

Features

- Very high speed: 45 ns
- Wide voltage range: 2.2 V to 3.6 V and 4.5 V to 5.5 V
- Ultra low standby power
 - Typical standby current: 1 μ A
 - Maximum standby current: 4 μ A
- 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
- Available in Pb-free 44-Pin thin small outline package (TSOP) II package

Functional Description

The CY62126ESL 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

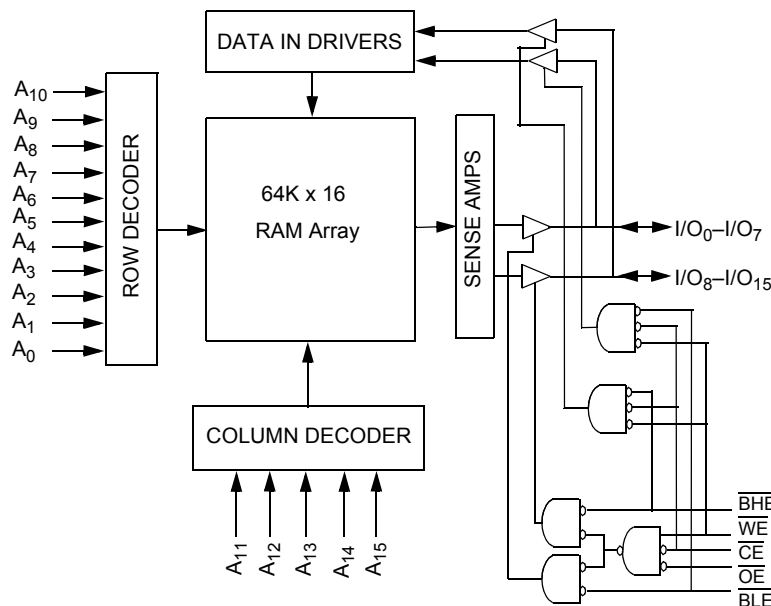
automatic power down feature that significantly reduces power consumption when addresses are not toggling. Placing the device into standby mode reduces power consumption by more than 99 percent when deselected (\overline{CE} HIGH). The input and output pins (I/O₀ through I/O₁₅) are placed in a high impedance 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/O₀ through I/O₇) is written into the location specified on the address pins (A₀ through A₁₅). If Byte High Enable (\overline{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).

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/O₀ to I/O₇. If Byte High Enable (\overline{BHE}) is LOW, then data from memory appears on I/O₈ to I/O₁₅. See the Truth Table on page 11 for a complete description of read and write modes.

For best practice recommendations, refer to the Cypress application note AN1064, SRAM System Guidelines.

Logic Block Diagram

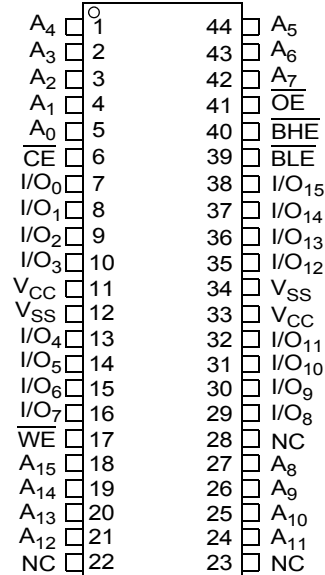


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Pin Configuration

44-Pin TSOP II (Top View) ^[1]



Product Portfolio

Product	Range	V _{CC} Range (V) ^[2]	Speed (ns)	Power Dissipation					
				Operating I _{CC} , (mA)				Standby, I _{SB2} (μA)	
				f = 1MHz		f = f _{max}			
				Typ ^[3]	Max	Typ ^[3]	Max	Typ ^[3]	Max
CY62126ESL	Auto-A	2.2 V–3.6 V and 4.5 V–5.5 V	45	1.3	2	11	16	1	4

Notes

1. NC pins are not connected on the die.
2. Datasheet specifications are not guaranteed for V_{CC} in the range of 3.6 V to 4.5 V.
3. 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 impair the useful 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	-0.5 V to 6.0 V
DC voltage applied to outputs in High Z state ^[4, 5]	-0.5 V to 6.0 V
DC input voltage ^[4, 5]	-0.5 V to 6.0 V

Output current into outputs (low)	20 mA
Static discharge voltage	> 2001 V (MIL-STD-883, method 3015)
Latch-up current	> 200 mA

