

1-Mbit (64K x 16) Static RAM

Features

- **Very high speed**
 - 55 ns
- **Temperature Ranges**
 - Industrial: -40°C to 85°C
 - Automotive: -40°C to 125°C
- **Wide voltage range**
 - 2.2V - 3.6V
- **Pin compatible with CY62126BV**
- **Ultra-low active power**
 - Typical active current: 0.85 mA @ f = 1 MHz
 - Typical active current: 5 mA @ f = f_{Max} (55 ns speed)
- **Ultra-low standby power**
- **Easy memory expansion with $\overline{\text{CE}}$ and $\overline{\text{OE}}$ features**
- **Automatic power-down when deselected**
- **Available in Pb-free and non Pb-free 48-ball VFBGA and 44-pin TSOP Type II packages**

Functional Description^[1]

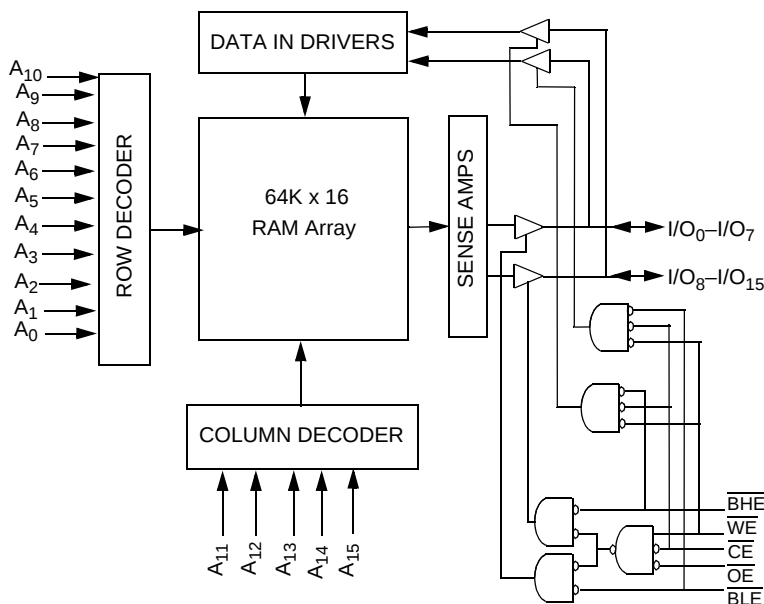
The CY62126DV30 is a high-performance CMOS static RAM organized as 64K words by 16 bits. This device features

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 ($\overline{\text{CE}}$ HIGH). The input/output pins (I/O₀ through I/O₁₅) are placed in a high-impedance state when: deselected ($\overline{\text{CE}}$ HIGH), outputs are disabled ($\overline{\text{OE}}$ HIGH), both Byte High Enable and Byte Low Enable are disabled ($\overline{\text{BHE}}$, $\overline{\text{BLE}}$ HIGH) or during a write operation ($\overline{\text{CE}}$ LOW and $\overline{\text{WE}}$ LOW).

Writing to the device is accomplished by taking Chip Enable ($\overline{\text{CE}}$) and Write Enable ($\overline{\text{WE}}$) inputs LOW. If Byte Low Enable ($\overline{\text{BLE}}$) is LOW, then data from I/O pins (I/O₀ through I/O₇), is written into the location specified on the address pins (A₀ through A₁₅). If Byte High Enable ($\overline{\text{BHE}}$) is LOW, then data from I/O pins (I/O₈ through I/O₁₅) is written into the location specified on the address pins (A₀ through A₁₅).

Reading from the device is accomplished by taking Chip Enable ($\overline{\text{CE}}$) and Output Enable ($\overline{\text{OE}}$) LOW while forcing the Write Enable ($\overline{\text{WE}}$) HIGH. If Byte Low Enable ($\overline{\text{BLE}}$) is LOW, then data from the memory location specified by the address pins will appear on I/O₀ to I/O₇. If Byte High Enable ($\overline{\text{BHE}}$) is LOW, then data from memory will appear on I/O₈ to I/O₁₅. See the truth table at the back of this data sheet for a complete description of read and write modes.

