

1 Mb (64K x 16) Static RAM

Features

- Very high speed: 45 ns
- Wide voltage range: 2.2V to 3.6V
- Pin compatible with CY62127BV
- Ultra-low active power
 - Typical active current: 0.85 mA @ f = 1 MHz
 - Typical active current: 5 mA @ f = f_{MAX}
- Ultra-low standby power
- Easy memory expansion with \overline{CE} and \overline{OE} features
- Automatic power-down when deselected
- Packages offered in a 48-ball FBGA and a 44-lead TSOP Type II
- Also available in Lead-Free 48-ball FBGA, and 44-lead TSOP Type II packages

Functional Description^[1]

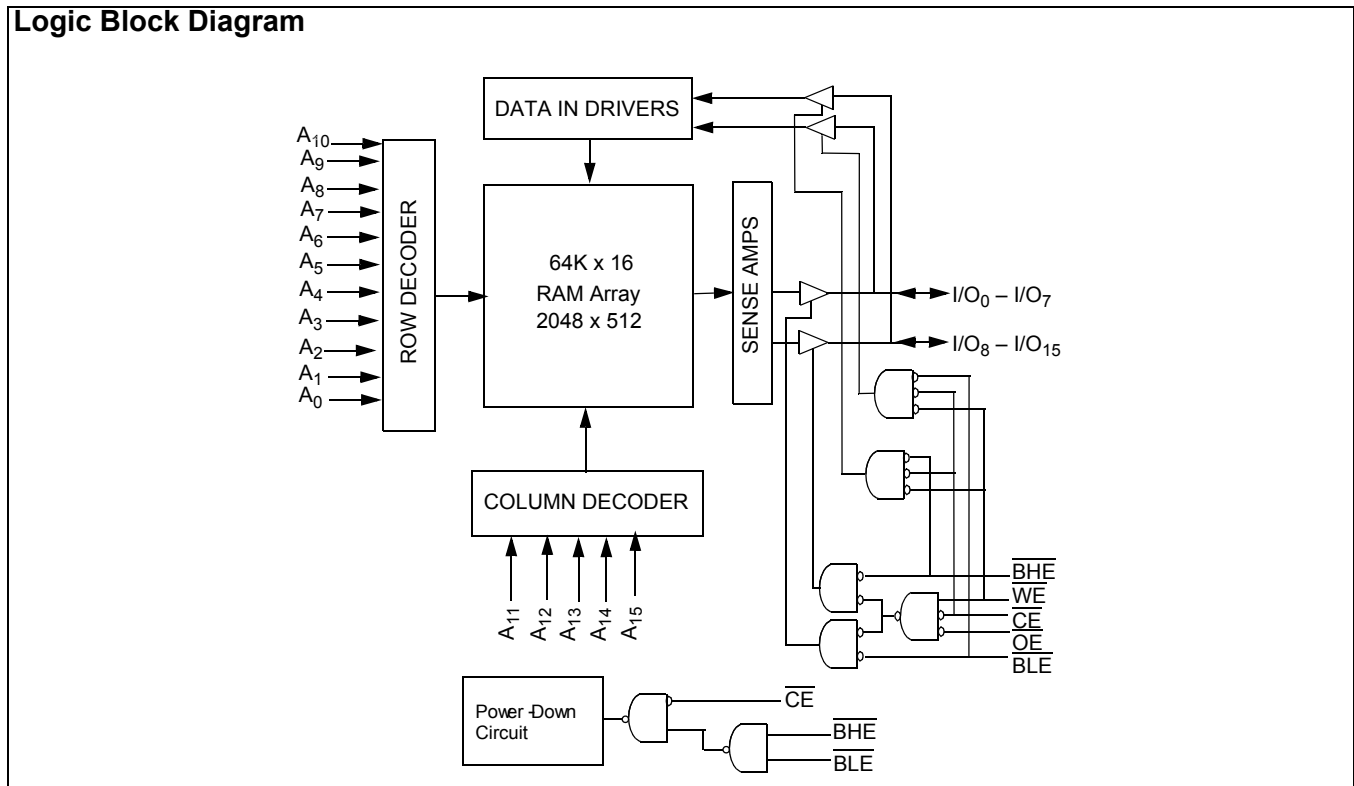
The CY62127DV30 is a high-performance CMOS static RAM organized as 64K words by 16 bits. This device features advanced circuit design to provide ultra-low active current. This is ideal for providing More Battery Life™ (MoBL®) in portable applications such as cellular telephones. The device

also has an automatic power-down feature that significantly reduces power consumption by 90% when addresses are not toggling. The device can be put into standby mode reducing power consumption by more than 99% when deselected (\overline{CE} HIGH or both \overline{BHE} and \overline{BLE} are HIGH). The input/output pins (I/O_0 through I/O_{15}) are placed in a high-impedance state when: deselected (\overline{CE} HIGH), outputs are disabled (\overline{OE} HIGH), both Byte High Enable and Byte Low Enable are disabled (\overline{BHE} , \overline{BLE} HIGH) or during a write operation (\overline{CE} LOW and \overline{WE} LOW).

Writing to the device is accomplished by taking Chip Enable (\overline{CE}) and Write Enable (\overline{WE}) inputs LOW. If Byte Low Enable (\overline{BLE}) is LOW, then data from I/O pins (I/O_0 through I/O_7), is written into the location specified on the address pins (A_0 through A_{15}). If Byte High Enable (\overline{BHE}) is LOW, then data from I/O pins (I/O_8 through I/O_{15}) is written into the location specified on the address pins (A_0 through A_{15}).

