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## Selection Guide

Description	-10	Unit
Maximum Access Time	10	ns
Maximum Operating Current	90	mA
Maximum CMOS Standby Current	10	mA

## Pin Configurations

Figure 1. 44-pin TSOP II pinout (Top View)

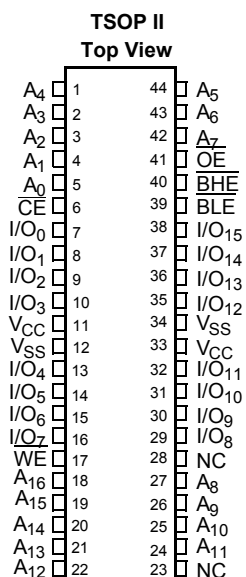
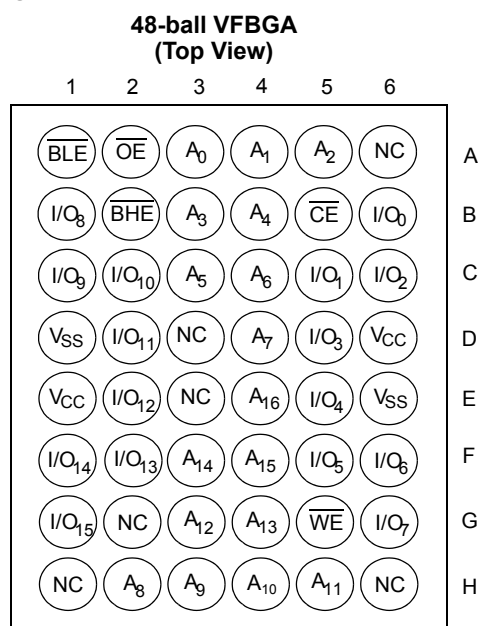


Figure 2. 48-ball VFBGA pinout (Top View)



## 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 on  $V_{CC}$  to relative GND <sup>[2]</sup> ..... -0.3 V to +4.6 V

DC voltage applied to outputs in high Z State <sup>[2]</sup> ..... -0.3 V to  $V_{CC} + 0.3$  V

DC input voltage <sup>[2]</sup> ..... -0.3 V to  $V_{CC} + 0.3$  V

Current into outputs (LOW) ..... 20 mA

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

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

## Operating Range

Range	Ambient Temperature	$V_{CC}$
Industrial	-40 °C to +85 °C	3.3 V ± 0.3 V

## DC Electrical Characteristics

Over the Operating Range

Parameter	Description	Test Conditions		-10		Unit
				Min	Max	
V <sub>OH</sub>	Output HIGH voltage	V <sub>CC</sub> = Min, I <sub>OH</sub> = −4.0 mA		2.4	–	V
V <sub>OL</sub>	Output LOW voltage	V <sub>CC</sub> = Min, I <sub>OL</sub> = 8.0 mA		–	0.4	V
V <sub>IH</sub>	Input HIGH voltage			2.0	V <sub>CC</sub> + 0.3	V
V <sub>IL</sub>	Input LOW voltage <sup>[3]</sup>			−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>OUT</sub> ≤ V <sub>CC</sub> , Output Disabled		−1	+1	μA
I <sub>CC</sub>	V <sub>CC</sub> operating supply current	V <sub>CC</sub> = Max, f = f <sub>MAX</sub> = 1/t <sub>RC</sub>	100 MHz	–	90	mA
			83 MHz	–	80	
			66 MHz	–	70	
			40 MHz	–	60	
I <sub>SB1</sub>	Automatic CE Power-down Current — TTL Inputs	Max V <sub>CC</sub> , $\overline{CE} \geq V_{IH}$ , V <sub>IN</sub> ≥ V <sub>IH</sub> or V <sub>IN</sub> ≤ V <sub>IL</sub> , f = f <sub>MAX</sub>		–	20	mA
I <sub>SB2</sub>	Automatic CE Power-down Current — CMOS Inputs	Max V <sub>CC</sub> , $\overline{CE} \geq V_{CC} - 0.3 \text{ V}$ , V <sub>IN</sub> ≥ V <sub>CC</sub> − 0.3 V, or V <sub>IN</sub> ≤ 0.3 V, f = 0		–	10	mA

### Notes

2. Tested initially and after any design or process changes that may affect these parameters.
3.  $V_{IL}(\text{min}) = -2.0 \text{ V}$  and  $V_{IH}(\text{max}) = V_{CC} + 2 \text{ V}$  for pulse durations of less than 20 ns.

