

## Features

- Temperature Ranges
  - Industrial: -40 °C to 85 °C
- Very high speed: 55 ns
  - Wide voltage range: 2.20 V–3.60 V
- Pin-compatible with CY62148CV25, CY62148CV30 and CY62148CV33
- Ultra low active power
  - Typical active current: 1.5 mA at  $f = 1$  MHz
  - Typical active current: 8 mA at  $f = f_{\max}$  (55-ns speed)
- Ultra low standby power
- Easy memory expansion with  $\overline{CE}$ , and  $\overline{OE}$  features
- Automatic power-down when deselected
- Complementary metal oxide semiconductor (CMOS) for optimum speed/power
- Available in Pb-free 32-pin Small-outline integrated circuit (SOIC package)

## Functional Description

The CY62148DV30<sup>[1]</sup> is a high-performance CMOS static RAM organized as 512K words by 8 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. The device can be put into standby mode reducing power consumption when deselected ( $\overline{CE}$  HIGH). The eight input and output pins (I/O<sub>0</sub> through I/O<sub>7</sub>) are placed in a high-impedance state when:

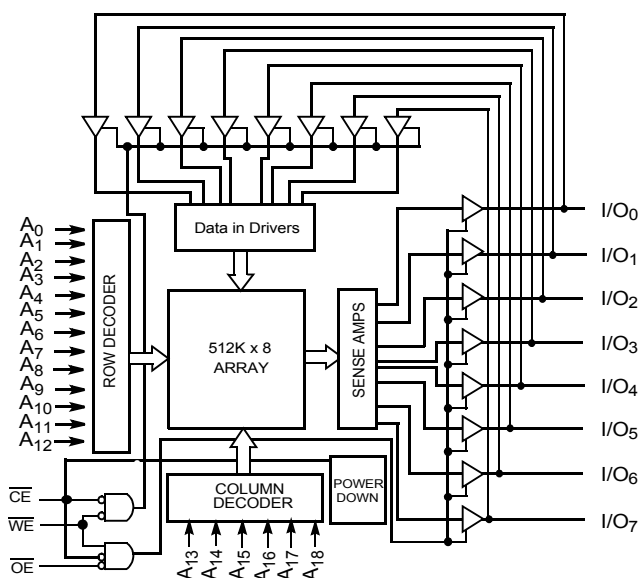
- Deselected ( $\overline{CE}$  HIGH)
- Outputs are disabled ( $\overline{OE}$  HIGH)
- When the write operation is active ( $\overline{CE}$  LOW and  $\overline{WE}$  LOW)

Write to the device by taking Chip Enable ( $\overline{CE}$ ) and Write Enable ( $\overline{WE}$ ) inputs LOW. Data on the eight I/O pins (I/O<sub>0</sub> through I/O<sub>7</sub>) is then written into the location specified on the address pins (A<sub>0</sub> through A<sub>18</sub>).

Read from the device by taking Chip Enable ( $\overline{CE}$ ) and Output Enable ( $\overline{OE}$ ) LOW while forcing Write Enable ( $\overline{WE}$ ) HIGH. Under these conditions, the contents of the memory location specified by the address pins will appear on the I/O pins.

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

## Logic Block Diagram



### Note

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

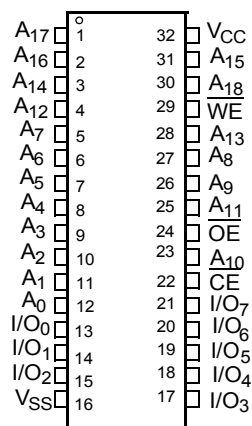
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## Pin Configuration

Figure 1. 32-pin SOIC pinout

Top View



## 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
CY62148DV30LL	Industrial	2.2	3.0	3.6	55	1.5	3	8	10	2	8

### Note

2. 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.

