V62C1801024L(L)

Ultra Low Power
128K x 8 CMOS SRAM

Features

- **Ultra Low-power consumption**
  - **Active: 20mA at 70ns**
  - **Stand-by: 5 µA (CMOS input/output)**
    1 µA CMOS input/output, L version
- **Single +1.8V to 2.2V Power Supply**
- **Equal access and cycle time**
- **70/85/100/150 ns access time**
- **Easy memory expansion with $\overline{CE1}$, CE2 and $\overline{OE}$ inputs**
- **1.0V data retention mode**
- **TTL compatible, Tri-state input/output**
- **Automatic power-down when deselected**

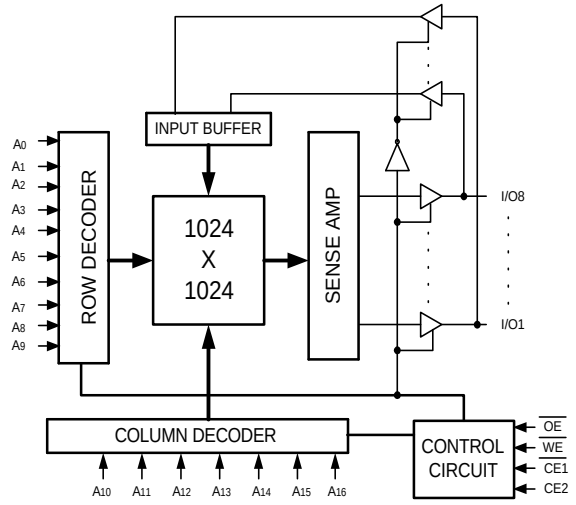
Functional Description

The V62C1801024L is a low power CMOS Static RAM organized as 131,072 words by 8 bits. Easy memory expansion is provided by an active LOW $\overline{CE1}$, an active HIGH CE2, an active LOW $\overline{OE}$, and Tri-state I/O's. This device has an automatic power-down mode feature when deselected.

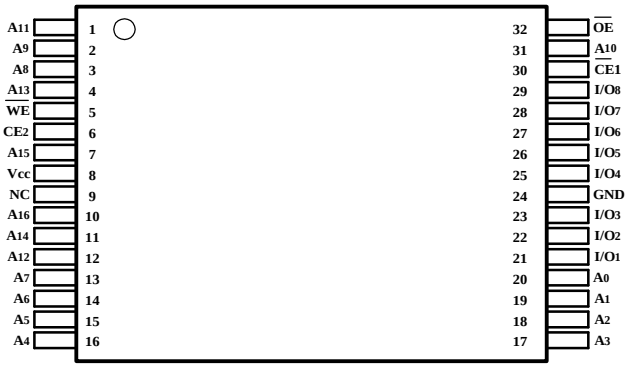
Writing to the device is accomplished by taking Chip Enable 1 ($\overline{CE1}$) with Write Enable ($\overline{WE}$) LOW, and Chip Enable 2 (CE2) HIGH. Reading from the device is performed by taking Chip Enable 1 ($\overline{CE1}$) with Output Enable ($\overline{OE}$) LOW while Write Enable ($\overline{WE}$) and Chip Enable 2 (CE2) is HIGH. The I/O pins are placed in a high-impedance state when the device is deselected: the outputs are disabled during a write cycle.

The V62C1801024LL comes with a 1V data retention feature and Lower Standby Power. The V62C1801024L is available in a 32-pin 8 x 20 mm TSOP1 / STSOP / 48-fpBGA packages.

