

Features

- High speed: 45 ns
- Temperature ranges
 - Industrial: -40 °C to +85 °C
 - Automotive-A: -40 °C to +85 °C
 - Automotive-E: -40 °C to +125 °C
- Wide voltage range: 2.2 V to 3.6 V
- Pin compatible with CY62126DV30
- Ultra low standby power
 - Typical standby current: 1 μA
 - Maximum standby current: 4 μA
- Ultra low active power
 - Typical active current: 1.3 mA at f = 1 MHz
- Easy memory expansion with \overline{CE} and \overline{OE} features
- Automatic power down when deselected
- Complementary metal oxide semiconductor (CMOS) for optimum speed and power
- Offered in Pb-free 48-ball very fine-pitch ball grid array (VFBGA) and 44-pin thin small outline package (TSOP) II packages

Functional Description

The CY62126EV30 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 when addresses are not toggling. Placing the device in standby mode reduces power consumption by more than 99 percent when deselected (\overline{CE} HIGH). The input and output pins (I/O_0 through I/O_{15}) are placed in a high impedance state when the device is deselected (\overline{CE} HIGH), the 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).

To write to the device, take 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}).

To read from the device, take 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 appear on I/O_0 to I/O_7 . If Byte High Enable (\overline{BHE}) is LOW, then data from memory appears on I/O_8 to I/O_{15} . See the Truth Table on page 11 for a complete description of read and write modes.

For a complete list of related documentation, [click here](#).

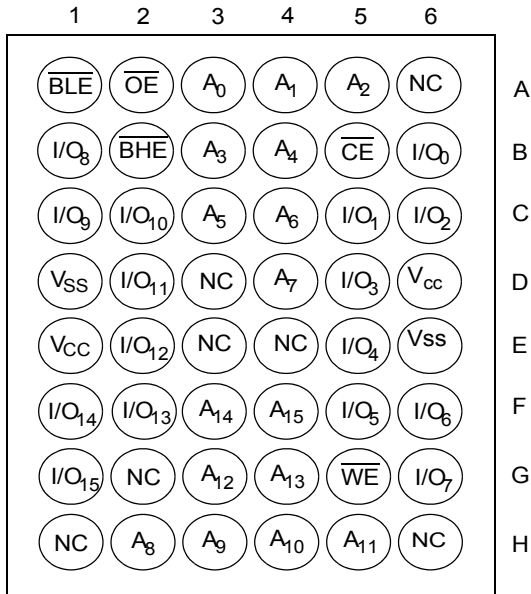
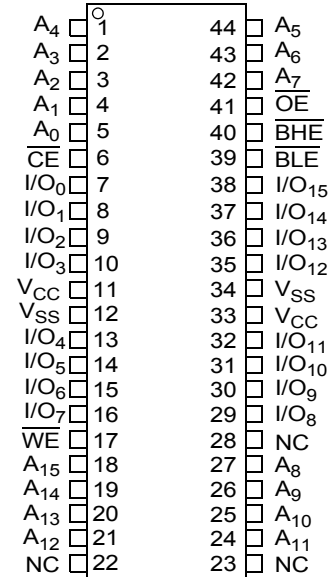
Logic Block Diagram



Contents

Pin Configuration	3	Ordering Information	12
Product Portfolio	3	Ordering Code Definitions	12
Maximum Ratings	4	Package Diagrams	13
Operating Range	4	Acronyms	15
Electrical Characteristics	4	Document Conventions	15
Capacitance	5	Units of Measure	15
Thermal Resistance	5	Document History Page	16
AC Test Loads and Waveforms	5	Sales, Solutions, and Legal Information	18
Data Retention Characteristics	6	Worldwide Sales and Design Support	18
Data Retention Waveform	6	Products	18
Switching Characteristics	7	PSoC [®] Solutions	18
Switching Waveforms	8	Cypress Developer Community	18
Truth Table	11	Technical Support	18

Pin Configuration

Figure 1. 48-ball VFBGA pinout (Top View)

Figure 2. 44-pin TSOP II pinout (Top View)^[1]


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 ^[2]	Max		Typ ^[2]	Max	Typ ^[2]	Max	Typ ^[2]	Max
CY62126EV30LL	Industrial	2.2	3.0	3.6	45	1.3	2	11	16	1	4
CY62126EV30LL	Automotive-A	2.2	3.0	3.6	45	1.3	2	11	16	1	4
CY62126EV30LL	Automotive-E	2.2	3.0	3.6	55	1.3	4	11	35	1	30

Notes

- NC pins are not connected on the die.
- 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

Exceeding maximum ratings may shorten the battery life of the device. These 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 [3, 4] -0.3 V to 3.6 V ($V_{CCmax} + 0.3$ V)

DC voltage applied to outputs
in High Z state [3, 4] -0.3 V to 3.6 V ($V_{CCmax} + 0.3$ V)

DC input voltage [3, 4] -0.3 V to 3.6 V ($V_{CCmax} + 0.3$ 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_{CC} [5]
CY62126EV30LL	Industrial / Automotive-A	-40 °C to +85 °C	2.2 V to 3.6 V
	Automotive-E	-40 °C to +125 °C	

