



Features

Temperature Ranges

Industrial: -40°C to 85°CAutomotive: -40°C to 125°C

· Very high speed: 45 ns

Wide voltage range: 2.2V to 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}

· Ultra-low standby power

• Easy memory expansion with CE and OE features

· Automatic power-down when deselected

 Packages offered in a 48-ball FBGA, 56-lead QFN and a 44-lead TSOP Type II

· Also available in Lead-free packages

Functional Description^[1]

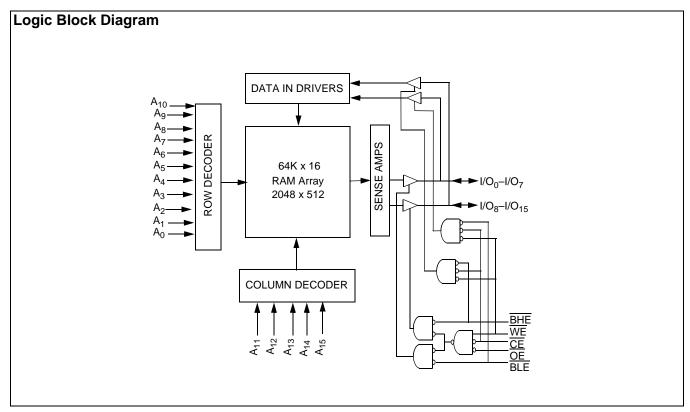
The CY62126DV30 is a high-performance CMOS static RAM organized as 64K words by 16 bits. This device features advanced circuit design to provide ultra-low active current.

1-Mbit (64K x 16) Static RAM

This is ideal for providing More Battery LifeTM (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 (CE HIGH). The input/output pins (I/O₀ through I/O₁₅) are placed in a high-impedance state when: deselected (CE HIGH), outputs are disabled (OE HIGH), both Byte High Enable and Byte Low Enable are disabled (BHE, BLE HIGH) or during a write operation (CE LOW and WE LOW).

<u>Writing</u> to the device is <u>acc</u>omplished by taking Chip Enable (\overline{CE}) and Write Enable (\overline{WE}) inputs LOW. If Byte Low Enable (BLE) is LOW, then data from I/O pins (I/O $_0$ through I/O $_7$), is written into the location specified <u>on the</u> address pins (A $_0$ through A $_{15}$). If Byte High Enable (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 (CE) and Output Enable (OE) LOW while forcing the Write Enable (WE) HIGH. If Byte Low Enable (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 (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.



Note:

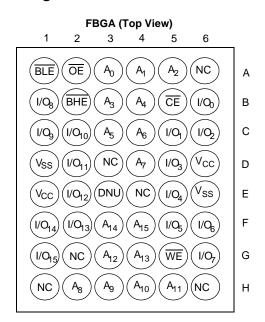
1. For best-practice recommendations, please refer to the Cypress application note "System Design Guidelines" on http://www.cypress.com.

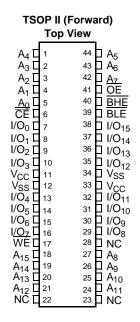


Product Portfolio

						Power Dissipation					
						(Operatin	g, I _{CC} (m	A)	Standby, I _{SB2}	
		Vcc	Range	(V)	Speed	f = 1	MHz	f =	f _{MAX}	(μ A)	
Product	Range	Min.	Тур.	Max.	(ns)	Typ. ^[2]	Max.	Typ . ^[2]	Max.	Typ. ^[2]	Max.
CY62126DV30L	Industrial	2.2	3.0	3.6	45	0.85	1.5	6.5	13	1.5	5
CY62126DV30LL	Industrial				45	0.85	1.5	6.5	13	1.5	4
CY62126DV30L	Industrial	2.2	3.0	3.6	55	0.85	1.5	5	10	1.5	5
CY62126DV30L	Automotive				55	0.85	1.5	5	10	1.5	15
CY62126DV30LL	Industrial				55	0.85	1.5	5	10	1.5	4
CY62126DV30L	Industrial	2.2	3.0	3.6	70	0.85	1.5	5	10	1.5	5
CY62126DV30LL	Industrial				70	0.85	1.5	5	10	1.5	4