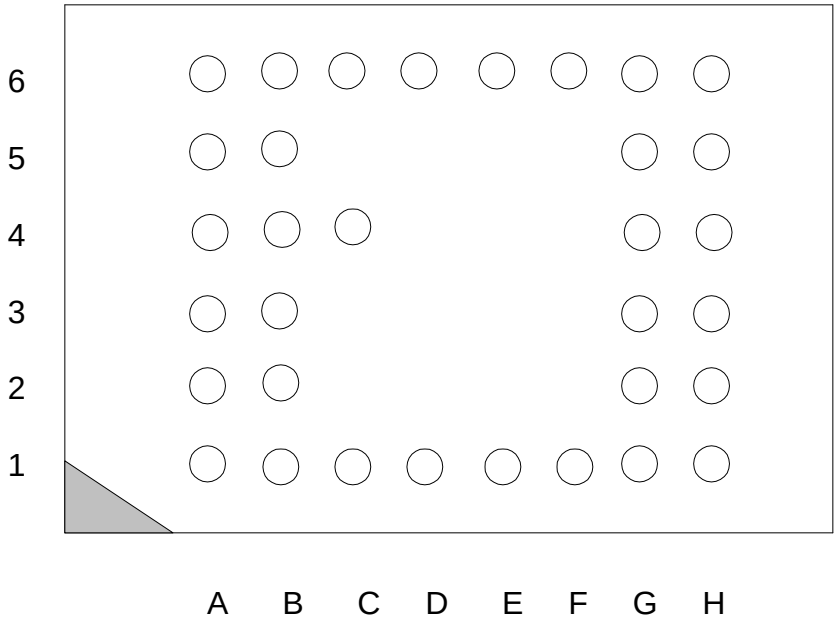
Logic Block Diagram



32-Pin TSOP1 / STSOP (See next page)



MOSEL VITELIC V62C1801024L(L)B



TOP VIEW

Top View

48-CSP Ball-Grid Array package (shading indicates no ball)

	1	2	3	4	5	6
A	A_0	A_1	$\overline{CE2}$	A_3	A_6	A_8
B	I/O_4	A_2	$\overline{WE}$	A_4	A_7	I/O_0
C	I/O_5	NC	NC	A_5	NC	I/O_1
D	V_{SS}	NC	NC	NC	NC	V_{DD}
E	V_{DD}	NC	NC	NC	NC	V_{SS}
F	I/O_6	$\overline{NC}$	$\overline{NC}$	NC	NC	I/O_2
G	I/O_7	$\overline{OE}$	$\overline{CE1}$	A_{16}	A_{15}	I/O_3
H	A_9	A_{10}	A_{11}	A_{12}	A_{13}	A_{14}

Absolute Maximum Ratings *

Parameter	Symbol	Minimum	Maximum	Unit
Voltage on Any Pin Relative to Gnd	Vt	-0.5	4.6	V
Power Dissipation	P_T	–	1.0	W
Storage Temperature (Plastic)	Tstg	-55	+150	^0C
Temperature Under Bias	Tbias	-40	+85	^0C

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

Truth Table

$\overline{CE1}$	CE2	$\overline{WE}$	$\overline{OE}$	Data	Mode
H	X	X	X	High-Z	Standby
X	L	X	X	High-Z	Standby
L	H	H	L	Data Out	Active, Read
L	H	H	H	High-Z	Active, Output Disable
L	H	L	X	Data In	Active, Write

*** Key:** X = Don't Care, L = Low, H = High

Recommended Operating Conditions ($T_A = 0^0C$ to $+70^0C$ / -40^0C to 85^0C**)

Parameter	Symbol	Min	Typ	Max	Unit
Supply Voltage	V_{CC}	1.8	2.0	2.2	V
	Gnd	0.0	0.0	0.0	V
Input Voltage	V_{IH}	1.6	-	V_{CC} + 0.2	V
	V_{IL}	-0.5*	-	0.4	V

* V_{IL} min = -1.0V for pulse width less than $t_{RC}/2$.

