V62C2802048L(L)

Ultra Low Power
256K x 8 CMOS SRAM

Features

- **Low-power consumption**
  - **Active: 35mA at 55ns**
  - **Stand-by: 10 µA (CMOS input/output)**
    2 µA CMOS input/output, L version
- **Single +2.2 to 2.7V Power Supply_Typical**
- **Extented Voltage from 2.2 to 3.6V.**
- **Equal access and cycle time**
- **55/70/85/100 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**
- **Package available: 32L TSOP(I)/ STSOP(I)**
- **48 Ball CSP_BGA**

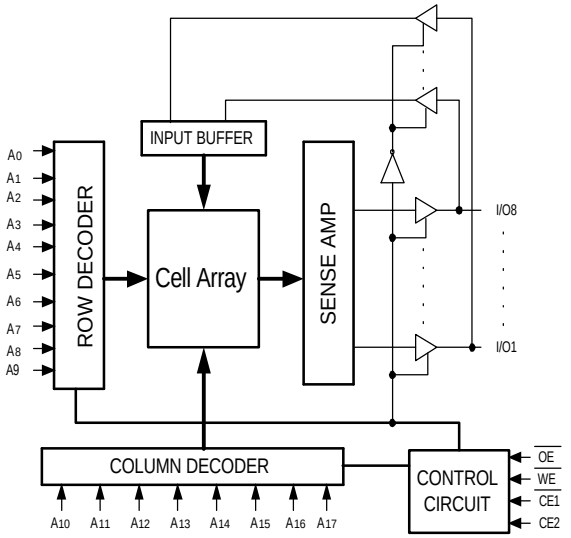
Functional Description

The V62C2802048L is a low power CMOS Static RAM organized as 262,144 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.

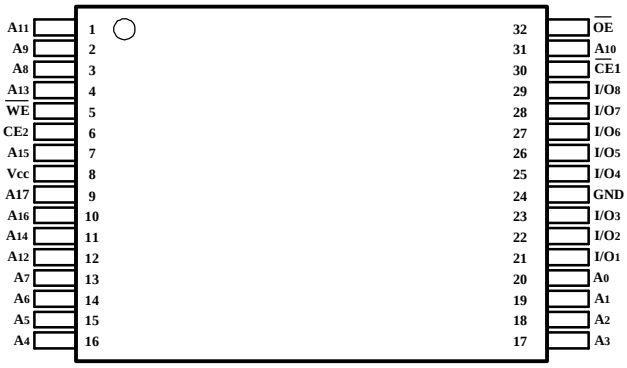
Writing to the device is accomplished by taking Chip Enable 1 ($\overline{CE1}$) with Write Enable ($\overline{WE}$) LOW, and Chip Enable 2 (CE2) HIGH. Reading from the device is performed by taking Chip Enable 1 ($\overline{CE1}$) with Output Enable ($\overline{OE}$) LOW while Write Enable ($\overline{WE}$) 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.

TheV62C2802048LL comes with a 1V data retention feature and Lower Standby Power. The V62C2802048L is avalable in a 32-pin 8 x 20 mm TSOP1 / STSOP 8x13.4 mm and CSP type 48-fpBGA packages.

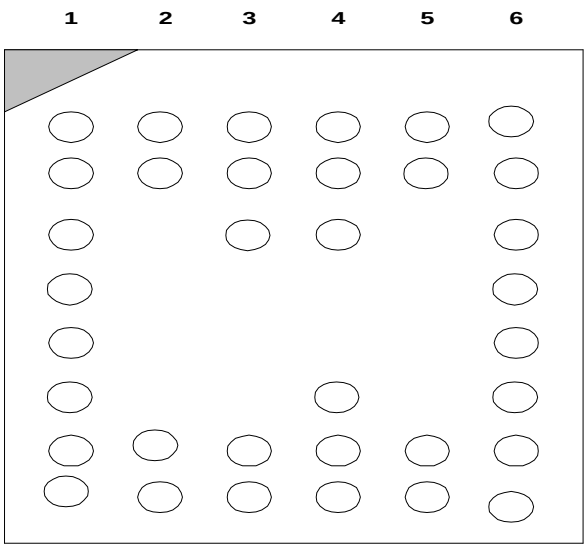
Logic Block Diagram



32-Pin TSOP1 / STSOP (CSP_BGA See next page)