Pin Configurations^[3, 4]

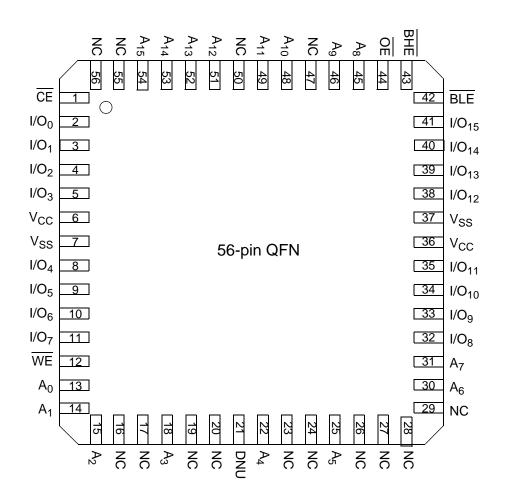




Notes:

- 2. Typical values are included for reference only and are not guaranteed or tested. Typical values are measured at $V_{CC} = V_{CC(typ)}$, $T_A = 25^{\circ}C$.
- 3. NC pins are not connected to the die.
- 4. 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).

Pin Configurations (continued)





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 $^{\rm [6]}$ -0.3V to V $_{\rm CC}$ + 0.3V

DC Input Voltage ^[6]	-0.3 V to V _{CC} + 0.3V
Output Current into Outputs (LOW)	20 mA
Static Discharge Voltage(per MIL-STD-883, Method 3015)	>2001V
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)

						CY6	2126DV	30-45	CY6	2126DV	30-55	CY62126DV30-70			
Parameter	Description	Test	Condit	ions		Min.	Typ. ^[5]	Max.	Min.	Typ. ^[5]	Max.	Min	Typ. ^[5]	Max.	Unit
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 m	ηA			0.4			0.4			0.4	V
		2.7≤V _{CC} ≤ 3.6	$I_{OL} = 2$	_{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 _{CC} + 0.3	V
		2.7 ≤ V _{CC} ≤	3.6			2.2		V _{CC} + 0.3	2.2		V _{CC} + 0.3	2.2		V _{CC} + 0.3	
	Input LOW	2.2 ≤ V _{CC} ≤	2.7			-0.3		0.6	-0.3		0.6	-0.3		0.6	V
	Voltage	2.7 ≤ V _{CC} ≤ 3.6				-0.3		0.8	-0.3		0.8	-0.3		0.8	
I _{IX}	Input Leakage	$ GND \le V_{I} \le V_{CC} $		Ind'l	-1		+1	-1		+1	-1		+1	μΑ	
	Current						-4		+4				μΑ		
I_{OZ}	Output	$GND \le V_O \le V_{CC}$, Incomput Disabled		Ind'l	-1		+1	-1		+1	-1		+1	μΑ	
	Leakage Current	Output Disa	abied		Auto				-4		+4				μΑ
I _{CC}	V _{CC} Operating Supply Current	$f = f_{MAX} = 1/t_{RC}$	V _{CC} =	0 m	ıA,		6.5	13		5	10		5	10	mA
		f = 1 MHz	CMOS	S lev	el		0.85	1.5		0.85	1.5		0.85	1.5	
I _{SB1}	Automatic CE	CE ≥ V _{CC} -		L	Ind'l		1.5	5		1.5	5		1.5	5	μΑ
	Power-down Current—	$V_{IN} \ge V_{CC} - V_{IN} \le 0.2V$	- 0.2V,		Auto					1.5	15				
	CMOS Inputs	$f = f_{MAX}$ (Ad and Data Or $f = 0$ (OE, W BHE and BL	nly), VE,	LL			1.5	4		1.5	4		1.5	4	
I _{SB2}	Automatic CE	CE ≥ V _{CC} -	0.2V,	L	Ind'l		1.5	5		1.5	5		1.5	5	μΑ
	Power-down Current—	$V_{IN} \ge V_{CC} - Or$	- 0.2V		Auto					1.5	15				
	CMOS Inputs	$V_{IN} \le 0.2V$, $f = 0, V_{CC} =$		LL			1.5	4		1.5	4		1.5	4	