Electrical Characteristics

Over the Operating Range

Parameter	Description	Test Conditions	45 ns (Industrial / Automotive-A)			55 ns (Automotive-E)			Unit
			Min	Typ ^[6]	Max	Min	Typ ^[6]	Max	
V_{OH}	Output high voltage	$I_{OH} = -0.1$ mA	2.0	-	-	2.0	-	-	V
		$I_{OH} = -1.0$ mA, $V_{CC} \geq 2.70$ V	2.4	-	-	2.4	-	-	V
V_{OL}	Output low voltage	$I_{OL} = 0.1$ mA	-	-	0.4	-	-	0.4	V
		$I_{OL} = 2.1$ mA, $V_{CC} \geq 2.70$ V	-	-	0.4	-	-	0.4	V
V_{IH}	Input high voltage	$V_{CC} = 2.2$ V to 2.7 V	1.8	-	$V_{CC} + 0.3$	1.8	-	$V_{CC} + 0.3$	V
		$V_{CC} = 2.7$ V to 3.6 V	2.2	-	$V_{CC} + 0.3$	2.2	-	$V_{CC} + 0.3$	V
V_{IL}	Input low voltage	$V_{CC} = 2.2$ V to 2.7 V	-0.3	-	0.6	-0.3	-	0.6	V
		$V_{CC} = 2.7$ V to 3.6 V	-0.3	-	0.8	-0.3	-	0.8	V
I_{IX}	Input leakage current	$GND \leq V_I \leq V_{CC}$	-1	-	+1	-4	-	+4	μ A
I_{OZ}	Output leakage current	$GND \leq V_O \leq V_{CC}$, Output Disabled	-1	-	+1	-4	-	+4	μ A
I_{CC}	V_{CC} operating supply current	$f = f_{max} = 1/t_{RC}$	-	11	16	-	11	35	mA
		$f = 1$ MHz	-	1.3	2.0	-	1.3	4.0	
I_{SB1} [7]	Automatic CE power down current —CMOS inputs	$\overline{CE} \geq V_{CC} - 0.2$ V, $V_{IN} \geq V_{CC} - 0.2$ V, $V_{IN} \leq 0.2$ V, $f = f_{max}$ (Address and Data Only), $f = 0$ (\overline{OE} , \overline{BHE} , \overline{BLE} and \overline{WE}), $V_{CC} = 3.60$ V	-	1	4	-	1	35	μ A
I_{SB2} [7]	Automatic CE power down current —CMOS inputs	$\overline{CE} \geq V_{CC} - 0.2$ V, $V_{IN} \geq V_{CC} - 0.2$ V or $V_{IN} \leq 0.2$ V, $f = 0$, $V_{CC} = 3.60$ V	-	1	4	-	1	30	μ A

Notes

3. $V_{L(min)}$ = -2.0 V for pulse durations less than 20 ns.

4. $V_{H(max)}$ = $V_{CC} + 0.75$ V for pulse durations less than 20 ns.

5. Full device AC operation assumes a 100 μ s ramp time from 0 to $V_{CC(min)}$ and 200 μ s wait time after V_{CC} stabilization.

6. 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.

7. Chip enable (CE) needs to be tied to CMOS levels to meet the I_{SB1} / I_{SB2} / I_{CCDR} spec. Other inputs can be left floating.

Capacitance

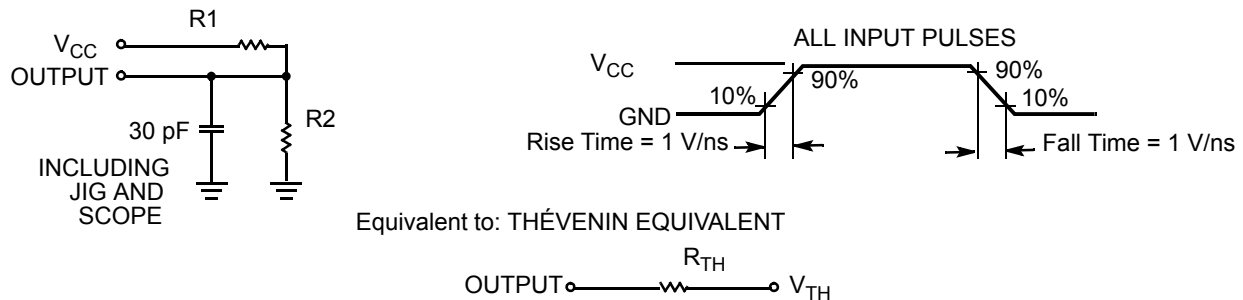
Parameter [8]	Description	Test Conditions	Max	Unit
C_{IN}	Input capacitance	$T_A = 25\text{ }^\circ\text{C}$, $f = 1\text{ MHz}$, $V_{CC} = V_{CC(\text{typ})}$	10	pF
C_{OUT}	Output capacitance		10	pF

Thermal Resistance

Parameter [8]	Description	Test Conditions	48-ball VFBGA Package	44-pin TSOP II Package	Unit
Θ_{JA}	Thermal resistance (junction to ambient)	Still Air, soldered on a 4.25 × 1.125 inch, two-layer printed circuit board	58.85	28.2	$^\circ\text{C/W}$
Θ_{JC}	Thermal resistance (junction to case)		17.01	3.4	$^\circ\text{C/W}$

AC Test Loads and Waveforms

Figure 3. AC Test Loads and Waveforms



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

Note

8. 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 ^[9]	Max	Unit	
V_{DR}	V_{CC} for data retention		1.5	–	–	V	
$I_{CCDR}^{[10]}$	Data retention current	$V_{CC} = V_{DR}$, $\overline{CE} \geq V_{CC} - 0.2\text{ V}$, $V_{IN} \geq V_{CC} - 0.2\text{ V}$ or $V_{IN} \leq 0.2\text{ V}$	Industrial / Automotive-A	–	–	3	μA
			Automotive-E	–	–	30	μA
$t_{CDR}^{[11]}$	Chip deselect to data retention time		0	–	–	ns	
$t_R^{[12]}$	Operation recovery time		CY62126EV30LL-45	45	–	–	ns
			CY62126EV30LL-55	55	–	–	

Data Retention Waveform

Figure 4. Data Retention Waveform



Notes

9. Typical values are included for reference only and are not guaranteed or tested. Typical values are measured at $V_{CC} = V_{CC(typ)}$, $T_A = 25\text{ }^\circ\text{C}$.
10. Chip enable (\overline{CE}) needs to be tied to CMOS levels to meet the I_{SB1} / I_{SB2} / I_{CCDR} spec. Other inputs can be left floating.
11. Tested initially and after any design or process changes that may affect these parameters.
12. Full device AC operation requires linear V_{CC} ramp from V_{DR} to $V_{CC(min)}$ > 100 μs .

