

## Features

- Very high speed: 45 ns
- Temperature ranges
  - Industrial: -40 °C to +85 °C
- Wide voltage range: 2.20 V to 3.60 V
- Pin compatible with CY62147DV30
- Ultra low standby power
  - Typical standby current: 1 μA
  - Maximum standby current: 7 μA (Industrial)
- Ultra low active power
  - Typical active current: 2 mA at f = 1 MHz
- Easy memory expansion with  $\overline{CE}$  [1] and  $\overline{OE}$  features
- Automatic power-down when deselected
- Complementary metal oxide semiconductor (CMOS) for optimum speed and power
- Available in Pb-free 48-ball very fine ball grid array (VFBGA) (single/dual CE option) and 44-pin thin small outline package (TSOP) II packages
- Byte power-down feature

## Functional Description

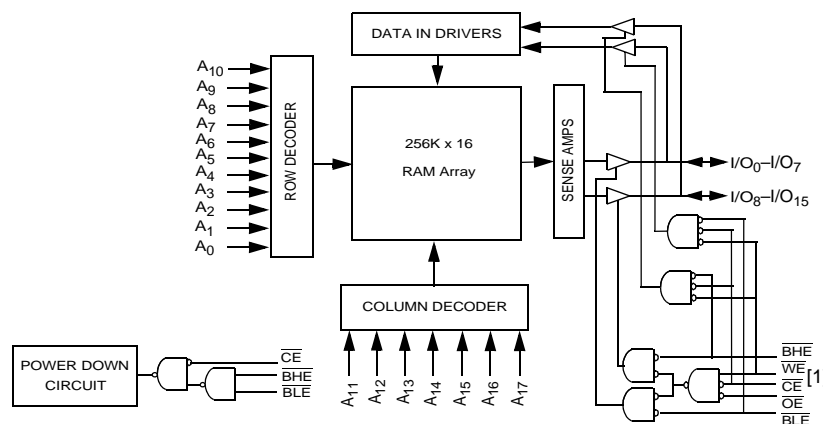
The CY62147EV30 is a high performance CMOS static RAM (SRAM) organized as 256 K words by 16 bits. This device features advanced circuit design to provide ultra low active current. It is ideal for providing More Battery Life™ (MoBL<sup>®</sup>) in portable applications such as cellular telephones. The device also has an automatic power down feature that significantly reduces power consumption when addresses are not toggling. Placing the device into standby mode reduces power consumption by more than 99 percent when deselected ( $\overline{CE}$  HIGH or both BLE and BHE are HIGH). The input and output pins (I/O<sub>0</sub> through I/O<sub>15</sub>) 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 (BHE, BLE HIGH)
- Write operation is active ( $\overline{CE}$  LOW and  $\overline{WE}$  LOW)

To write to the device, take Chip Enable ( $\overline{CE}$ ) and Write Enable (WE) inputs LOW. If Byte Low Enable (BLE) is LOW, then data from I/O pins (I/O<sub>0</sub> through I/O<sub>7</sub>) is written into the location specified on the address pins (A<sub>0</sub> through A<sub>17</sub>). If Byte High Enable (BHE) is LOW, then data from I/O pins (I/O<sub>8</sub> through I/O<sub>15</sub>) is written into the location specified on the address pins (A<sub>0</sub> through A<sub>17</sub>).

To read from the device, take Chip Enable ( $\overline{CE}$ ) and Output Enable ( $\overline{OE}$ ) 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 appear on I/O<sub>0</sub> to I/O<sub>7</sub>. If Byte High enable (BHE) is LOW, then data from memory appears on I/O<sub>8</sub> to I/O<sub>15</sub>. See the Truth Table on page 11 for a complete description of read and write modes.

## Logic Block Diagram



### Note

1. BGA packaged device is offered in single CE and dual CE options. In this data sheet, for a dual CE device,  $\overline{CE}$  refers to the internal logical combination of  $\overline{CE}_1$  and  $\overline{CE}_2$  such that when  $\overline{CE}_1$  is LOW and  $\overline{CE}_2$  is HIGH,  $\overline{CE}$  is LOW. For all other cases  $\overline{CE}$  is HIGH.

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**Product Portfolio**

Product	Range	V <sub>CC</sub> Range (V)			Speed (ns)	Power Dissipation					
						Operating I <sub>CC</sub> (mA)				Standby I <sub>SB2</sub> (μA)	
						f = 1 MHz		f = f <sub>max</sub>			
Min	Typ <sup>[2]</sup>	Max	Typ <sup>[2]</sup>	Max	Typ <sup>[2]</sup>	Max	Typ <sup>[2]</sup>	Max			
CY62147EV30LL	Industrial	2.2	3.0	3.6	45 ns	2	2.5	15	20	1	7

**Pin Configurations**

Figure 1. 48-ball VFBGA (Single Chip Enable)<sup>[3, 4]</sup>

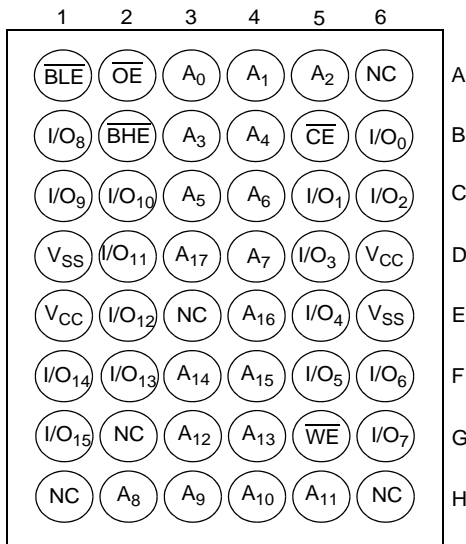


Figure 2. 48-ball VFBGA (Dual Chip Enable)<sup>[3, 4]</sup>

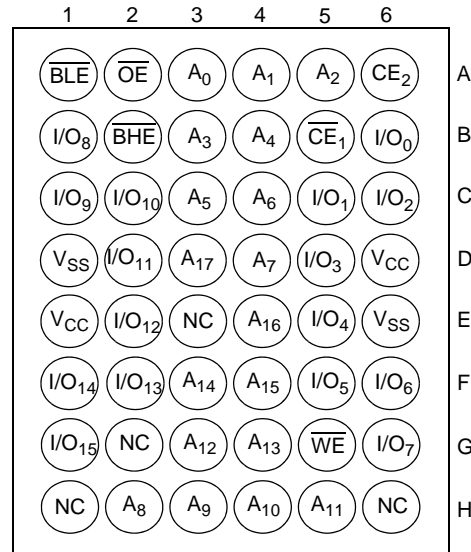
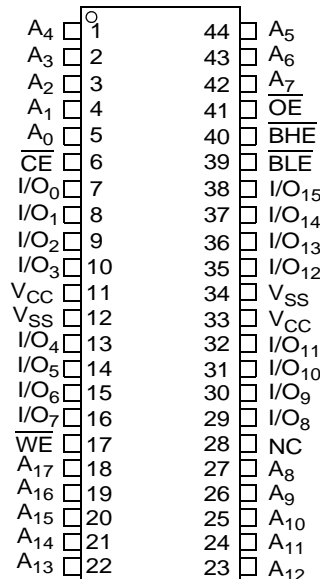