** For Industrial Temperature.

DC Operating Characteristics (V_{cc} = 1.8 to 2.2V, Gnd = 0V, T_A = 0^0C to +70^0C / -40^0C to 85^0C)

Parameter	Sym	Test Conditions	-70		-85		-100		-150		Unit
			Min	Max	Min	Max	Min	Max	Min	Max	
Input Leakage Current	$\|I_{LI}\|$	V_{cc} = Max, V_{in} = Gnd to V_{cc}	-	1	-	1	-	1	-	1	µA
Output Leakage Current	$\|I_{LO}\|$	$\overline{CE1}$ = V_{IH} or CE2 = V_{IL} V_{cc}= Max, V_{OUT} = Gnd to V_{cc}	-	1	-	1	-	1	-	1	µA
Operating Power Supply Current	I_{CC}	$\overline{CE1}$ = V_{IL} , CE2 = V_{IH} V_{IN}=V_{IH}orV_{IL},I_{OUT}=0mA	-	3	-	3	-	3	-	3	mA
Average Operating Current	I_{CC1}	$\overline{CE1}$ = V_{IL} , CE2 = V_{IH} I_{OUT} = 0mA, Min Cycle, 100% Duty	-	25	-	20	-	15	-	15	mA
	I_{CC2}	$\overline{CE1}$ = 0.2V, CE2 = V_{cc} - 0.2V I_{OUT} = 0mA, Cycle Time=1µs, 100% Duty	-	3	-	3	-	3	-	3	mA
Standby Power Supply Current (TTL Level)	I_{SB}	$\overline{CE1}$ = V_{IH} or CE2 = V_{IL}	-	0.5	-	0.5	-	0.5	-	0.5	mA
Standby Power Supply Current (CMOS Level)	I_{SB1}	$\overline{CE1}$ ≥ V_{cc} - 0.2V or CE2 ≤ 0.2V, f = 0 V_{IN} ≤ 0.2V or V_{IN} ≥ V_{cc}- 0.2V — L	-	5	-	5	-	5	-	5	µA
		LL	-	*1*	-	*1*	-	*1*	-	*1*	µA
Output Low Voltage	V_{OL}	I_{OL} = 2 mA	-	0.4	-	0.4	-	0.4	-	0.4	V
Output High Voltage	V_{OH}	I_{OH} = -1 mA	1.6	-	1.6	-	1.6	-	1.6	-	V

Capacitance (f = 1MHz, T_A = 25^0C)

Parameter*	Symbol	Test Condition	Max	Unit
Input Capacitance	C_{in}	V_{in} = 0V	7	pF
I/O Capacitance	$C_{I/O}$	V_{in} = V_{out} = 0V	8	pF

* This parameter is guaranteed by device characterization and is not production tested.

AC Test Conditions

Input Pulse Level	0.4V to 1.6V
Input Rise and Fall Time	5ns
Input and Output Timing Reference Level	50% of input level (V_{IL} + V_{IH})/2

Output Load Condition

70ns/85 ns	C_L = 30pf + 1TTL Load
Load 100ns/150 ns	C_L = 100pf + 1TTL Load

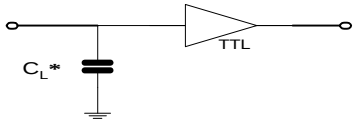


Figure A. * Including Scope and Jig Capacitance

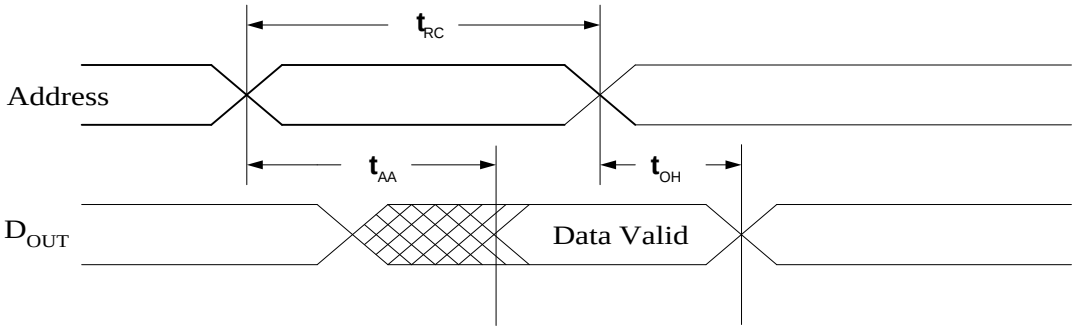
Read Cycle [3,9] (V_{cc} = 1.8 to 2.2V, Gnd = 0V, T_A = 0^0C to +70^0C / -40^0C to +85^0C)