Logic Block Diagram

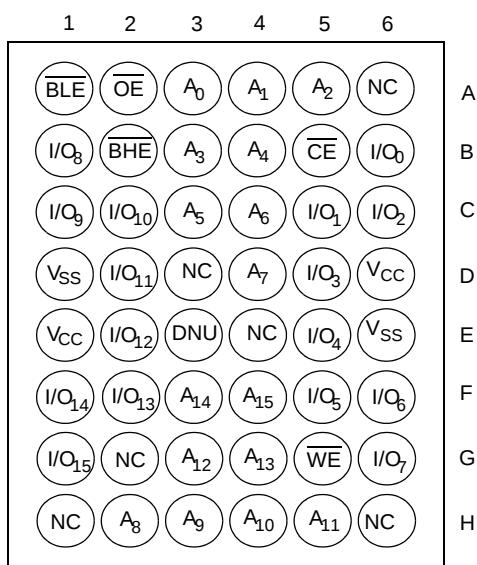
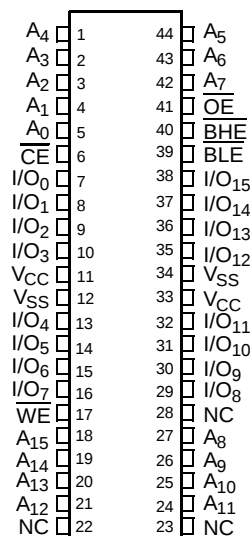


Note:

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

Product Portfolio

Product	Range	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. ^[2]	Max.	Typ. ^[2]	Max.	Typ. ^[2]	Max.	Typ. ^[2]	Max.	
CY62126DV30L	Automotive	2.2	3.0	3.6	55	0.85	1.5	5	10	1.5	15
CY62126DV30LL	Industrial				55	0.85	1.5	5	10	1.5	4

Pin Configurations^[3, 4]
48-ball VFBGA
Top View

TSOP II (Forward)
Top View

Notes:

- 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.
- 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).

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 -0.3 to 3.9V

DC Voltage Applied to Outputs
in High-Z State^[6] -0.3V to $V_{CC} + 0.3V$

DC Input Voltage^[6] -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} ^[7]
Industrial	-40°C to +85°C	2.2V to 3.6V
Automotive	-40°C to +125°C	2.2V to 3.6V

DC Electrical Characteristics (Over the Operating Range)

Parameter	Description	Test Conditions		CY62126DV30-55			Unit
				Min.	Typ. ^[5]	Max.	
V_{OH}	Output HIGH Voltage	$2.2V \leq V_{CC} \leq 2.7V$	$I_{OH} = -0.1 \text{ mA}$	2.0			V
		$2.7V \leq V_{CC} \leq 3.6V$	$I_{OH} = -1.0 \text{ mA}$	2.4			
V_{OL}	Output LOW Voltage	$2.2V \leq V_{CC} \leq 2.7V$	$I_{OL} = 0.1 \text{ mA}$			0.4	V
		$2.7V \leq V_{CC} \leq 3.6V$	$I_{OL} = 2.1 \text{ mA}$			0.4	
V_{IH}	Input HIGH Voltage	$2.2V \leq V_{CC} \leq 2.7V$		1.8		$V_{CC} + 0.3$	V
		$2.7V \leq V_{CC} \leq 3.6V$		2.2		$V_{CC} + 0.3$	
V_{IL}	Input LOW Voltage	$2.2V \leq V_{CC} \leq 2.7V$		-0.3		0.6	V
		$2.7V \leq V_{CC} \leq 3.6V$		-0.3		0.8	
I_{IX}	Input Leakage Current	$GND \leq V_I \leq V_{CC}$	Ind'I	-1		+1	μA
			Auto	-4		+4	
I_{OZ}	Output Leakage Current	$GND \leq V_O \leq V_{CC}$, Output Disabled	Ind'I	-1		+1	μA
			Auto	-4		+4	
I_{CC}	V_{CC} Operating Supply Current	$f = f_{Max} = 1/t_{RC}$	$V_{CC} = 3.6V$, $I_{OUT} = 0 \text{ mA}$, CMOS level		5	10	mA
		$f = 1 \text{ MHz}$			0.85	1.5	
I_{SB1}	Automatic CE Power-down Current—CMOS Inputs	$\overline{CE} \geq V_{CC} - 0.2V$, $V_{IN} \geq V_{CC} - 0.2V$, $V_{IN} \leq 0.2V$, $f = f_{Max}$ (Address and Data Only), $f = 0$ ($\overline{OE}$, $\overline{WE}$, $\overline{BHE}$ and $\overline{BLE}$)	L	Ind'I	1.5	5	μA
				Auto	1.5	15	
			LL		1.5	4	
I_{SB2}	Automatic CE Power-down Current—CMOS Inputs	$\overline{CE} \geq V_{CC} - 0.2V$, $V_{IN} \geq V_{CC} - 0.2V$ or $V_{IN} \leq 0.2V$, $f = 0$, $V_{CC} = 3.6V$	L	Ind'I	1.5	5	μA
				Auto	1.5	15	
			LL		1.5	4	

Notes:

5. Typical values are included for reference only and are not guaranteed or tested. Typical values are measured at $V_{CC} = V_{CC(typ)}$, $T_A = 25^\circ\text{C}$.