MOSEL VITELIC V62C2802048L(L)B



Top View

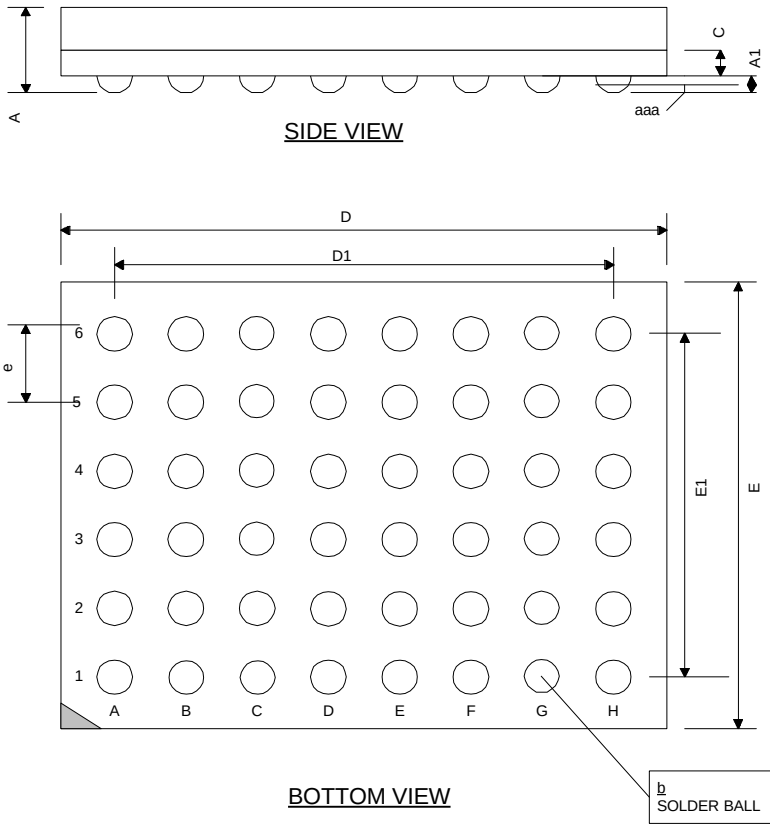
	1	2	3	4	5	6
A	A0	A1	CS2	A3	A6	A8
B	I/O5	A2	$\overline{WE}$	A4	A7	I/O1
C	I/O6	NC	NC	A5	NC	I/O2
D	VSS	NC	NC	NC	NC	VCC
E	VCC	NC	NC	NC	NC	VSS
F	I/O7	NC	NC	A17	NC	I/O3
G	I/O8	$\overline{OE}$	$\overline{CS1}$	A16	A15	I/O4
H	A9	A10	A11	A12	A13	A14

Note: NC means no Ball.

Top View

48 Ball - 9x12 fpBGA (Ultra Low Power)

PACKAGE OUTLINE DWG.



SYMBOL	UNIT:MM
A	1.05+0.15
A1	0.25±0.05
b	0.35±.05
c	0.30(TYP)
D	12.00±0.10
D1	5.25
E	9.00±0.10
E1	3.75
e	0.75TYP
aaa	0.10

Absolute Maximum Ratings *

Parameter	Symbol	Minimum	Maximum	Unit
Voltage on Any Pin Relative to Gnd	Vt	-0.5	3.6	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}	2.2	2.5	2.7	V
	Gnd	0.0	0.0	0.0	V
Input Voltage	V_{IH}	2.0	-	V_{CC} + 0.2	V
	V_{IL}	-0.5*	-	0.6	V

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

** For Industrial Temperature

DC Operating Characteristics (V_{cc} = 2.2~2.7V, Gnd = 0V, T_A = 0^0C to +70^0C / -40^0C to 85^0C)

