

# 16-Mbit (2M words × 8 bit) Static RAM with Error-Correcting Code (ECC)

## Features

- High speed
  - $t_{AA} = 10 \text{ ns}$
- Embedded error-correcting code (ECC) for single-bit error correction
- Low active and standby currents
  - $I_{CC} = 90 \text{ mA}$  typical at 100 MHz
  - $I_{SB2} = 20 \text{ mA}$  typical
- Operating voltage range: 1.65 V to 2.2 V, 2.2 V to 3.6 V, 4.5 V to 5.5 V
- 1.0-V data retention
- Transistor-transistor logic (TTL) compatible inputs and outputs
- ERR pin to indicate 1-bit error detection and correction
- Available in Pb-free 54-pin TSOP II, and 48-ball VFBGA packages

## Functional Description

The CY7C1069G and CY7C1069GE are dual chip enable high-performance CMOS fast static RAM devices with embedded ECC. The CY7C1069G device is available in standard pin configurations. The CY7C1069GE device includes a single bit error indication pin (ERR) that signals the host

processor in the case of an ECC error-detection and correction event.

To write to the device, take Chip Enables ( $\overline{CE}_1$  LOW and  $CE_2$  HIGH) and Write Enable (WE) input LOW. Data on the eight I/O pins ( $I/O_0$  through  $I/O_7$ ) is then written into the location specified on the address pins ( $A_0$  through  $A_{20}$ ).

To read from the device, take Chip Enables ( $\overline{CE}_1$  LOW and  $CE_2$  HIGH) and Output Enable ( $\overline{OE}$ ) LOW while forcing the Write Enable (WE) HIGH. Under these conditions, the contents of the memory location specified by the address pins will appear on the I/O pins. See [Truth Table – CY7C1069G/CY7C1069GE on page 14](#) for a complete description of Read and Write modes. The input and output pins ( $I/O_0$  through  $I/O_7$ ) are placed in a high impedance state when the device is deselected ( $\overline{CE}_1$  HIGH or  $CE_2$  LOW), the outputs are disabled ( $\overline{OE}$  HIGH), or during a write operation ( $\overline{CE}_1$  LOW,  $CE_2$  HIGH, and WE LOW).

On CY7C1069GE devices, the detection and correction of a single-bit error in the accessed location is indicated by the assertion of the ERR output (ERR = High) <sup>[1]</sup>.

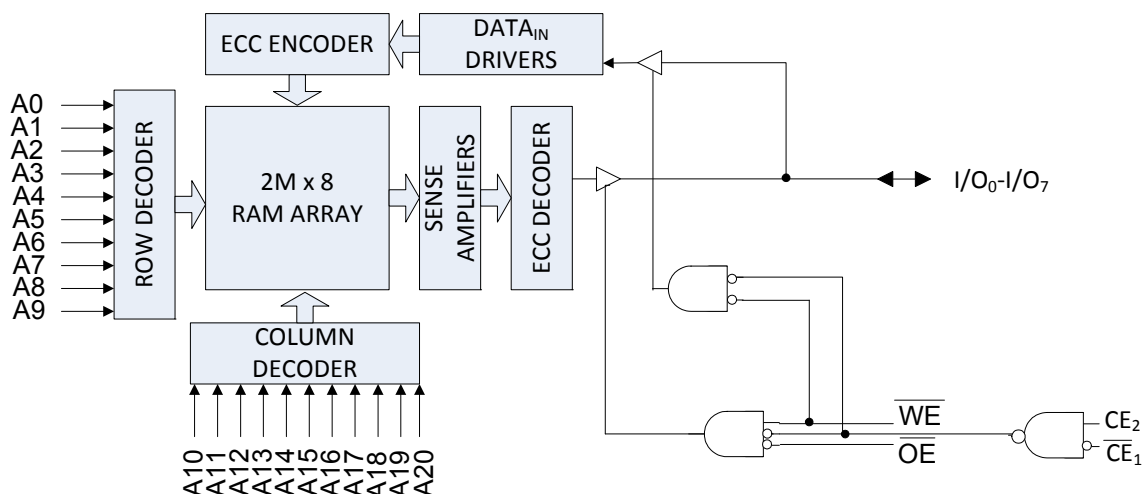
All I/Os ( $I/O_0$  through  $I/O_7$ ) are placed in a high impedance state when the device is deselected ( $\overline{CE}_1$  HIGH or  $CE_2$  LOW), and control signals are de-asserted ( $\overline{CE}_1$  /  $CE_2$ ,  $\overline{OE}$ , WE). CY7C1069G and CY7C1069GE devices are available in a 54-pin TSOP II package with center power and ground (revolutionary) pinout, and in a 48-ball VFBGA package.