## Maximum Ratings

Exceeding maximum ratings may shorten 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 [3, 4] ..... -0.3 V to  $V_{CC(max)} + 0.3$  V

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

DC input voltage [3, 4] ..... -0.3 V to  $V_{CC(max)} + 0.3$  V

Output current into outputs (LOW) ..... 20 mA

Static discharge voltage  
(per MIL-STD-883, method 3015) ..... > 2001 V

Latch-up current ..... > 200 mA

## Operating Range

Product	Range	Ambient Temperature	$V_{CC}^{[5]}$
CY62148DV30LL	Industrial	-40 °C to +85 °C	2.2 V to 3.6 V

## Electrical Characteristics

Over the Operating Range

Parameter	Description	Test Conditions	55 ns			Unit
			Min	Typ <sup>[2]</sup>	Max	
$V_{OH}$	Output HIGH voltage	$I_{OH} = -0.1$ mA, $V_{CC} = 2.20$ V	2.0	—	—	V
		$I_{OH} = -1.0$ mA, $V_{CC} = 2.70$ V	2.4	—	—	V
$V_{OL}$	Output LOW voltage	$I_{OL} = 0.1$ mA, $V_{CC} = 2.20$ V	—	—	0.4	V
		$I_{OL} = 2.1$ mA, $V_{CC} = 2.70$ V	—	—	0.4	V
$V_{IH}$	Input HIGH voltage	$V_{CC} = 2.2$ V to 2.7 V	1.8	—	$V_{CC} + 0.3$	V
		$V_{CC} = 2.7$ V to 3.6 V	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	V
		$V_{CC} = 2.7$ V to 3.6 V	-0.3	—	0.8	V
$I_{IX}$	Input leakage current	$GND \leq V_I \leq V_{CC}$	-1	—	+1	μA
$I_{OZ}$	Output leakage current	$GND \leq V_O \leq V_{CC}$ , output disabled	-1	—	+1	μA
$I_{CC}$	$V_{CC}$ operating supply current	$f = f_{max} = 1/t_{RC}$ , $V_{CC} = V_{CC(max)}$	—	8	10	mA
		$f = 1$ MHz, $I_{OUT} = 0$ mA, CMOS levels	—	1.5	3	mA
$I_{SB1}$	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), $f = 0$ ( $\overline{OE}$ , and $\overline{WE}$ ), $V_{CC} = 3.60$ V	—	2	8	μA
$I_{SB2}$	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	—	2	8	μA

### Notes

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

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

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

## Capacitance

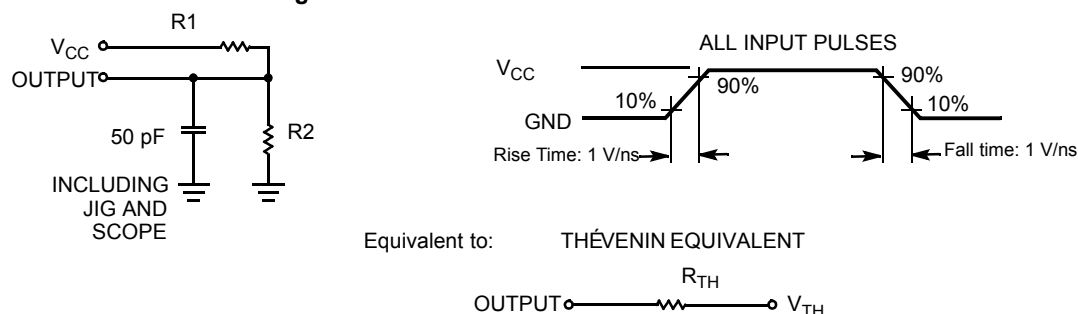
Parameter <sup>[7]</sup>	Description	Test Conditions	Max	Unit
$C_{IN}$	Input capacitance	$T_A = 25\text{ }^{\circ}\text{C}$ , $f = 1\text{ MHz}$ , $V_{CC} = V_{CC(typ)}$	10	pF
$C_{OUT}$	Output capacitance		10	pF