Parameter	Sym	Test Conditions	-55		-70		-85		-100		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	-	35	-	30	-	25	-	20	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	-	10	-	10	-	10	-	10	µA
		L	***-***	***2***	***-***	***2***	***-***	***2***	***-***	***2***	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} = -2 mA	2.0	-	2.0	-	2.0	-	2.0	-	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 0.6V to 2.2V
Input Rise and Fall Time 5ns
Input and Output Timing
Reference Level 1.4V

Output Load Condition

70ns/85 ns C_L = 30pf + 1TTL Load
Load 100ns/120 ns C_L= 100pf + 1TTL Load

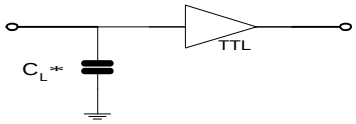


Figure A. *** Including Scope and Jig Capacitan**

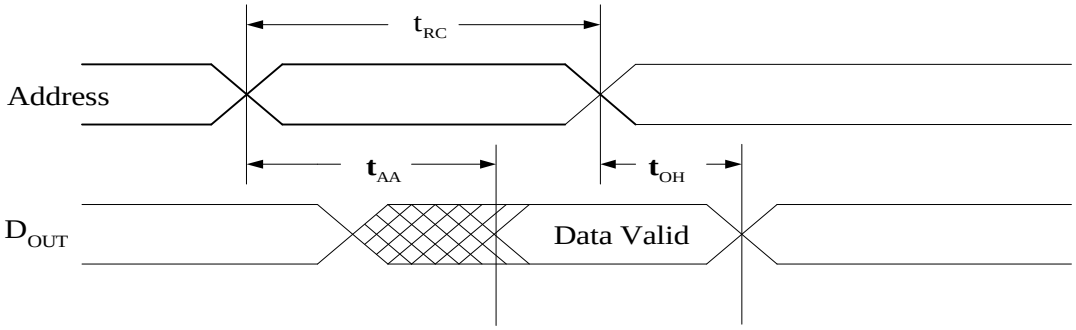
Read Cycle [3,9] (V_{cc} = 2.2~2.7V, Gnd = 0V, T_A = 0^0C to +70^0C / -40^0C to +85^0C)

Parameter	Symbol	-55		-70		-85		-100		Unit	Note
		Min	Max	Min	Max	Min	Max	Min	Max		
Read Cycle Time	t_{RC}	55	-	70	-	85	-	100	-	ns	
Address Access Time	t_{AA}	-	55	-	70	-	85	-	100	ns	
Chip Enable Access Time	t_{ACE}	-	55	-	70	-	85	-	100	ns	
Output Enable Access Time	t_{OE}	-	35	-	40	-	40	-	50	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}	-	25	-	30	-	35	-	40	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	-	25	-	30	-	35	ns	4,5
Power-Up Time	t_{PU}	0	-	0	-	0	-	0	-	ns	5
Power-Down Time	t_{PD}	-	55	-	70	-	85	-	100	ns	5

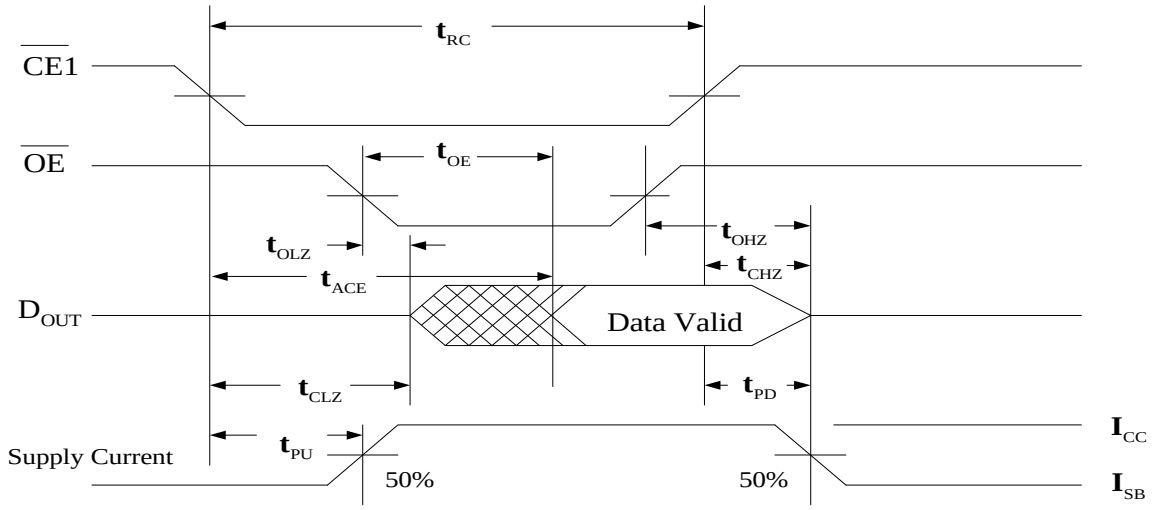
Write Cycle [3,11] (V_{cc} = 2.2~2.7V, Gnd = 0V, T_A = 0^0C to +70^0C / -40^0C to +85^0C)