Operating Range

Device	Range	Ambient Temperature	V _{CC} ^[6]
CY62126ESL	Automotive-A	-40 °C to +85 °C	2.2 V–3.6 V, and 4.5 V–5.5 V

Electrical Characteristics

Over the Operating Range

Parameter	Description	Test Conditions	45 ns			Unit	
			Min	Typ ^[7]	Max		
V _{OH}	Output high voltage	2.2 ≤ V _{CC} ≤ 2.7	I _{OH} = -0.1 mA	2.0	-	-	V
		2.7 ≤ V _{CC} ≤ 3.6	I _{OH} = -1.0 mA	2.4	-	-	
		4.5 ≤ V _{CC} ≤ 5.5	I _{OH} = -1.0 mA	2.4	-	-	
V _{OL}	Output low voltage	2.2 ≤ V _{CC} ≤ 2.7	I _{OL} = 0.1 mA	-	-	0.4	V
		2.7 ≤ V _{CC} ≤ 3.6	I _{OL} = 2.1mA	-	-	0.4	
		4.5 ≤ V _{CC} ≤ 5.5	I _{OL} = 2.1mA	-	-	0.4	
V _{IH}	Input high voltage	2.2 ≤ V _{CC} ≤ 2.7		1.8	-	V _{CC} + 0.3	V
		2.7 ≤ V _{CC} ≤ 3.6		2.2	-	V _{CC} + 0.3	
		4.5 ≤ V _{CC} ≤ 5.5		2.2	-	V _{CC} + 0.5	
V _{IL}	Input low voltage	2.2 ≤ V _{CC} ≤ 2.7		-0.3	-	0.6	V
		2.7 ≤ V _{CC} ≤ 3.6		-0.3	-	0.8	
		4.5 ≤ V _{CC} ≤ 5.5		-0.5	-	0.8	
I _{IX}	Input leakage current	GND ≤ V _I ≤ V _{CC}		-1	-	+1	μA
I _{OZ}	Output leakage current	GND ≤ V _O ≤ V _{CC} , Output disabled		-1	-	+1	μA
I _{CC}	V _{CC} operating supply current	f = f _{max} = 1/t _{RC}	V _{CC} = V _{CCmax}	-	11	16	mA
		f = 1 MHz	I _{OUT} = 0 mA, CMOS levels	-	1.3	2.0	
I _{SB1}	Automatic CE power-down current — CMOS Inputs	$\overline{CE} \geq V_{CC} - 0.2 \text{ V}$, V _{IN} ≥ V _{CC} - 0.2 V or V _{IN} ≤ 0.2 V, f = f _{max} (address and data only), f = 0 (\overline{OE} and \overline{WE}), V _{CC} = V _{CC(max)}		-	1	4	μA
I _{SB2} ^[8]	Automatic CE power-down current — CMOS inputs	$\overline{CE} \geq V_{CC} - 0.2 \text{ V}$, V _{IN} ≥ V _{CC} - 0.2 V or V _{IN} ≤ 0.2 V, f = 0, V _{CC} = V _{CC(max)}		-	1	4	μA

Notes

- V_{IL}(min) = -2.0 V for pulse durations less than 20 ns.
- V_{IH}(max) = V_{CC} + 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_{CC}(min) and 200 μs wait time after V_{CC} stabilization.
- 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.
- Chip enable (CE) must be HIGH at CMOS level to meet the I_{SB2} / I_{CCDR} spec. Other inputs can be left floating.

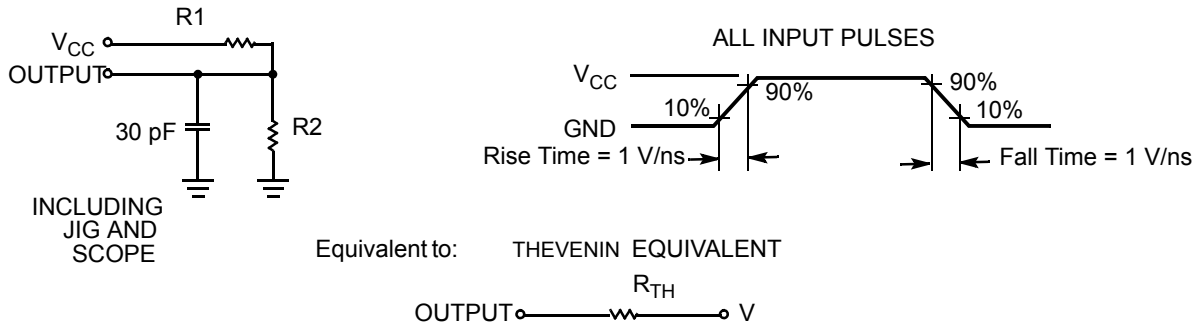
Capacitance

Parameter ^[9]	Description	Test Conditions	Max	Unit
C _{IN}	Input capacitance	T _A = 25 °C, f = 1 MHz, V _{CC} = V _{CC(typ)}	10	pF
C _{OUT}	Output capacitance		10	pF