## Thermal Resistance

Parameter <sup>[7]</sup>	Description	Test Conditions	SOIC	Unit
$\Theta_{JA}$	Thermal resistance (junction to ambient)	Still air, soldered on a 3 x 4.5 inch, four-layer printed circuit board	55	$^{\circ}\text{C/W}$
$\Theta_{JC}$	Thermal resistance (junction to case)		22	$^{\circ}\text{C/W}$

## AC Test Loads and Waveforms

Figure 2. AC Test Loads and Waveforms



Parameters	2.5 V (2.2 V – 2.7 V)	3.0 V (2.7 V – 3.6 V)	Unit
R1	16667	1103	$\Omega$
R2	15385	1554	$\Omega$
$R_{TH}$	8000	645	$\Omega$
$V_{TH}$	1.20	1.75	V

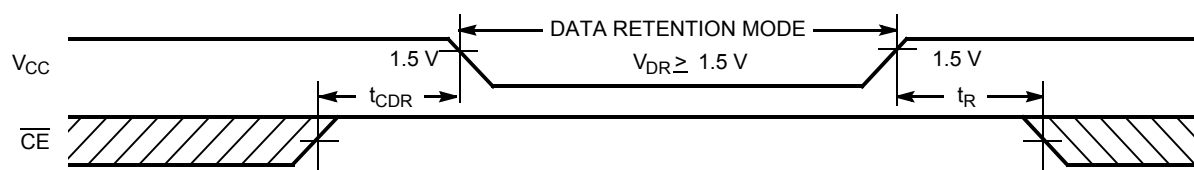
## Data Retention Characteristics

Over the Operating Range

Parameter	Description	Conditions	Min	Typ <sup>[6]</sup>	Max	Unit
$V_{DR}$	$V_{CC}$ for data retention		1.5	–	–	V
$I_{CCDR}$	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 $V_{IN} \leq 0.2\text{ V}$	–		6	$\mu\text{A}$
$t_{CDR}^{[7]}$	Chip deselect to data retention time		0	–	–	ns
$t_R^{[8]}$	Operation recovery time		55	–	–	ns

## Data Retention Waveform

Figure 3. Data Retention Waveform



### Notes

6. Typical values are included for reference only and are not guaranteed or tested. Typical values are measured at  $V_{CC} = V_{CC(typ)}$ ,  $T_A = 25\text{ }^{\circ}\text{C}$ .
7. Tested initially and after any design or process changes that may affect these parameters.
8. Full Device AC operation requires linear  $V_{CC}$  ramp from  $V_{DR}$  to  $V_{CC(min)} \geq 100\text{ }\mu\text{s}$  or stable at  $V_{CC(min)} \geq 100\text{ }\mu\text{s}$ .

## Switching Characteristics

Over the Operating Range

Parameter <sup>[9]</sup>	Description	55 ns		Unit
		Min	Max	
Read Cycle				
t <sub>RC</sub>	Read cycle time	55	–	ns
t <sub>AA</sub>	Address to data valid	–	55	ns
t <sub>OHA</sub>	Data hold from address change	10	–	ns
t <sub>ACE</sub>	$\overline{CE}$ LOW to data valid	–	55	ns
t <sub>DOE</sub>	$\overline{OE}$ LOW to data valid	–	25	ns
t <sub>LZOE</sub>	$\overline{OE}$ LOW to Low Z <sup>[10]</sup>	5	–	ns
t <sub>HZOE</sub>	$\overline{OE}$ HIGH to High Z <sup>[10, 11]</sup>	–	20	ns
t <sub>LZCE</sub>	$\overline{CE}$ LOW to Low Z <sup>[10]</sup>	10	–	ns
t <sub>HZCE</sub>	$\overline{CE}$ HIGH to High Z <sup>[10, 11]</sup>	–	20	ns
t <sub>PU</sub>	$\overline{CE}$ LOW to power-up	0	–	ns
t <sub>PD</sub>	$\overline{CE}$ HIGH to power-up	–	55	ns
Write Cycle <sup>[12, 13]</sup>				
t <sub>WC</sub>	Write cycle time	55	–	ns
t <sub>SCE</sub>	$\overline{CE}$ LOW to write end	40	–	ns
t <sub>AW</sub>	Address set-up to write end	40	–	ns
t <sub>HA</sub>	Address hold from write end	0	–	ns
t <sub>SA</sub>	Address set-up to write start	0	–	ns
t <sub>PWE</sub>	$\overline{WE}$ pulse width	40	–	ns
t <sub>SD</sub>	Data set-up to write end	25	–	ns
t <sub>HD</sub>	Data hold from write end	0	–	ns
t <sub>HZWE</sub>	$\overline{WE}$ LOW to High Z <sup>[10, 11]</sup>	–	20	ns
t <sub>LZWE</sub>	$\overline{WE}$ HIGH to Low Z <sup>[10]</sup>	10	–	ns