Switching Characteristics

Over the Operating Range

Parameter ^[13, 14]	Description	45 ns (Industrial / Automotive-A)		55 ns (Automotive-E)		Unit
		Min	Max	Min	Max	
Read Cycle						
t _{RC}	Read cycle time	45	–	55	–	ns
t _{AA}	Address to data valid	–	45	–	55	ns
t _{OHA}	Data hold from address change	10	–	10	–	ns
t _{ACE}	\overline{CE} LOW to data valid	–	45	–	55	ns
t _{DOE}	\overline{OE} LOW to data valid	–	22	–	25	ns
t _{LZOE}	\overline{OE} LOW to Low Z ^[15]	5	–	5	–	ns
t _{HZOE}	\overline{OE} HIGH to High Z ^[15, 16]	–	18	–	20	ns
t _{LZCE}	\overline{CE} LOW to Low Z ^[15]	10	–	10	–	ns
t _{HZCE}	\overline{CE} HIGH to High Z ^[15, 16]	–	18	–	20	ns
t _{PU}	\overline{CE} LOW to power up	0	–	0	–	ns
t _{PD}	\overline{CE} HIGH to power down	–	45	–	55	ns
t _{DBE}	\overline{BHE} / \overline{BLE} LOW to data valid	–	22	–	25	ns
t _{LZBE}	\overline{BHE} / \overline{BLE} LOW to Low Z ^[15]	5	–	5	–	ns
t _{HZBE}	\overline{BHE} / \overline{BLE} HIGH to High Z ^[15, 16]	–	18	–	20	ns
Write Cycle^[17, 18]						
t _{WC}	Write cycle time	45	–	55	–	ns
t _{SCE}	\overline{CE} LOW to write end	35	–	40	–	ns
t _{AW}	Address setup to write end	35	–	40	–	ns
t _{HA}	Address hold from write end	0	–	0	–	ns
t _{SA}	Address setup to write start	0	–	0	–	ns
t _{PWE}	\overline{WE} pulse width	35	–	40	–	ns
t _{BW}	\overline{BHE} / \overline{BLE} pulse width	35	–	40	–	ns
t _{SD}	Data setup to write end	25	–	25	–	ns
t _{HD}	Data hold from write end	0	–	0	–	ns
t _{HZWE}	\overline{WE} LOW to High Z ^[15, 16]	–	18	–	20	ns
t _{LZWE}	\overline{WE} HIGH to Low Z ^[15]	10	–	10	–	ns

Notes

13. Test conditions assume signal transition time of 3 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} and 30-pF load capacitance.

14. AC timing parameters are subject to byte enable signals (\overline{BHE} or \overline{BLE}) not switching when chip is disabled. See [application note AN13842](#) for further clarification.

15. 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.

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

17. 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 refer to the edge of signal that terminates write.

18. The minimum write cycle pulse width for Write Cycle No. 3 (\overline{WE} Controlled, \overline{OE} LOW) should be equal to sum of t_{SD} and t_{HZWE}.

Switching Waveforms

Figure 5. Read Cycle No. 1 (Address transition controlled) [19, 20]

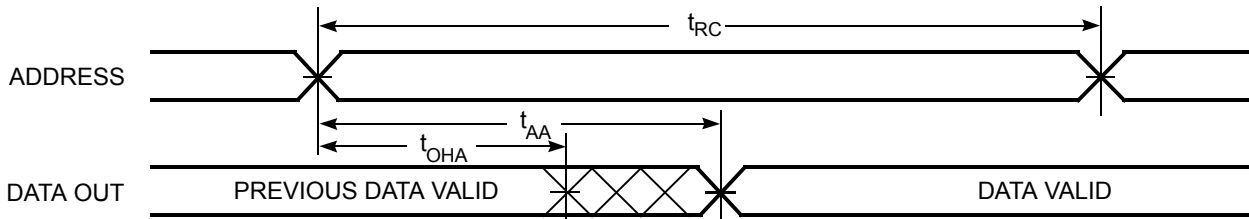
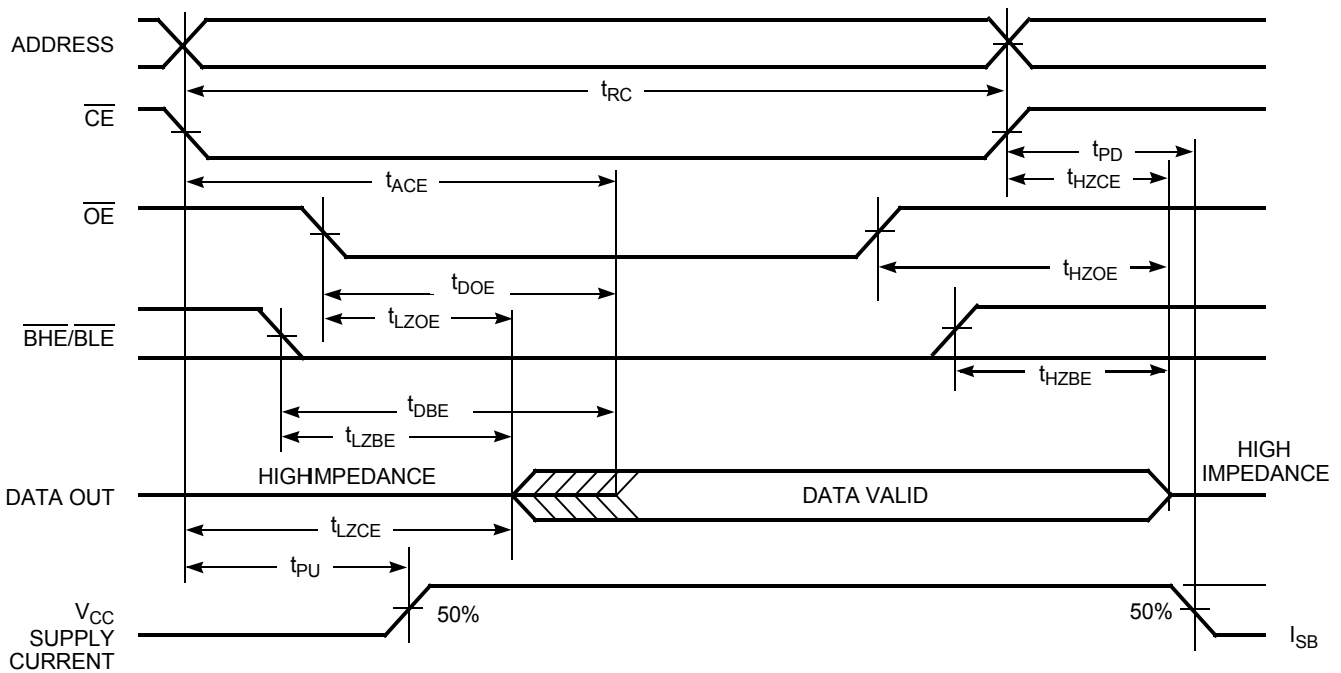


Figure 6. Read Cycle No. 2 (\overline{OE} controlled) [20, 21]



Notes

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

20. \overline{WE} is high for read cycle.