## Capacitance

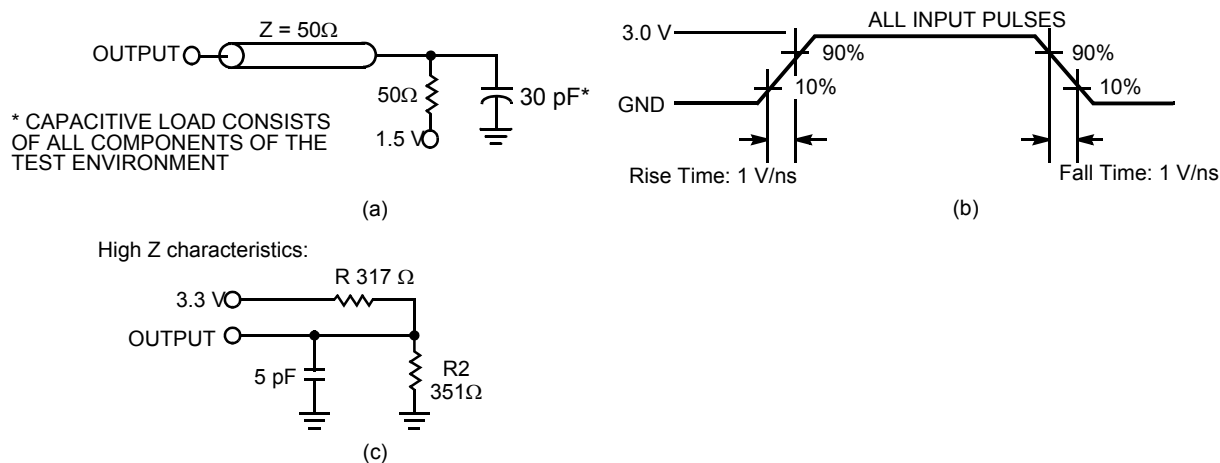
Parameter <sup>[4]</sup>	Description	Test Conditions	Max	Unit
$C_{IN}$	Input capacitance	$T_A = 25^\circ\text{C}$ , $f = 1\text{ MHz}$ , $V_{CC} = 3.3\text{ V}$	8	pF
$C_{OUT}$	I/O capacitance		8	pF

## Thermal Resistance

Parameter <sup>[4]</sup>	Description	Test Conditions	TSOP II	VFBGA	Unit
$\Theta_{JA}$	Thermal resistance (junction to ambient)	Still air, soldered on a $3 \times 4.5$ inch, four-layer printed circuit board	50.66	27.89	$^\circ\text{C/W}$
$\Theta_{JC}$	Thermal resistance (junction to case)		17.17	14.74	$^\circ\text{C/W}$

## AC Test Loads and Waveforms

Figure 3. AC Test Loads and Waveforms <sup>[5]</sup>



### Note

4. Tested initially and after any design or process changes that may affect these parameters.
5. AC characteristics (except high Z) are tested using the load conditions shown in (a). High Z characteristics are tested for all speeds using the test load shown in (c).

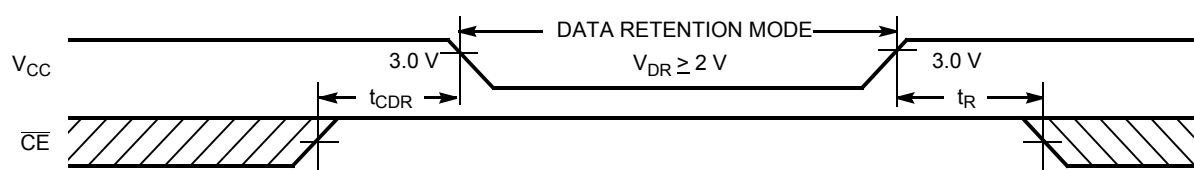
## Data Retention Characteristics

Over the Operating Range

Parameter	Description	Conditions <sup>[6]</sup>	Min	Max	Unit
$V_{DR}$	$V_{CC}$ for data retention		2.0	–	V
$I_{CCDR}$	Data retention current		–	10	mA
$t_{CDR}^{[7]}$	Chip deselect to data retention time	$V_{CC} = V_{DR} = 2.0\text{ V}$ , $\overline{CE} \geq V_{CC} - 0.3\text{ V}$ , $V_{IN} \geq V_{CC} - 0.3\text{ V}$ or $V_{IN} \leq 0.3\text{ V}$	0	–	ns
$t_R^{[8]}$	Operation recovery time		$t_{RC}$	–	ns

## Data Retention Waveform

Figure 4. Data Retention Waveform



### Notes

6. No input may exceed  $V_{CC} + 0.3\text{ V}$ .
7. Tested initially and after any design or process changes that may affect these parameters.
8. Full device operation requires linear  $V_{CC}$  ramp from  $V_{DR}$  to  $V_{CC(min.)} \geq 50\text{ }\mu\text{s}$  or stable at  $V_{CC(min.)} \geq 50\text{ }\mu\text{s}$ .