6. $V_{IL(min.)} = -2.0V$ for pulse durations less than 20 ns., $V_{IH(max.)} = V_{CC} + 0.75V$ for pulse durations less than 20 ns.

7. 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 .

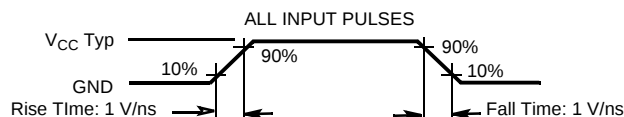
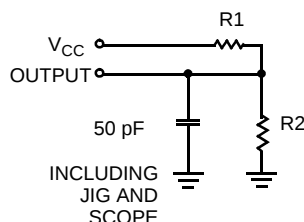
Capacitance^[8]

Parameter	Description	Test Conditions	Max.	Unit
C _{IN}	Input Capacitance	T _A = 25°C, f = 1 MHz, V _{CC} = V _{CC(typ)}	8	pF
C _{OUT}	Output Capacitance		8	pF

Thermal Resistance^[8]

Parameter	Description	Test Conditions	TSOP	VFBGA	Unit
Θ _{JA}	Thermal Resistance (Junction to Ambient)	Still Air, soldered on a 3 x 4.5 inch, 2-layer printed circuit board	55	76	°C/W
Θ _{JC}	Thermal Resistance (Junction to Case)		12	11	°C/W

AC Test Loads and Waveforms



Equivalent to: THEVENIN EQUIVALENT

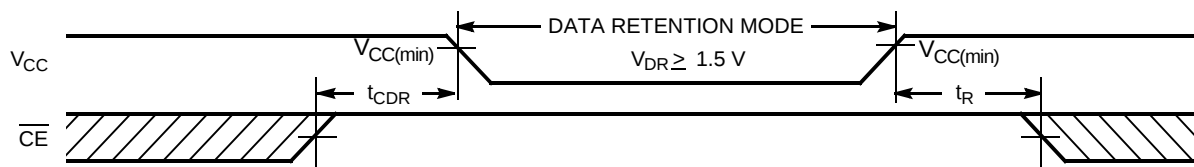
OUTPUT — R_{TH} — V_{TH}

Parameters	2.5V	3.0V	Unit
R1	16600	1103	Ohms
R2	15400	1554	Ohms
R _{TH}	8000	645	Ohms
V _{TH}	1.2	1.75	Volts

Data Retention Characteristics

Parameter	Description	Conditions	Min.	Typ ^[2]	Max.	Unit
V _{DR}	V _{CC} for Data Retention		1.5			V
I _{CCDR}	Data Retention Current	V _{CC} =1.5V, $\overline{CE} \geq V_{CC} - 0.2V$, V _{IN} ≥ V _{CC} - 0.2V or V _{IN} ≤ 0.2V				μA
		L Ind'l			4	
		L Auto			10	
		LL Ind'l			3	
t _{CDR} ^[8]	Chip Deselect to Data Retention Time		0			ns
t _R ^[9]	Operation Recovery Time		100			μs

Data Retention Waveform



Notes:

- Tested initially and after any design or process changes that may affect these parameters.
- Full device operation requires linear V_{CC} ramp from V_{DR} to V_{CC(min.)} >100 μs.

Switching Characteristics (Over the Operating Range)^[10]

Parameter	Description	CY62126DV30-55		Unit
		Min.	Max.	
Read Cycle				
t _{RC}	Read Cycle Time	55		ns
t _{AA}	Address to Data Valid		55	ns
t _{OHA}	Data Hold from Address Change	10		ns
t _{ACE}	$\overline{CE}$ LOW to Data Valid		55	ns
t _{DOE}	$\overline{OE}$ LOW to Data Valid		25	ns
t _{LZOE}	$\overline{OE}$ LOW to Low Z ^[11]	5		ns
t _{HZOE}	$\overline{OE}$ HIGH to High Z ^[11, 12]		20	ns
t _{LZCE}	$\overline{CE}$ LOW to Low Z ^[11]	10		ns
t _{HZCE}	$\overline{CE}$ HIGH to High Z ^[11, 12]		20	ns
t _{PU}	$\overline{CE}$ LOW to Power-up	0		ns
t _{PD}	$\overline{CE}$ HIGH to Power-down		55	ns
t _{DBE}	$\overline{BLE/BHE}$ LOW to Data Valid		25	ns
t _{LZBE}	$\overline{BLE/BHE}$ LOW to Low Z ^[11]	5		ns
t _{HZBE}	$\overline{BLE/BHE}$ HIGH to High-Z ^[11, 12]		20	ns
Write Cycle ^[13]				
t _{WC}	Write Cycle Time	55		ns
t _{SCE}	$\overline{CE}$ LOW to Write End	40		ns
t _{AW}	Address Set-up to Write End	40		ns
t _{HA}	Address Hold from Write End	0		ns
t _{SA}	Address Set-up to Write Start	0		ns
t _{PWE}	$\overline{WE}$ Pulse Width	40		ns
t _{BW}	$\overline{BLE/BHE}$ LOW to Write End	40		ns
t _{SD}	Data Set-up to Write End	25		ns
t _{HD}	Data Hold from Write End	0		ns
t _{HZWE}	$\overline{WE}$ LOW to High Z ^[11, 12]		20	ns
t _{LZWE}	$\overline{WE}$ HIGH to Low Z ^[11]	10		ns