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

Switching Waveforms (continued)

Figure 7. Write Cycle No. 1 (\overline{WE} controlled) [22, 23, 24]

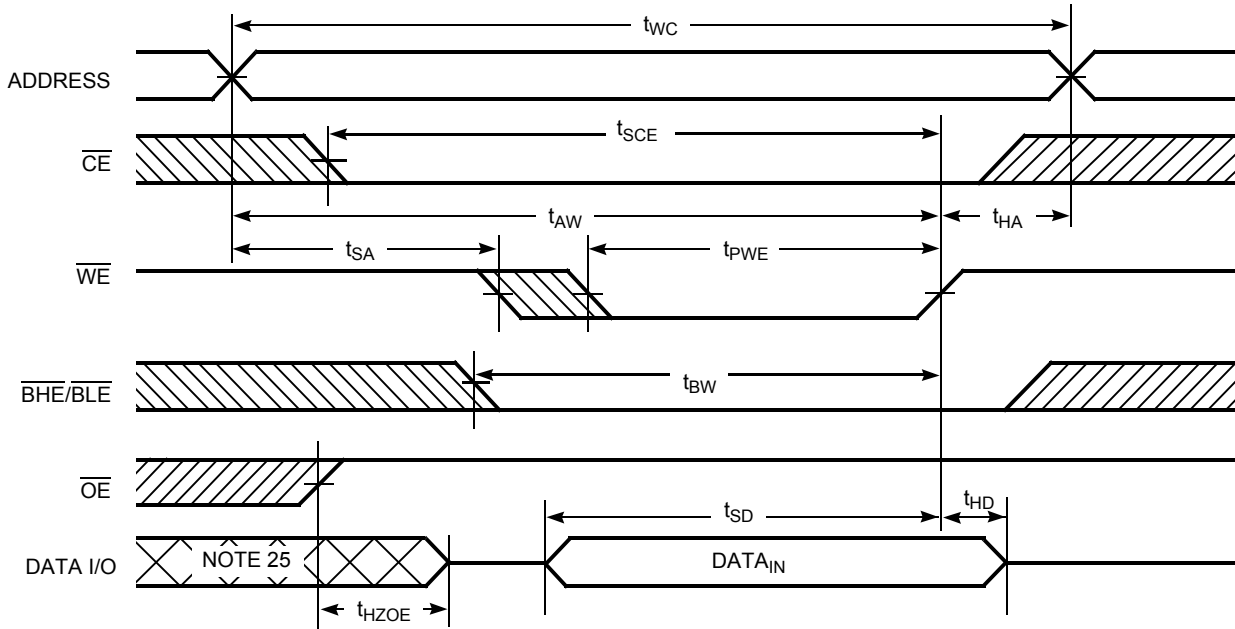
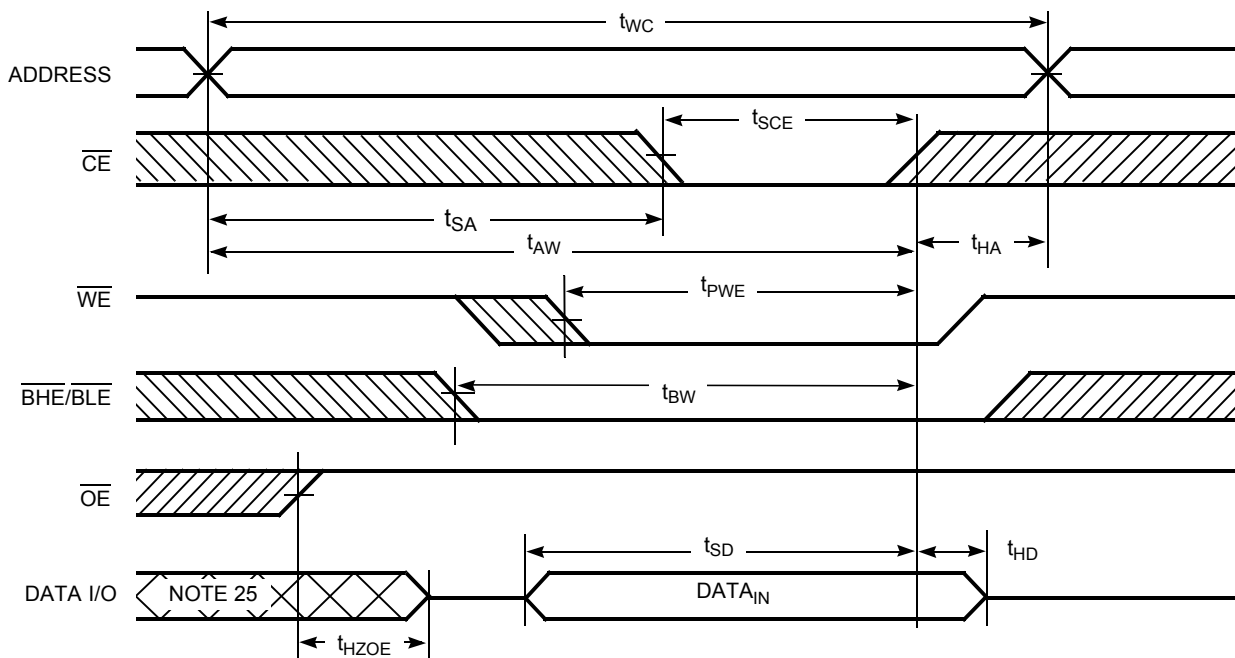


Figure 8. Write Cycle No. 2 (\overline{CE} controlled) [22, 23, 24]



Notes

22. 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 refer to the edge of signal that terminates write.

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

24. If \overline{CE} goes high simultaneously with $\overline{WE} = V_{IH}$, the output remains in a high impedance state.

