin #66: 0.017
- Pin #1 to Pin #67: 0.017
- Pin #1 to Pin #68: 0.017
- Pin #1 to Pin #69: 0.017
- Pin #1 to Pin #70: 0.017
- Pin #1 to Pin #71: 0.017
- Pin #1 to Pin #72: 0.017
- Pin #1 to Pin #73: 0.017
- Pin #1 to Pin #74: 0.017
- Pin #1 to Pin #75: 0.017
- Pin #1 to Pin #76: 0.017
- Pin #1 to Pin #77: 0.017
- Pin #1 to Pin #78: 0.017
- Pin #1 to Pin #79: 0.017
- Pin #1 to Pin #80: 0.017
- Pin #1 to Pin #81: 0.017
- Pin #1 to Pin #82: 0.017
- Pin #1 to Pin #83: 0.017
- Pin #1 to Pin #84: 0.017
- Pin #1 to Pin #85: 0.017
- Pin #1 to Pin #86: 0.017
- Pin #1 to Pin #87: 0.017
- Pin #1 to Pin #88: 0.017
- Pin #1 to Pin #89: 0.017
- Pin #1 to Pin #90: 0.017
- Pin #1 to Pin #91: 0.017
- Pin #1 to Pin #92: 0.017
- Pin #1 to Pin #93: 0.017
- Pin #1 to Pin #94: 0.017
- Pin #1 to Pin #95: 0.017
- Pin #1 to Pin #96: 0.017
- Pin #1 to Pin #97: 0.017
- Pin #1 to Pin #98: 0.017
- Pin #1 to Pin #99: 0.017
- Pin #1 to Pin #100: 0.017

Side View Dimensions:

- Overall height: 7.62 ± 0.300
- Pin #1 to Pin #16: 6.86 ± 0.25
- Pin #1 to Pin #17: 0.270 ± 0.010
- Pin #1 to Pin #18: $0.20 \text{ }^{+0.10}_{-0.05}$
- Pin #1 to Pin #19: $0.008 \text{ }^{+0.004}_{-0.002}$
- Pin #1 to Pin #20: 0.69 MIN
- Pin #1 to Pin #21: 0.027
- Pin #1 to Pin #22: 0.14
- Pin #1 to Pin #23: 0.045
- Pin #1 to Pin #24: 3.76 MAX
- Pin #1 to Pin #25: 0.148
- Pin #1 to Pin #26: 0.10 MAX
- Pin #1 to Pin #27: 0.004
- Pin #1 to Pin #28: 0.004
- Pin #1 to Pin #29: 0.004
- Pin #1 to Pin #30: 0.004
- Pin #1 to Pin #31: 0.004
- Pin #1 to Pin #32: 0.004
- Pin #1 to Pin #33: 0.004
- Pin #1 to Pin #34: 0.004
- Pin #1 to Pin #35: 0.004
- Pin #1 to Pin #36: 0.004
- Pin #1 to Pin #37: 0.004
- Pin #1 to Pin #38: 0.004
- Pin #1 to Pin #39: 0.004
- Pin #1 to Pin #40: 0.004
- Pin #1 to Pin #41: 0.004
- Pin #1 to Pin #42: 0.004
- Pin #1 to Pin #43: 0.004
- Pin #1 to Pin #44: 0.004
- Pin #1 to Pin #45: 0.004
- Pin #1 to Pin #46: 0.004
- Pin #1 to Pin #47: 0.004
- Pin #1 to Pin #48: 0.004
- Pin #1 to Pin #49: 0.004
- Pin #1 to Pin #50: 0.004
- Pin #1 to Pin #51: 0.004
- Pin #1 to Pin #52: 0.004
- Pin #1 to Pin #53: 0.004
- Pin #1 to Pin #54: 0.004
- Pin #1 to Pin #55: 0.004
- Pin #1 to Pin #56: 0.004
- Pin #1 to Pin #57: 0.004
- Pin #1 to Pin #58: 0.004
- Pin #1 to Pin #59: 0.004
- Pin #1 to Pin #60: 0.004
- Pin #1 to Pin #61: 0.004
- Pin #1 to Pin #62: 0.004
- Pin #1 to Pin #63: 0.004
- Pin #1 to Pin #64: 0.004
- Pin #1 to Pin #65: 0.004
- Pin #1 to Pin #66: 0.004
- Pin #1 to Pin #67: 0.004
- Pin #1 to Pin #68: 0.004
- Pin #1 to Pin #69: 0.004
- Pin #1 to Pin #70: 0.004
- Pin #1 to Pin #71: 0.004
- Pin #1 to Pin #72: 0.004
- Pin #1 to Pin #73: 0.004
- Pin #1 to Pin #74: 0.004
- Pin #1 to Pin #75: 0.004
- Pin #1 to Pin #76: 0.004
- Pin #1 to Pin #77: 0.004
- Pin #1 to Pin #78: 0.004
- Pin #1 to Pin #79: 0.004
- Pin #1 to Pin #80: 0.004
- Pin #1 to Pin #8

Technical drawing of a rectangular component with dimensions in millimeters. The drawing includes a top view, a side view, and a detailed view of the bottom edge.

Top View Dimensions:

- Overall width: 11.18 ± 0.12 / 0.440 ± 0.005
- Overall height: 21.36 / 0.841 MAX
- Inner width: 20.95 ± 0.12 / 0.825 ± 0.005
- Inner height: 20.95 ± 0.12 / 0.825 ± 0.005
- Bottom edge features:
 - Feature 1: 0.95 / (0.0375)
 - Feature 2: $0.43^{+0.10}_{-0.05}$ / $0.017^{+0.004}_{-0.002}$
 - Feature 3: 1.27 / 0.050
 - Feature 4: $0.71^{+0.10}_{-0.05}$ / $0.028^{+0.004}_{-0.002}$

Side View Dimensions:

- Overall height: 9.40 ± 0.25 / 0.370 ± 0.010
- Inner height: 10.16 / 0.400
- Bottom edge features:
 - Feature 1: $0.20^{+0.10}_{-0.05}$ / $0.008^{+0.004}_{-0.002}$
 - Feature 2: 0.69 / 0.027 MIN

Bottom Edge Detail Dimensions:

- Overall width: 1.30 / (0.051)
- Feature 1: 0.10 / 0.004 MAX
- Feature 2: 3.76 / 0.148 MAX
- Feature 3: 1.30 / (0.051)