Figure 3. 44-pin TSOP II<sup>[3]</sup>



**Notes**

- Typical values are included for reference only and are not guaranteed or tested. Typical values are measured at V<sub>CC</sub> = V<sub>CC(typ)</sub>, T<sub>A</sub> = 25 °C.
- NC pins are not connected on the die.
- Pins H1, G2, and H6 in the BGA package are address expansion pins for 8 Mb, 16 Mb, and 32 Mb, respectively.

## Maximum Ratings

Exceeding the maximum ratings may impair the useful life of the device. User guidelines are 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 V to + 3.9 V ( $V_{CC(max)}$  + 0.3 V)  
 DC voltage applied to outputs in High Z state <sup>[5, 6]</sup> ..... -0.3 V to 3.9 V ( $V_{CC(max)}$  + 0.3 V)

DC input voltage <sup>[5, 6]</sup> ..... -0.3 V to 3.9 V ( $V_{CC(max)}$  + 0.3 V)  
 Output current into outputs (LOW) ..... 20 mA  
 Static discharge voltage (MIL-STD-883, method 3015) ..... > 2001 V  
 Latch-up current ..... > 200 mA

## Operating Range

Device	Range	Ambient Temperature	V <sub>CC</sub> <sup>[7]</sup>
CY62147EV30LL	Industrial	-40 °C to +85 °C	2.2 V to 3.6 V

## Electrical Characteristics

Over the Operating Range

Parameter	Description	Test Conditions	45 ns (Industrial)			Unit
			Min	Typ <sup>[8]</sup>	Max	
V <sub>OH</sub>	Output HIGH voltage	I <sub>OH</sub> = -0.1 mA	2.0	-	-	V
		I <sub>OH</sub> = -1.0 mA, V <sub>CC</sub> ≥ 2.70 V	2.4	-	-	V
V <sub>OL</sub>	Output LOW voltage	I <sub>OL</sub> = 0.1 mA	-	-	0.4	V
		I <sub>OL</sub> = 2.1 mA, V <sub>CC</sub> = 2.70 V	-	-	0.4	V
V <sub>IH</sub>	Input HIGH voltage	V <sub>CC</sub> = 2.2 V to 2.7 V	1.8	-	V <sub>CC</sub> + 0.3	V
		V <sub>CC</sub> = 2.7 V to 3.6 V	2.2	-	V <sub>CC</sub> + 0.3	V
V <sub>IL</sub>	Input LOW voltage	V <sub>CC</sub> = 2.2 V to 2.7 V	-0.3	-	0.6	V
		V <sub>CC</sub> = 2.7 V to 3.6 V	-0.3	-	0.8	V
I <sub>IX</sub>	Input leakage current	GND ≤ V <sub>I</sub> ≤ V <sub>CC</sub>	-1	-	+1	μA
I <sub>OZ</sub>	Output leakage current	GND ≤ V <sub>O</sub> ≤ V <sub>CC</sub> , output disabled	-1	-	+1	μA
I <sub>CC</sub>	V <sub>CC</sub> operating supply current	f = f <sub>max</sub> = 1/t <sub>RC</sub>	-	15	20	mA
		f = 1 MHz	-	2	2.5	
I <sub>SB1</sub> <sup>[9]</sup>	Automatic $\overline{CE}$ power-down current – CMOS inputs	$\overline{CE} \geq V_{CC} - 0.2$ V, V <sub>IN</sub> ≥ V <sub>CC</sub> - 0.2 V, V <sub>IN</sub> ≤ 0.2 V, f = f <sub>max</sub> (address and data only), f = 0 (OE, BHE, BLE and WE), V <sub>CC</sub> = 3.60 V	-	1	7	μA
I <sub>SB2</sub> <sup>[9]</sup>	Automatic CE power-down current – CMOS inputs	$\overline{CE} \geq V_{CC} - 0.2$ V, V <sub>IN</sub> ≥ V <sub>CC</sub> - 0.2 V or V <sub>IN</sub> ≤ 0.2 V, f = 0, V <sub>CC</sub> = 3.60 V	-	1	7	μA

### Notes

- V<sub>IL(min)</sub> = -2.0 V for pulse durations less than 20 ns.
- V<sub>IH(max)</sub> = V<sub>CC</sub> + 0.75 V for pulse durations less than 20 ns.
- Full device AC operation assumes a minimum of 100 μs ramp time from 0 to V<sub>CC(min)</sub> and 200 μs wait time after V<sub>CC</sub> stabilization.
- Typical values are included for reference only and are not guaranteed or tested. Typical values are measured at V<sub>CC</sub> = V<sub>CC(typ)</sub>, T<sub>A</sub> = 25 °C.
- Chip enable (CE) and byte enables (BHE and BLE) need to be tied to CMOS levels to meet the I<sub>SB1</sub> / I<sub>SB2</sub> / I<sub>CCDR</sub> spec. Other inputs can be left floating.