Notes:

10. 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} .

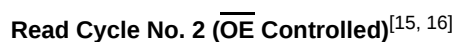
11. At any given temperature and voltage condition, t_{HZCE} is less than t_{LZCE} , t_{HZBE} is less than t_{LZBE} , t_{HZOE} is less than t_{LZOE} .

12. t_{HZOE} , t_{HZCE} , t_{HZBE} , and t_{HZWE} transitions are measured when the outputs enter a high-impedance state.

13. 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.

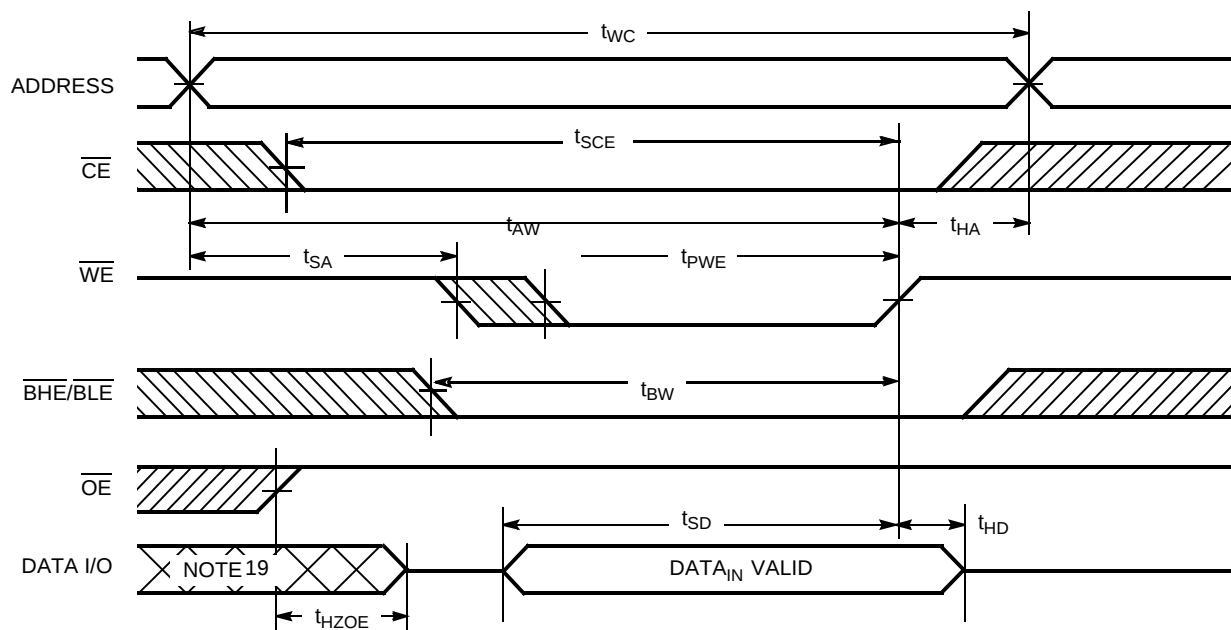


Read Cycle No. 1 (Address Transition Controlled)^[14, 15]