Notes:

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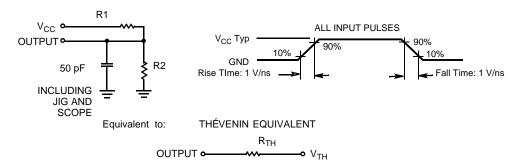
Capacitance^[8]

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

Thermal Resistance

Parameter	Description	Test Conditions	QFN	TSOP	FBGA	Unit
θ_{JA}	Thermal Resistance (Junction to Ambient) ^[8]		22.08	55	76	°C/W
θ_{JC}	Thermal Resistance (Junction to Case)[8]	two-layer printed circuit board	5.03	12	11	°C/W

AC Test Loads and Waveforms^[9]

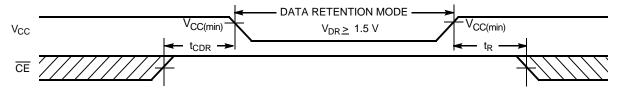


Parameters	2.5V	3.0V	Unit
R1	16600	1103	Ohms
R2	15400	1554	Ohms
R _{TH}	8000	645	Ohms
V _{TH}	1.2	1.75	Volts

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	$V_{CC}=1.5V, \overline{CE} \ge V_{CC} - 0.2V, V_{IN} \ge V_{CC} - 0.2V \text{ or } V_{IN} \le 0.2V$	L	Ind'l			4	μΑ
		$V_{\text{IN}} \ge V_{\text{CC}} - 0.2V \text{ or } V_{\text{IN}} \le 0.2V$	L	Auto			10	
			LL	Ind'l			3	
t _{CDR} ^[8]	Chip Deselect to Data Retention Time				0			ns
t _R ^[10]	Operation Recovery Time				100			μS

Data Retention Waveform



- 8. Tested initially and after any design or proces changes that may affect these parameters.
 9. Test condition for the 45-ns part is a load capacitance of 30 pF.
- 10. Full device operation requires linear V_{CC} ramp from V_{DR} to $\dot{V}_{CC(min.)}$ >100 μs .



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

		CY62126	DV30-45 ^[9]	CY62126	SDV30-55	CY62126	6DV30-70	
Parameter	Description	Min.	Max.	Min.	Max.	Min.	Max.	Unit
Read Cycle			1	•	•	•	•	•
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}	CE LOW to Data Valid		45		55		70	ns
t _{DOE}	OE LOW to Data Valid		25		25		35	ns
t _{LZOE}	OE LOW to Low Z ^[12]	5		5		5		ns
t _{HZOE}	OE HIGH to High Z ^[12, 13]		15		20		25	ns
t _{LZCE}	CE LOW to Low Z ^[12]	10		10		10		ns
t _{HZCE}	CE HIGH to High Z ^[12, 13]		20		20		25	ns
t _{PU}	CE LOW to Power-up	0		0		0		ns
t _{PD}	CE HIGH to Power-down		45		55		70	ns
t _{DBE}	BLE/BHE LOW to Data Valid		25		25		35	ns
t _{LZBE}	BLE/BHE LOW to Low Z ^[12]	5		5		5		ns
t _{HZBE}	BLE/BHE HIGH to High-Z ^[12, 13]		15		20		25	ns
Write Cycle[1	4]		1	•	•		•	•
t _{WC}	Write Cycle Time	45		55		70		ns
t _{SCE}	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}	WE Pulse Width	35		40		50		ns
t _{BW}	BLE/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}	WE LOW to High Z ^[12, 13]		15		20		25	ns
t _{LZWE}	WE HIGH to Low Z ^[12]	10		10		5		ns

^{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

^{12.} At any given temperature and voltage condition, t_{HZCE} is less than t_{LZCE}, t_{HZBE} is less than t_{LZDE}, t_{HZOE} is less than t_{LZOE}.