### Capacitance

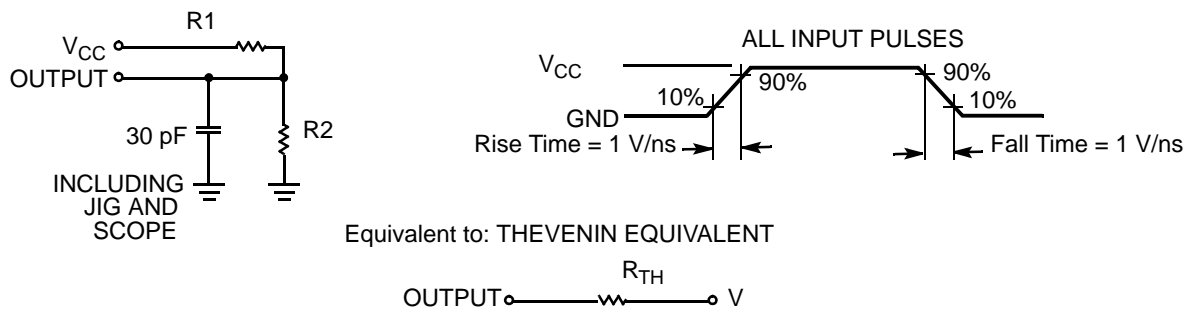
Parameter <sup>[10]</sup>	Description	Test Conditions	Max	Unit
C <sub>IN</sub>	Input capacitance	T <sub>A</sub> = 25 °C, f = 1 MHz, V <sub>CC</sub> = V <sub>CC(typ)</sub>	10	pF
C <sub>OUT</sub>	Output capacitance		10	pF

### Thermal Resistance

Parameter <sup>[10]</sup>	Description	Test Conditions	48-ball VFBGA Package	44-pin TSOP II Package	Unit
Θ <sub>JA</sub>	Thermal resistance (junction to ambient)	Still Air, soldered on a 3 × 4.5 inch, two-layer printed circuit board	75	77	°C/W
Θ <sub>JC</sub>	Thermal resistance (junction to case)		10	13	°C/W

### AC Test Load and Waveforms

Figure 4. AC Test Load and Waveforms



Parameters	2.50 V	3.0 V	Unit
R1	16667	1103	Ω
R2	15385	1554	Ω
R <sub>TH</sub>	8000	645	Ω
V <sub>TH</sub>	1.20	1.75	V

**Note**

10. Tested initially and after any design or process changes that may affect these parameters.

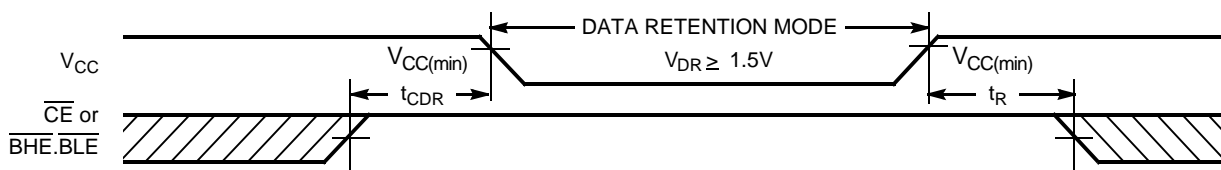
## Data Retention Characteristics

Over the Operating Range

Parameter	Description	Conditions	Min	Typ <sup>[11]</sup>	Max	Unit
$V_{DR}$	$V_{CC}$ for data retention		1.5	–	–	V
$I_{CCDR}$ <sup>[12]</sup>	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 $V_{IN} \leq 0.2\text{ V}$	–	0.8	7	$\mu\text{A}$
$t_{CDR}$ <sup>[13]</sup>	Chip deselect to data retention time		0	–	–	ns
$t_R$ <sup>[14]</sup>	Operation recovery time		45	–	–	ns

## Data Retention Waveform

Figure 5. Data Retention Waveform<sup>[15, 16]</sup>



### Notes

11. Typical values are included for reference only and are not guaranteed or tested. Typical values are measured at  $V_{CC} = V_{CC(\text{typ})}$ ,  $T_A = 25\text{ }^\circ\text{C}$ .
12. Chip enable ( $\overline{CE}$ ) and byte enables ( $\overline{BHE}$  and  $\overline{BLE}$ ) need to be tied to CMOS levels to meet the  $I_{SB1}$  /  $I_{SB2}$  /  $I_{CCDR}$  spec. Other inputs can be left floating.
13. Tested initially and after any design or process changes that may affect these parameters.
14. Full device operation requires linear  $V_{CC}$  ramp from  $V_{DR}$  to  $V_{CC(\text{min})} \geq 100\text{ }\mu\text{s}$  or stable at  $V_{CC(\text{min})} \geq 100\text{ }\mu\text{s}$ .
15. BGA packaged device is offered in single CE and dual CE options. In this data sheet, for a dual CE device,  $\overline{CE}$  refers to the internal logical combination of  $\overline{CE}_1$  and  $\overline{CE}_2$  such that when  $\overline{CE}_1$  is LOW and  $\overline{CE}_2$  is HIGH, CE is LOW. For all other cases CE is HIGH.
16.  $\overline{BHE.BLE}$  is the AND of both  $\overline{BHE}$  and  $\overline{BLE}$ . Deselect the chip by either disabling the chip enable signals or by disabling both  $\overline{BHE}$  and  $\overline{BLE}$ .

## Switching Characteristics

Over the Operating Range

Parameter [17, 18]	Description	45 ns (Industrial)		Unit
		Min	Max	
<b>Read Cycle</b>				
$t_{RC}$	Read cycle time	45	–	ns
$t_{AA}$	Address to data valid	–	45	ns
$t_{OHA}$	Data hold from address change	10	–	ns
$t_{ACE}$	$\overline{CE}$ LOW to data valid	–	45	ns
$t_{DOE}$	$\overline{OE}$ LOW to data valid	–	22	ns
$t_{LZOE}$	$\overline{OE}$ LOW to low Z [19]	5	–	ns
$t_{HZOE}$	$\overline{OE}$ HIGH to high Z [19, 20]	–	18	ns
$t_{LZCE}$	$\overline{CE}$ LOW to low Z [19]	10	–	ns
$t_{HZCE}$	$\overline{CE}$ HIGH to high Z [19, 20]	–	18	ns
$t_{PU}$	$\overline{CE}$ LOW to power-up	0	–	ns
$t_{PD}$	$\overline{CE}$ HIGH to power-down	–	45	ns
$t_{DBE}$	$\overline{BLE}/\overline{BHE}$ LOW to data valid	–	45	ns
$t_{LZBE}$	$\overline{BLE}/\overline{BHE}$ LOW to low Z [19, 22]	5	–	ns
$t_{HZBE}$	$\overline{BLE}/\overline{BHE}$ HIGH to high Z [19, 20]	–	18	ns
<b>Write Cycle [21]</b>				
$t_{WC}$	Write cycle time	45	–	ns
$t_{SCE}$	$\overline{CE}$ LOW to write end	35	–	ns
$t_{AW}$	Address setup to write end	35	–	ns
$t_{HA}$	Address hold from write end	0	–	ns
$t_{SA}$	Address setup to write start	0	–	ns
$t_{PWE}$	$\overline{WE}$ pulse width	35	–	ns
$t_{BW}$	$\overline{BLE}/\overline{BHE}$ LOW to write end	35	–	ns
$t_{SD}$	Data setup to write end	25	–	ns
$t_{HD}$	Data hold from write end	0	–	ns
$t_{HZWE}$	$\overline{WE}$ LOW to high Z [19, 20]	–	18	ns
$t_{LZWE}$	$\overline{WE}$ HIGH to low Z [19]	10	–	ns