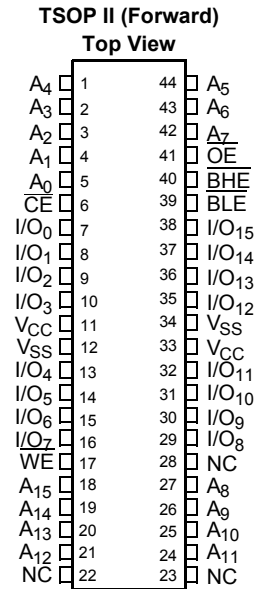
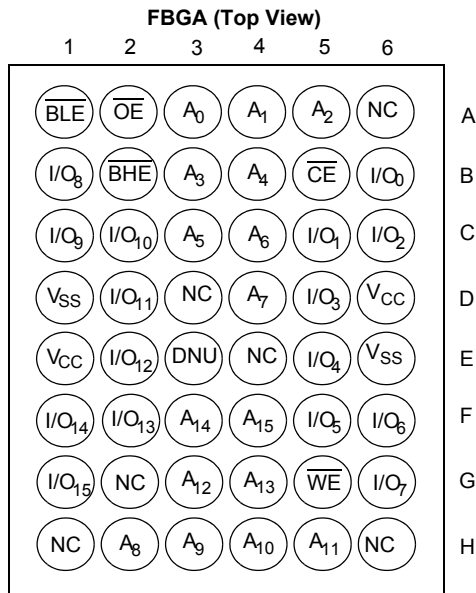
Reading from the device is accomplished by taking Chip Enable (\overline{CE}) and Output Enable (\overline{OE}) LOW while forcing the Write Enable (\overline{WE}) HIGH. If Byte Low Enable (\overline{BLE}) is LOW, then data from the memory location specified by the address pins will appear on I/O_0 to I/O_7 . If Byte High Enable (\overline{BHE}) is LOW, then data from memory will appear on I/O_8 to I/O_{15} . See the truth table at the back of this data sheet for a complete description of read and write modes.

Logic Block Diagram



Note:

1. For best-practice recommendations, please refer to the Cypress application note "System Design Guidelines" on <http://www.cypress.com>.

Pin Configuration^[2, 3]

Product Portfolio

Product	V _{CC} Range (V)			Speed (ns)	Power Dissipation					
					Operating, I _{CC} (mA)				Standby, I _{SB2} (μA)	
	f = 1 MHz		f = f _{MAX}							
	Min.	Typ.	Max.		Typ. ^[4]	Max.	Typ. ^[4]	Max.	Typ. ^[4]	Max.
CY62127DV30L	2.2	3.0	3.6	45	0.85	1.5	6.5	13	1.5	5
CY62127DV30LL				45	0.85	1.5	6.5	13	1.5	4
CY62127DV30L	2.2	3.0	3.6	55	0.85	1.5	5	10	1.5	5
CY62127DV30LL				55	0.85	1.5	5	10	1.5	4
CY62127DV30L	2.2	3.0	3.6	70	0.85	1.5	5	10	1.5	5
CY62127DV30LL				70	0.85	1.5	5	10	1.5	4

Notes:

- NC pins are not connected to the die.
- E3 (DNU) can be left as NC or V_{SS} to ensure proper operation. (Expansion Pins on FBGA Package: E4 - 2M, D3 - 4M, H1 - 8M, G2 - 16M, H6 - 32M).
- Typical values are included for reference only and are not guaranteed or tested. Typical values are measured at V_{CC} = V_{CC(typ)}, T_A = 25°C.



Maximum Ratings

(Above which the useful life may be impaired. For user guidelines, not tested.)

- Storage Temperature -65°C to +150°C
- Ambient Temperature with Power Applied..... -55°C to +125°C
- Supply Voltage to Ground Potential -0.3V to 3.9V
- DC Voltage Applied to Outputs in High-Z State^[5] -0.3V to V_{CC} + 0.3V

- DC Input Voltage^[5] -0.3V to V_{CC} + 0.3V
- Output Current into Outputs (LOW)..... 20 mA
- Static Discharge Voltage..... > 2001V (per MIL-STD-883, Method 3015)
- Latch-up Current..... > 200 mA

Operating Range

Range	Ambient Temperature (T _A)	V _{CC} ^[6]
Industrial	-40°C to +85°C	2.2V to 3.6V

DC Electrical Characteristics (Over the Operating Range)