Parameter	Symbol	-55		-70		-85		-100		Unit	Note
		Min	Max	Min	Max	Min	Max	Min	Max		
Write Cycle Time	t_{WC}	55	-	70	-	85	-	100	-	ns	
Chip Enable to Write End	t_{CW}	45	-	60	-	70	-	80	-	ns	
Address Setup to Write End	t_{AW}	45	-	60	-	70	-	80	-	ns	
Address Setup Time	t_{AS}	0	-	0	-	0	-	0	-	ns	
Write Pulse Width	t_{WP}	45	-	50	-	60	-	70	-	ns	
Write Recovering Time	t_{WR}	0	-	0	-	0	-	0	-	ns	
Data Valid to Write End	t_{DW}	25	-	30	-	35	-	40	-	ns	
Data Hold Time	t_{DH}	0	-	0	-	0	-	0	-	ns	
Write Enable to Output in High-Z	t_{WZ}	-	25	-	30	-	35	-	40	ns	4,5
Output Active from Write End	t_{OW}	5	-	5	-	5	-	5	-	ns	4,5

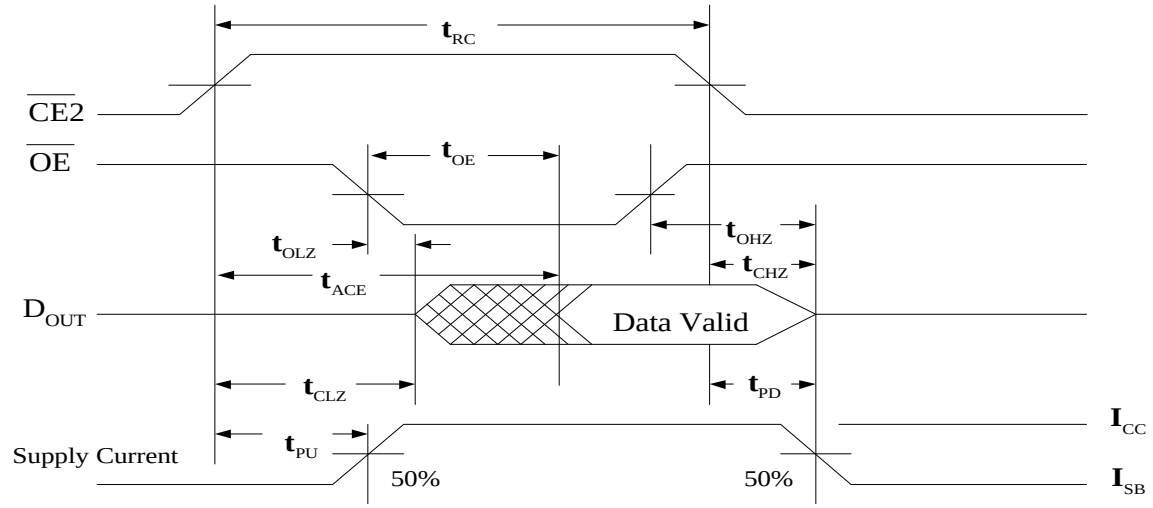
Timing Waveform of Read Cycle 1(Address Controlled) (3,6,7,9)