Parameter	Symbol	-70		-85		-100		-150		Unit	Note
		Min	Max	Min	Max	Min	Max	Min	Max		
Read Cycle Time	t_{RC}	70	-	85	-	100	-	150	-	ns	
Address Access Time	t_{AA}	-	70	-	85	-	100	-	150	ns	
Chip Enable Access Time	t_{ACE}	-	70	-	85	-	100	-	150	ns	
Output Enable Access Time	t_{OE}	-	40	-	40	-	50	-	70	ns	
Output Hold from Address Change	t_{OH}	10	-	10	-	10	-	10	-	ns	
Chip Enable to Output in Low-Z	t_{CLZ}	10	-	10	-	10	-	10	-	ns	4,5
Chip Disable to Output in High-Z	t_{CHZ}	-	30	-	35	-	40	-	50	ns	4,5
Output Enable to Output in Low-Z	t_{OLZ}	5	-	5	-	5	-	5	-	ns	4,5
Output Disable to Output in High-Z	t_{OHZ}	-	25	-	30	-	35	-	40	ns	4,5
Power-Up Time	t_{PU}	0	-	0	-	0	-	0	-	ns	5
Power-Down Time	t_{PD}	-	70	-	85	-	100	-	150	ns	5

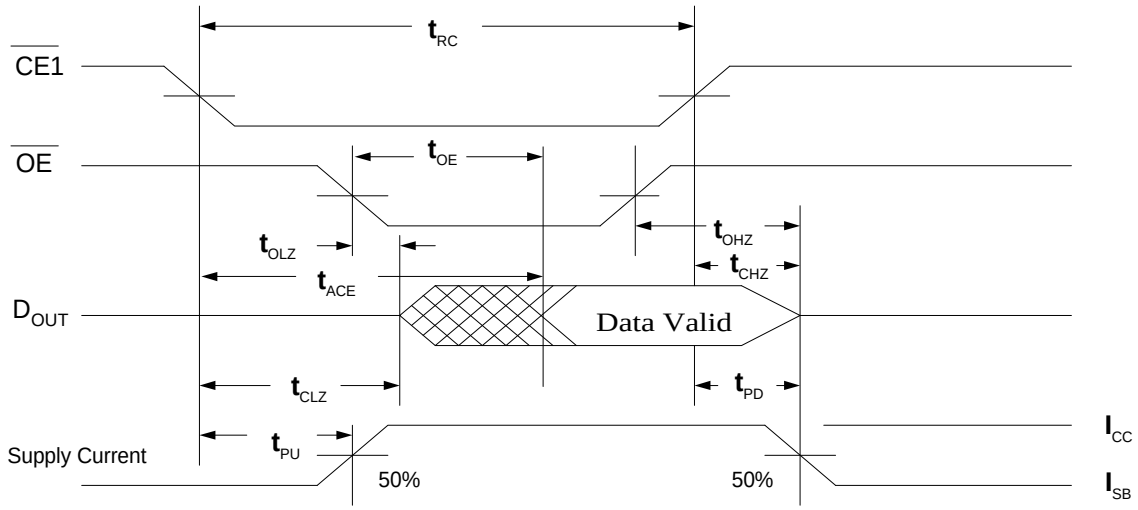
Write Cycle [3,11] (V_{cc} = 1.8 to 2.2V, Gnd = 0V, T_A = 0^0C to +70^0C / -40^0C to +85^0C)