## AC Switching Characteristics

Over the Operating Range

Parameter <sup>[9]</sup>	Description	-10		Unit
		Min	Max	
Read Cycle				
t <sub>power</sub> <sup>[10]</sup>	V <sub>CC</sub> (typical) to the first access	100	–	μs
t <sub>RC</sub>	Read cycle time	10	–	ns
t <sub>AA</sub>	Address to data valid	–	10	ns
t <sub>OHA</sub>	Data hold from address change	3	–	ns
t <sub>ACE</sub>	$\overline{\text{CE}}$ LOW to data valid	–	10	ns
t <sub>DOE</sub>	$\overline{\text{OE}}$ LOW to data valid	–	5	ns
t <sub>LZOE</sub>	$\overline{\text{OE}}$ LOW to low Z <sup>[11]</sup>	0	–	ns
t <sub>HZOE</sub>	$\overline{\text{OE}}$ HIGH to high Z <sup>[11, 12]</sup>	–	5	ns
t <sub>LZCE</sub>	$\overline{\text{CE}}$ LOW to low Z <sup>[11]</sup>	3	–	ns
t <sub>HZCE</sub>	$\overline{\text{CE}}$ HIGH to high Z <sup>[11, 12]</sup>	–	5	ns
t <sub>PU</sub>	$\overline{\text{CE}}$ LOW to power-up	0	–	ns
t <sub>PD</sub>	$\overline{\text{CE}}$ HIGH to power-down	–	10	ns
t <sub>DBE</sub>	Byte enable to data valid	–	5	ns
t <sub>LZBE</sub>	Byte enable to low Z	0	–	ns
t <sub>HZBE</sub>	Byte disable to high Z	–	6	ns
Write Cycle <sup>[13, 14]</sup>				
t <sub>WC</sub>	Write cycle time	10	–	ns
t <sub>SCE</sub>	$\overline{\text{CE}}$ LOW to write end	7	–	ns
t <sub>AW</sub>	Address set-up to write end	7	–	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>	$\overline{\text{WE}}$ pulse width	7	–	ns
t <sub>SD</sub>	Data set-up to write end	5	–	ns
t <sub>HD</sub>	Data hold from write end	0	–	ns
t <sub>LZWE</sub>	$\overline{\text{WE}}$ HIGH to low Z <sup>[11]</sup>	3	–	ns
t <sub>HZWE</sub>	$\overline{\text{WE}}$ LOW to high Z <sup>[11, 12]</sup>	–	5	ns
t <sub>BW</sub>	Byte enable to end of write	7	–	ns

### Notes

9. Test conditions assume signal transition time of 3 ns or less, timing reference levels of 1.5 V, input pulse levels of 0 to 3.0 V.

10.  $t_{\text{POWER}}$  gives the minimum amount of time that the power supply should be at typical  $V_{\text{CC}}$  values until the first memory access is performed.

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

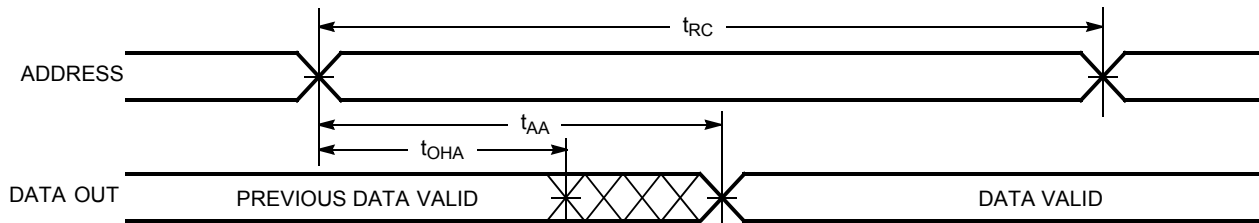
12.  $t_{\text{HZOE}}$ ,  $t_{\text{HZCE}}$ ,  $t_{\text{HZBE}}$  and  $t_{\text{HZWE}}$  are specified with a load capacitance of 5 pF as in part (d) of AC Test Loads. Transition is measured when the outputs enter a high impedance state.

13. The internal write time of the memory is defined by the overlap of  $\overline{\text{CE}}$  LOW, and  $\overline{\text{WE}}$  LOW.  $\overline{\text{CE}}$  and  $\overline{\text{WE}}$  must be LOW to initiate a write, and the transition of either of these signals can terminate the write. The input data set-up and hold timing should be referenced to the leading edge of the signal that terminates the write.

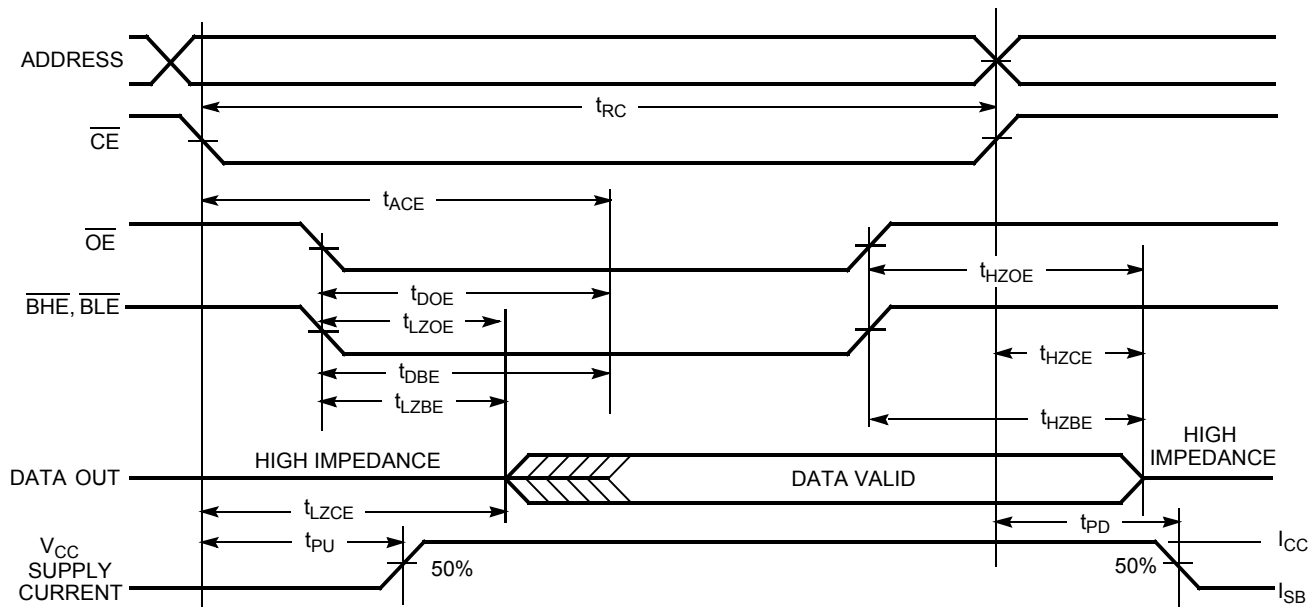
14. The minimum write cycle pulse width for Write Cycle No. 4 ( $\overline{\text{WE}}$  Controlled,  $\overline{\text{OE}}$  LOW) should be the sum of  $t_{\text{SD}}$  and  $t_{\text{HZWE}}$ .

