

Features

- Ultra Low-power consumption
 - Active: 20mA at 70ns
 - Stand-by: 5 μ A (CMOS input/output)
1 μ A 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

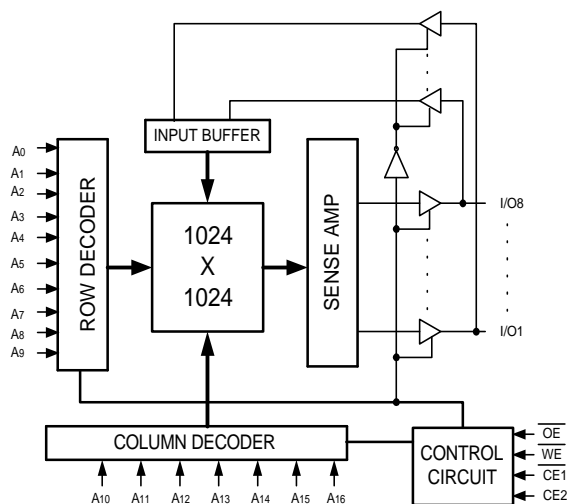
Functional Description

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.

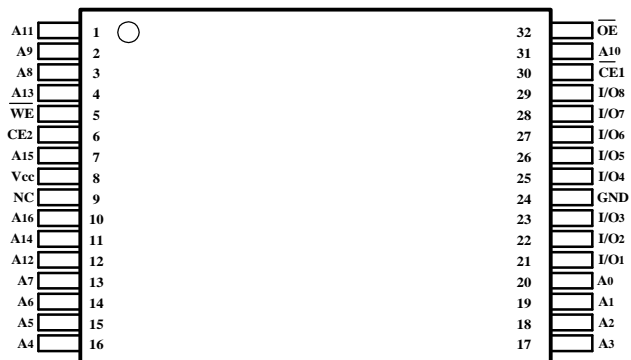
Writing to the device is accomplished by taking Chip Enable 1 ($\overline{CE1}$) with Write Enable (\overline{WE}) LOW, and Chip Enable 2 (CE2) HIGH. Reading from the device is performed by taking Chip Enable 1 ($\overline{CE1}$) with Output Enable (\overline{OE}) LOW while Write Enable (\overline{WE})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

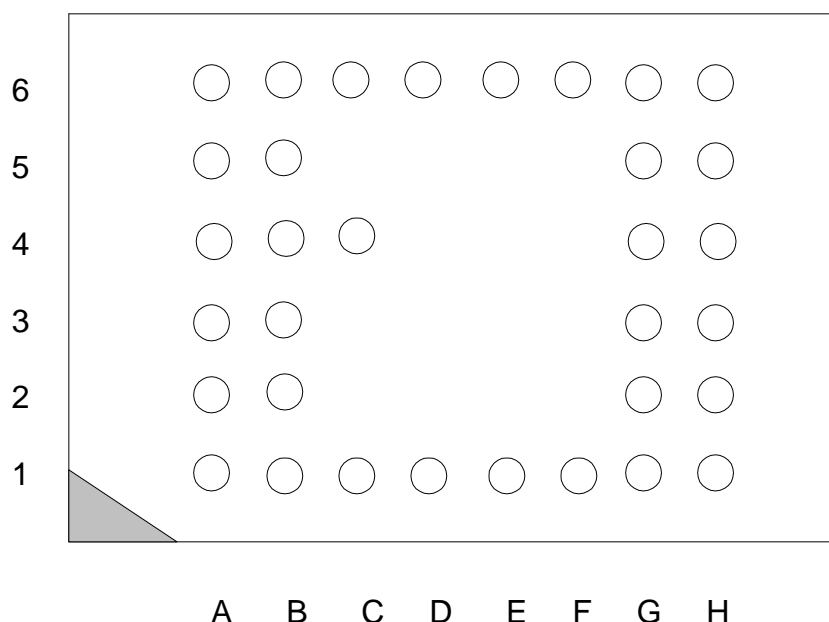
The V62C1801024LL comes with a 1V data retention feature and Lower Standby Power. The V62C1801024L is available in a 32-pin 8 x 20 mm TSOP1 / STSOP / 48-fpBGA packages.