Parameter	Symbol	-70		-85		-100		-150		Unit	Note
		Min	Max	Min	Max	Min	Max	Min	Max		
Write Cycle Time	t_{WC}	70	-	85	-	100	-	150	-	ns	
Chip Enable to Write End	t_{CW}	60	-	70	-	80	-	120	-	ns	
Address Setup to Write End	t_{AW}	60	-	70	-	80	-	120	-	ns	
Address Setup Time	t_{AS}	0	-	0	-	0	-	0	-	ns	
Write Pulse Width	t_{WP}	50	-	60	-	70	-	100	-	ns	
Write Recovering Time	t_{WR}	0	-	0	-	0	-	0	-	ns	
Data Valid to Write End	t_{DW}	30	-	35	-	40	-	60	-	ns	
Data Hold Time	t_{DH}	0	-	0	-	0	-	0	-	ns	
Write Enable to Output in High-Z	t_{WZ}	-	30	-	35	-	40	-	50	ns	4,5
Output Active from Write End	t_{OW}	5	-	5	-	5	-	5	-	ns	4,5

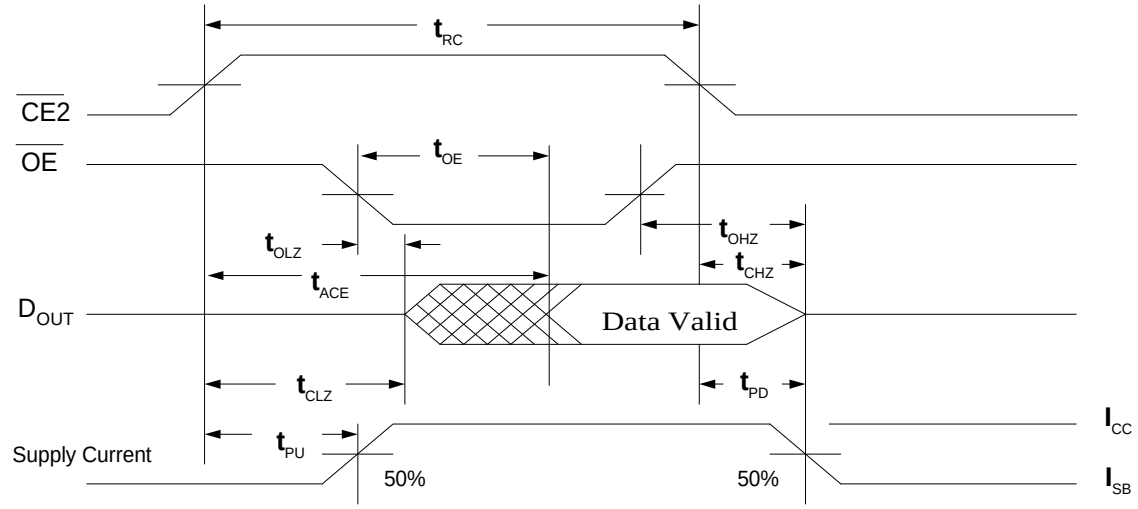
Timing Waveform of Read Cycle 1 (3,6,7,9) (Address Controlled)