Parameter	Description	Test Conditions	CY62127DV30-45			CY62127DV30-55			CY62127DV30-70			Unit	
			Min.	Typ. ^[4]	Max.	Min.	Typ. ^[4]	Max.	Min.	Typ. ^[4]	Max.		
V _{OH}	Output HIGH Voltage	2.2 ≤ V _{CC} ≤ 2.7	I _{OH} = -0.1 mA	2.0			2.0			2.0		V	
		2.7 ≤ V _{CC} ≤ 3.6	I _{OH} = -1.0 mA	2.4			2.4			2.4			
V _{OL}	Output LOW Voltage	2.2 ≤ V _{CC} ≤ 2.7	I _{OL} = 0.1 mA			0.4			0.4			V	
		2.7 ≤ V _{CC} ≤ 3.6	I _{OL} = 2.1 mA			0.4			0.4		0.4		
V _{IH}	Input HIGH Voltage	2.2 ≤ V _{CC} ≤ 2.7		1.8		V _{CC} + 0.3	1.8		V _{CC} + 0.3	1.8		V	
		2.7 ≤ V _{CC} ≤ 3.6		2.2		V _{CC} + 0.3	2.2		V _{CC} + 0.3	2.2			
V _{IL}	Input LOW Voltage	2.2 ≤ V _{CC} ≤ 2.7		-0.3		0.6	-0.3		0.6	-0.3		V	
		2.7 ≤ V _{CC} ≤ 3.6		-0.3		0.8	-0.3		0.8	-0.3			
I _{IX}	Input Leakage Current	GND ≤ V _I ≤ V _{CC}		-1		+1	-1		+1	-1		μA	
I _{OZ}	Output Leakage Current	GND ≤ V _O ≤ V _{CC} , Output Disabled		-1		+1	-1		+1	-1		μA	
I _{CC}	V _{CC} Operating Supply Current	f = f _{MAX} = 1/t _{RC}	V _{CC} = 3.6V, I _{OUT} = 0 mA, CMOS level		6.5	13		5	10		5	10	mA
		f = 1 MHz			0.85	1.5		0.85	1.5		0.85	1.5	
I _{SB1}	Automatic CE Power-down Current—CMOS Inputs	CE ≥ V _{CC} - 0.2V, V _{IN} ≥ V _{CC} - 0.2V, V _{IN} ≤ 0.2V, f = f _{MAX} (Address and Data Only), f = 0 (OE, WE, BHE and BLE)	L		1.5	5		1.5	5		1.5	5	μA
			LL		1.5	4		1.5	4		1.5	4	
I _{SB2}	Automatic CE Power-down Current—CMOS Inputs	CE ≥ V _{CC} - 0.2V, V _{IN} ≥ V _{CC} - 0.2V or V _{IN} ≤ 0.2V, f = 0, V _{CC} = 3.6V	L		1.5	5		1.5	5		1.5	5	μA
			LL		1.5	4		1.5	4		1.5	4	

Notes:

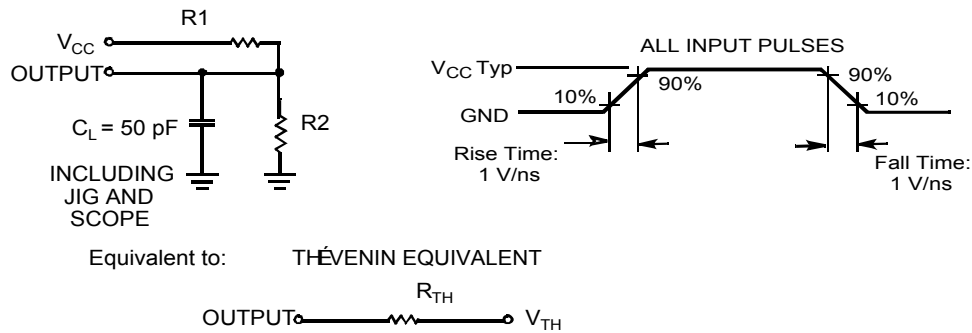
- 5. V_{IL(min.)} = -2.0V for pulse durations less than 20 ns., V_{IH(max.)} = V_{CC}+0.75V for pulse durations less than 20 ns.
- 6. Full device Operation Requires linear Ramp of V_{CC} from 0V to V_{CC(min)} & V_{CC} must be stable at V_{CC(min)} for 500 μs.

Capacitance^[7]

Parameter	Description	Test Conditions	Max.	Unit
C_{IN}	Input Capacitance	$T_A = 25^\circ\text{C}$, $f = 1\text{ MHz}$ $V_{CC} = V_{CC(\text{typ})}$	8	pF
C_{OUT}	Output Capacitance		8	pF

Thermal Resistance

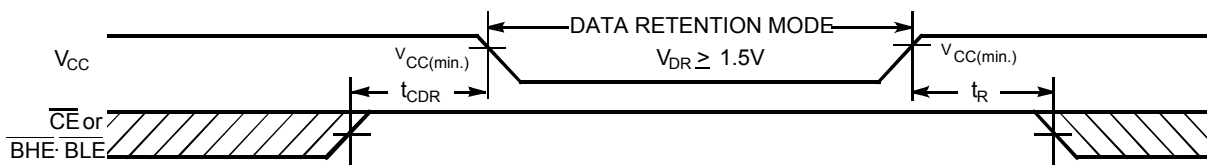
Parameter	Description	Test Conditions	FBGA	TSOP II	Unit
θ_{JA}	Thermal Resistance (Junction to Ambient) ^[7]	Still Air, soldered on a 3 x 4.5 inch, two-layer printed circuit board	55	76	$^\circ\text{C/W}$
θ_{JC}	Thermal Resistance (Junction to Case) ^[7]		12	11	$^\circ\text{C/W}$

AC Test Loads and Waveforms^[8]


Parameters	2.5V (2.2–2.7V)	3.0V (2.7–3.6V)	Unit
R1	16600	1103	Ω
R2	15400	1554	Ω
R_{TH}	8000	645	Ω
V_{TH}	1.2	1.75	V

Data Retention Characteristics

Parameter	Description	Conditions	Min.	Typ ^[4]	Max.	Unit
V_{DR}	V_{CC} for Data Retention		1.5			V
I_{CCDR}	Data Retention Current	$V_{CC} = 1.5\text{V}$, $\overline{CE} \geq V_{CC} - 0.2\text{V}$, $V_{IN} \geq V_{CC} - 0.2\text{V}$ or $V_{IN} \leq 0.2\text{V}$	L		4	μA
			LL		3	
$t_{CDR}^{[7]}$	Chip Deselect to Data Retention Time		0			ns
$t_R^{[9]}$	Operation Recovery Time		200			μs