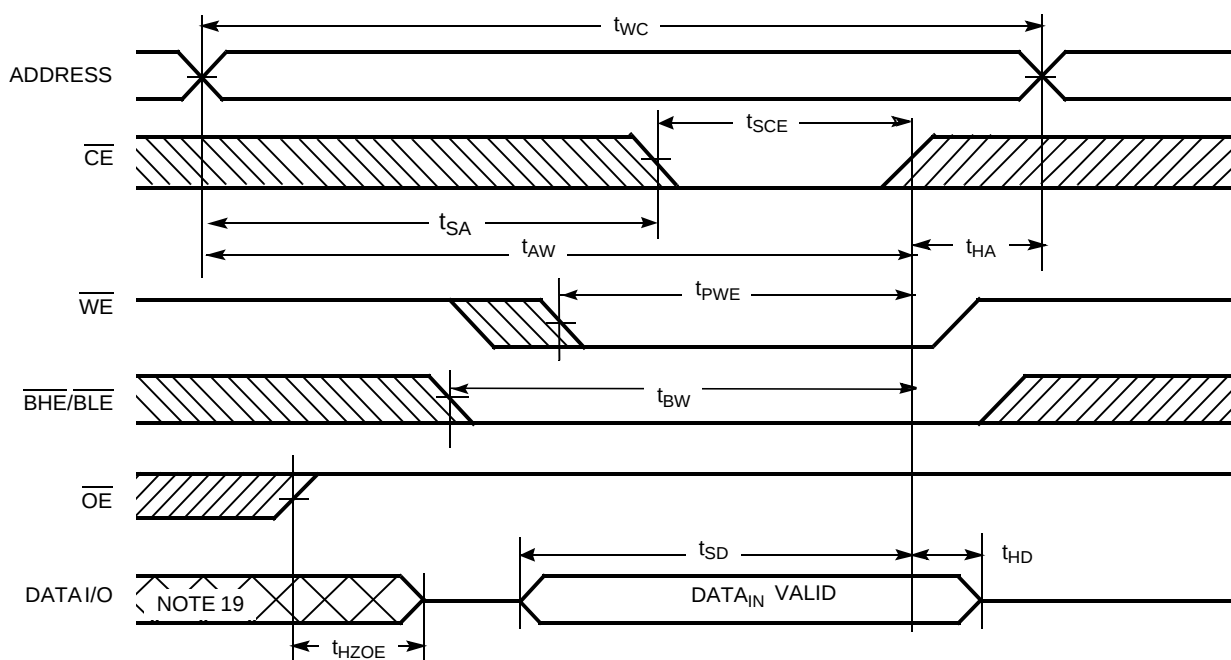


Switching Waveforms(continued)

Write Cycle No. 1 ($\overline{\text{WE}}$ Controlled)^[12, 13, 16, 17, 18]



Write Cycle No. 2 ($\overline{\text{CE}}$ Controlled)^[12, 13, 16, 17, 18]



Notes:

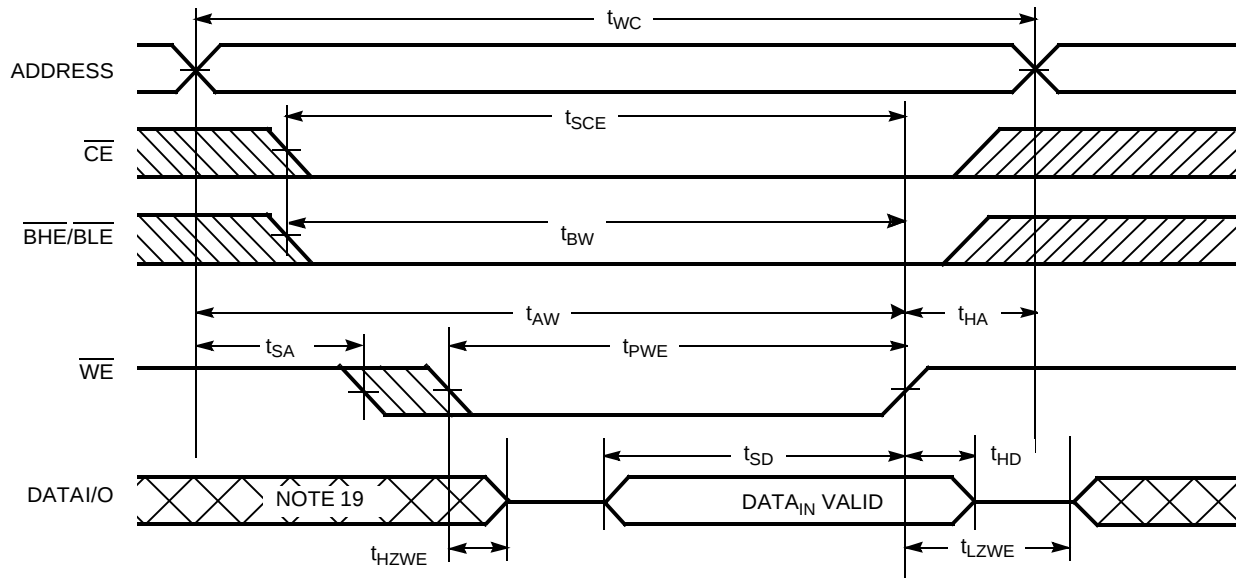
17. Data I/O is high-impedance if $\overline{\text{OE}} = V_{\text{IH}}$.