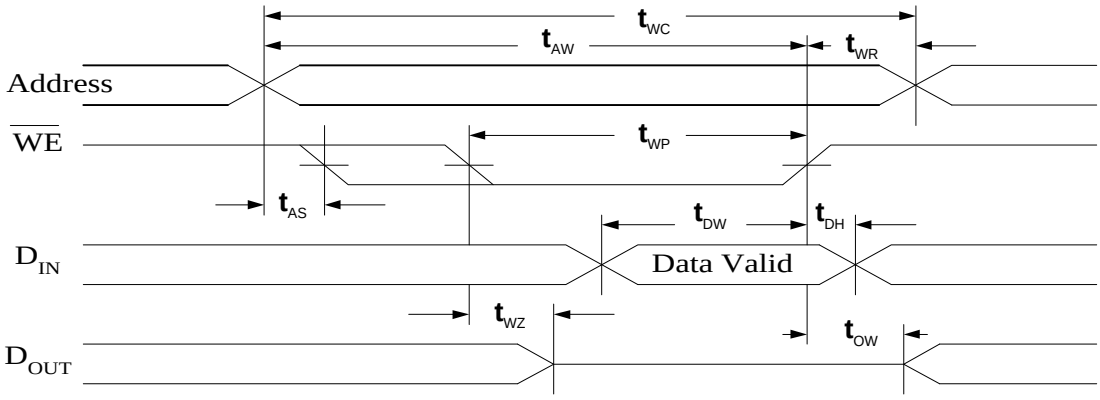
Timing Waveform of Read Cycle 2 (5,6,8,9) ($\overline{CE1}$ Controlled)



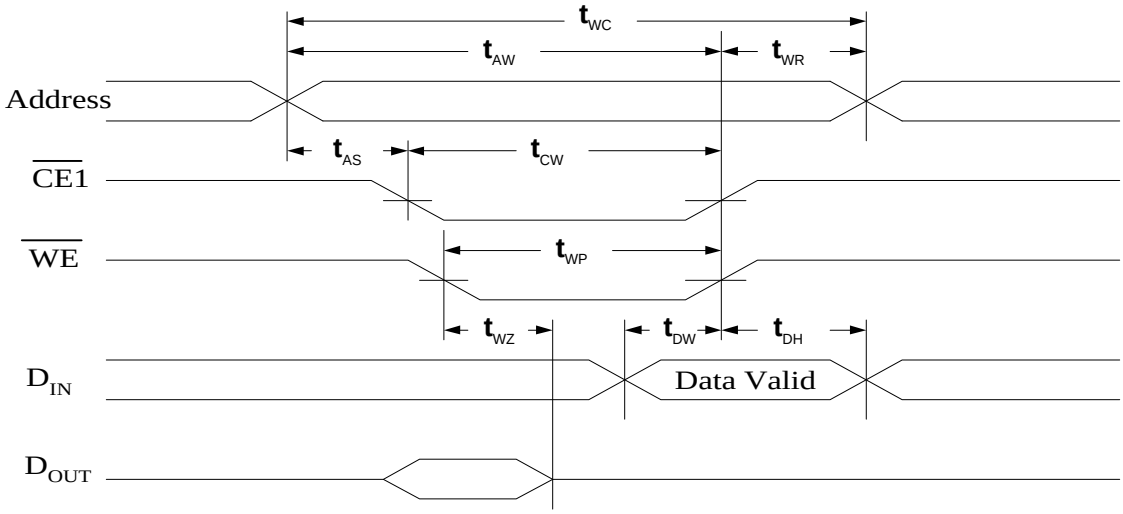
Timing Waveform of Read Cycle 3 (3,6,8,9) (CE2 Controlled)