Data Retention Waveform^[10]

Notes:

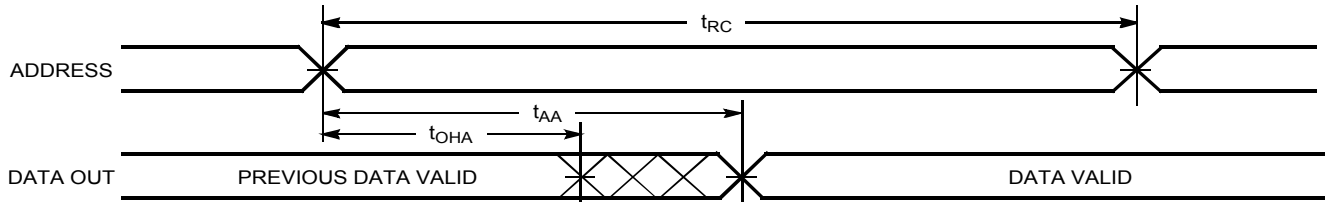
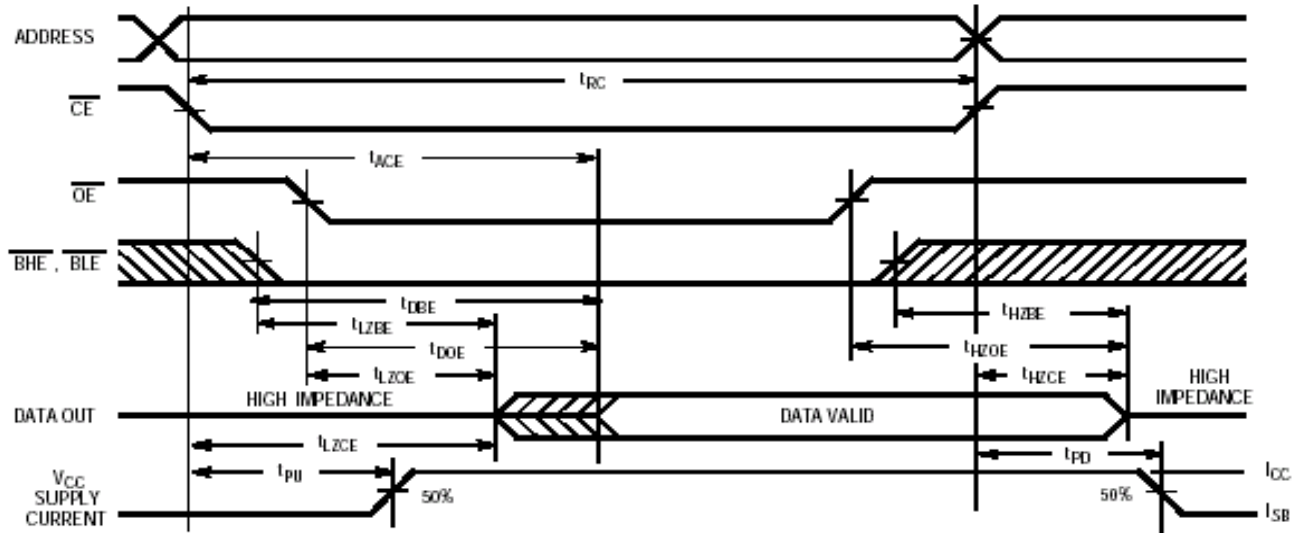
7. Tested initially and after any design or process changes that may affect these parameters.
8. Test condition for the 45-ns part is a load capacitance of 30 pF.
9. Full device operation requires linear V_{CC} ramp from V_{DR} to $V_{CC(\text{min.})} > 200\ \mu\text{s}$.
10. $\overline{BHE}:\overline{BLE}$ is the AND of both \overline{BHE} and \overline{BLE} . Chip can be deselected by either disabling the Chip Enable signals or by disabling both.

Switching Characteristics (Over the Operating Range)^[11]

Parameter	Description	CY62127DV30-45 ^[8]		CY62127DV30-55		CY62127DV30-70		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Read Cycle								
t_{RC}	Read Cycle Time	45		55		70		ns
t_{AA}	Address to Data Valid		45		55		70	ns
t_{OHA}	Data Hold from Address Change	10		10		10		ns
t_{ACE}	\overline{CE} LOW to Data Valid		45		55		70	ns
t_{DOE}	\overline{OE} LOW to Data Valid		25		25		35	ns
t_{LZOE}	\overline{OE} LOW to Low Z ^[12]	5		5		5		ns
t_{HZOE}	\overline{OE} HIGH to High Z ^[12,14]		15		20		25	ns
t_{LZCE}	\overline{CE} LOW to Low Z ^[12]	10		10		10		ns
t_{HZCE}	\overline{CE} HIGH to High Z ^[12,14]		20		20		25	ns
t_{PU}	\overline{CE} LOW to Power-up	0		0		0		ns
t_{PD}	\overline{CE} HIGH to Power-down		45		55		70	ns
t_{DBE}	$\overline{BLE}/\overline{BHE}$ LOW to Data Valid		45		55		70	ns
t_{LZBE} ^[13]	$\overline{BLE}/\overline{BHE}$ LOW to Low Z ^[12]	5		5		5		ns
t_{HZBE}	$\overline{BLE}/\overline{BHE}$ HIGH to High-Z ^[12,14]		15		20		25	ns
Write Cycle^[15]								
t_{WC}	Write Cycle Time	45		55		70		ns
t_{SCE}	\overline{CE} LOW to Write End	40		40		60		ns
t_{AW}	Address Set-up to Write End	40		40		60		ns
t_{HA}	Address Hold from Write End	0		0		0		ns
t_{SA}	Address Set-up to Write Start	0		0		0		ns
t_{PWE}	\overline{WE} Pulse Width	35		40		50		ns
t_{BW}	$\overline{BLE}/\overline{BHE}$ LOW to Write End	40		40		60		ns
t_{SD}	Data Set-up to Write End	25		25		30		ns
t_{HD}	Data Hold from Write End	0		0		0		ns
t_{HZWE}	\overline{WE} LOW to High Z ^[12,14]		15		20		25	ns
t_{LZWE}	\overline{WE} HIGH to Low Z ^[12]	10		10		5		ns