18. If $\overline{\text{CE}}$ goes HIGH simultaneously with $\overline{\text{WE}}$ HIGH, the output remains in a high-impedance state.

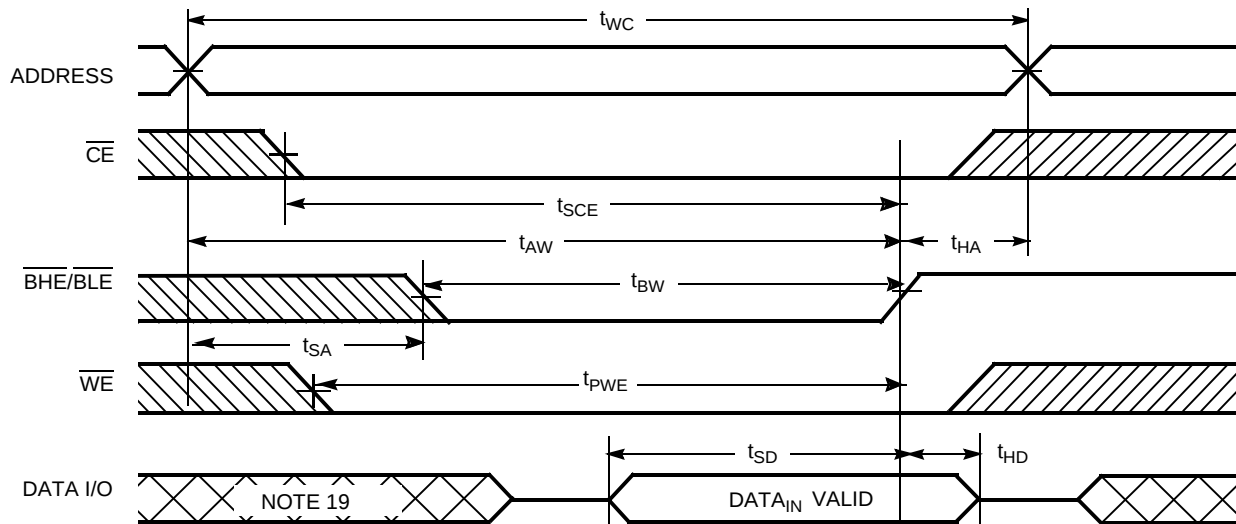
19. During the DON'T CARE period in the DATA I/O waveform, the I/Os are in output state and input signals should not be applied.

Switching Waveforms(continued)

Write Cycle No. 3 ($\overline{\text{WE}}$ Controlled, $\overline{\text{OE}}$ LOW)^[17, 18]



Write Cycle No. 4 ($\overline{\text{BHE/BLE}}$ -controlled, $\overline{\text{OE}}$ LOW)^[17, 18]



Truth Table

$\overline{\text{CE}}$	$\overline{\text{WE}}$	$\overline{\text{OE}}$	$\overline{\text{BHE}}$	$\overline{\text{BLE}}$	Inputs/Outputs	Mode	Power
H	X	X	X	X	High Z	Deselect/Power-Down	Standby (I_{SB})
L	X	X	H	H	High Z	Output Disabled	Active (I_{CC})
L	H	L	L	L	Data Out (I/O_0 – I/O_{15})	Read	Active (I_{CC})
L	H	L	H	L	High Z (I/O_8 – I/O_{15}); Data Out (I/O_0 – I/O_7)	Read	Active (I_{CC})
L	H	L	L	H	Data Out (I/O_8 – I/O_{15}); High Z (I/O_0 – I/O_7)	Read	Active (I_{CC})
L	L	X	L	L	Data In (I/O_0 – I/O_{15})	Write	Active (I_{CC})
L	L	X	H	L	High Z (I/O_8 – I/O_{15}); Data In (I/O_0 – I/O_7)	Write	Active (I_{CC})
L	L	X	L	H	Data in (I/O_8 – I/O_{15}); High Z (I/O_0 – I/O_7)	Write	Active (I_{CC})
L	H	H	L	L	High Z	Output Disabled	Active (I_{CC})
L	H	H	H	L	High Z	Output Disabled	Active (I_{CC})
L	H	H	L	H	High Z	Output Disabled	Active (I_{CC})