### Notes

17. Test conditions for all parameters other than tri-state parameters assume signal transition time of 3 ns (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  $I_{OL}/I_{OH}$  as shown in the [Figure 4 on page 5](#).
18. AC timing parameters are subject to byte enable signals (BHE or BLE) not switching when chip is disabled. See application note [AN13842](#) for further clarification.
19. At any 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 device.
20.  $t_{HZOE}$ ,  $t_{HZCE}$ ,  $t_{HZBE}$ , and  $t_{HZWE}$  transitions are measured when the outputs enter a high impedance state.
21. The internal write time of the memory is defined by the overlap of  $\overline{WE}$ ,  $CE = V_{IL}$ , BHE, BLE, or both =  $V_{IL}$ . All signals must be active to initiate a write and any of these signals can terminate a write by going inactive. The data input setup and hold timing must be referenced to the edge of the signal that terminates the write.
22. If both byte enables are toggled together, this value is 10 ns.

## Switching Waveforms

Figure 6. Read Cycle No. 1: Address Transition Controlled [23, 24]

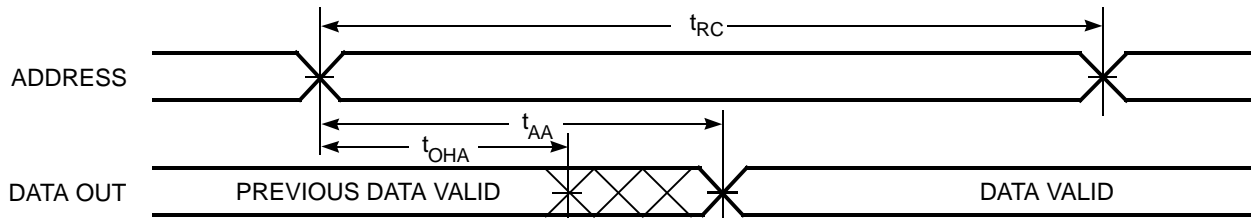
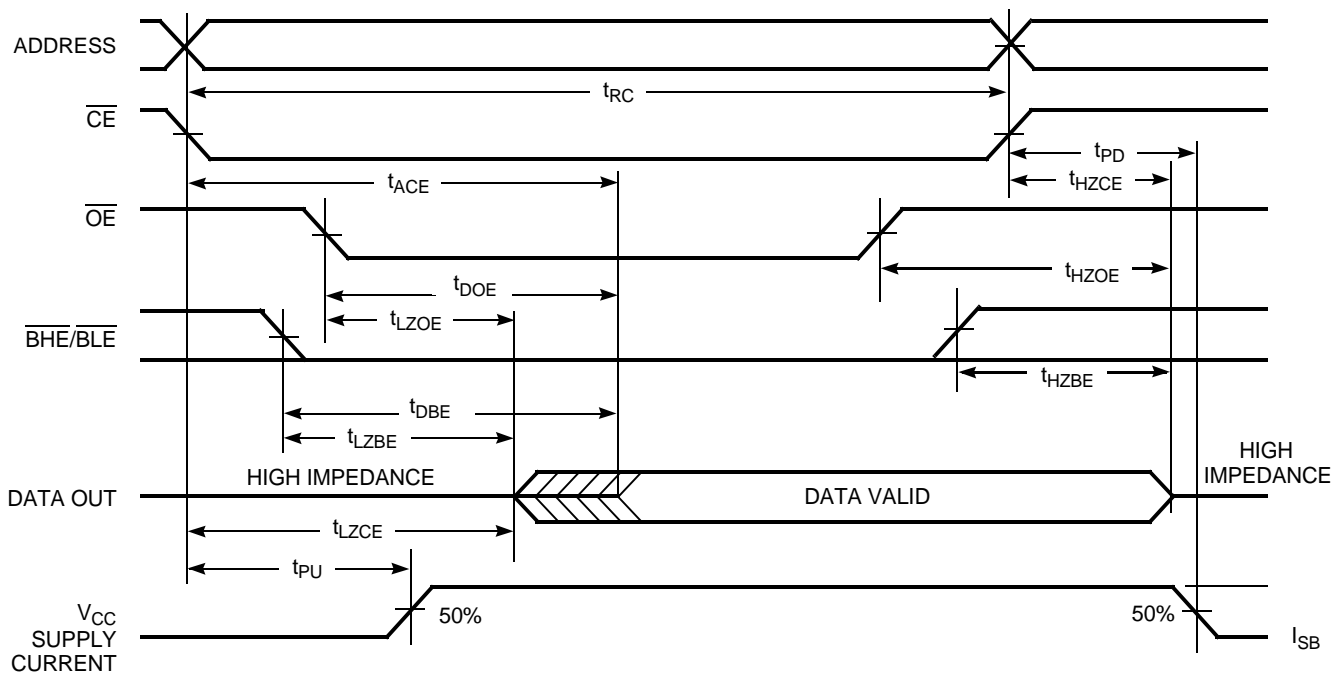


Figure 7. Read Cycle No. 2:  $\overline{OE}$  Controlled [24, 25, 26]



### Notes

23. The device is continuously selected.  $\overline{OE}$ ,  $\overline{CE}$  =  $V_{IL}$ ,  $\overline{BHE}$ ,  $\overline{BLE}$ , or both =  $V_{IL}$ .

24.  $\overline{WE}$  is HIGH for read cycle.

25. BGA packaged device is offered in single CE and dual CE options. In this data sheet, for a dual CE device,  $\overline{CE}$  refers to the internal logical combination of  $\overline{CE}_1$  and  $\overline{CE}_2$  such that when  $\overline{CE}_1$  is LOW and  $\overline{CE}_2$  is HIGH, CE is LOW. For all other cases CE is HIGH.