25. During this period, the I/Os are in output state. Do not apply input signals.

Switching Waveforms (continued)

Figure 9. Write Cycle No. 3 (\overline{WE} Controlled, \overline{OE} LOW) [26, 27]

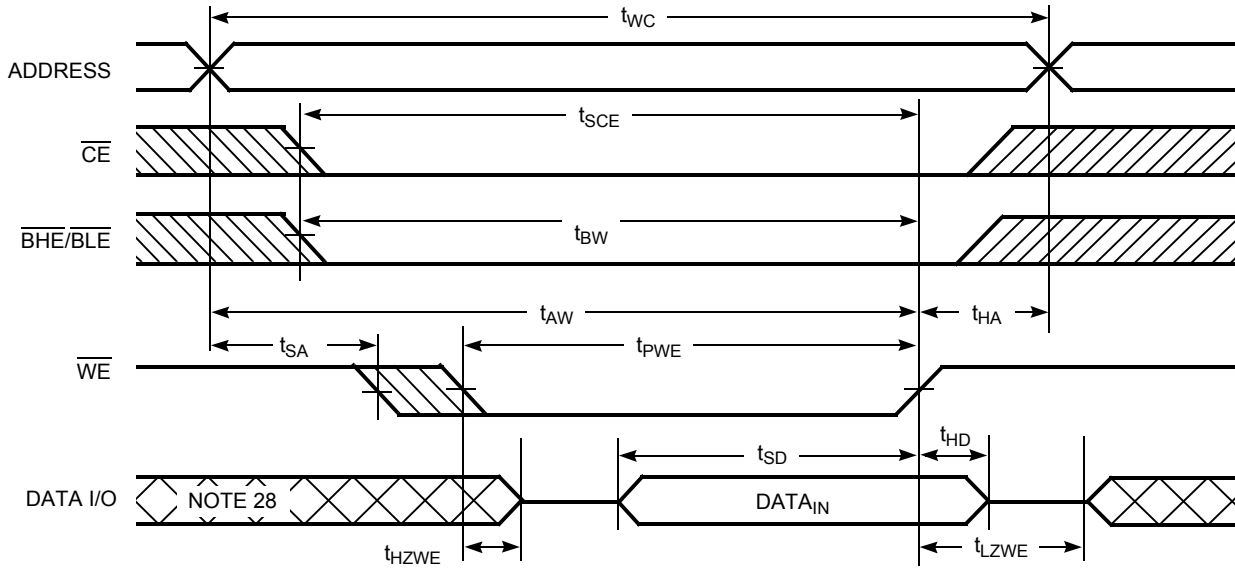
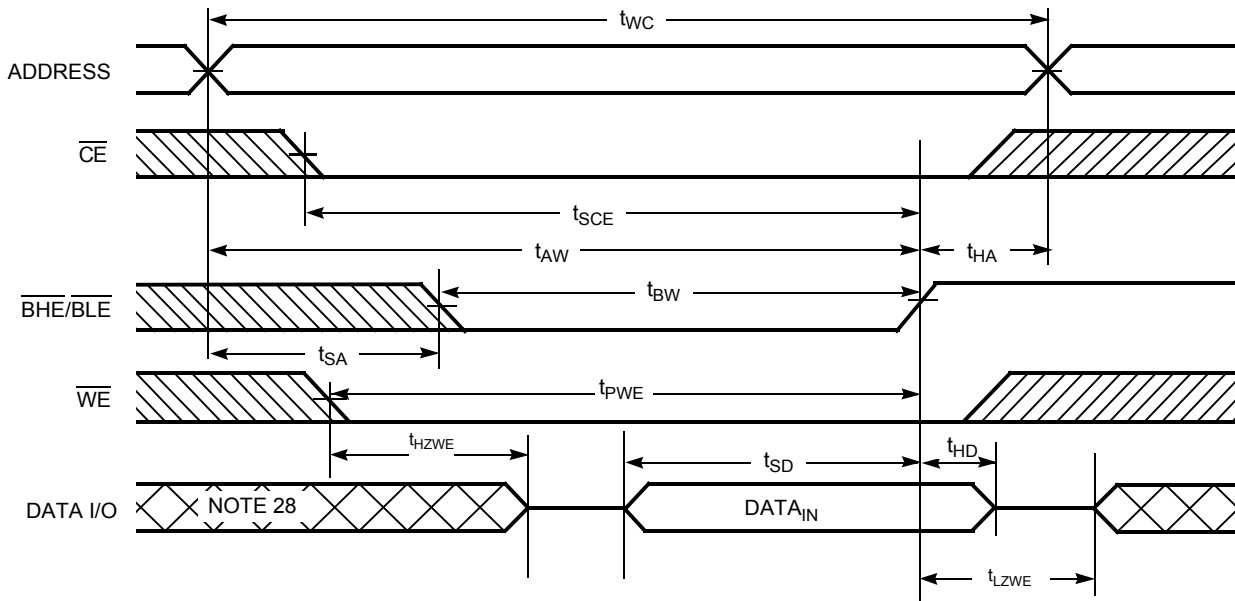


Figure 10. Write Cycle No. 4 ($\overline{BHE}/\overline{BLE}$ controlled, \overline{OE} LOW) [26]



Notes

- 26. If \overline{CE} goes high simultaneously with $\overline{WE} = V_{IH}$, the output remains in a high impedance state.
- 27. The minimum write cycle pulse width should be equal to sum of t_{SD} and t_{HZWE} .
- 28. During this period, the I/Os are in output state. Do not apply input signals.

Truth Table

$\overline{CE}^{[29]}$	\overline{WE}	\overline{OE}	\overline{BHE}	\overline{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	Data out (I/O_0 – I/O_7); I/O_8 – I/O_{15} in High Z	Read	Active (I_{CC})
L	H	L	L	H	Data out (I/O_8 – I/O_{15}); I/O_0 – I/O_7 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_0 – I/O_{15})	Write	Active (I_{CC})
L	L	X	H	L	Data in (I/O_0 – I/O_7); I/O_8 – I/O_{15} in High Z	Write	Active (I_{CC})
L	L	X	L	H	Data in (I/O_8 – I/O_{15}); I/O_0 – I/O_7 in High Z	Write	Active (I_{CC})