## Switching Waveforms

**Figure 5. Read Cycle No. 1** [15, 16]



**Figure 6. Read Cycle No. 2 ( $\overline{OE}$  Controlled)** [16, 17]

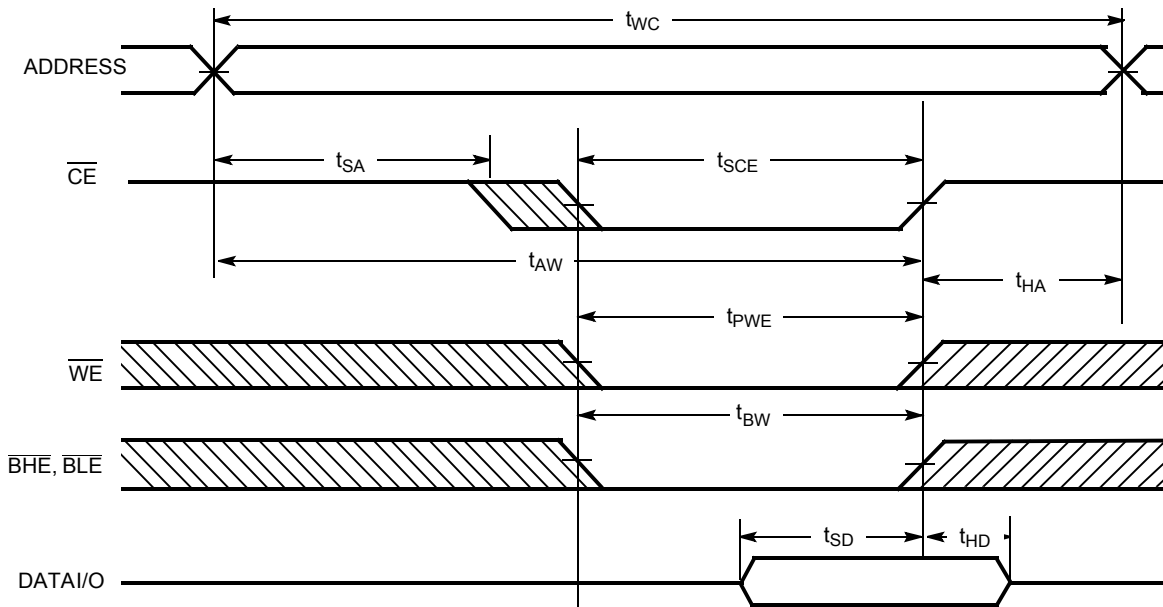


### Notes

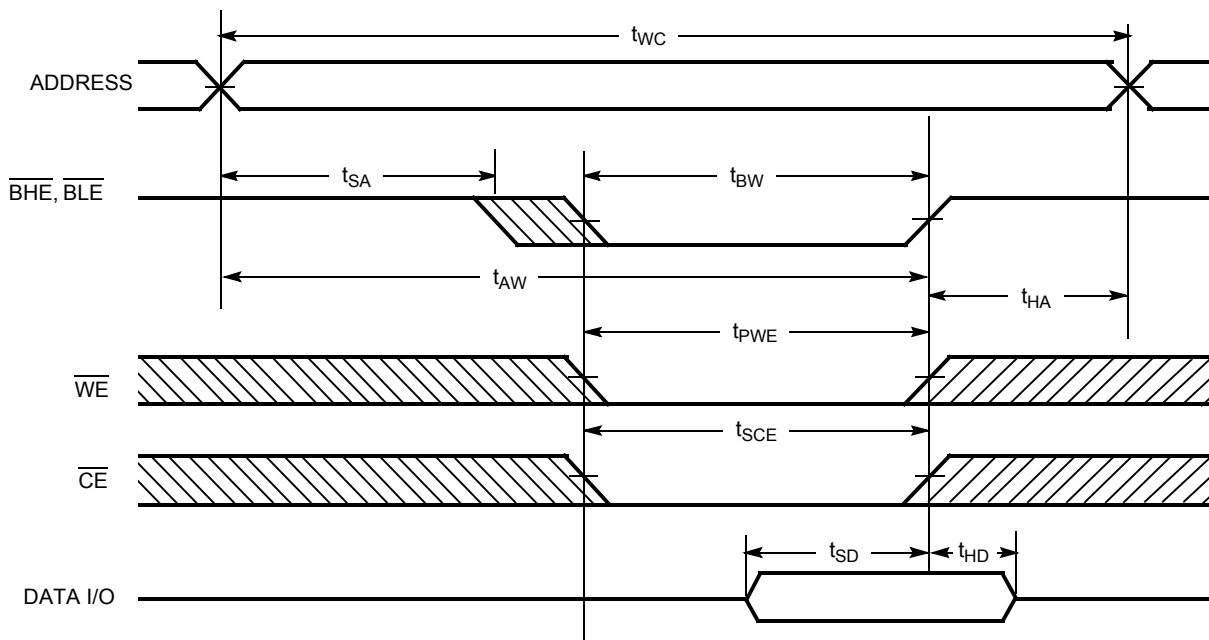
15. Device is continuously selected.  $\overline{OE}$ ,  $\overline{CE}$ ,  $\overline{BHE}$  and/or  $\overline{BLE}$  =  $V_{IL}$ .
16.  $\overline{WE}$  is HIGH for read cycle.
17. Address valid prior to or coincident with  $\overline{CE}$  transition LOW.