26. Address valid before or similar to  $\overline{CE}$  and  $\overline{BHE}$ ,  $\overline{BLE}$  transition LOW.

Switching Waveforms (continued)

Figure 8. Write Cycle No. 1:  $\overline{WE}$  Controlled [27, 28, 29, 30]

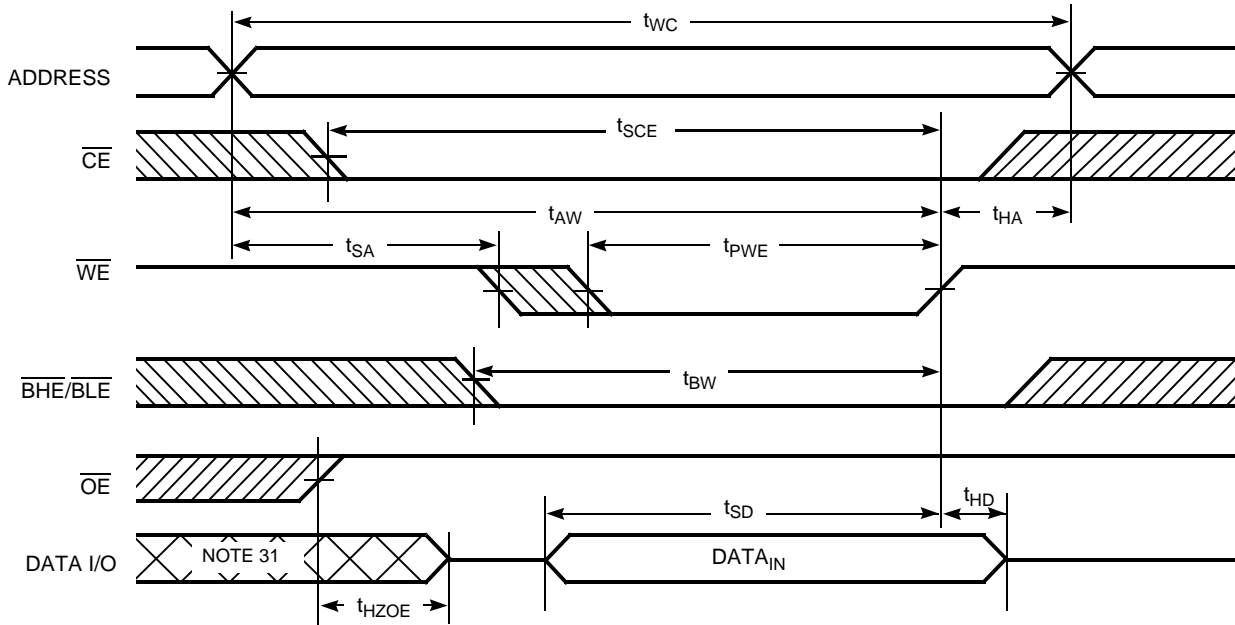
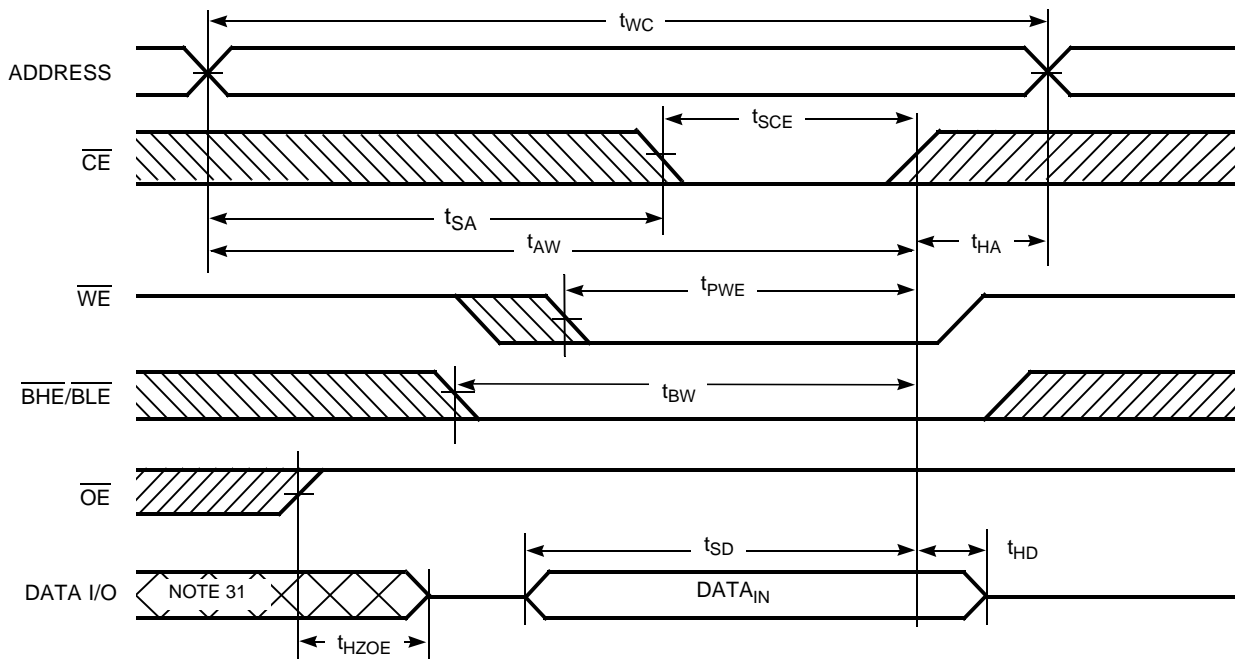


Figure 9. Write Cycle No. 2:  $\overline{CE}$  Controlled [27, 28, 29, 30]



Notes

- 27. BGA packaged device is offered in single CE and dual CE options. In this data sheet, for a dual CE device,  $\overline{CE}$  refers to the internal logical combination of  $\overline{CE}_1$  and  $\overline{CE}_2$  such that when  $\overline{CE}_1$  is LOW and  $\overline{CE}_2$  is HIGH,  $\overline{CE}$  is LOW. For all other cases  $\overline{CE}$  is HIGH.
- 28. The internal write time of the memory is defined by the overlap of  $\overline{WE}$ ,  $\overline{CE} = V_{IL}$ ,  $\overline{BHE}$ ,  $\overline{BLE}$ , or both =  $V_{IL}$ . All signals must be active to initiate a write and any of these signals can terminate a write by going inactive. The data input setup and hold timing must be referenced to the edge of the signal that terminates the write.
- 29. Data I/O is high impedance if  $\overline{OE} = V_{IH}$ .
- 30. If  $\overline{CE}$  goes HIGH simultaneously with  $\overline{WE} = V_{IH}$ , the output remains in a high impedance state.
- 31. During this period, the I/Os are in output state. Do not apply input signals.