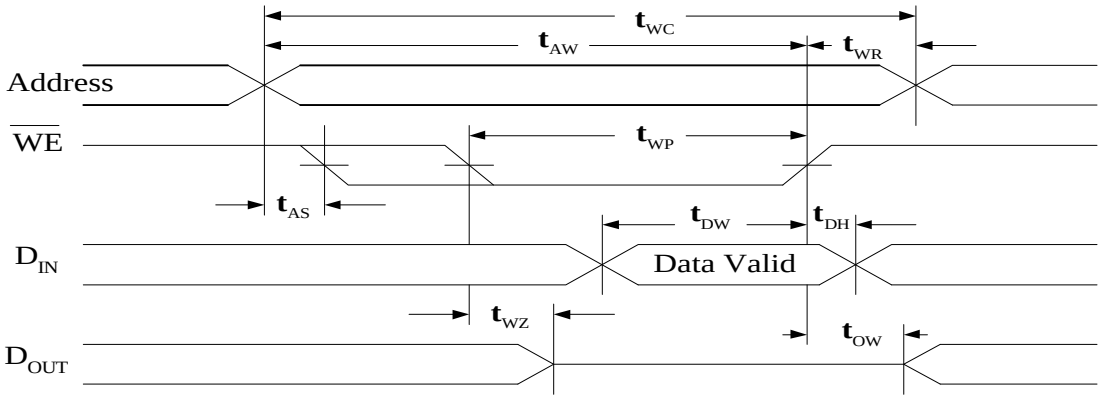
Timing Waveform of Read Cycle 2($\overline{CE1}$ Controled)(5,6,8,9)



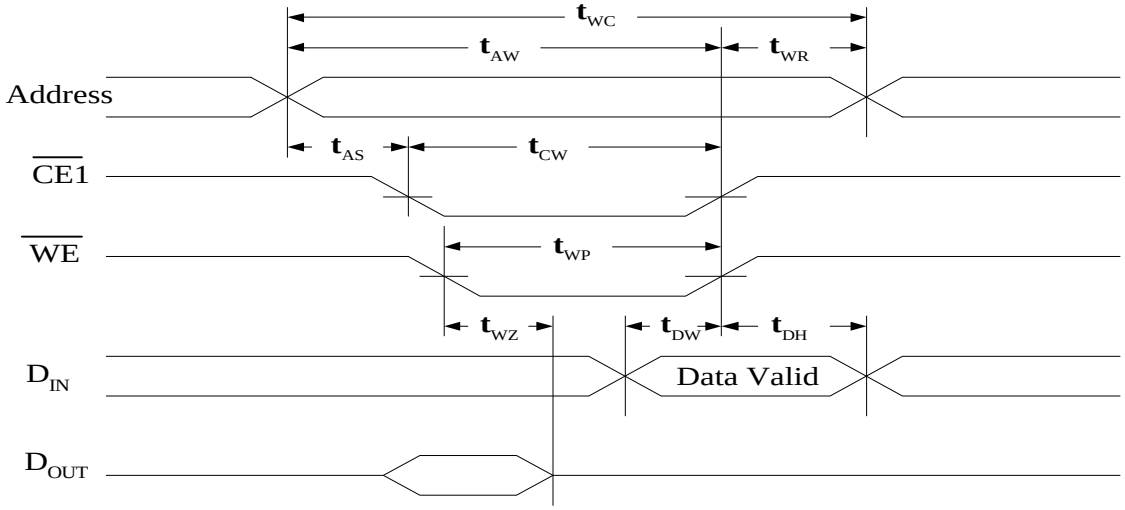
Timing Waveform of Read Cycle 3(CE2 Controlled) (3,6,8,9)