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	<u>CE2</u>	A ₃	A ₆	A ₈
B	I/O ₄	A ₂	<u>WE</u>	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	NC	NC	NC	NC	I/O ₂
G	I/O ₇	<u>OE</u>	<u>CE1</u>	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	V _t	-0.5	4.6	V
Power Dissipation	P _T	—	1.0	W
Storage Temperature (Plastic)	T _{stg}	-55	+150	°C
Temperature Under Bias	T _{bias}	-40	+85	°C

* **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

CE1	CE2	WE	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°C to +70°C / -40°C to 85°C**)

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 $2.2V$, $Gnd = 0V$, $T_A = 0^{\circ}C$ to $+70^{\circ}C$ / $-40^{\circ}C$ to $85^{\circ}C$)

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

Capacitance ($f = 1MHz$, $T_A = 25^{\circ}C$)

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 $C_L = 30pF + 1TTL \text{ Load}$
Load 100ns/150 ns $C_L = 100pF + 1TTL \text{ Load}$

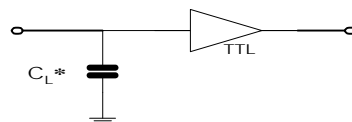


Figure A. * Including Scope and Jig Capacitance

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

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 $2.2V$, $Gnd = 0V$, $T_A = 0^{\circ}C$ to $+70^{\circ}C$ / $-40^{\circ}C$ to $+85^{\circ}C$)

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

The diagram shows two signals over time. The top signal, labeled 'Address', transitions from a low state to a high state and then back to low. The bottom signal, labeled 'D_{OUT}', transitions from a high state to a low state and then back to high. A shaded region on the 'D_{OUT}' signal indicates the period when data is valid. Three time intervals are marked: t_{RC} is the time from the rising edge of the Address signal to the falling edge of the Data Valid signal; t_{AA} is the time from the rising edge of the Address signal to the rising edge of the Data Valid signal; and t_{OH} is the time from the falling edge of the Address signal to the falling edge of the Data Valid signal.

The timing diagram illustrates the relationship between the clock enable (CE1), output enable (OE), data output (DOUT), and supply current. Key timing parameters are defined as follows:

- t_{RC} : Clock-to-output delay from CE1 to DOUT.
- t_{OE} : Output enable delay from OE to DOUT.
- t_{OLZ} : Output low-to-ohm delay from DOUT to OE.
- t_{OHZ} : Output high-to-ohm delay from DOUT to OE.
- t_{ACE} : Address-to-output delay from DOUT to CE1.
- t_{CHZ} : Output high-to-ohm delay from DOUT to OE.
- t_{CLZ} : Output low-to-ohm delay from DOUT to OE.
- t_{PD} : Power-down delay from DOUT to OE.
- t_{PU} : Power-up delay from DOUT to OE.

The diagram also shows the 50% crossing points for the supply current and the data output signal, with the region between them labeled "Data Valid".