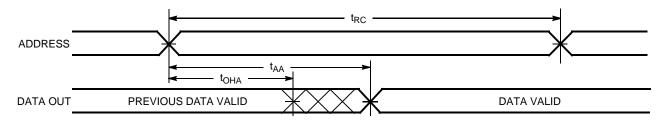
13. t_{HZOE}, t_{HZCE}, t_{HZBE}, and t_{HZWE} transitions are measured when the <u>outputs</u> enter <u>a high-impedance</u> state.

14. The internal Write time of the memory is defined by the overlap of WE, CE = V_{IL}, BHE and/or 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.

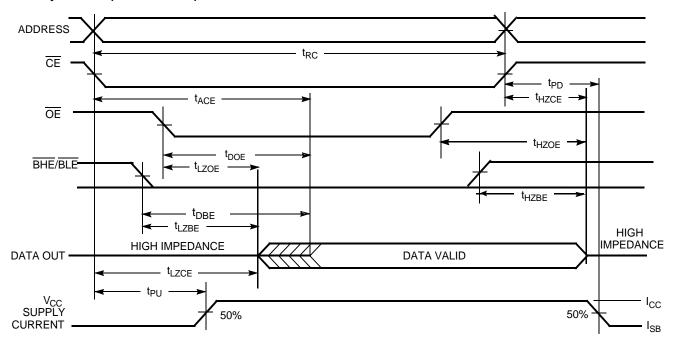


Switching Waveforms

Read Cycle No. 1 (Address Transition Controlled)^[15, 16]



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



Notes:

- 15. <u>Device</u> is continuously selected. <u>OE</u>, <u>CE</u> = V_{IL}, <u>BHE</u>, <u>BLE</u> = V_{IL}.

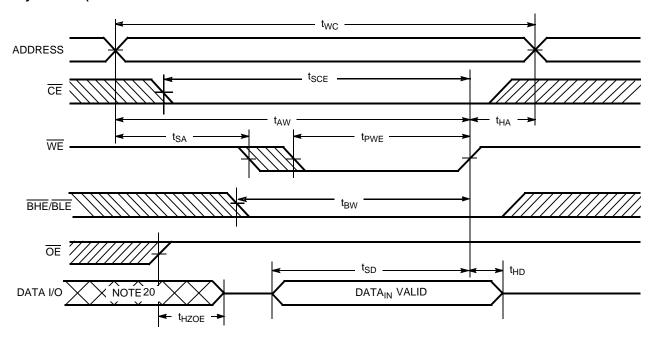
 16. <u>WE</u> is HIGH for Read cycle.

 17. Address valid prior to or coincident with <u>CE</u>, <u>BHE</u>, <u>BLE</u> transition LOW.

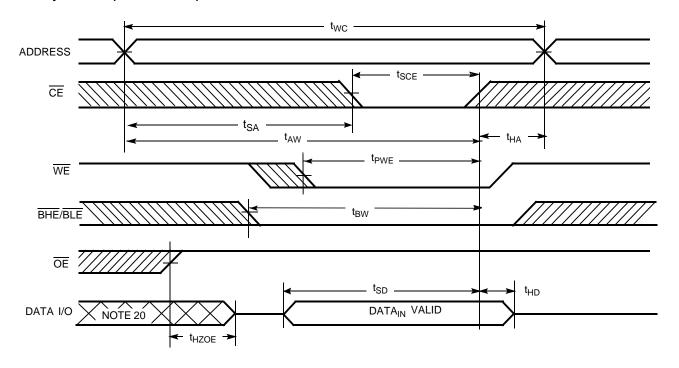


Switching Waveforms(continued)

Write Cycle No. 1 (WE Controlled^[13, 14, 17, 18, 19]



Write Cycle No. 2 (CE Controlled)[13, 14, 17, 18, 19]



Notes:

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

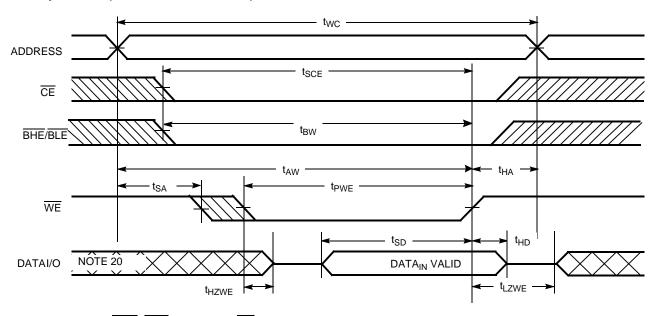
19. If \overline{CE} goes HIGH simultaneously with \overline{WE} HIGH, the output remains in a high-impedance state.

20. 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.

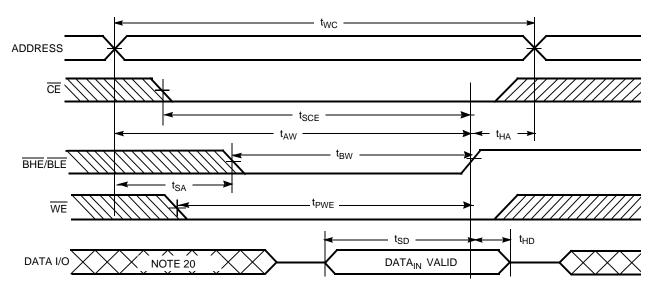


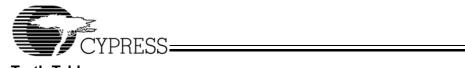
Switching Waveforms(continued)

Write Cycle No. 3 ($\overline{\text{WE}}$ Controlled, $\overline{\text{OE}}$ LOW)[18, 19]



Write Cycle No. 4 (BHE-/BLE-controlled, OE LOW)[17, 18]





Truth Table

CE	WE	OE	BHE	BLE	Inputs/Outputs	Mode	Power
Н	Х	Х	Х	Х	High Z	Deselect/Power-Down	Standby (I _{SB})
L	Х	Х	Н	Н	High Z	Output Disabled	Active (I _{CC})
L	Н	L	L	L	Data Out (I/O _O -I/O ₁₅)	Read	Active (I _{CC})
L	Н	L	Н	L	Data Out (I/O _O –I/O ₇); I/O ₈ –I/O ₁₅ in High Z	Read	Active (I _{CC})
L	Н	L	L	Н	Data Out (I/O ₈ –I/O ₁₅); I/O ₀ –I/O ₇ in High Z	Read	Active (I _{CC})
L	Н	Н	L	L	High Z	Output Disabled	Active (I _{CC})
L	Н	Н	Н	L	High Z	Output Disabled	Active (I _{CC})
L	Н	Н	L	Н	High Z	Output Disabled	Active (I _{CC})
L	L	Х	L	L	Data In (I/O _O -I/O ₁₅)	Write	Active (I _{CC})
L	L	Х	Н	L	Data In (I/O _O –I/O ₇); I/O ₈ –I/O ₁₅ in High Z	Write	Active (I _{CC})
L	L	Х	L	Н	Data In (I/O ₈ –I/O ₁₅); I/O ₀ –I/O ₇ in High Z	Write	Active (I _{CC})