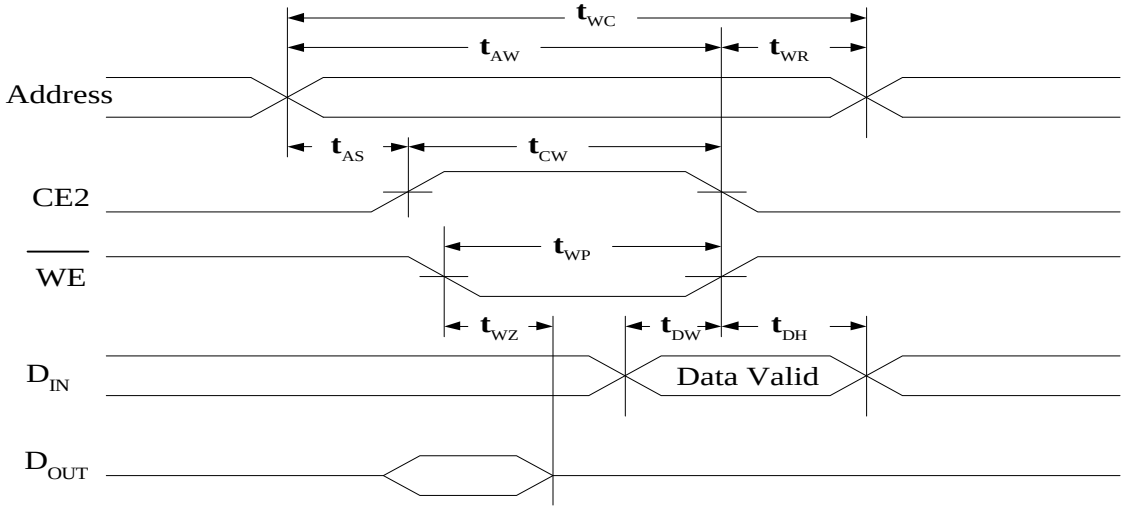
Timing Waveform of Write Cycle 1 ($\overline{WE}$ Controlled)(10,11)



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



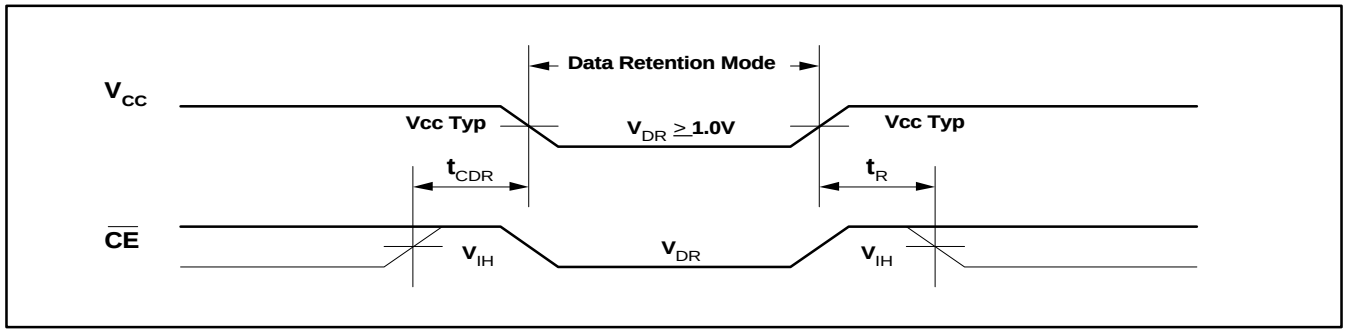
Timing Waveform of Write Cycle 3 (CE2 Controlled) (10,11)



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 samples 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
V62C2802048L-55T	55 ns	8 x 20 mm 32-pin Plastic TSOP1
V62C2802048L-70T	70 ns	
V62C2802048L-85T	85 ns	
V62C2802048L-100T	100 ns	
V62C2802048LL-55T	55 ns	
V62C2802048LL-70T	70 ns	
V62C2802048LL-85T	85 ns	
V62C2802048LL-100T	100 ns	
V62C2802048L(L)-55V	55 ns	8 x 13.4 mm 32-pin Plastic STSOP
V62C2802048L(L)-70V	70 ns	
V62C2802048L(L)-85V	85 ns	
V62C2802048L(L)-100V	100 ns	
V62C2802048L(L)-55B	55 ns	48-fpBGA
V62C2802048L(L)-70B	70 ns	
V62C2802048L(L)-85B	85 ns	
V62C2802048L(L)-100B	100 ns	

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

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