Switching Waveforms (continued)

Figure 10. Write Cycle No. 3:  $\overline{WE}$  Controlled,  $\overline{OE}$  LOW [32, 33]

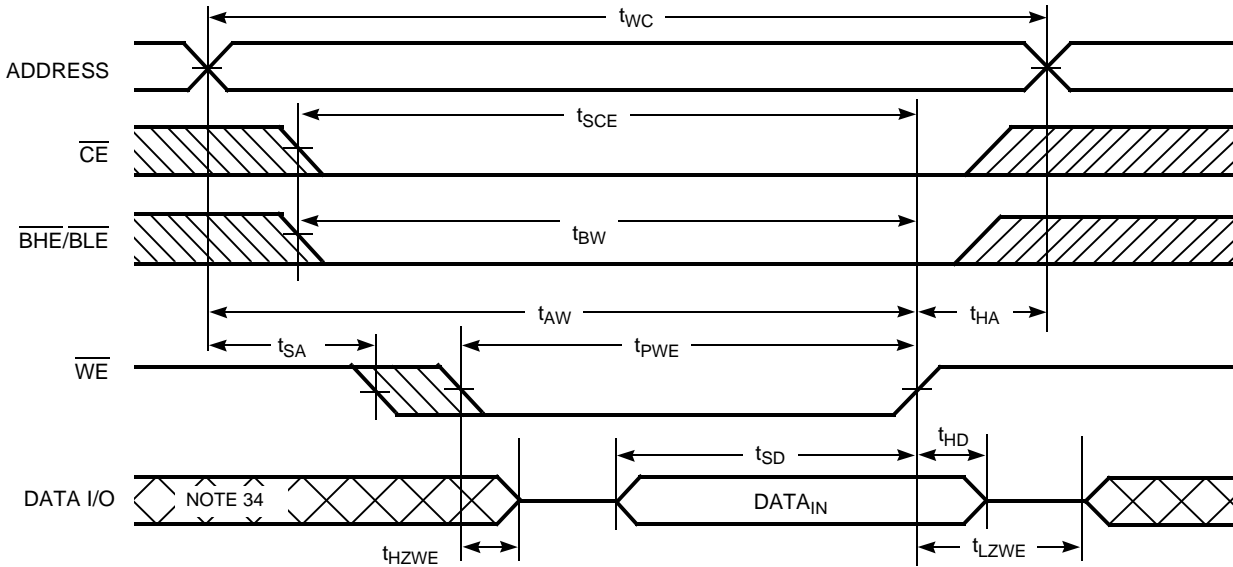
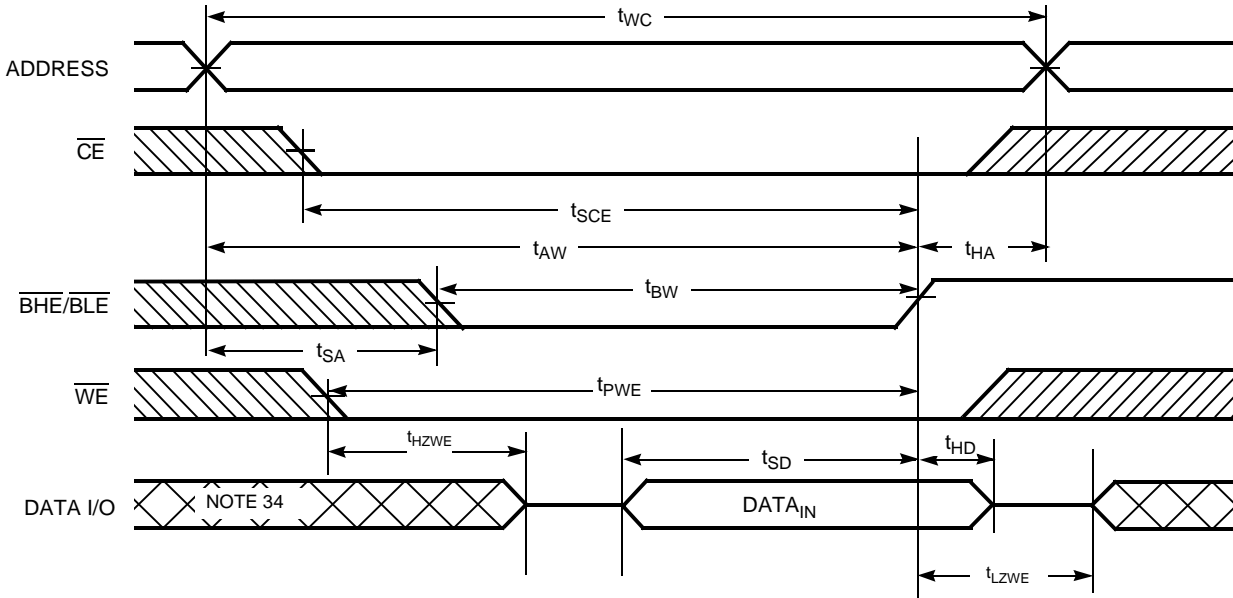


Figure 11. Write Cycle No. 4:  $\overline{BHE}/\overline{BLE}$  Controlled,  $\overline{OE}$  LOW [32, 33]



Notes

- 32. BGA packaged device is offered in single CE and dual CE options. In this data sheet, for a dual CE device,  $\overline{CE}$  refers to the internal logical combination of  $\overline{CE}_1$  and  $\overline{CE}_2$  such that when  $\overline{CE}_1$  is LOW and  $\overline{CE}_2$  is HIGH,  $\overline{CE}$  is LOW. For all other cases  $\overline{CE}$  is HIGH.
- 33. If  $\overline{CE}$  goes HIGH simultaneously with  $\overline{WE} = V_{IH}$ , the output remains in a high impedance state.
- 34. During this period, the I/Os are in output state. Do not apply input signals.

**Truth Table**

$\overline{CE}$ [35, 36]	$\overline{WE}$	$\overline{OE}$	$\overline{BHE}$	$\overline{BLE}$	I/Os	Mode	Power
H	X	X	X	X	High Z	Deselect/Power-down	Standby ( $I_{SB}$ )
L	X	X	H	H	High Z	Deselect/Power-down	Standby ( $I_{SB}$ )
L	H	L	L	L	Data out (I/O <sub>0</sub> –I/O <sub>15</sub> )	Read	Active ( $I_{CC}$ )
L	H	L	H	L	Data out (I/O <sub>0</sub> –I/O <sub>7</sub> ); I/O <sub>8</sub> –I/O <sub>15</sub> in High Z	Read	Active ( $I_{CC}$ )
L	H	L	L	H	Data out (I/O <sub>8</sub> –I/O <sub>15</sub> ); I/O <sub>0</sub> –I/O <sub>7</sub> in High Z	Read	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 ( $I_{CC}$ )
L	L	X	L	L	Data in (I/O <sub>0</sub> –I/O <sub>15</sub> )	Write	Active ( $I_{CC}$ )
L	L	X	H	L	Data in (I/O <sub>0</sub> –I/O <sub>7</sub> ); I/O <sub>8</sub> –I/O <sub>15</sub> in High Z	Write	Active ( $I_{CC}$ )
L	L	X	L	H	Data in (I/O <sub>8</sub> –I/O <sub>15</sub> ); I/O <sub>0</sub> –I/O <sub>7</sub> in High Z	Write	Active ( $I_{CC}$ )

**Notes**

35. BGA packaged device is offered in single CE and dual CE options. In this data sheet for a dual CE device,  $\overline{CE}$  refers to the internal logical combination of  $\overline{CE}_1$  and  $\overline{CE}_2$  such that when  $\overline{CE}_1$  is LOW and  $\overline{CE}_2$  is HIGH,  $\overline{CE}$  is LOW. For all other cases  $\overline{CE}$  is HIGH.