**Switching Waveforms** (continued)

**Figure 7. Write Cycle No. 1 ( $\overline{\text{CE}}$  Controlled)** [18, 19]



**Figure 8. Write Cycle No. 2 ( $\overline{\text{BLE}}$  or  $\overline{\text{BHE}}$  Controlled)**

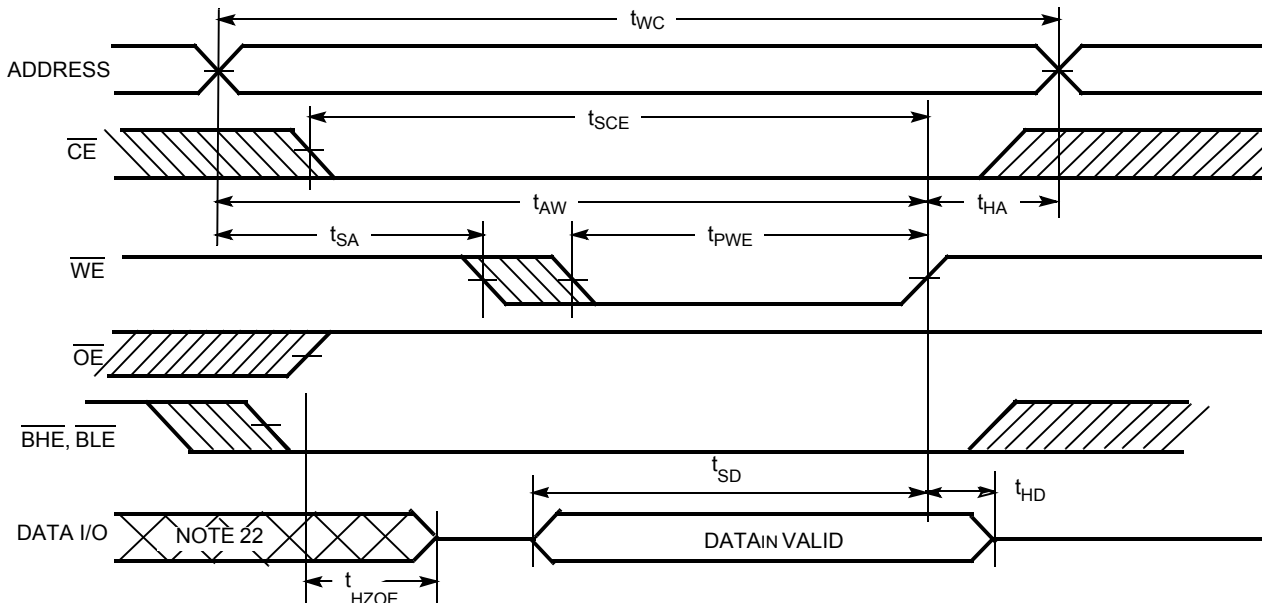
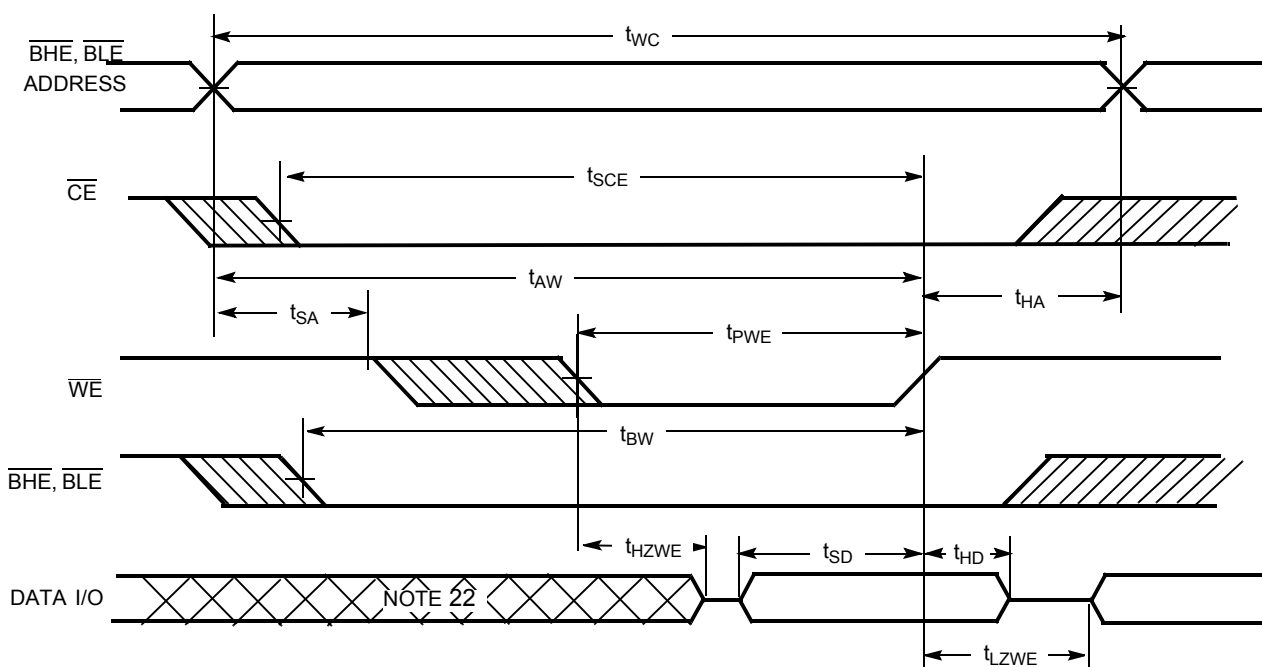