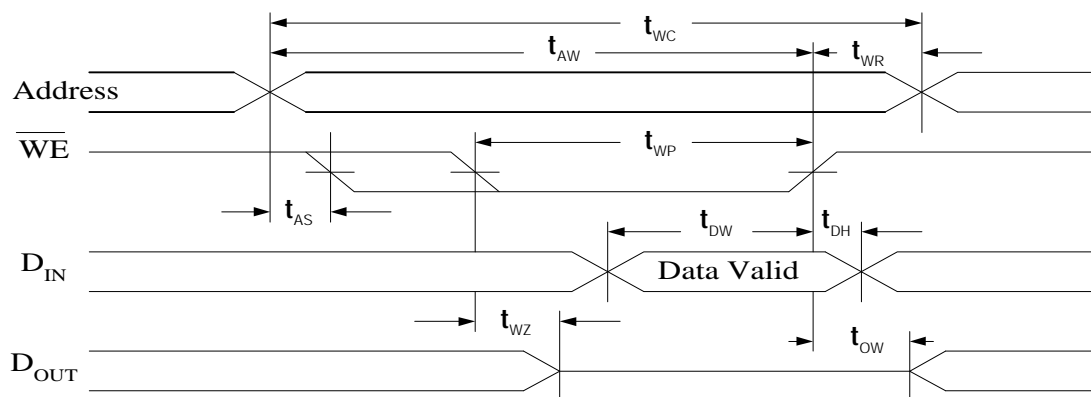
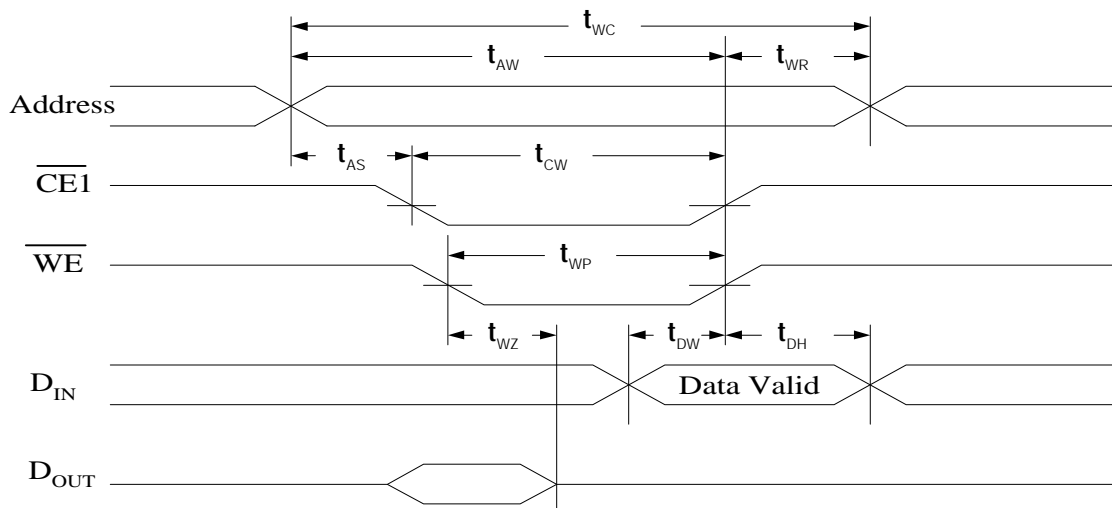
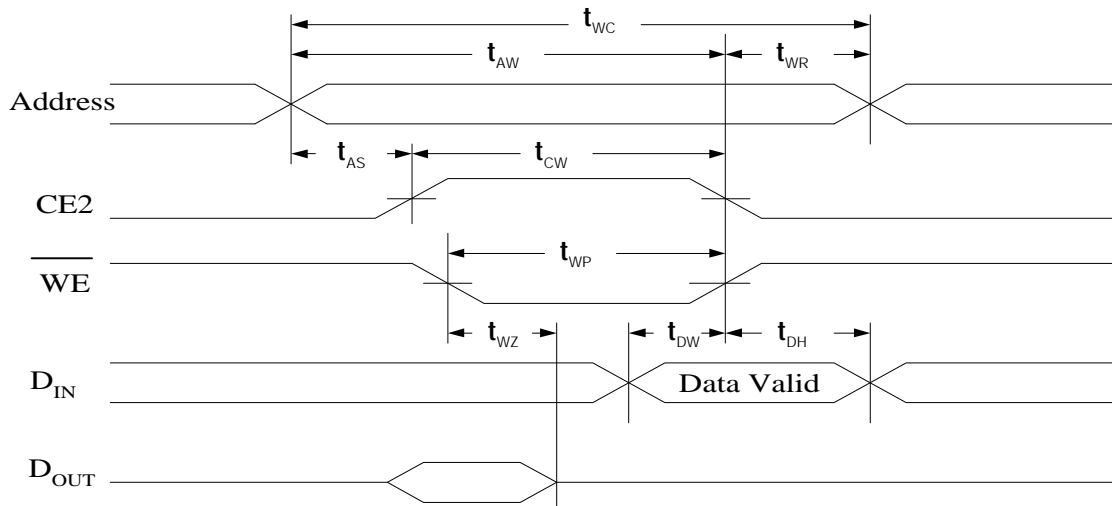
The timing diagram illustrates the relationship between several signals and their timing parameters:

- CE2**: Chip Enable 2, shown as an active-low signal.
- OE**: Output Enable, shown as an active-low signal.
- D_{OUT}**: Data Output signal.
- Supply Current**: The current drawn from the supply, showing a 50% duty cycle for the active period.
- I_{CC}**: Core supply current.
- I_{SB}**: Standby supply current.

Key timing parameters are indicated by arrows:

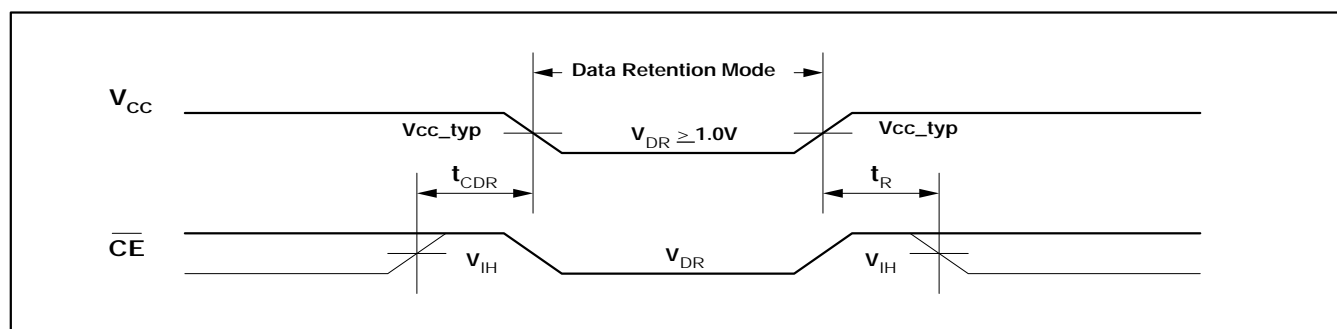
- t_{RC}**: Recovery time from CE2 to OE.
- t_{OE}**: Output Enable delay.
- t_{OLZ}**: Output Low-Z delay.
- t_{ACE}**: Address Change delay.
- t_{OHZ}**: Output High-Z delay.
- t_{CHZ}**: Output Change delay.
- t_{CLZ}**: Output Low-Z delay.
- t_{PD}**: Power Down delay.
- t_{PU}**: Power Up delay.

The **Data Valid** period is highlighted with a hatched pattern, indicating the time during which the output data is valid.

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

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

Timing Waveform of Write Cycle 3 ^(10,11) ($\overline{\text{CE2}}$ 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 $CE_2 \leq +0.2V$	1.0	-	V
Data Retention Current	I_{CCDR}		-	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) ($T_A = 0^{\circ}C$ to $+70^{\circ}C$ / $-40^{\circ}C$ to $+85^{\circ}C$)

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 $\pm 500mV$ from steady-state voltage.
5. This parameter is guaranteed, but is not tested.
6. \overline{WE} is HIGH for read cycle.
7. \overline{CE}_1 and \overline{OE} are LOW and CE_2 is HIGH for read cycle.
8. Address valid prior to or coincident with \overline{CE}_1 transition LOW or CE_2 transition HIGH.
9. All read cycle timings are referenced from the last valid address to the first transition address.
10. \overline{CE}_1 or \overline{WE} must be HIGH or CE_2 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 “T” designator will be added to the end of the device number.

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