Notes:

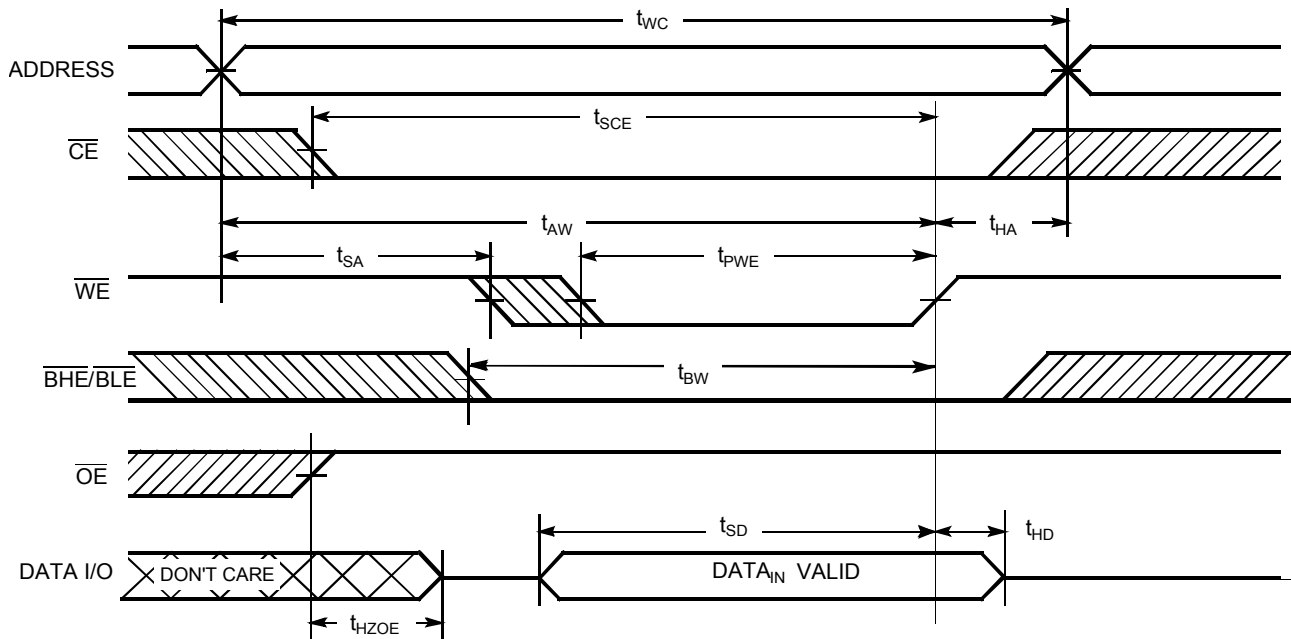
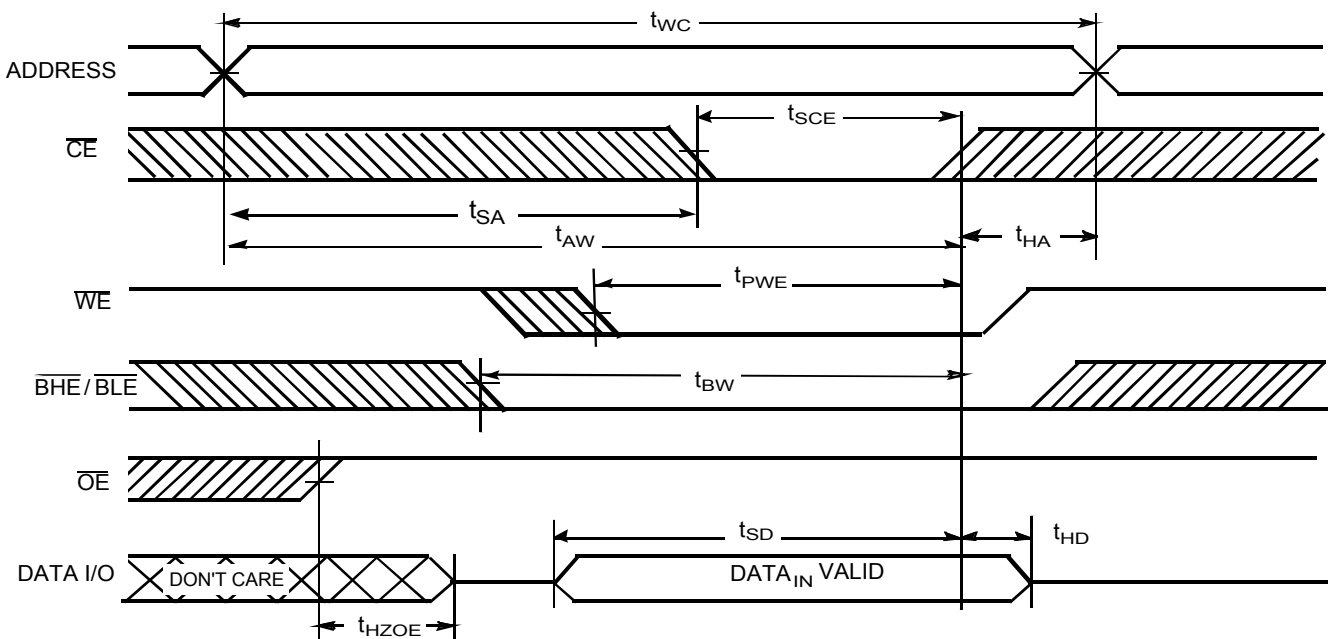
11. Test conditions assume signal transition time of 1V/ns or less, timing reference levels of $V_{CC(typ.)}/2$, input pulse levels of 0 to $V_{CC(typ.)}$, and output loading of the specified I_{OL} .
12. At any given temperature and voltage condition, t_{HZCE} is less than t_{LZCE} , t_{HZBE} is less than t_{LZBE} , t_{HZOE} is less than t_{LZOE} , and t_{HZWE} is less than t_{LZWE} for any given device.
13. If both byte enables are toggled together, this value is 10 ns.
14. t_{HZOE} , t_{HZCE} , t_{HZBE} , and t_{HZWE} transitions are measured when the outputs enter a high-impedance state.
15. The internal Write time of the memory is defined by the overlap of \overline{WE} , $\overline{CE} = V_{IL}$, \overline{BHE} and/or $\overline{BLE} = V_{IL}$. All signals must be ACTIVE to initiate a write and any of these signals can terminate a write by going INACTIVE. The data input set-up and hold timing should be referenced to the edge of the signal that terminates the write.