**Notes**

18. Data I/O is high-impedance if  $\overline{\text{OE}}$  or  $\overline{\text{BHE}}$  and/or  $\overline{\text{BLE}} = V_{IH}$ .  
 19. If  $\overline{\text{CE}}$  goes HIGH simultaneously with  $\overline{\text{WE}}$  going HIGH, the output remains in a high-impedance state.



**Switching Waveforms** (continued)

**Figure 9. Write Cycle No. 3 ( $\overline{WE}$  Controlled,  $\overline{OE}$  HIGH During Write) [20, 21]**

**Figure 10. Write Cycle No. 4 ( $\overline{WE}$  Controlled,  $\overline{OE}$  LOW) [23]**

**Notes**

20. Data I/O is high-impedance if  $\overline{OE}$  or  $\overline{BHE}$  and/or  $\overline{BLE} = V_{IH}$ .  
 21. If  $\overline{CE}$  goes HIGH simultaneously with  $\overline{WE}$  going HIGH, the output remains in a high-impedance state.  
 22. During this period the I/Os are in the output state and input signals should not be applied.  
 23. The minimum write pulse width for Write Cycle No. 4 ( $\overline{WE}$  controlled,  $\overline{OE}$  LOW) should be the sum of  $t_{SD}$  and  $t_{HZWE}$ .

**Truth Table**

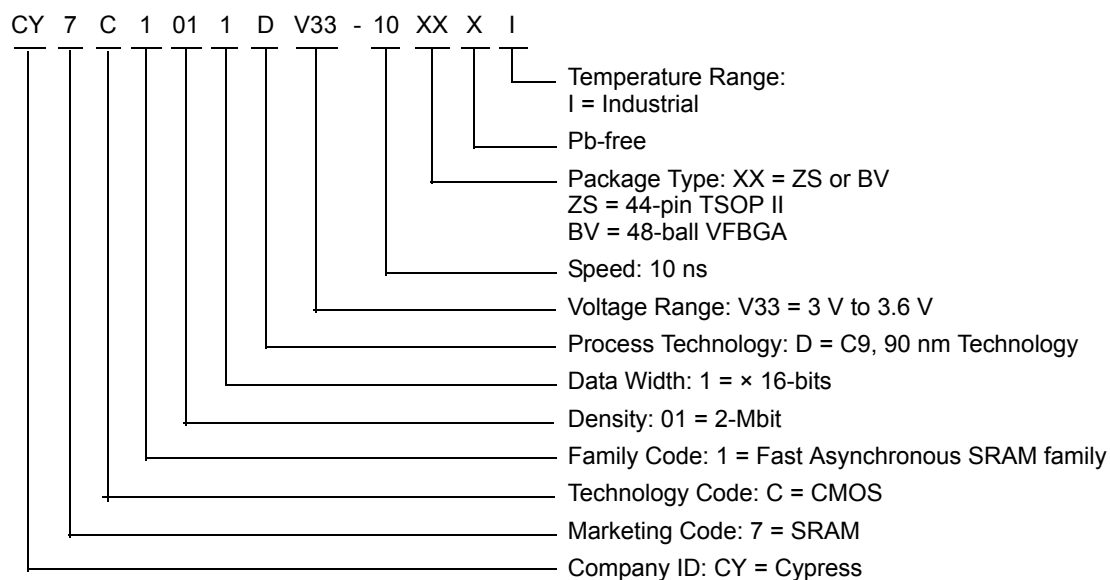
$\overline{\text{CE}}$	$\overline{\text{OE}}$	$\overline{\text{WE}}$	$\overline{\text{BLE}}$	$\overline{\text{BHE}}$	I/O <sub>0</sub> –I/O <sub>7</sub>	I/O <sub>8</sub> –I/O <sub>15</sub>	Mode	Power
H	X	X	X	X	High Z	High Z	Power-down	Standby (I <sub>SB</sub> )
L	L	H	L	L	Data Out	Data Out	Read all bits	Active (I <sub>CC</sub> )
L	L	H	L	H	Data Out	High Z	Read lower bits only	Active (I <sub>CC</sub> )
L	L	H	H	L	High Z	Data Out	Read upper bits only	Active (I <sub>CC</sub> )
L	X	L	L	L	Data In	Data In	Write all bits	Active (I <sub>CC</sub> )
L	X	L	L	H	Data In	High Z	Write lower bits only	Active (I <sub>CC</sub> )
L	X	L	H	L	High Z	Data In	Write upper bits only	Active (I <sub>CC</sub> )
L	H	H	X	X	High Z	High Z	Selected, outputs disabled	Active (I <sub>CC</sub> )