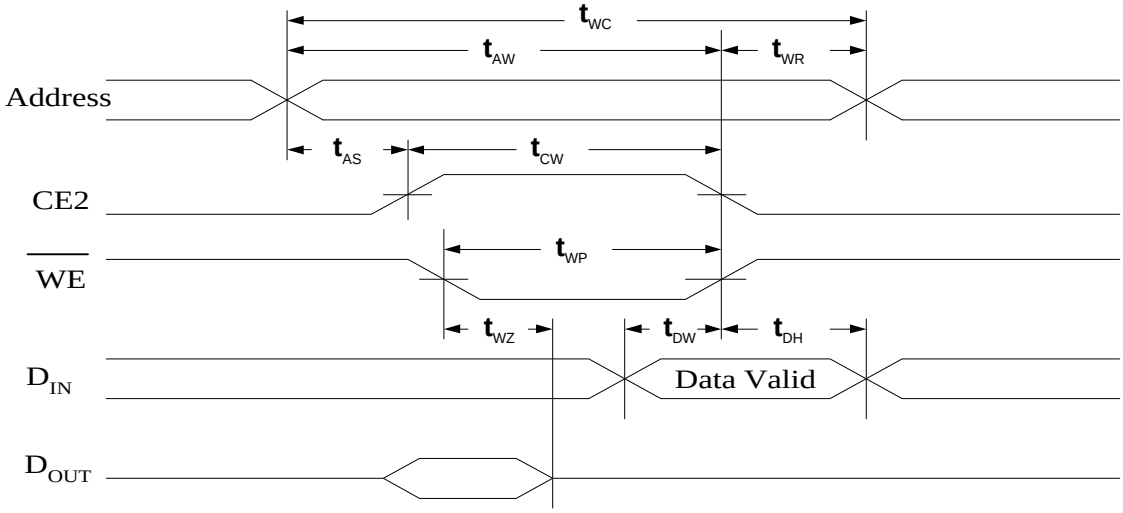
Timing Waveform of Write Cycle 1 (10,11) ($\overline{WE}$ Controlled)



Timing Waveform of Write Cycle 2 (10,11) ($\overline{CE1}$ Controlled)



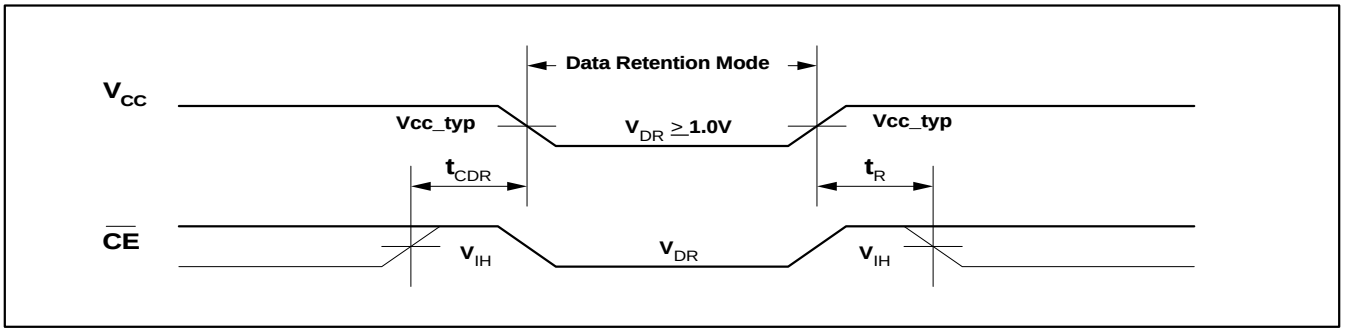
Timing Waveform of Write Cycle 3 (10,11) (CE2 Controlled)



Data Retention Characteristics (L Version Only)[1]

Parameter	Symbol	Test Condition	Min	Max	Unit
V_{CC} for Data Retention	V_{DR}	$\overline{CE}_1 \geq V_{CC}$ - 0.2V or	1.0	-	V
Data Retention Current	I_{CCDR}	$CE_2 \leq$ + 0.2V	-	1	µA
Chip Deselect to Data Retention Time	t_{CDR}	$V_{IN} \geq V_{CC}$ - 0.2V or	0	-	ns
Operation Recovery Time[2]	t_R	$V_{IN} \leq 0.2V$	t_{RC}	-	ns

Data Retention Waveform (L Version Only) ($T_A = 0^0C$ to $+70^0C$ / -40^0C to $+85^0C$)