### Notes

9. Test Conditions for all parameters other than three-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 [Figure 2 on page 5](#).

10. At any given temperature and voltage condition,  $t_{HZCE}$  is less than  $t_{LZCE}$ ,  $t_{HZOE}$  is less than  $t_{LZOE}$ , and  $t_{HZWE}$  is less than  $t_{LZWE}$  for any given device.

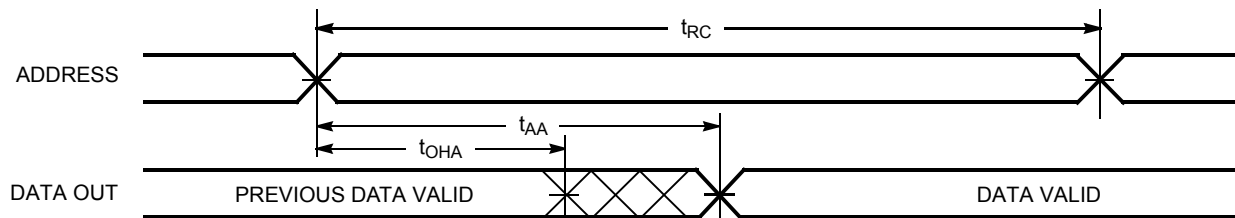
11.  $t_{HZOE}$ ,  $t_{HZCE}$ , and  $t_{HZWE}$  transitions are measured when the output enter a high impedance state.

12. 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 set-up and hold timing should be referenced to the edge of the signal that terminates the write.

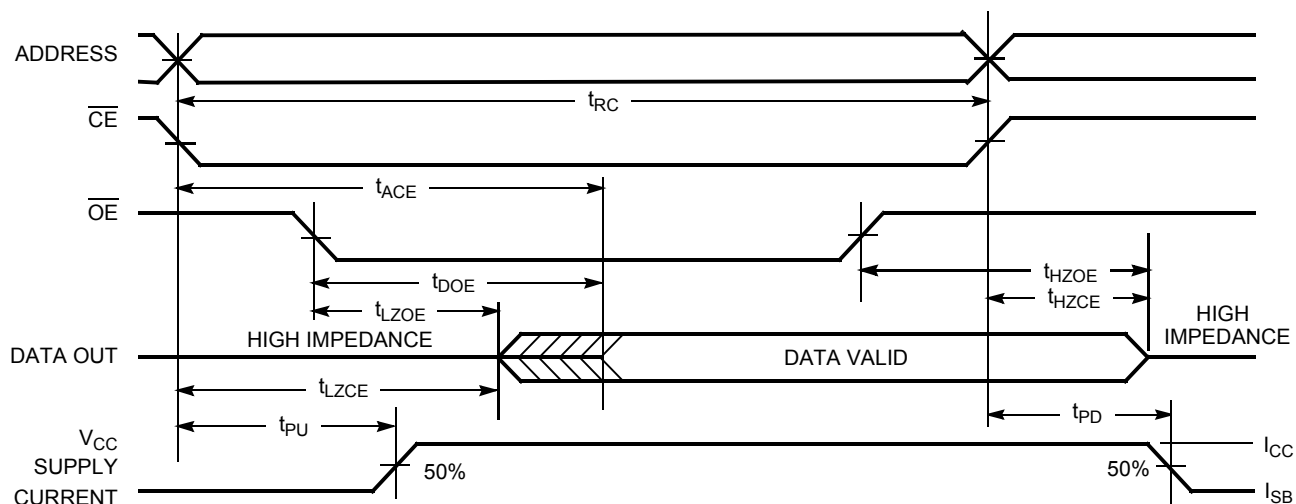
13. The minimum write cycle pulse width for Write Cycle No. 3 ( $\overline{WE}$  controlled,  $\overline{OE}$  LOW) should be equal to the sum of  $t_{SD}$  and  $t_{HZWE}$ .