Switching Waveforms
Read Cycle No. 1 (Address Transition Controlled)^[16,17]

Read Cycle No. 2 (OE Controlled)^[16,17, 18]

Notes:

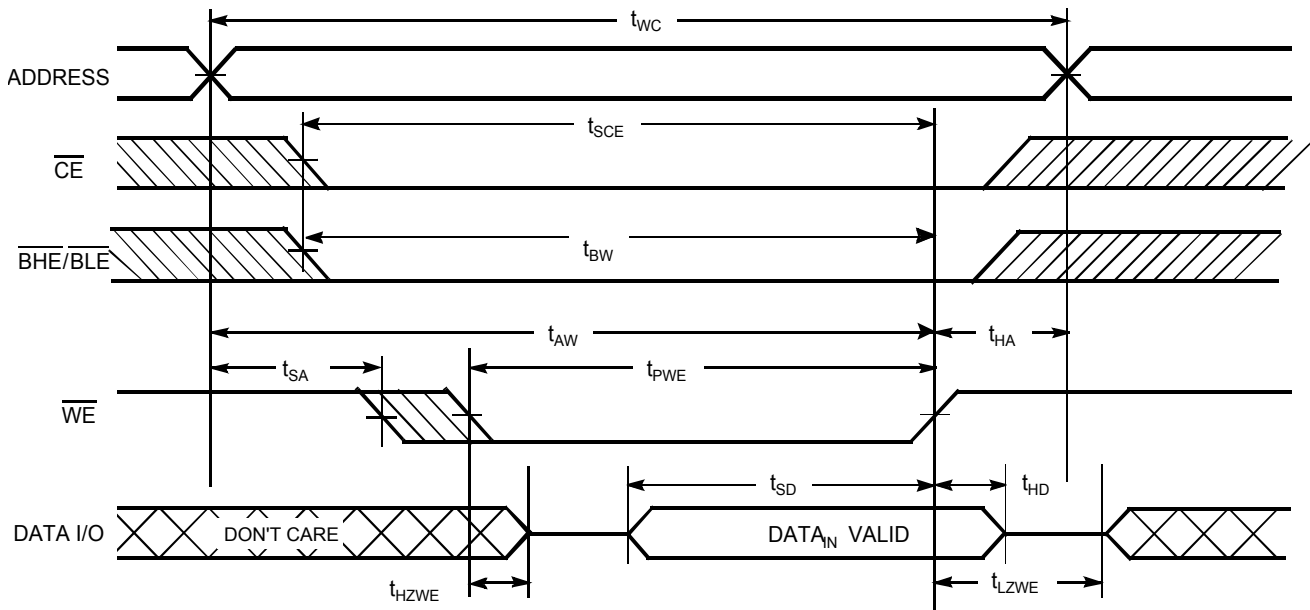
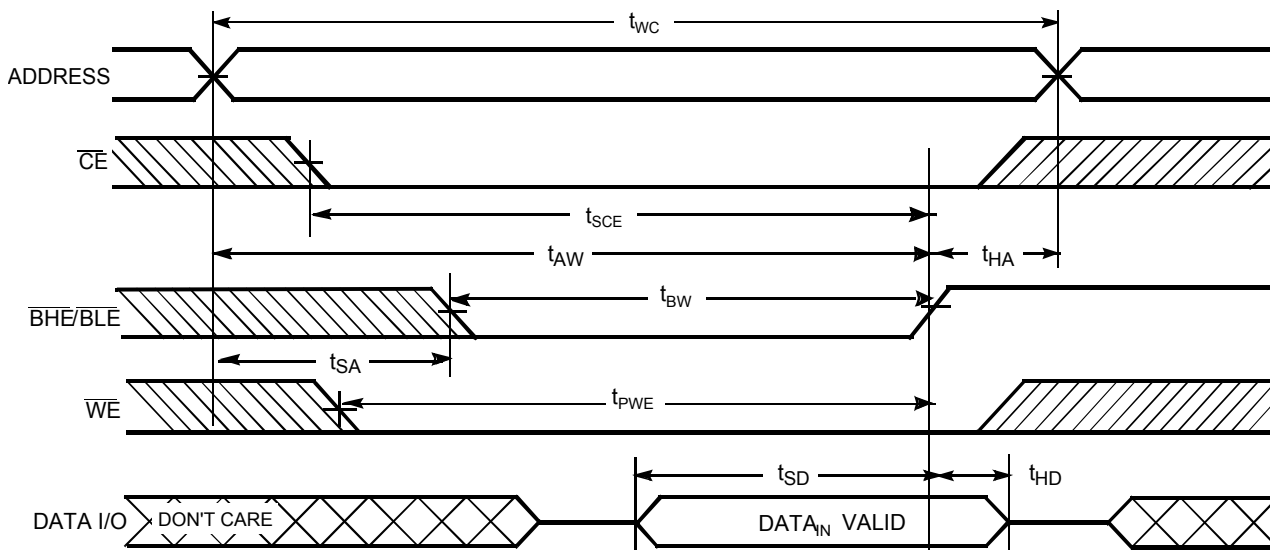
16. Device is continuously selected. \overline{OE} , $\overline{CE} = V_{IL}$, \overline{BHE} , $\overline{BLE} = V_{IL}$.