## Ordering Information

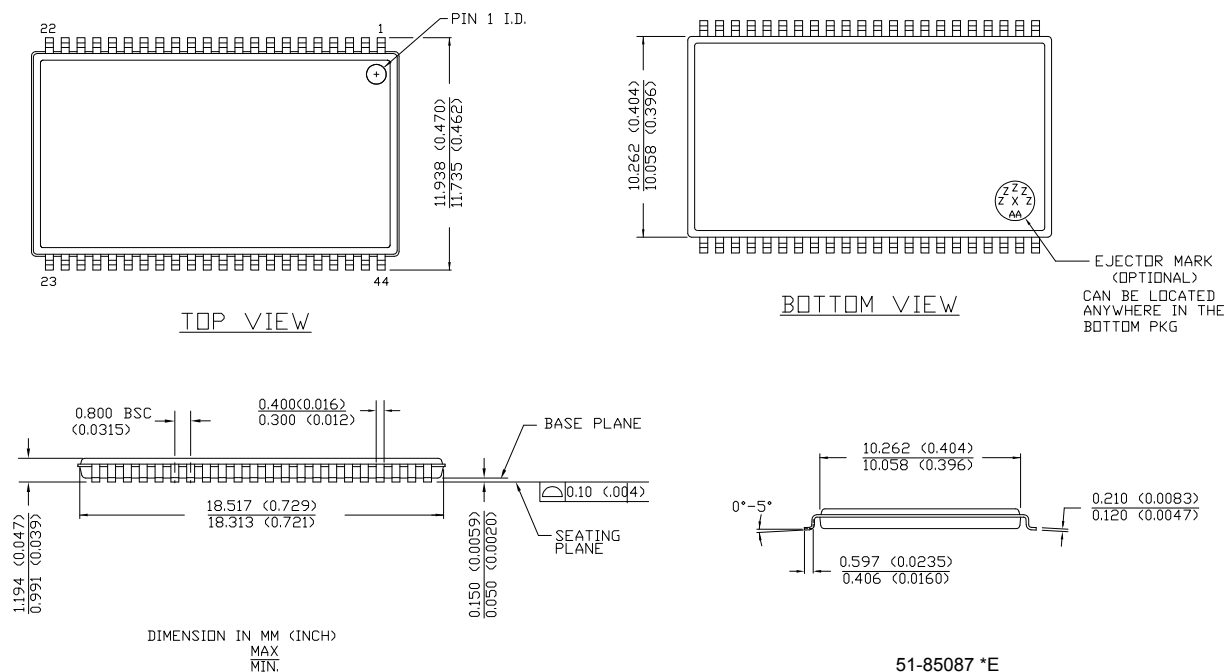
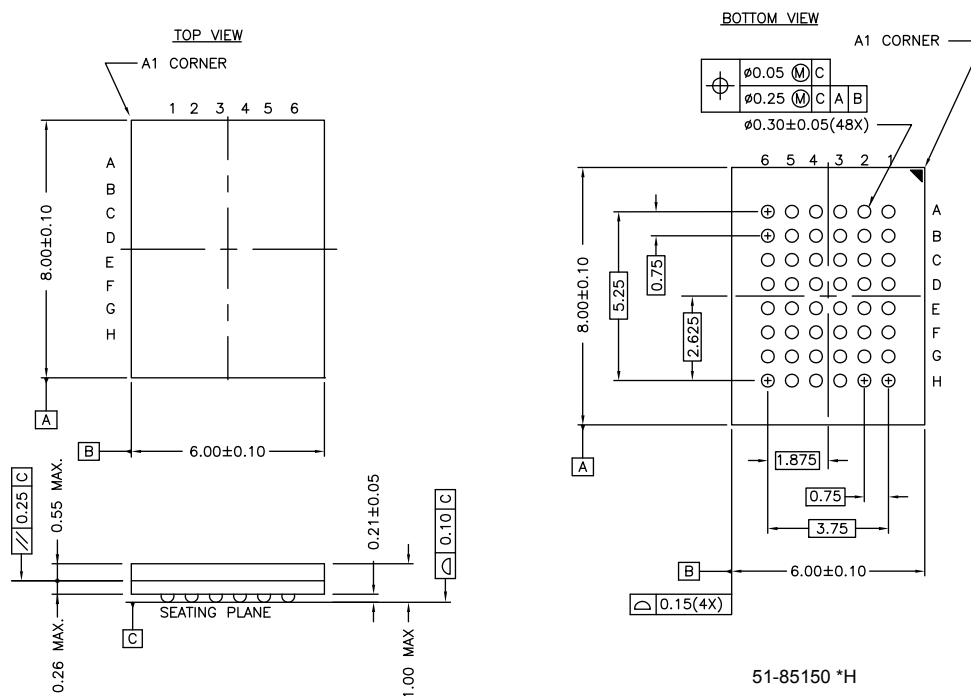
Speed (ns)	Ordering Code	Package Diagram	Package Type	Operating Range
10	CY7C1011DV33-10ZSXI	51-85087	44-pin TSOP II (Pb-free)	Industrial
	CY7C1011DV33-10BVXI	51-85150	48-ball VFBGA (Pb-free)	