## Switching Waveforms

**Figure 4. Read Cycle No. 1 (Address Transition Controlled)** [14, 15]



**Figure 5. Read Cycle No. 2 ( $\overline{OE}$  Controlled)** [15, 16]

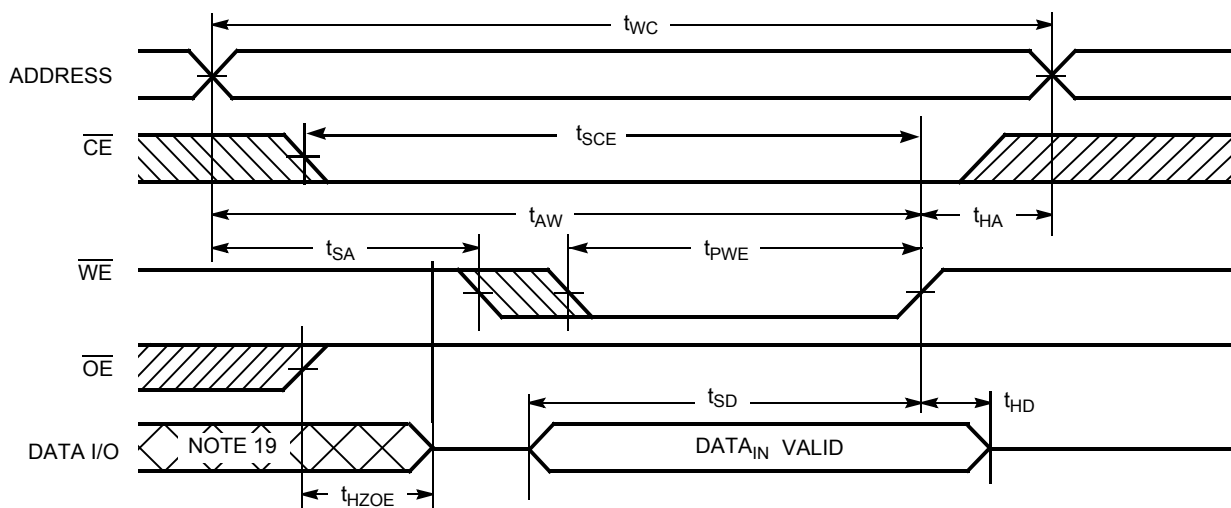


### Notes

14. Device is continuously selected.  $\overline{OE}$ ,  $\overline{CE} = V_{IL}$ .
15.  $\overline{WE}$  is HIGH for read cycle.
16. Address valid prior to or coincident with  $\overline{CE}$  transition LOW.