17. \overline{WE} is HIGH for Read cycle.

18. Address valid prior to or coincident with \overline{CE} , \overline{BHE} , \overline{BLE} transition LOW.

Switching Waveforms (continued)
Write Cycle No. 1 (\overline{WE} Controlled)^[14, 15, 19, 20, 21]

Write Cycle No. 2 (\overline{CE} Controlled)^[14, 15, 19, 20, 21]

Notes:

19. Data I/O is high-impedance if $\overline{OE} = V_{IH}$.
20. If \overline{CE} goes HIGH simultaneously with \overline{WE} HIGH, the output remains in a high-impedance state.
21. During the DON'T CARE period in the DATA I/O waveform, the I/Os are in output state and input signals should not be applied.

Switching Waveforms (continued)
Write Cycle No. 3 (\overline{WE} Controlled, \overline{OE} LOW)^[20, 21]

Write Cycle No. 4 ($\overline{BHE}/\overline{BLE}$ -controlled, \overline{OE} LOW)^[20, 21]


Truth Table

CE	WE	OE	BHE	BLE	I/O ₀ -I/O ₇	I/O ₈ -I/O ₁₅	Mode	Power
H	X	X	X	X	High Z	High Z	Deselect/Power-down	Standby (I _{SB})
X	X	X	H	H	High Z	High Z	Deselect/Power-down	Standby (I _{SB})
L	H	L	L	L	Data Out	Data Out	Read All bits	Active (I _{CC})
L	H	L	H	L	Data Out	High Z	Read Lower Byte Only	Active (I _{CC})
L	H	L	L	H	High Z	Data Out	Read Upper Byte Only	Active (I _{CC})
L	H	H	L	L	High Z	High Z	Output Disabled	Active (I _{CC})
L	H	H	H	L	High Z	High Z	Output Disabled	Active (I _{CC})
L	H	H	L	H	High Z	High Z	Output Disabled	Active (I _{CC})
L	L	X	L	L	Data In	Data In	Write	Active (I _{CC})
L	L	X	H	L	Data In	High Z	Write Lower Byte Only	Active (I _{CC})
L	L	X	L	H	High Z	Data In	Write Upper Byte Only	Active (I _{CC})