Thermal Resistance

Parameter ^[9]	Description	Test Conditions	TSOP II	Unit
Θ _{JA}	Thermal resistance (Junction to ambient)	Still air, soldered on a 3 x 4.5 inch, two-layer printed circuit board	28.2	°C/W
Θ _{JC}	Thermal resistance (Junction to case)		3.4	°C/W

Figure 1. AC Test Loads and Waveforms



Parameters	2.50 V	3.0 V	5.0 V	Unit
R1	16600	1103	1800	Ω
R2	15400	1554	990	Ω
R _{TH}	8000	645	639	Ω
V _{TH}	1.2	1.75	1.77	V

Note

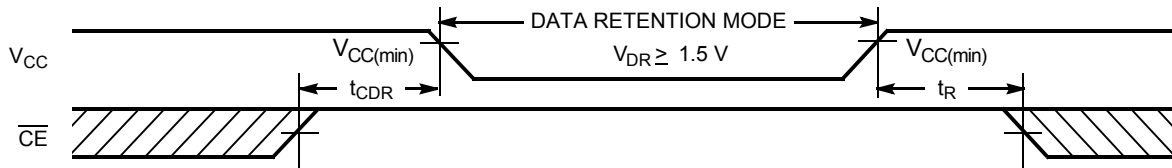
9. Tested initially and after any design or process changes that may affect these parameters

Data Retention Characteristics

Over the Operating Range

Parameter	Description	Conditions	Min	Typ ^[10]	Max	Unit
V_{DR}	V_{CC} for data retention		1.5	–	–	V
$I_{CCDR}^{[11]}$	Data retention current	$\overline{CE} \geq V_{CC} - 0.2\text{ V}$, $V_{IN} \geq V_{CC} - 0.2\text{ V}$ or $V_{IN} \leq 0.2\text{ V}$	–	–	3	μA
$t_{CDR}^{[12]}$	Chip deselect to data retention time		0	–	–	ns
$t_R^{[13]}$	Operation recovery time		45	–	–	ns

Figure 2. Data Retention Waveform



Notes

10. Typical values are included for reference only and are not guaranteed or tested. Typical values are measured at $V_{CC} = V_{CC(\text{typ})}$, $T_A = 25\text{ }^\circ\text{C}$.
11. Chip enable (\overline{CE}) must be HIGH at CMOS level to meet the I_{SB2} / I_{CCDR} spec. Other inputs can be left floating.
12. Tested initially and after any design or process changes that may affect these parameters.
13. 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 $V_{CC(\text{min})} \geq 100\text{ }\mu\text{s}$.

Switching Characteristics

Over the Operating Range

Parameter ^[14]	Description	45 ns		Unit
		Min	Max	
Read Cycle				
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 ^[15]	5	–	ns
t_{HZOE}	\overline{OE} HIGH to High Z ^[15, 16]	–	18	ns
t_{LZCE}	\overline{CE} LOW to Low Z ^[15]	10	–	ns
t_{HZCE}	\overline{CE} HIGH to High Z ^[15, 16]	–	18	ns
t_{PU}	\overline{CE} LOW to power up	0	–	ns
t_{PD}	\overline{CE} HIGH to power up	–	45	ns
t_{DBE}	\overline{BHE} / \overline{BLE} LOW to data valid	–	22	ns
t_{LZBE}	\overline{BHE} / \overline{BLE} LOW to Low Z ^[15]	5	–	ns
t_{HZBE}	\overline{BHE} / \overline{BLE} HIGH to High Z ^[15, 16]	–	18	ns
Write Cycle^[17]				
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{BHE} / \overline{BLE} pulse width	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 ^[15, 16]	–	18	ns
t_{LZWE}	\overline{WE} HIGH to Low Z ^[15]	10	–	ns

Notes

14. Test Conditions for all parameters other than tri-state parameters assume signal transition time of 3 ns or less (1 V/ns), 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 "AC Test Loads and Waveforms" on page 5.
15. 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.
16. t_{HZOE} , t_{HZCE} , t_{HZBE} , and t_{HZWE} transitions are measured when the output enter a high impedance state.
17. The internal write time of the memory is defined by the overlap of \overline{WE} , $\overline{CE} = V_{IL}$. 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.