Ordering Information

Speed (ns)	Ordering Code	Package Name	Package Type	Operating Range
45	CY62126DV30LL-45BVI	BV48A	48-ball Fine Pitch BGA (6 mm x 8 mm x 1 mm)	Industrial
	CY62126DV30LL-45BVXI	BV48A	48-ball Fine Pitch BGA (6 mm x 8 mm x 1 mm) (Pb-free)	
	CY62126DV30LL-45ZXI	Z44	44-Lead TSOP Type II (Pb-free)	
	CY62126DV30LL-45LFXI	LF56	56-pin QFN (Pb-free)	
55	CY62126DV30L-55BVI	BV48A	48-ball Fine Pitch BGA (6 mm x 8 mm x 1 mm)	Industrial
	CY62126DV30LL-55BVI	BV48A	48-ball Fine Pitch BGA (6 mm x 8 mm x 1 mm)	
	CY62126DV30LL-55BVXI	BV48A	48-ball Fine Pitch BGA (6 mm x 8 mm x 1 mm) (Pb-Free)	
	CY62126DV30L-55ZI	Z44	44-Lead TSOP Type II	
	CY62126DV30LL-55ZI	Z44	44-Lead TSOP Type II	
	CY62126DV30LL-55ZXI	Z44	44-Lead TSOP Type II (Pb-Free)	
	CY62126DV30L-55ZSE	Z44	44-Lead TSOP Type II	Automotive
	CY62126DV30L-55ZSXE	Z44	44-Lead TSOP Type II (Pb-Free)	
	CY62126DV30L-55BVXE	BV48A	48-ball Fine Pitch BGA (6 mm x 8 mm x 1 mm) (Pb-Free)	
	CY62126DV30LL-55LFXI	LF56	56-pin QFN (Pb-free)	Industrial
70	CY62126DV30L-70BVI	BV48A	48-ball Fine Pitch BGA (6 mm x 8 mm x 1 mm)	Industrial
	CY62126DV30LL-70BVI	BV48A	48-ball Fine Pitch BGA (6 mm x 8 mm x 1 mm)	
	CY62126DV30LL-70BVXI	BV48A	48-ball Fine Pitch BGA (6 mm x 8 mm x 1 mm) (Pb-Free)	
	CY62126DV30L-70ZI	Z44	44-Lead TSOP Type II	
	CY62126DV30LL-70ZI	Z44	44-Lead TSOP Type II	1
	CY62126DV30LL-70ZXI	Z44	44-Lead TSOP Type II (Pb-Free)	1
	CY62126DV30LL-70LFXI	LF56	56-pin QFN (Pb-free)	

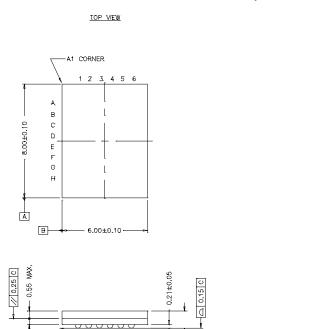


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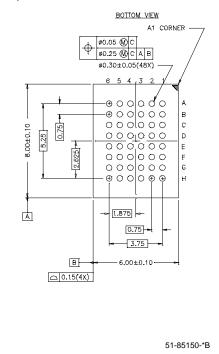
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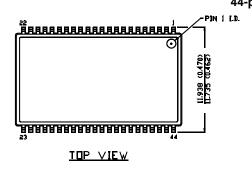
Package Diagrams

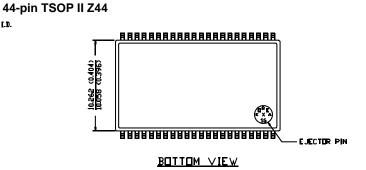
48-Lead VFBGA (6 x 8 x 1 mm) BV48A

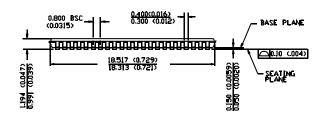


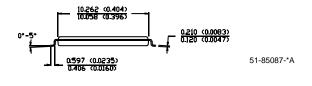
1.00 MAX







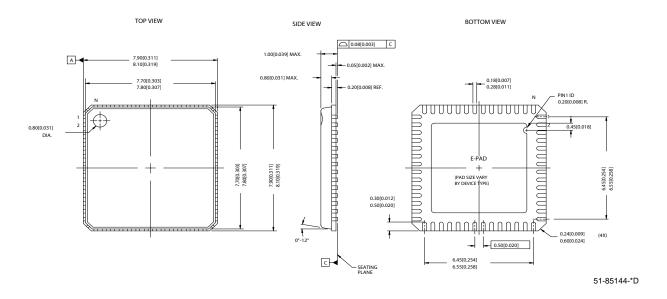






Package Diagrams (continued)

56-Lead QFN 8 x 8 MM LF56A



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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 I_{N} 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 $I_{\rm IX}$ and $I_{\rm OZ}$ in the DC Electrical Characteristics table on Page# 4					