Notes

1. L-version includes this feature.
2. This Parameter is sampled and not 100% tested.
3. For test conditions, see *AC Test Condition*, Figure A.
4. This parameter is tested with CL = 5pF as shown in Figure B. Transition is measured ± 500mV from steady-state voltage.
5. This parameter is guaranteed, but is not tested.
6. $\overline{WE}$ is HIGH for read cycle.
7. $\overline{CE1}$ and $\overline{OE}$ are LOW and CE2 is HIGH for read cycle.
8. Address valid prior to or coincident with $\overline{CE1}$ transition LOW or CE2 transition HIGH.
9. All read cycle timings are referenced from the last valid address to the first transtion address.
10. $\overline{CE1}$ or $\overline{WE}$ must be HIGH or CE2 must be LOW during address transition.
11. All write cycle timings are referenced from the last valid address to the first transition address.

Ordering Information

Device Type*	Speed	Package
V62C1801024L-70T	70 ns	8 x 20 mm 32-pin Plastic TSOP1
V62C1801024L-85T	85 ns	
V62C1801024L-100T	100 ns	
V62C1801024L-150T	150 ns	
V62C1801024LL-70T	70 ns	
V62C1801024LL-85T	85 ns	
V62C1801024LL-100T	100 ns	
V62C1801024LL-150T	150 ns	
V62C1801024L-70V	70 ns	8 x 13.4 mm 32-pin Plastic STSOP
V62C1801024L-85V	85 ns	
V62C1801024L-100V	100 ns	
V62C1801024L-150V	150 ns	
V62C1801024LL-70V	70 ns	
V62C1801024LL-85V	85 ns	
V62C1801024LL-100V	100 ns	
V62C1801024LL-150V	150 ns	
V62C1801024L(L)-70B	70 ns	48-fpBGA
V62C1801024L(L)-85B	85 ns	
V62C1801024L(L)-100B	100 ns	
V62C1801024L(L)-150B	150 ns	

*** For Industrial Temperature tested devices, an "I" designator will be added to the end of the device number.**

U.S.A.
3910 NORTH FIRST STREET
SAN JOSE, CA 95134
PHONE: 408-433-6000
FAX: 408-433-0952

TAIWAN
7F, NO. 102
MIN-CHUAN E. ROAD, SEC. 3
TAIPEI
PHONE: 886-2-2545-1213
FAX: 886-2-2545-1209

NO 19 LI HSIN ROAD
SCIENCE BASED IND. PARK
HSIN CHU, TAIWAN, R.O.C.
PHONE: 886-3-579-5888
FAX: 886-3-566-5888

SINGAPORE
10 ANSON ROAD #23-13
INTERNATIONAL PLAZA
SINGAPORE 079903
PHONE: 65-3231801
FAX: 65-3237013

JAPAN
ONZE 1852 BUILDING 6F
2-14-6 SHINTOMI, CHUO-KU
TOKYO 104-0041
PHONE: 03-3537-1400
FAX: 03-3537-1402

UK & IRELAND
SUITE 50, GROVEWOOD
BUSINESS CENTRE
STRATHCLYDE BUSINESS
PARK
BELLSHILL, LANARKSHIRE,
SCOTLAND, ML4 3NQ
PHONE: 44-1698-748515
FAX: 44-1698-748516

GERMANY
(CONTINENTAL
EUROPE & ISRAEL)
BENZSTRASSE 32
71083 HERRENBERG
GERMANY
PHONE: +49 7032 2796-0
FAX: +49 7032 2796 22

U.S. SALES OFFICES

NORTHWESTERN
3910 NORTH FIRST STREET
SAN JOSE, CA 95134
PHONE: 408-433-6000
FAX: 408-433-0952

SOUTHWESTERN
302 N. EL CAMINO REAL #200
SAN CLEMENTE, CA 92672
PHONE: 949-361-7873
FAX: 949-361-7807

CENTRAL,
NORTHEASTERN &
SOUTHEASTERN
604 FIELDWOOD CIRCLE
RICHARDSON, TX 75081
PHONE: 214-826-6176
FAX: 214-828-9754

4/01
Printed in U.S.A.