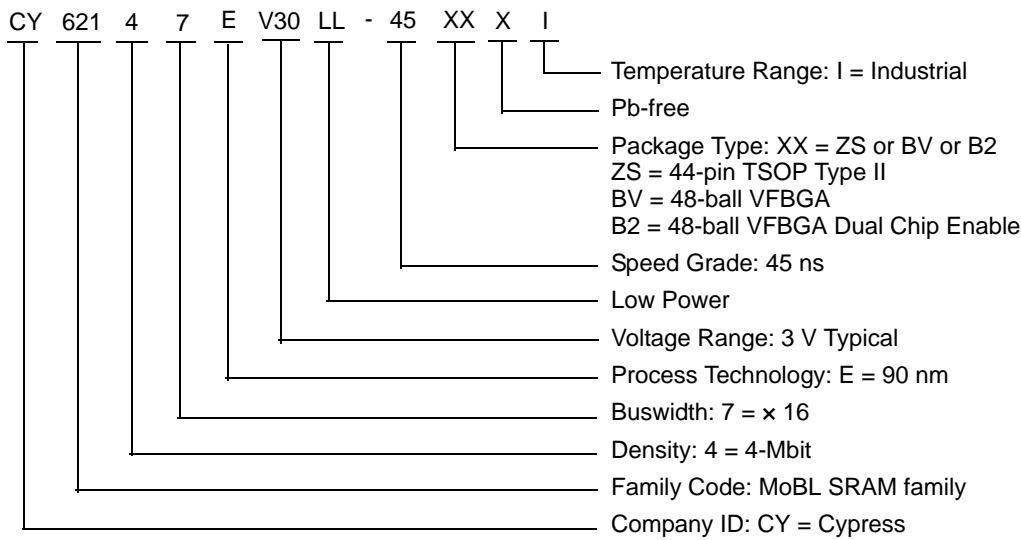
36. For the Dual Chip Enable device,  $\overline{CE}$  refers to the internal logical combination of  $\overline{CE}_1$  and  $\overline{CE}_2$  such that when  $\overline{CE}_1$  is LOW and  $\overline{CE}_2$  is HIGH,  $\overline{CE}$  is LOW. For all other cases  $\overline{CE}$  is HIGH. Intermediate voltage levels are not permitted on any of the Chip Enable pins ( $\overline{CE}$  for the Single Chip Enable device;  $\overline{CE}_1$  and  $\overline{CE}_2$  for the Dual Chip Enable device).

### Ordering Information

Speed (ns)	Ordering Code	Package Diagram	Package Type	Operating Range
45	CY62147EV30LL-45BVI	51-85150	48-ball VFBGA <sup>[37]</sup>	Industrial
	CY62147EV30LL-45BVXI	51-85150	48-ball VFBGA (Pb-free) <sup>[37]</sup>	
	CY62147EV30LL-45B2XI	51-85150	48-ball VFBGA (Pb-free) <sup>[38]</sup>	
	CY62147EV30LL-45ZSXI	51-85087	44-pin TSOP Type II (Pb-free)	

Contact your local Cypress sales representative for availability of these parts.

### Ordering Code Definitions



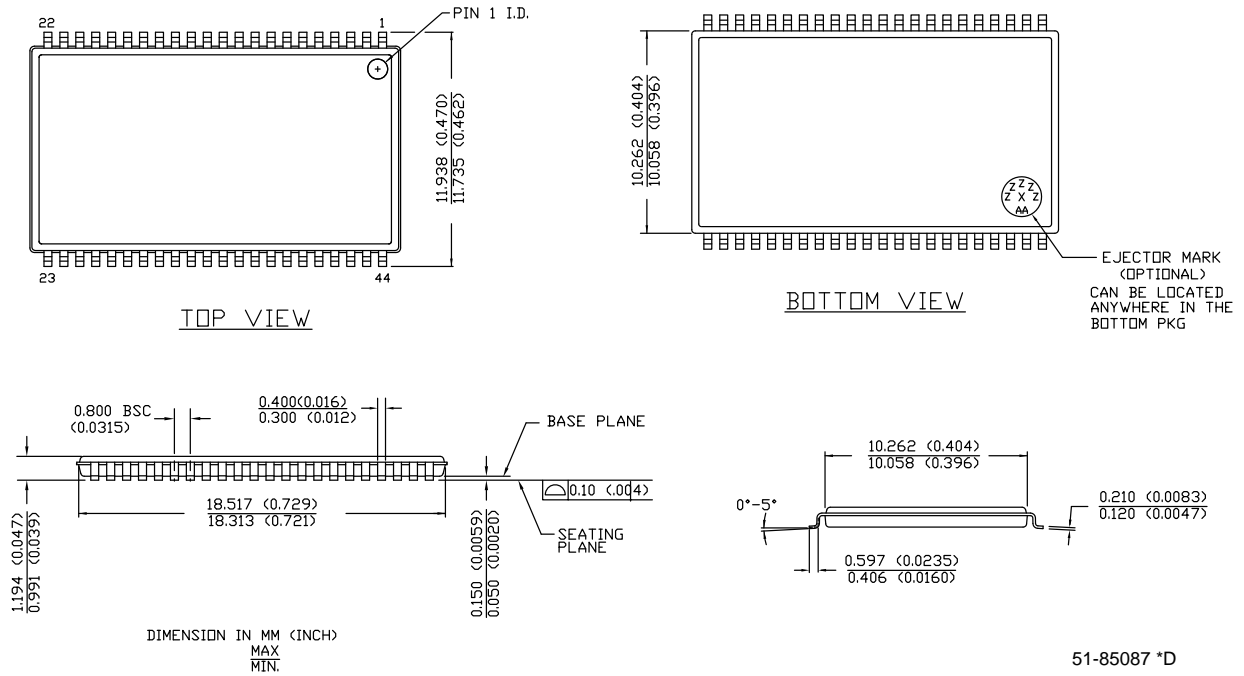
**Notes**

- 37. This BGA package is offered with single chip enable.
- 38. This BGA package is offered with dual chip enable.