Switching Waveforms

Figure 3. Read Cycle No. 1 (Address Transition Controlled) [18, 19]

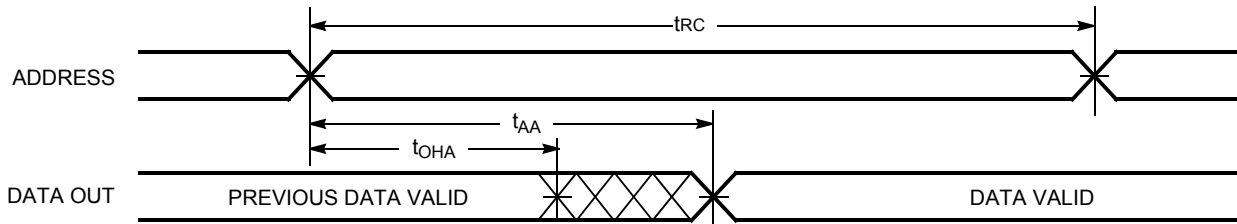
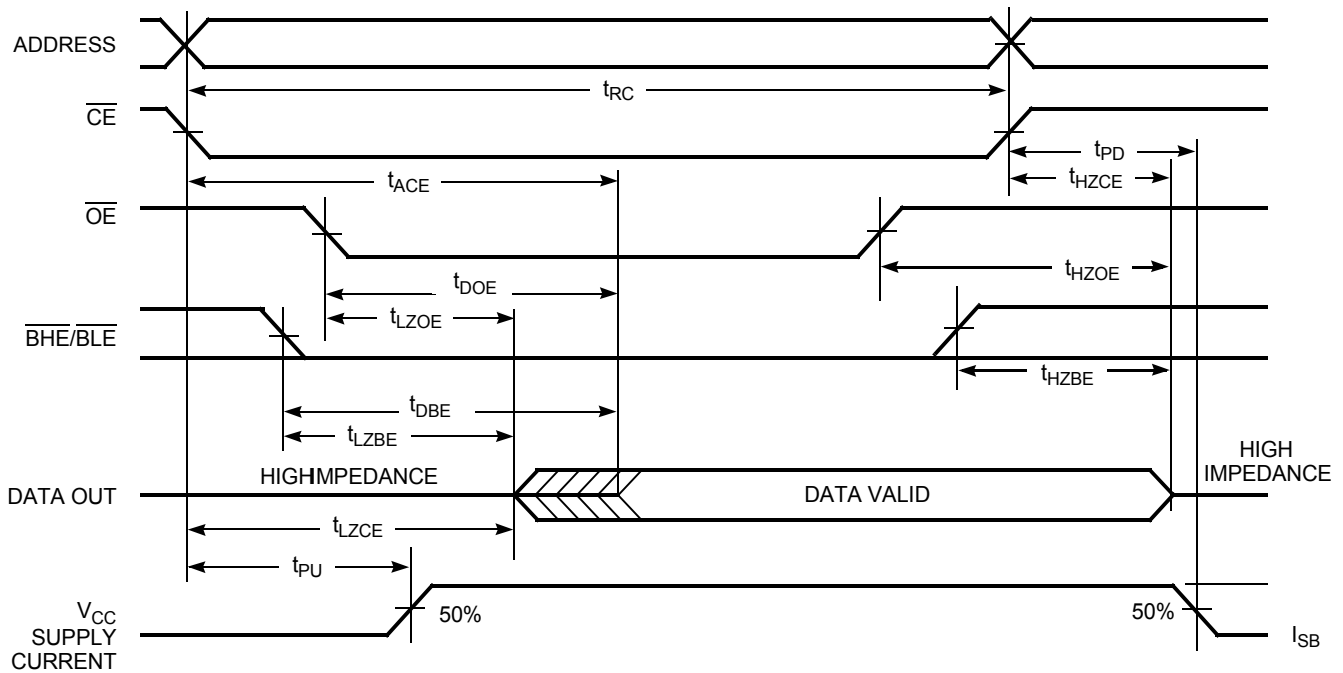


Figure 4. Read Cycle No. 2 ($\overline{\text{OE}}$ Controlled) [19, 20]



Notes

- 18. Device is continuously selected. $\overline{\text{OE}}, \overline{\text{CE}} = V_{\text{IL}}$.
- 19. $\overline{\text{WE}}$ is high for read cycles.
- 20. Address valid before or similar to $\overline{\text{CE}}$ transition low.