**Switching Waveforms** (continued)

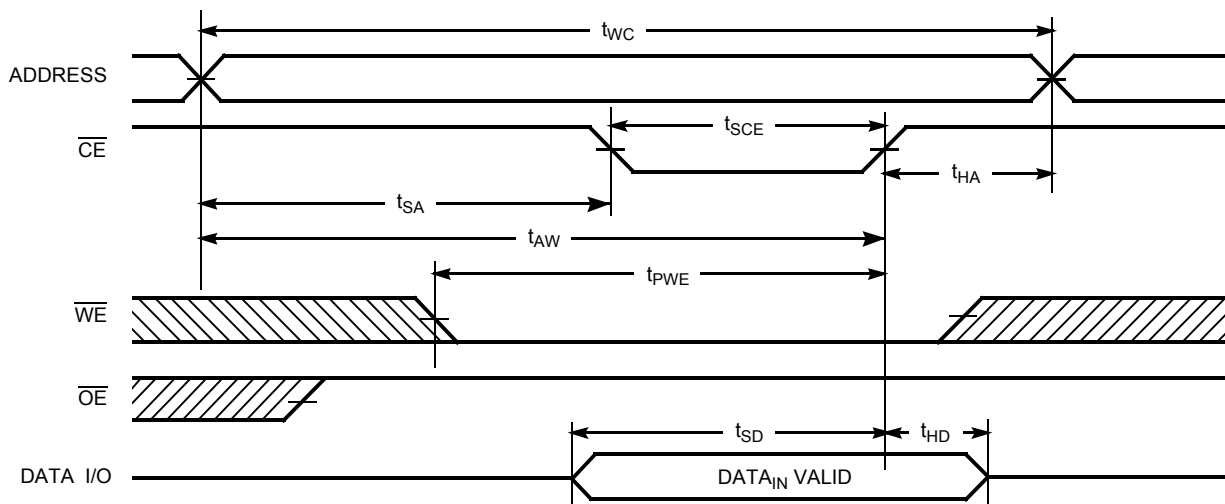
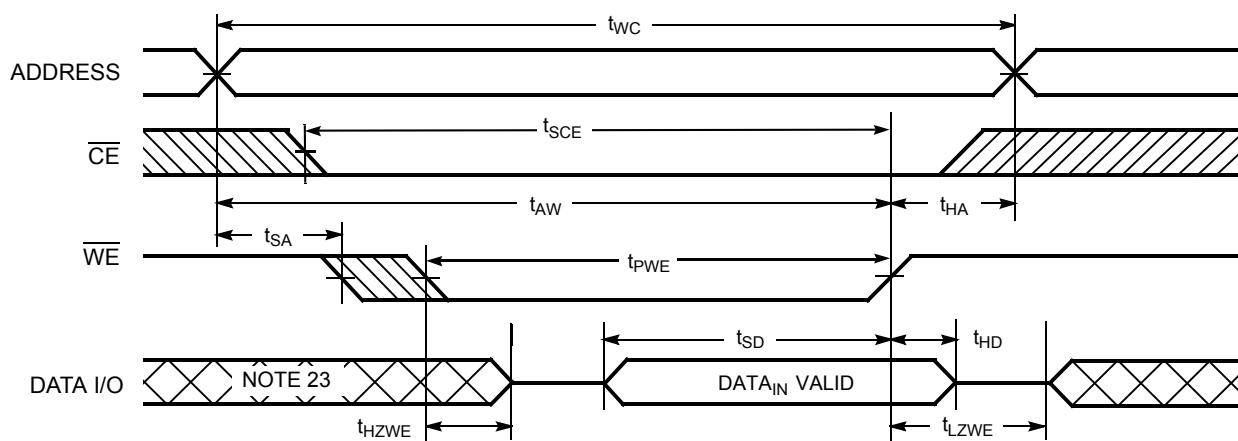
**Figure 6. Write Cycle No. 1 ( $\overline{\text{WE}}$  Controlled)** [17, 18]

**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 high-impedance state.

19. During this period, the I/Os are in output state and input signals should not be applied.

**Switching Waveforms** (continued)

**Figure 7. Write Cycle No. 2 ( $\overline{\text{CE}}$  Controlled)** [20, 21]

**Figure 8. Write Cycle No. 3 ( $\overline{\text{WE}}$  Controlled,  $\overline{\text{OE}}$  LOW)** [21, 22]

**Notes**

20. Data I/O is high impedance if  $\overline{\text{OE}} = V_{IH}$ .
21. If  $\overline{\text{CE}}$  goes HIGH simultaneously with  $\overline{\text{WE}}$  HIGH, the output remains in high-impedance state.
22. The minimum write cycle pulse width should be equal to the sum of  $t_{SD}$  and  $t_{HZWE}$ .
23. During this period, the I/Os are in output state and input signals should not be applied.