Package Diagrams (continued)

Figure 13. 44-pin TSOP Z44-II Package Outline, 51-85087



## Acronyms

Acronym	Description
BHE	byte high enable
BLE	byte low enable
CE	chip enable
CMOS	complementary metal oxide semiconductor
I/O	input/output
OE	output enable
SRAM	static random access memory
TSOP	thin small outline package
VFBGA	very fine-pitch ball grid array
WE	write enable

## Document Conventions

### Units of Measure

Symbol	Unit of Measure
°C	degree Celsius
MHz	megahertz
μA	microampere
μs	microsecond
mA	milliampere
ns	nanosecond
Ω	ohm
pF	picofarad
V	volt
W	watt

**Document History Page**

Document Title: CY62147EV30 MoBL <sup>®</sup> , 4-Mbit (256 K × 16) Static RAM Document Number: 38-05440				
Revision	ECN	Orig. of Change	Submission Date	Description of Change
**	201861	AJU	01/13/04	New Data Sheet
*A	247009	SYT	See ECN	<p>Changed from Advanced Information to Preliminary            Moved Product Portfolio to Page 2            Changed V<sub>CC</sub> stabilization time in footnote #8 from 100 μs to 200 μs            Removed Footnote #15(t<sub>LZBE</sub>) from Previous Revision            Changed I<sub>CCDR</sub> from 2.0 μA to 2.5 μA            Changed typo in Data Retention Characteristics(t<sub>R</sub>) from 100 μs to t<sub>RC</sub> ns            Changed t<sub>OHA</sub> from 6 ns to 10 ns for both 35 ns and 45 ns Speed Bin            Changed t<sub>HZOE</sub>, t<sub>HZBE</sub>, t<sub>HZWE</sub> from 12 to 15 ns for 35 ns Speed Bin and 15 to 18 ns for 45 ns Speed Bin            Changed t<sub>SCE</sub> and t<sub>BW</sub> from 25 to 30 ns for 35 ns Speed Bin and 40 to 35 ns for 45 ns Speed Bin            Changed t<sub>HZCE</sub> from 12 to 18 ns for 35 ns Speed Bin and 15 to 22 ns for 45 ns Speed Bin            Changed t<sub>SD</sub> from 15 to 18 ns for 35 ns Speed Bin and 20 to 22 ns for 45 ns Speed Bin            Changed t<sub>DOE</sub> from 15 to 18 ns for 35 ns Speed Bin            Changed Ordering Information to include Pb-Free Packages</p>
*B	414807	ZSD	See ECN	<p>Changed from Preliminary information to Final            Changed the address of Cypress Semiconductor Corporation on Page #1 from "3901 North First Street" to "198 Champion Court"            Removed 35ns Speed Bin, "L" version of CY62147EV30            Changed ball E3 from DNU to NC.            Removed redundant foot note on DNU.            Changed I<sub>CC</sub> (Max) value from 2 mA to 2.5 mA and I<sub>CC</sub> (Typ) value from 1.5 mA to 2 mA at f = 1 MHz            Changed I<sub>CC</sub> (Typ) value from 12 mA to 15 mA at f = f<sub>max</sub>            Changed I<sub>SB1</sub> and I<sub>SB2</sub> Typ values from 0.7 μA to 1 μA and Max values from 2.5 μA to 7 μA.            Changed I<sub>CCDR</sub> from 2.5 μA to 7 μA.            Added I<sub>CCDR</sub> typical value.            Changed AC test load capacitance from 50 pF to 30 pF on Page #4, changed t<sub>LZOE</sub> from 3 ns to 5 ns, changed t<sub>LZCE</sub>, t<sub>LZBE</sub> and t<sub>LZWE</sub> from 6 ns to 10 ns, changed t<sub>HZCE</sub> from 22 ns to 18 ns, changed t<sub>PWE</sub> from 30 ns to 35 ns and changed t<sub>SD</sub> from 22 ns to 25 ns.            Updated the package diagram 48-pin VFBGA from *B to *D            Updated the ordering information table and replaced the Package Name column with Package Diagram.</p>
*C	464503	NXR	See ECN	<p>Included Automotive Range in product offering            Updated <a href="#">Ordering Information</a>.</p>
*D	925501	VKN	See ECN	<p>Added Preliminary Automotive-A information            Added footnote #9 related to I<sub>SB2</sub> and I<sub>CCDR</sub>            Added footnote #14 related AC timing parameters</p>
*E	1045701	VKN	See ECN	<p>Converted Automotive-A and Automotive -E specs from preliminary to final</p>
*F	2577505	VKN / PYRS	10/03/08	<p>Added -45B2XI part (Dual CE option)</p>
*G	2681901	VKN / PYRS	04/01/09	<p>Added CY62147EV30LL-45ZSXA in the ordering information table</p>
*H	2886488	AJU	03/02/2010	<p>Updated <a href="#">Package Diagrams</a>.            Added <a href="#">Contents</a>.            Updated links in <a href="#">Sales, Solutions, and Legal Information</a>.            Added Note 36.</p>

**Document History Page** (continued)

Document Title: CY62147EV30 MoBL <sup>®</sup> , 4-Mbit (256 K x 16) Static RAM Document Number: 38-05440				
Revision	ECN	Orig. of Change	Submission Date	Description of Change
*I	3109050	PRAS	12/13/2010	Changed Table Footnotes to Notes. Added <a href="#">Ordering Code Definitions</a> .
*J	3123973	RAME	01/31/2011	Separated Industrial and Auto parts from this datasheet Removed Automotive info Added <a href="#">Acronyms</a> and <a href="#">Units of Measure</a> table
*K	3296744	RAME	08/09/2011	Updated <a href="#">Functional Description</a> (Removed reference to AN1064 SRAM system guidelines). Added I <sub>SB1</sub> to footnote 9 and 12. Notes 17 and 18 moved to parameter section of <a href="#">Switching Characteristics</a> . Added Note 22 and referred the same note in the description of t <sub>LZBE</sub> parameter.
*L	3456837	TAVA	12/06/2011	Updated <a href="#">Package Diagrams</a> . Updated in new template.
*M	3724736	JISH	08/23/2012	Fixed typo errors and minor clean-up.

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