Switching Waveforms (continued)

Figure 5. Write Cycle No. 1 ($\overline{\text{WE}}$ Controlled, $\overline{\text{OE}}$ HIGH During Write) [21, 22]

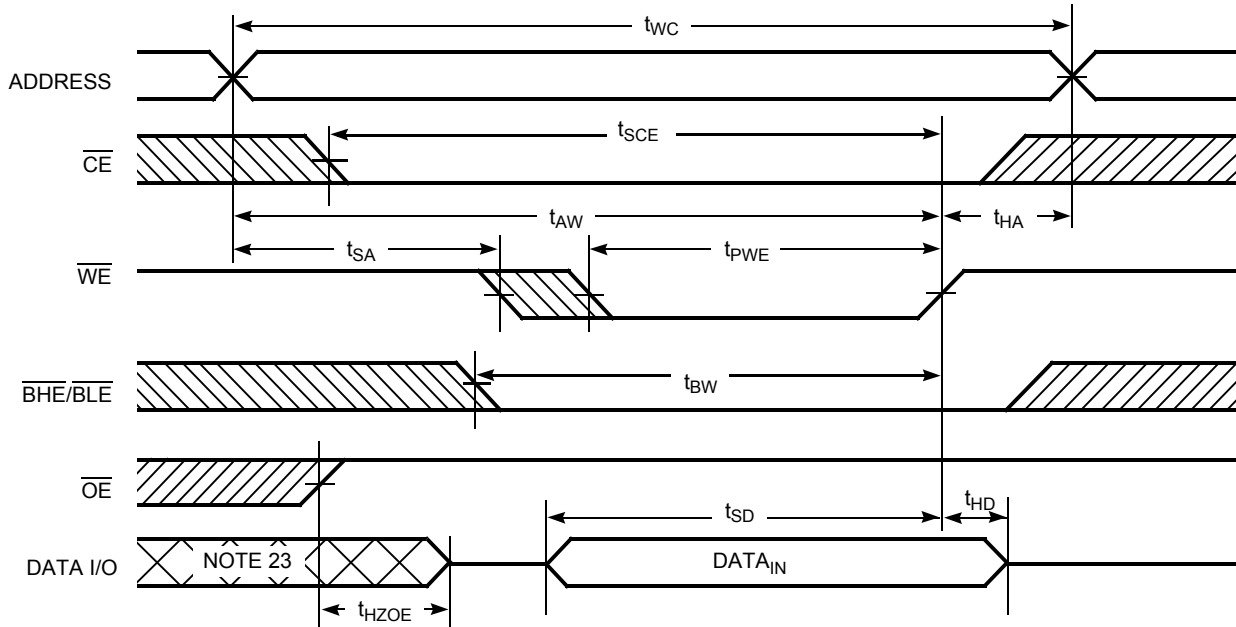
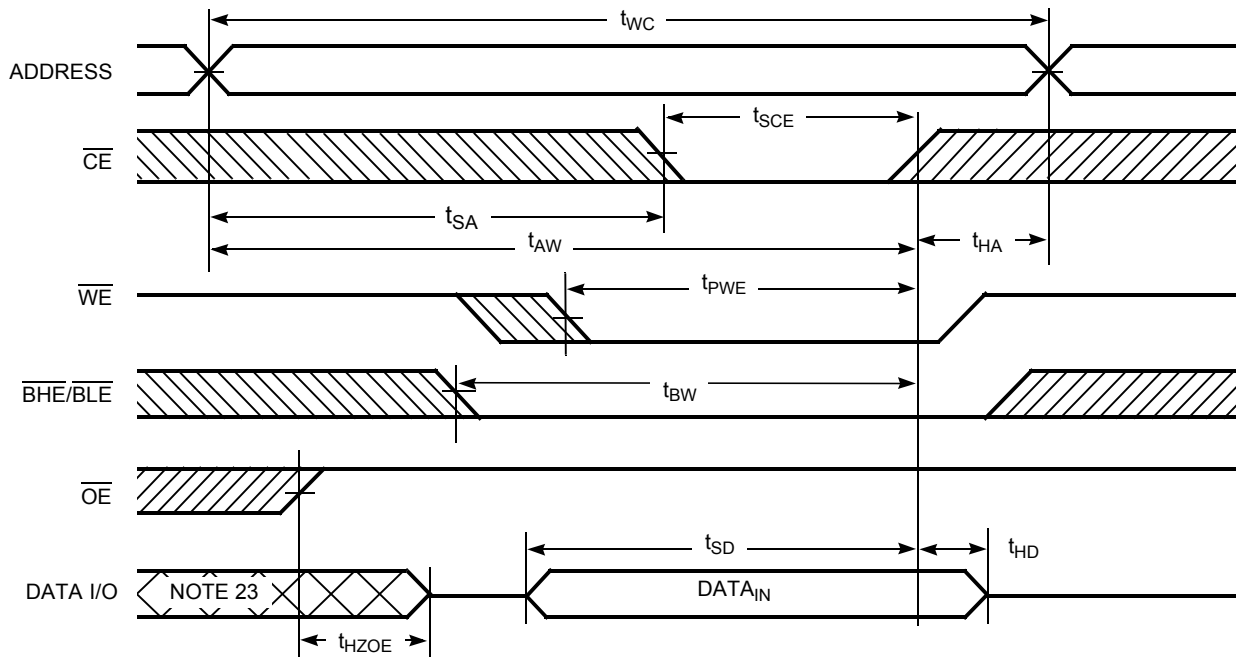