## Truth Table

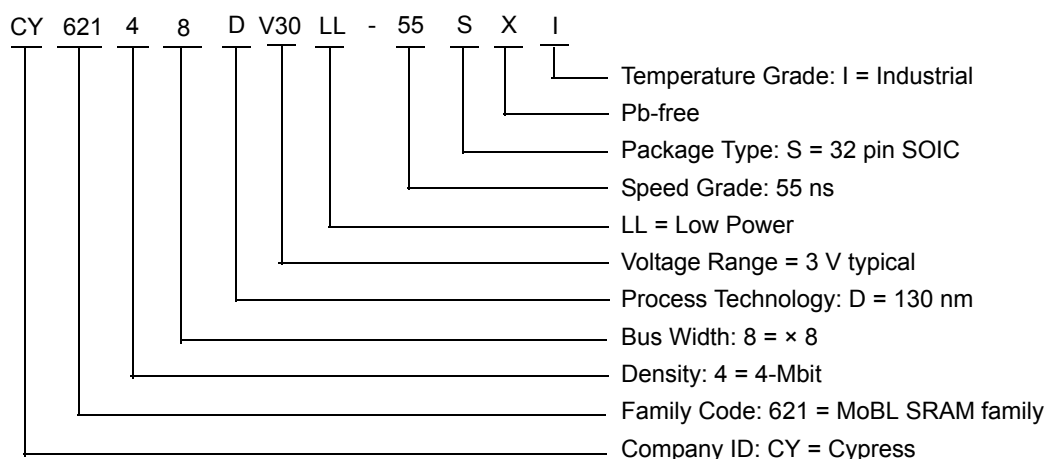
$\overline{CE}$	$\overline{WE}$	$\overline{OE}$	Inputs/Outputs	Mode	Power
H	X	X	High Z	Deselect/Power-down	Standby ( $I_{SB}$ )
L	H	L	Data out ( $I/O_0$ - $I/O_7$ )	Read	Active ( $I_{CC}$ )
L	H	H	High Z	Output disabled	Active ( $I_{CC}$ )
L	L	X	Data in ( $I/O_0$ - $I/O_7$ )	Write	Active ( $I_{CC}$ )

## Ordering Information

Speed (ns)	Ordering Code	Package Diagram	Package Type	Operating Range
55	CY62148DV30LL-55SXI	51-85081	32-pin SOIC (Pb-free)	Industrial

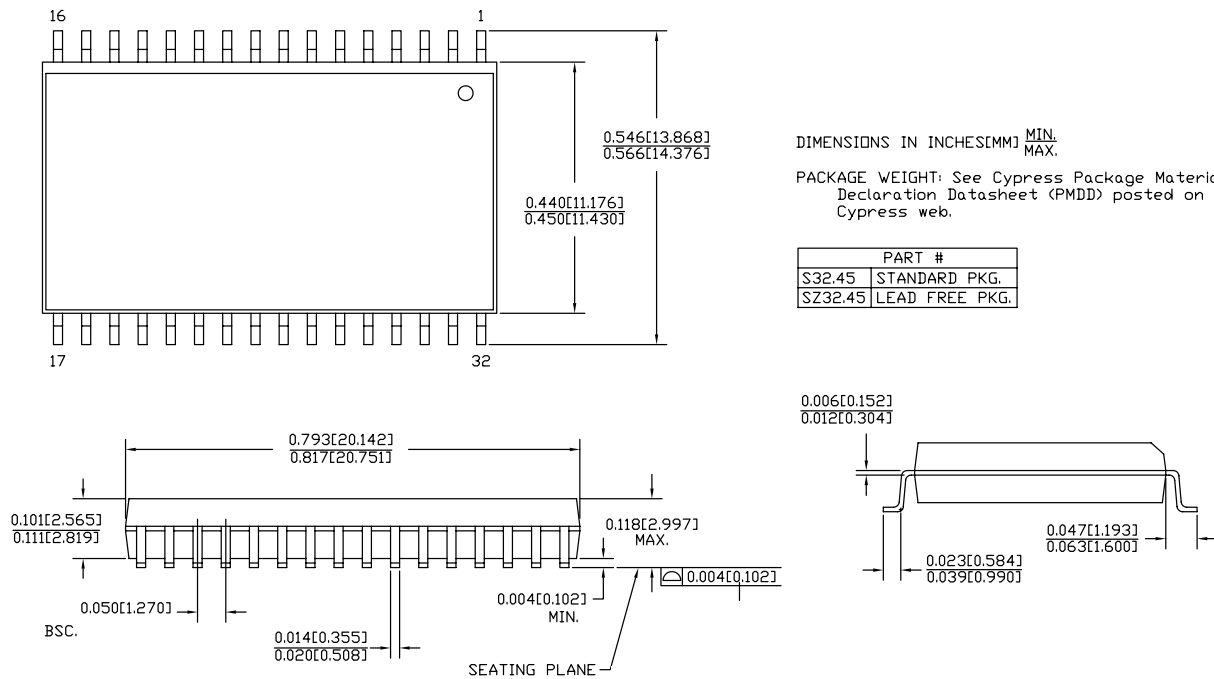
Contact your local Cypress sales representative for availability of these parts.