Note

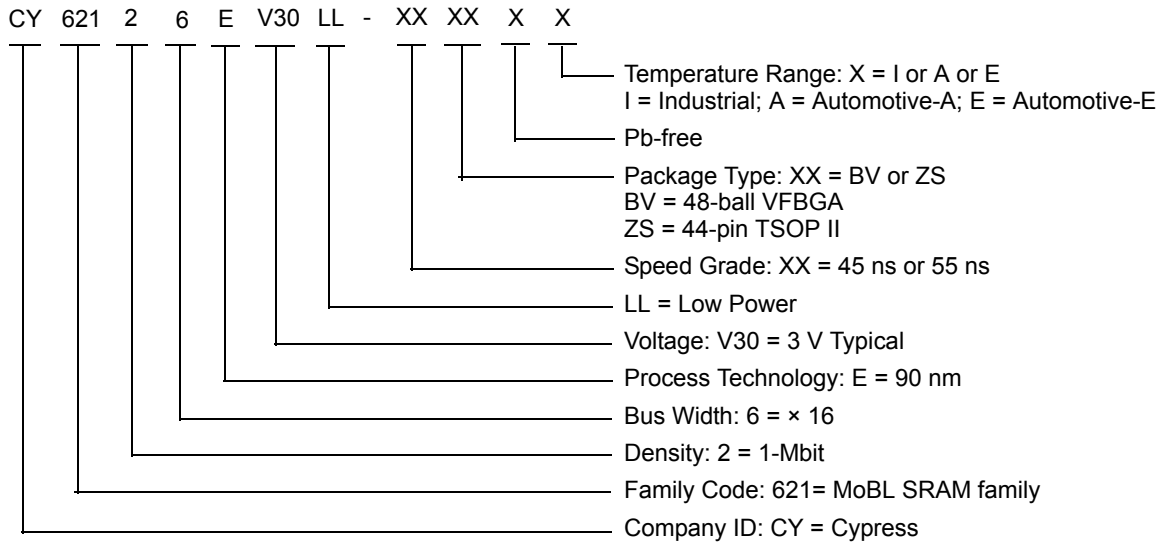
29. Chip enable must be at CMOS levels (not floating). Intermediate voltage levels on this pin is not permitted.

Ordering Information

Speed (ns)	Ordering Code	Package Diagram	Package Type	Operating Range
45	CY62126EV30LL-45BVXI	51-85150	48-ball VFBGA (Pb-free)	Industrial
	CY62126EV30LL-45ZSXI	51-85087	44-pin TSOP II (Pb-free)	Industrial
	CY62126EV30LL-45ZSXA	51-85087	44-pin TSOP II (Pb-free)	Automotive-A
55	CY62126EV30LL-55BVXE	51-85150	48-ball VFBGA (Pb-free)	Automotive-E
	CY62126EV30LL-55ZSXE	51-85087	44-pin TSOP II (Pb-free)	Automotive-E

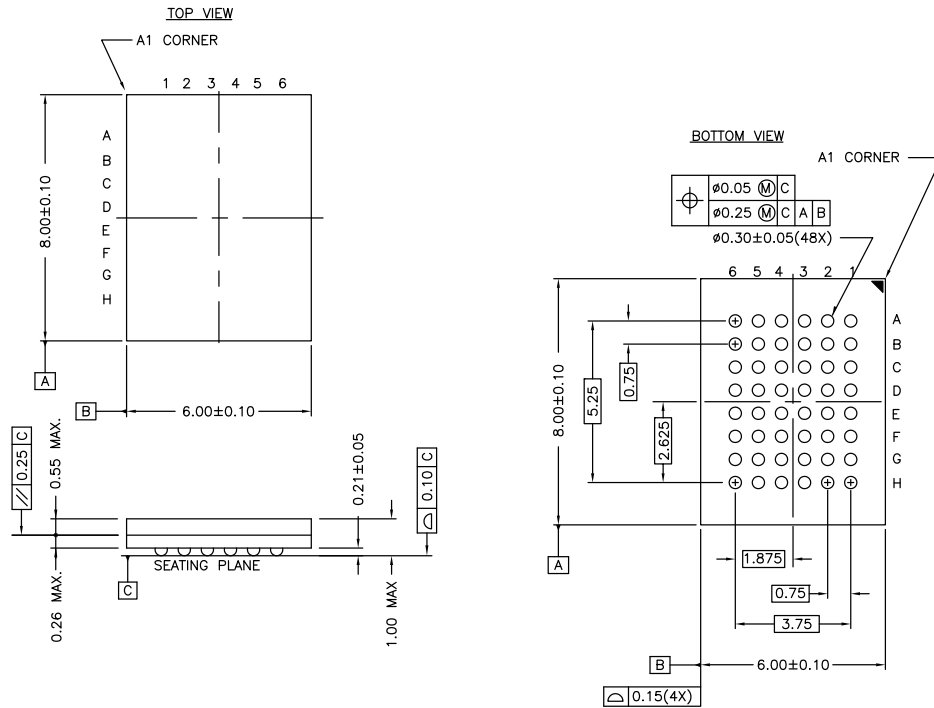
Contact your local Cypress sales representative for availability of other parts.