Figure 6. Write Cycle No. 2 ($\overline{\text{CE}}$ Controlled) [21, 22]



Notes

- 21. Data I/O is high impedance if $\overline{\text{OE}} = V_{IH}$.
- 22. If $\overline{\text{CE}}$ goes high simultaneously with $\overline{\text{WE}}$ high, the output remains in high impedance state.
- 23. During this period, the I/Os are in output state. Do not apply input signals.

Switching Waveforms (continued)

Figure 7. Write Cycle No. 3 (\overline{WE} Controlled, \overline{OE} LOW) ^[24]

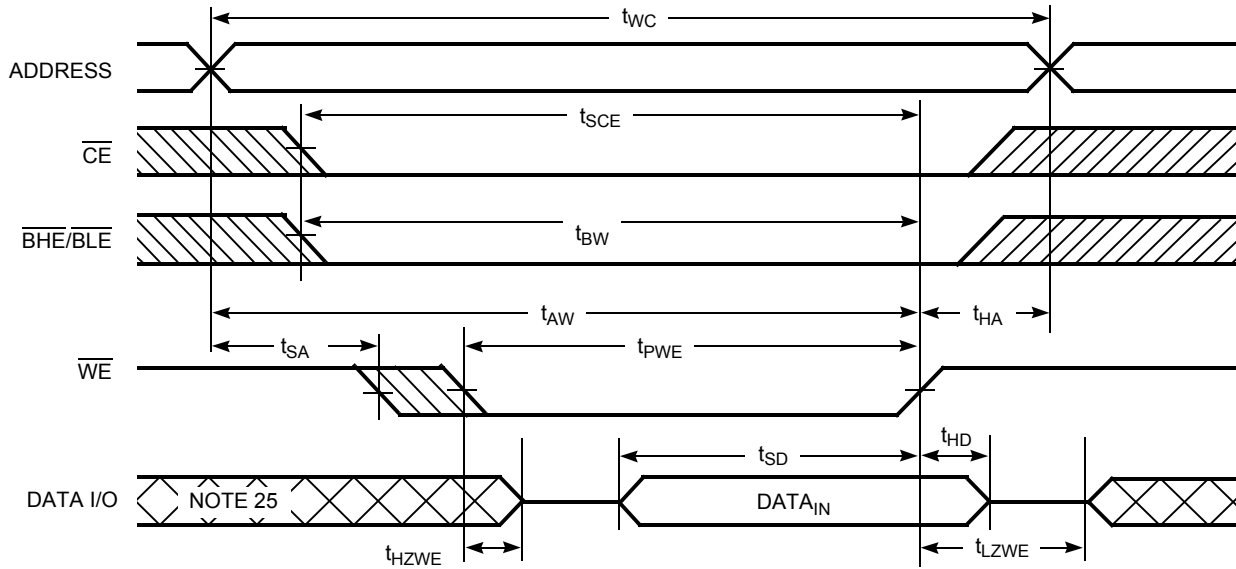
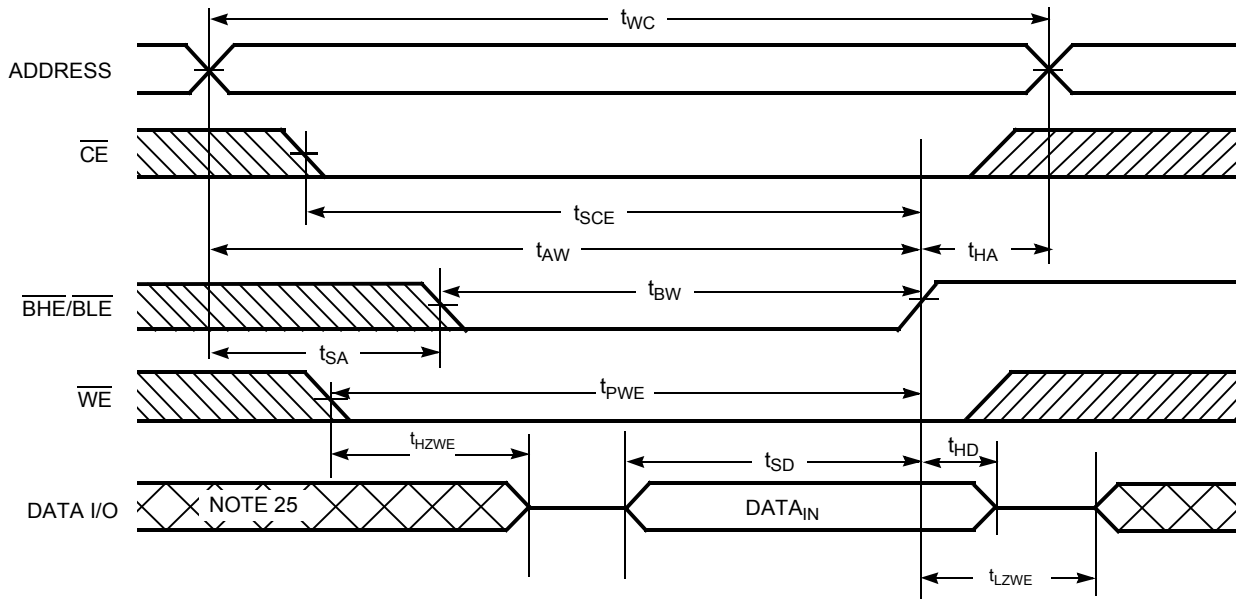