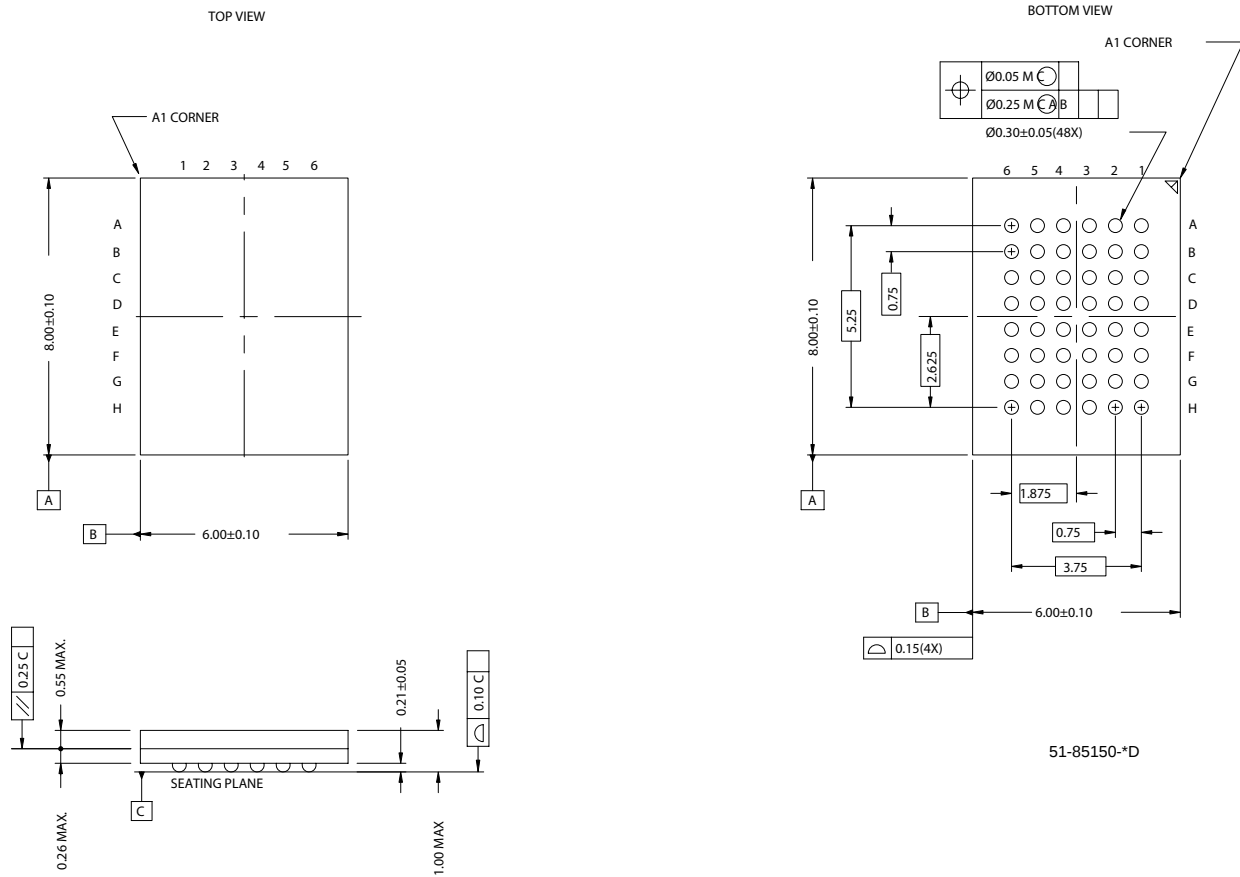
Ordering Information

Speed (ns)	Ordering Code	Package Diagram	Package Type	Operating Range
55	CY62126DV30LL-55BVI	51-85150	48-ball Fine-Pitch Ball Grid Array (6 x 8 x 1 mm)	Industrial
	CY62126DV30LL-55BVXI		48-ball Fine-Pitch Ball Grid Array (6 x 8 x 1 mm) (Pb-free)	
	CY62126DV30LL-55ZI	51-85087	44-pin TSOP II	
	CY62126DV30LL-55ZXI		44-pin TSOP II (Pb-free)	
	CY62126DV30L-55BVXE	51-85150	48-ball Fine-Pitch Ball Grid Array (6 x 8 x 1 mm) (Pb-free)	Automotive
	CY62126DV30L-55ZSXE	51-85087	44-pin TSOP II (Pb-free)	

Please contact your local Cypress sales representative for availability of these parts