Ordering Code Definitions



Package Diagrams

Figure 11. 48-ball VFBGA (6 × 8 × 1.0 mm) Package Outline, 51-85150

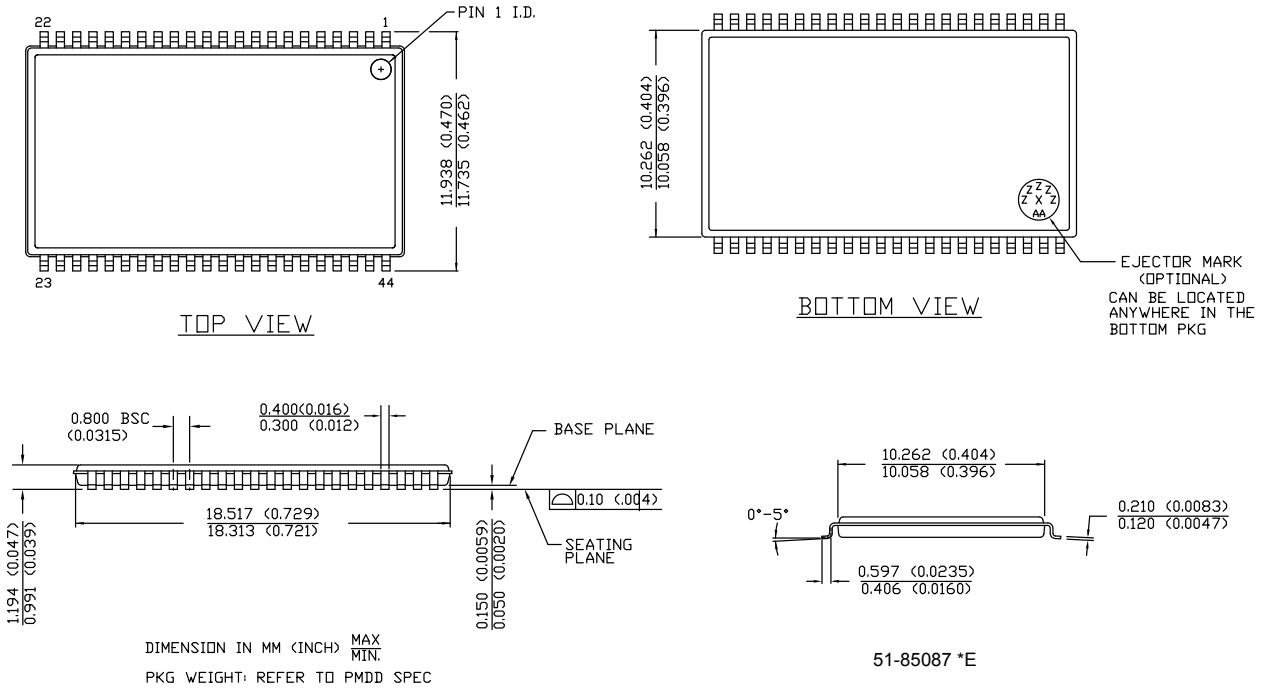


NOTE:
 PACKAGE WEIGHT: See Cypress Package Material Declaration Datasheet (PMDD) posted on the Cypress web.

51-85150 *H

Package Diagrams (continued)

Figure 12. 44-pin TSOP II Package Outline, 51-85087



Acronyms

Acronym	Description
\overline{CE}	Chip Enable
CMOS	Complementary Metal Oxide Semiconductor
I/O	Input/Output
\overline{OE}	Output Enable
RAM	Random Access Memory
SRAM	Static Random Access Memory
TSOP	Thin Small Outline Package
VFBGA	Very Fine-Pitch Ball Grid Array
\overline{WE}	Write Enable

Document Conventions

Units of Measure

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

Document History Page

Document Title: CY62126EV30 MoBL [®] , 1-Mbit (64 K × 16) Static RAM				
Document Number: 38-05486				
Rev.	ECN No.	Submission Date	Orig. of Change	Description of Change
**	202760	See ECN	AJU	New data sheet.
*A	300835	See ECN	SYT	<p>Converted from Advance Information to Preliminary</p> <p>Specified Typical standby power in the Features Section</p> <p>Changed E3 ball from DNU to NC in the Pin Configuration for the FBGA Package and removed the footnote associated with it on page #2</p> <p>Changed t_{OHA} from 6 ns to 10 ns for both 35- and 45-ns speed bins, respectively</p> <p>Changed t_{DOE}, t_{SD} from 15 to 18 ns for 35-ns speed bin</p> <p>Changed t_{HZOE}, t_{HZBE}, t_{HZWE} from 12 and 15 ns to 15 and 18 ns for the 35 ns and 45 ns speed bins, respectively</p> <p>Changed t_{HZCE} from 12 and 15 ns to 18 and 22 ns for the 35- and 45-ns speed bins, respectively</p> <p>Changed t_{SCE}, t_{BW} from 25 and 40 ns to 30 and 35 ns for the 35- and 45-ns speed bins, respectively</p> <p>Changed t_{AW} from 25 to 30 ns and 40 to 35 ns for 35 and 45-ns speed bins respectively</p> <p>Changed t_{DBE} from 35 and 45 ns to 18 and 22 ns for the 35 and 45 ns speed bins respectively</p> <p>Removed footnote that read "BHE.BLE is the AND of both BHE and BLE. Chip can be deselected by either disabling the chip enable signals or by disabling both BHE and BLE" on page # 4</p> <p>Removed footnote that read "If both BHE and BLE are toggled together, then t_{LZBE} is 10 ns" on page # 5</p> <p>Added Pb-free package information</p>
*B	461631	See ECN	NXR	<p>Converted from Preliminary to Final</p> <p>Removed 35 ns Speed Bin</p> <p>Removed "L" version of CY62126EV30</p> <p>Changed $I_{CC(Typ)}$ from 8 mA to 11 mA and $I_{CC(max)}$ from 12 mA to 16 mA for $f = f_{max}$</p> <p>Changed $I_{CC(max)}$ from 1.5 mA to 2.0 mA for $f = 1$ MHz, I_{SB1}, $I_{SB2(max)}$ from 1 μA to 4 μA, I_{SB1}, $I_{SB2(Typ)}$ from 0.5 μA to 1 μA, $I_{CCDR(max)}$ from 1.5 μA to 3 μA, AC Test load Capacitance value from 50 pF to 30 pF, t_{LZOE} from 3 to 5 ns, t_{LZCE} from 6 to 10 ns, t_{HZCE} from 22 to 18 ns, t_{LZBE} from 6 to 5 ns, t_{PWE} from 30 to 35 ns, t_{SD} from 22 to 25 ns, t_{LZWE} from 6 to 10 ns, and updated the Ordering Information table.</p>
*C	925501	See ECN	VKN	<p>Added footnote #7 related to I_{SB2} and I_{CCDR}</p> <p>Added footnote #11 related AC timing parameters</p>
*D	1045260	See ECN	VKN	<p>Added Automotive information</p> <p>Updated Ordering Information table</p>
*E	2631771	01/07/09	NXR / PYRS	<p>Changed CE condition from X to L in Truth table for Output Disable mode</p> <p>Updated template</p>
*F	2944332	06/04/2010	VKN	<p>Added Contents</p> <p>Removed byte enable from footnote #2 in Electrical Characteristics</p> <p>Added footnote related to chip enable in Truth Table</p> <p>Updated Package Diagrams</p> <p>Updated links in Sales, Solutions, and Legal Information</p>
*G	2996166	07/29/2010	AJU	<p>Added CY62126EV30LL-45ZSXA part in Ordering Information.</p> <p>Added Ordering Code Definitions.</p> <p>Modified table footnote format.</p>
*H	3113864	12/17/2010	PRAS	Updated Figure 1 and Package Diagram, and fixed Typo in Figure 3.