Figure 8. Write Cycle No. 4 ($\overline{BHE/BLE}$ Controlled, \overline{OE} LOW) ^[24]



Notes

- 24. If CE goes high simultaneously with \overline{WE} high, the output remains in high impedance state.
- 25. During this period, the I/Os are in output state. Do not apply input signals.

Truth Table

$\overline{\text{CE}}^{[26]}$	$\overline{\text{WE}}$	$\overline{\text{OE}}$	$\overline{\text{BHE}}$	$\overline{\text{BLE}}$	Inputs/Outputs	Mode	Power
H	X	X	X	X	High Z	Deselect or 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

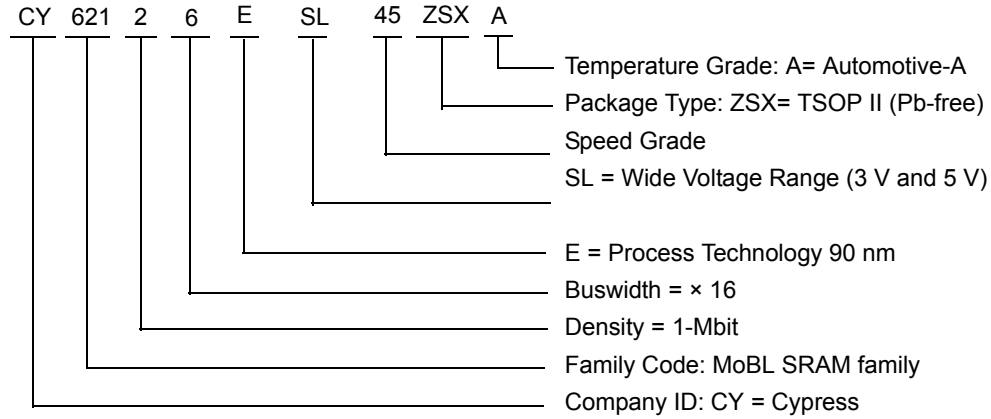
26. Chip enable must be at CMOS levels (not floating). Intermediate voltage levels on this pin is not permitted.