## Ordering Code Definitions



## Package Diagrams

**Figure 9. 32-pin SOIC (450 Mils) Package Outline, 51-85081**



51-85081 \*E

## Acronyms

Acronym	Description
CMOS	Complementary Metal Oxide Semiconductor
I/O	Input/Output
MoBL	More Battery Life
SOIC	Small-Outline Integrated Circuit
SRAM	Static Random Access Memory

## Document Conventions

### Units of Measure

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

## Document History Page

Document Title: CY62148DV30, 4-Mbit (512 K × 8) MoBL <sup>®</sup> Static RAM Document Number: 38-05341				
Rev.	ECN No.	Issue Date	Orig. of Change	Description of Change
**	127480	06/17/03	HRT	Created new data sheet
*A	131041	01/23/04	CBD	Changed from Advance to Preliminary
*B	222180	See ECN	AJU	Changed from Preliminary to Final Added 70 ns speed bin Modified footnote #6 and #12 Removed MAX value for V <sub>DR</sub> on "Data Retention Characteristics" table Modified input and output capacitance values Added Pb-free ordering information Removed 32-pin STSOP package
*C	498575	See ECN	NXR	Added Automotive-A Operating Range Removed SOIC package from Product Offering Updated Ordering Information Table
*D	729917	See ECN	VKN	Added SOIC package and its related information Updated Ordering Information Table
*E	2896036	03/19/10	AJU	Added Table of Contents. Removed inactive parts from Ordering Information. Updated Packaging Information Updated links in Sales, Solutions, and Legal Information.
*F	3166059	02/08/2011	RAME	Removed Automotive related info Removed 70 ns speed bin related info Remove TSOP and VFBGA package related info Added <a href="#">Ordering Code Definitions</a> . Added <a href="#">Acronyms</a> and <a href="#">Units of Measure</a> . Updated to new template.
*G	4315741	03/20/2014	VINI	Updated <a href="#">Package Diagrams</a> : spec 51-85081 – Changed revision from *C to *E. Updated to new template. Completing Sunset Review.
*H	4576406	01/16/2015	VINI	Added related documentation hyperlink in page 1. Updated <a href="#">Switching Characteristics</a> : Added Note 13 and referred the same note in "Write Cycle". Updated <a href="#">Switching Waveforms</a> : Added Note 22 and referred the same note in <a href="#">Figure 8</a> .
*I	4702987	03/27/2015	VINI	Updated <a href="#">Maximum Ratings</a> : Referred Notes 3, 4 in "Supply voltage to ground potential". Completing Sunset Review.
*K	5975781	11/24/2017	AESATMP8	Updated logo and Copyright.

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