Document History Page *(continued)*

Document Title: CY62126EV30 MoBL [®] , 1-Mbit (64 K × 16) Static RAM Document Number: 38-05486				
Rev.	ECN No.	Submission Date	Orig. of Change	Description of Change
*I	3270487	05/31/2011	RAME	Updated Functional Description (Removed "For best practice recommendations, refer to the Cypress application note AN1064, SRAM System Guidelines."). Updated Electrical Characteristics . Updated Data Retention Characteristics . Added Acronyms and Units of Measure . Updated to new template.
*J	4205722	11/29/2013	MEMJ	Updated Features : Added Automotive-A range information. Updated Product Portfolio : Added Automotive-A range information. Updated Operating Range : Segregated Automotive-A and Automotive-E ranges. Updated Electrical Characteristics : Added Automotive-A with Industrial for 45 ns speed bin. Renamed Automotive as Automotive-E for 55 ns speed bin. Updated Data Retention Characteristics : Segregated Automotive-A and Automotive-E in conditions for I _{CCDR} parameter. Updated Switching Characteristics : Added Automotive-A with Industrial for 45 ns speed bin. Renamed Automotive as Automotive-E for 55 ns speed bin. Updated Package Diagrams : spec 51-85150 – Changed revision from *F to *H. spec 51-85087 – Changed revision from *C to *E. Updated to new template.
*K	4211675	12/12/2013	MEMJ	No technical updates. Removed the border lines in Package Diagram specs.
*L	4410948	06/17/2014	VINI	Updated Switching Characteristics : Added Note 18 and referred the same note in "Write Cycle". Updated Switching Waveforms : Added Note 27 and referred the same note in Figure 9 . Completing Sunset Review.
*M	4576475	11/21/2014	VINI	Updated Functional Description : Added "For a complete list of related documentation, click here ." at the end.
*N	4612072	01/05/2015	VINI	Updated Maximum Ratings : Referred Notes 3, 4 in "Supply voltage to ground potential".
*O	4797476	06/15/2015	VINI	Updated to new template. Completing Sunset Review.
*P	5975641	11/24/2017	AESATMP9	Updated logo and Copyright.

Sales, Solutions, and Legal Information

Worldwide Sales and Design Support

Cypress maintains a worldwide network of offices, solution centers, manufacturer's representatives, and distributors. To find the office closest to you, visit us at [Cypress Locations](#).

Products

ARM [®] Cortex [®] Microcontrollers	cypress.com/arm
Automotive	cypress.com/automotive
Clocks & Buffers	cypress.com/clocks
Interface	cypress.com/interface
Internet of Things	cypress.com/iot
Memory	cypress.com/memory
Microcontrollers	cypress.com/mcu
PSoC	cypress.com/psoc
Power Management ICs	cypress.com/pmic
Touch Sensing	cypress.com/touch
USB Controllers	cypress.com/usb
Wireless Connectivity	cypress.com/wireless

PSoC[®] Solutions

[PSoC 1](#) | [PSoC 3](#) | [PSoC 4](#) | [PSoC 5LP](#) | [PSoC 6](#)

Cypress Developer Community

[Forums](#) | [WICED IOT Forums](#) | [Projects](#) | [Video](#) | [Blogs](#) | [Training](#) | [Components](#)

Technical Support

cypress.com/support

© Cypress Semiconductor Corporation, 2004-2017. This document is the property of Cypress Semiconductor Corporation and its subsidiaries, including Spansion LLC ("Cypress"). This document, including any software or firmware included or referenced in this document ("Software"), is owned by Cypress under the intellectual property laws and treaties of the United States and other countries worldwide. Cypress reserves all rights under such laws and treaties and does not, except as specifically stated in this paragraph, grant any license under its patents, copyrights, trademarks, or other intellectual property rights. If the Software is not accompanied by a license agreement and you do not otherwise have a written agreement with Cypress governing the use of the Software, then Cypress hereby grants you a personal, non-exclusive, nontransferable license (without the right to sublicense) (1) under its copyright rights in the Software (a) for Software provided in source code form, to modify and reproduce the Software solely for use with Cypress hardware products, only internally within your organization, and (b) to distribute the Software in binary code form externally to end users (either directly or indirectly through resellers and distributors), solely for use on Cypress hardware product units, and (2) under those claims of Cypress's patents that are infringed by the Software (as provided by Cypress, unmodified) to make, use, distribute, and import the Software solely for use with Cypress hardware products. Any other use, reproduction, modification, translation, or compilation of the Software is prohibited.

TO THE EXTENT PERMITTED BY APPLICABLE LAW, CYPRESS MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARD TO THIS DOCUMENT OR ANY SOFTWARE OR ACCOMPANYING HARDWARE, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. To the extent permitted by applicable law, Cypress reserves the right to make changes to this document without further notice. Cypress does not assume any liability arising out of the application or use of any product or circuit described in this document. Any information provided in this document, including any sample design information or programming code, is provided only for reference purposes. It is the responsibility of the user of this document to properly design, program, and test the functionality and safety of any application made of this information and any resulting product. Cypress products are not designed, intended, or authorized for use as critical components in systems designed or intended for the operation of weapons, weapons systems, nuclear installations, life-support devices or systems, other medical devices or systems (including resuscitation equipment and surgical implants), pollution control or hazardous substances management, or other uses where the failure of the device or system could cause personal injury, death, or property damage ("Unintended Uses"). A critical component is any component of a device or system whose failure to perform can be reasonably expected to cause the failure of the device or system, or to affect its safety or effectiveness. Cypress is not liable, in whole or in part, and you shall and hereby do release Cypress from any claim, damage, or other liability arising from or related to all Unintended Uses of Cypress products. You shall indemnify and hold Cypress harmless from and against all claims, costs, damages, and other liabilities, including claims for personal injury or death, arising from or related to any Unintended Uses of Cypress products.

Cypress, the Cypress logo, Spansion, the Spansion logo, and combinations thereof, WICED, PSoC, CapSense, EZ-USB, F-RAM, and Traveo are trademarks or registered trademarks of Cypress in the United States and other countries. For a more complete list of Cypress trademarks, visit cypress.com. Other names and brands may be claimed as property of their respective owners.