Ordering Information

Speed (ns)	Ordering Code	Package Diagram	Package Type	Operating Range
45	CY62126ESL-45ZSXA	51-85087	44-Pin TSOP II (Pb-free)	Automotive-A

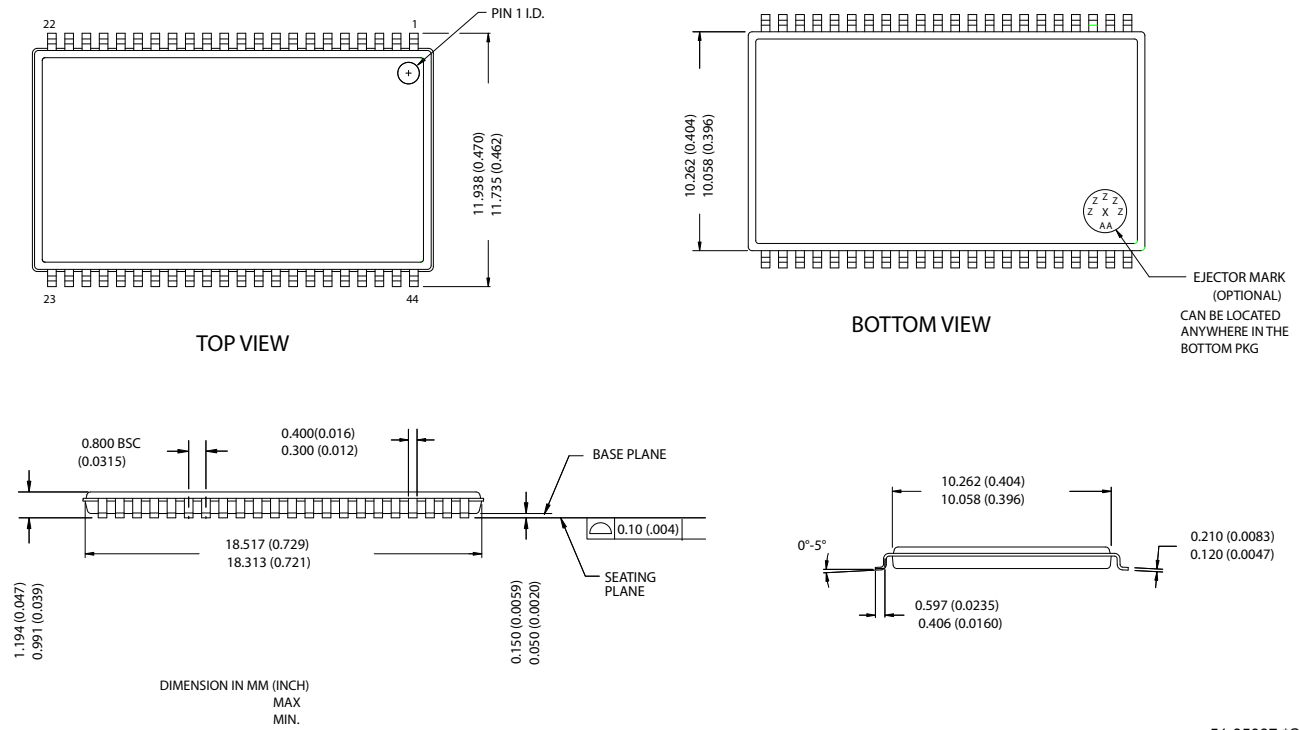
Contact your local Cypress sales representative for availability of these parts.

Ordering Code Definitions



Package Diagram

Figure 9. 44-Pin Thin Small Outline Package Type II, 51-85087



51-85087-C

Acronyms

Acronym	Description
$\overline{\text{BHE}}$	byte high enable
$\overline{\text{BLE}}$	byte low enable
CMOS	complementary metal oxide semiconductor
$\overline{\text{CE}}$	chip enable
I/O	input/output
$\overline{\text{OE}}$	output enable
SRAM	static random access memory
TSOP	thin small outline package
$\overline{\text{WE}}$	write enable

Document Conventions

Units of Measure

Symbol	Unit of Measure
°C	degree Celcius
μA	micro Amperes
mA	milli Amperes
MHz	Mega Hertz
mV	milli Volts
ns	nano seconds
pF	pico Farad
V	Volts
Ω	Ohms
W	Watts

Document History Page

Document Title: CY62126ESL MoBL [®] Automotive 1-Mbit (64K x 16) Static RAM				
Document Number: 001-66522				
Revision	ECN	Submission Date	Orig. of Change	Description of Change
**	3144223	01/17/2011	RAME	New datasheet for Automotive parts

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