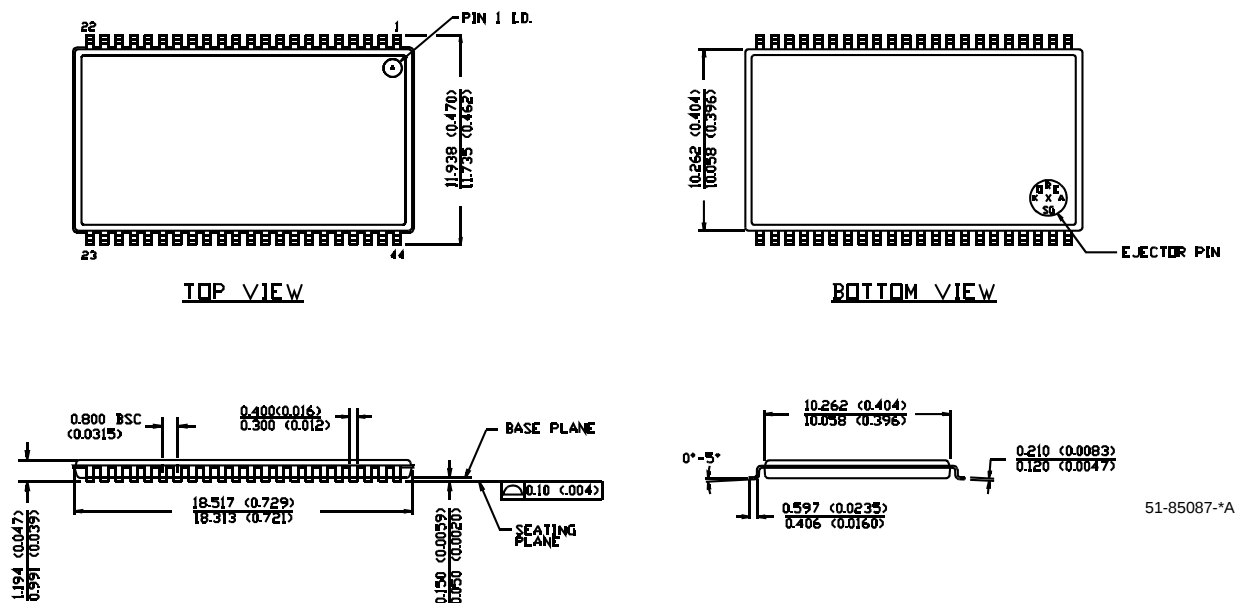
Package Diagrams

48-ball VFBGA (6 x 8 x 1 mm) (51-85150)



Package Diagrams(continued)

44-pin TSOP II (51-85087)



MoBL is a registered trademark, and MoBL2 and More Battery Life are trademarks of Cypress Semiconductor. All product and company names mentioned in this document are the trademarks of their respective holders.

Document History Page

Document Title: CY62126DV30 MoBL [®] 1-Mbit (64K x 16) Static RAM Document Number: 38-05230				
REV.	ECN NO.	Issue Date	Orig. of Change	Description of Change
**	117689	08/27/02	JUI	New Data Sheet
*A	127313	06/13/03	MPR	Changed From Advanced Status to Preliminary. Changed I _{SB2} to 5 μ A (L), 4 μ A (LL) Changed I _{CCDR} to 4 μ A (L), 3 μ A (LL) Changed C _{IN} from 6 pF to 8 pF
*B	128340	07/22/03	JUI	Changed from Preliminary to Final Add 70-ns speed, updated ordering information
*C	129002	08/29/03	CDY	Changed I _{CC} 1 MHz typ from 0.5 mA to 0.85 mA
*D	238050	See ECN	AJU	Fixed typo: Changed t _{DBE} from 70 ns to 35 ns
*E	316039	See ECN	PCI	Added 45-ns Speed Bin in AC, DC and Ordering Information tables Added Footnote #8 on page #4 Added Pb-free package ordering information on page # 9 Changed 44-pin TSOP-II package name from Z44 to ZS44
*F	335861	See ECN	SYT	Added Temperature Ranges in the Features Section on Page # 1 Added Automotive Product Information for CY62126DV30-L for 55 ns Added I _{SB1} and I _{SB2} values for Automotive range of CY62126DV30-L for 55 ns Added Automotive Information for I _{CCDR} in the Data Retention Characteristics table Added Pb-free packages in the ordering information Changed 44-pin TSOP-II package name from ZS44 to Z44
*G	357256	See ECN	PCI	Added Pin Configuration and Package Diagram for 56-Lead QFN Package Updated Thermal Characteristics and Ordering Information Table Added Automotive Specs for I _{IX} and I _{OZ} in the DC Electrical Characteristics table on Page# 4
*H	486789	See ECN	VKN	Changed the address of Cypress Semiconductor Corporation on Page #1 from "3901 North First Street" to "198 Champion Court" Removed 45 ns and 70ns Speed bin from Product offering Removed 56-pin QFN package Updated Ordering Information Table