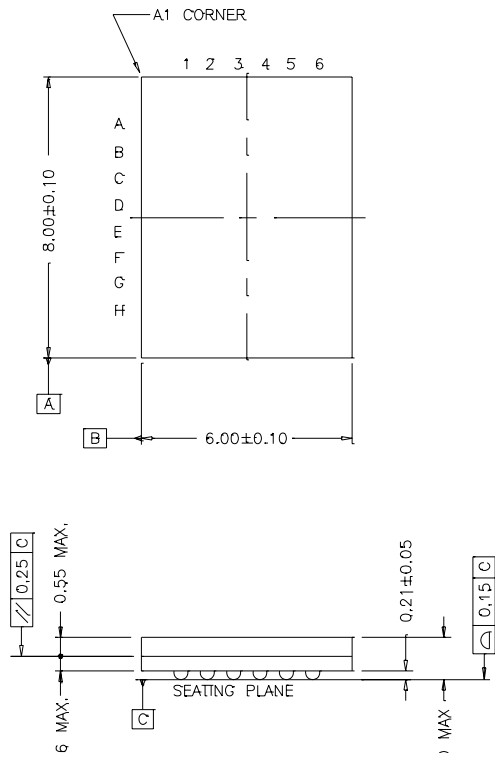
Ordering Information

Speed (ns)	Ordering Code	Package Name	Package Type	Operating Range
45	CY62127DV30LL-45BVI	BV48A	48-ball Fine Pitch BGA (6 mm x 8 mm x 1 mm)	Industrial
	CY62127DV30LL-45BVXI	BV48A	48-ball Fine Pitch BGA (6 mm x 8 mm x 1 mm) (Pb-Free)	
	CY62127DV30LL-45ZSI	ZS44	44-lead TSOP Type II	
	CY62127DV30LL-45ZSXI	ZS44	44-lead TSOP Type II (Pb-Free)	
55	CY62127DV30L-55BVI	BV48A	48-ball Fine Pitch BGA (6 mm x 8 mm x 1 mm)	Industrial
	CY62127DV30LL-55BVI	BV48A	48-ball Fine Pitch BGA (6 mm x 8 mm x 1 mm)	
	CY62127DV30LL-55BVXI	BV48A	48-ball Fine Pitch BGA (6 mm x 8 mm x 1 mm) (Pb-Free)	
	CY62127DV30L-55ZSI	ZS44	44-lead TSOP Type II	
	CY62127DV30L-55ZSXI	ZS44	44-lead TSOP Type II (Pb-Free)	
	CY62127DV30LL-55ZSI	ZS44	44-lead TSOP Type II	
70	CY62127DV30L-70BVI	BV48A	48-ball Fine Pitch BGA (6 mm x 8 mm x 1 mm)	Industrial
	CY62127DV30LL-70BVI	BV48A	48-ball Fine Pitch BGA (6 mm x 8 mm x 1 mm)	
	CY62127DV30LL-70BVXI	BV48A	48-ball Fine Pitch BGA (6 mm x 8 mm x 1 mm) (Pb-Free)	
	CY62127DV30L-70ZSI	ZS44	44-lead TSOP Type II	
	CY62127DV30LL-70ZSI	ZS44	44-lead TSOP Type II	

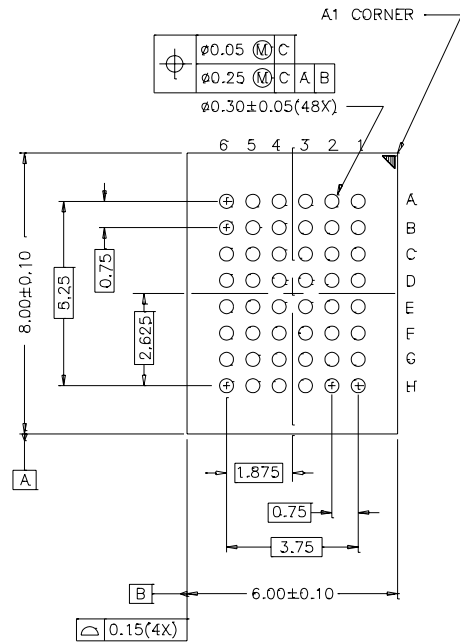
Package Diagrams

48-Lead VFBGA (6 x 8 x 1 mm) BV48A

TOP VIEW



BOTTOM VIEW

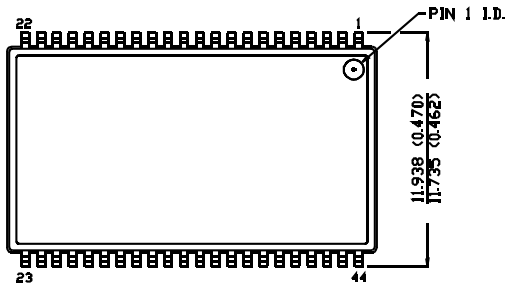


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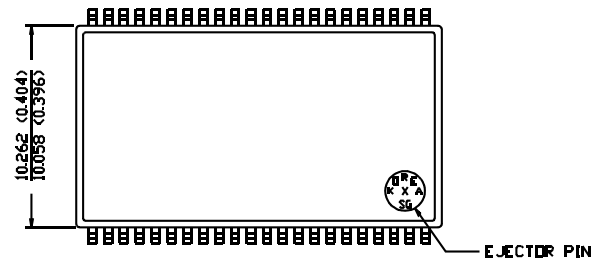
Package Diagrams

44-pin TSOP II ZS44

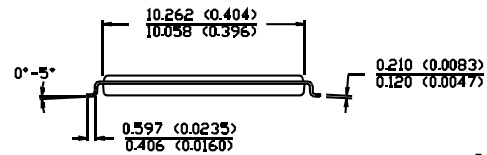
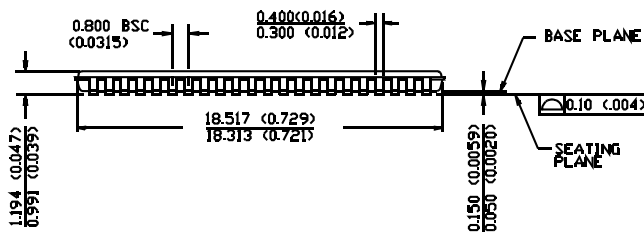
DIMENSION IN MM (INCH)
MAX
MIN



TOP VIEW



BOTTOM VIEW



51-85087-A

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Document History Page

Document Title: CY62127DV30 MoBL [®] 1 Mb (64K x 16) Static RAM				
Document Number: 38-05229				
REV.	ECN NO.	Issue Date	Orig. of Change	Description of Change
**	117690	08/27/02	JUI	New Data Sheet
*A	127311	06/13/03	MPR	Changed From Advanced Status to Preliminary Changed Isb2 to 5 μ A (L), 4 μ A (LL) Changed Iccdr to 4 μ A (L), 3 μ A (LL) Changed Cin from 6 pF to 8 pF
*B	128341	07/22/03	JUI	Changed from Preliminary to Final Add 70-ns speed, updated ordering information
*C	129000	08/29/03	CDY	Changed Icc 1 MHz typ from 0.5 mA to 0.85 mA
*D	316039	See ECN	PCI	Added 45-ns Speed Bin in AC, DC and Ordering Information tables Added Footnote # 8 on page #4 Added Lead-Free Package ordering information on page# 9 Changed 44-lead TSOP-II package name from Z44 to ZS44