Please contact your local Cypress sales representative for availability of these parts

## Ordering Code Definitions



## Package Diagrams

**Figure 11. 44-pin TSOP Z44-II Package Outline, 51-85087**

**Figure 12. 48-ball VFBGA (6 × 8 × 1 mm) BV48/BZ48 Package Outline, 51-85150**


## Acronyms

Acronym	Description
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
TTL	Transistor-Transistor Logic
VFBGA	Very Fine-Pitch Ball Grid Array
$\overline{\text{WE}}$	Write Enable

## Document Conventions

### Units of Measure

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

## Document History

Document Title: CY7C1011DV33, 2-Mbit (128 K × 16) Static RAM Document Number: 38-05609				
Rev.	ECN No.	Issue Date	Orig. of Change	Description of Change
**	250650	See ECN	RKF	New data sheet.
*A	399070	See ECN	NXR	Changed from Advance to Preliminary Changed address of Cypress Semiconductor Corporation on Page# 1 from "3901 North First Street" to "198 Champion Court" Removed TQFP Package from product offering Removed –15 speed bin Corrected DC voltage limits in maximum ratings section from –0.5 to –0.3V and $V_{CC} + 0.5V$ to $V_{CC} + 0.3V$ Redefined $I_{CC}$ values for Com'l and Ind'l temperature ranges $I_{CC}$ (Com'l): Changed from 100, 80 and 70 mA to 90, 80 and 75 mA for 8, 10 and 12ns speed bins respectively $I_{CC}$ (Ind'l): Changed from 80 and 70 mA to 90 and 85 mA for 10 and 12ns speed bins respectively Modified Note# 4 on AC Test Loads Added Static Discharge Voltage and latch-up current spec Added $V_{IH(max)}$ spec in Note# 2 Changed reference voltage level for measurement of Hi-Z parameters from $\pm 500$ mV to $\pm 200$ mV Added Data Retention Characteristics Table and footnote on $t_R$ Added Write Cycle (WE Controlled, OE HIGH During Write) Timing Diagram Changed package name for 44-pin TSOP II from Z to ZS Added 8 ns parts in the Ordering Information table Shaded Ordering Information Table
*B	459073	See ECN	NXR	Converted Preliminary to Final. Removed –8 and –12 Speed bins Removed Commercial Operating Range from product offering. Changed the description of $I_{IX}$ from "Input Load Current" to "Input Leakage Current" Updated the Thermal Resistance table. Changed $t_{HZBE}$ from 5 ns to 6 ns. Updated footnote #7 on High-Z parameter measurement Added footnote #12. Updated the Ordering Information and replaced Package Name column with Package Diagram in the Ordering Information table.
*C	480177	See ECN	VKN	Added -10BVI product ordering code in the Ordering Information table.
*D	3059162	10/14/2010	PRAS	Added <a href="#">Ordering Code Definitions</a> . Updated <a href="#">Package Diagrams</a> .
*E	3098812	12/01/2010	PRAS	Added <a href="#">Acronyms and Units of Measure</a> . Minor edits and updated in new template.
*F	3861347	01/08/2013	TAVA	Updated <a href="#">Ordering Information</a> (Updated part numbers).  Updated <a href="#">Package Diagrams</a> : spec 51-85087 – Changed revision from *C to *E. spec 51-85150 – Changed revision from *F to *H.
*G	4187715	11/10/2013	MEMJ	Updated in new template.  Completing Sunset Review.

**Document History** *(continued)*

Document Title: CY7C1011DV33, 2-Mbit (128 K × 16) Static RAM Document Number: 38-05609				
Rev.	ECN No.	Issue Date	Orig. of Change	Description of Change
*H	4567909	11/12/2014	MEMJ	<p>Updated <a href="#">Functional Description</a>: Added “For a complete list of related resources, <a href="#">click here</a>.” at the end.</p> <p>Updated <a href="#">Switching Waveforms</a>: Added Note 23 and referred the same note in <a href="#">Figure 10</a>.</p> <p>Competing Sunset Review.</p>

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