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

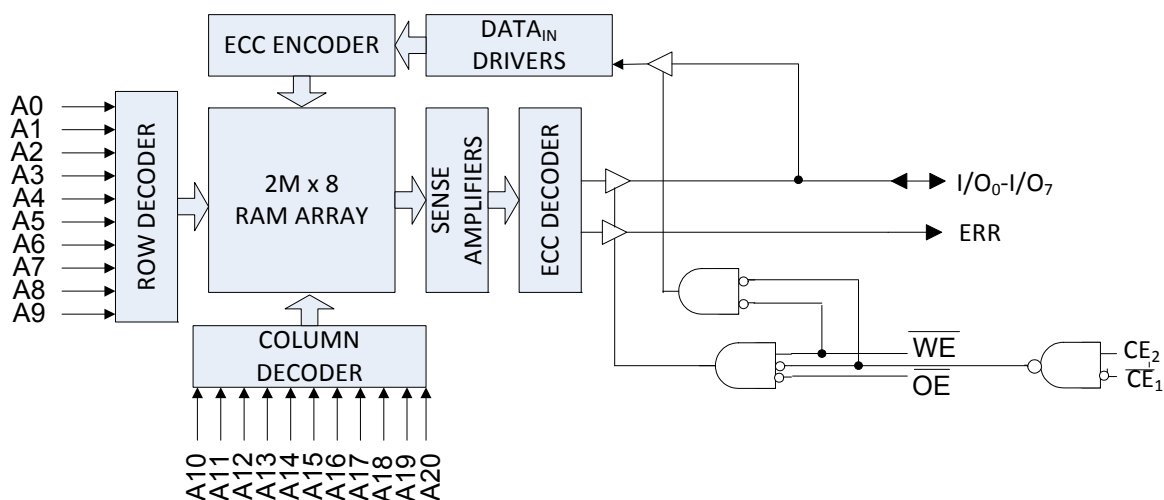
### Note

1. Automatic write back on error detection feature is not supported in this device.

## Logic Block Diagram – CY7C1069G



## Logic Block Diagram – CY7C1069GE



## Contents

<b>Pin Configurations</b> .....	<b>4</b>	<b>Ordering Information</b> .....	<b>15</b>
<b>Product Portfolio</b> .....	<b>6</b>	Ordering Code Definitions .....	15
<b>Maximum Ratings</b> .....	<b>7</b>	<b>Package Diagrams</b> .....	<b>16</b>
<b>Operating Range</b> .....	<b>7</b>	<b>Acronyms</b> .....	<b>18</b>
<b>DC Electrical Characteristics</b> .....	<b>7</b>	<b>Document Conventions</b> .....	<b>18</b>
<b>Capacitance</b> .....	<b>8</b>	Units of Measure .....	18
<b>Thermal Resistance</b> .....	<b>8</b>	<b>Document History Page</b> .....	<b>19</b>
<b>AC Test Loads and Waveforms</b> .....	<b>8</b>	<b>Sales, Solutions, and Legal Information</b> .....	<b>20</b>
<b>Data Retention Characteristics</b> .....	<b>9</b>	Worldwide Sales and Design Support .....	20
<b>Data Retention Waveform</b> .....	<b>9</b>	Products .....	20
<b>AC Switching Characteristics</b> .....	<b>10</b>	PSoC@Solutions .....	20
<b>Switching Waveforms</b> .....	<b>11</b>	Cypress Developer Community .....	20
<b>Truth Table – CY7C1069G/CY7C1069GE</b> .....	<b>14</b>	Technical Support .....	20
<b>ERR Output – CY7C1069GE</b> .....	<b>14</b>		

## Pin Configurations

Figure 1. 54-pin TSOP II pinout (Top View) – CY7C1069G [2]

NC	1	54	NC
V <sub>CC</sub>	2	53	V <sub>SS</sub>
NC	3	52	NC
I/O <sub>6</sub>	4	51	I/O <sub>5</sub>
V <sub>SS</sub>	5	50	V <sub>CC</sub>
I/O <sub>7</sub>	6	49	I/O <sub>4</sub>
A <sub>4</sub>	7	48	A <sub>5</sub>
A <sub>3</sub>	8	47	A <sub>6</sub>
A <sub>2</sub>	9	46	A <sub>7</sub>
A <sub>1</sub>	10	45	A <sub>8</sub>
A <sub>0</sub>	11	44	A <sub>9</sub>
NC	12	43	NC
$\overline{CE}_1$	13	42	$\overline{OE}$
V <sub>CC</sub>	14	41	V <sub>SS</sub>
$\overline{WE}$	15	40	NC
CE <sub>2</sub>	16	39	A <sub>20</sub>
A <sub>19</sub>	17	38	A <sub>10</sub>
A <sub>18</sub>	18	37	A <sub>11</sub>
A <sub>17</sub>	19	36	A <sub>12</sub>
A <sub>16</sub>	20	35	A <sub>13</sub>
A <sub>15</sub>	21	34	A <sub>14</sub>
I/O <sub>0</sub>	22	33	I/O <sub>3</sub>
V <sub>CC</sub>	23	32	V <sub>SS</sub>
I/O <sub>1</sub>	24	31	I/O <sub>2</sub>
NC	25	30	NC
V <sub>SS</sub>	26	29	V <sub>CC</sub>
NC	27	28	NC

Figure 2. 54-pin TSOP II pinout (Top View) – CY7C1069GE [2, 3]

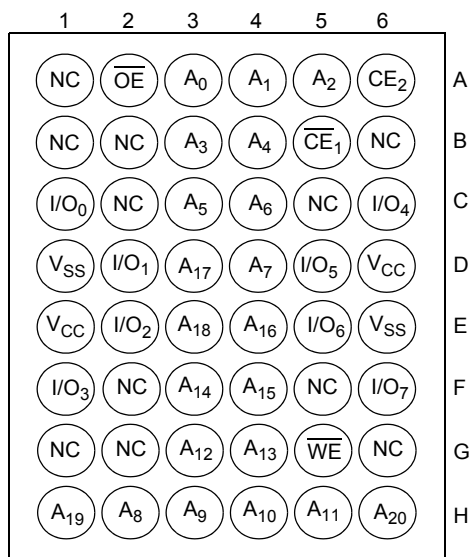
NC	1	54	NC
V <sub>CC</sub>	2	53	V <sub>SS</sub>
NC	3	52	NC
I/O <sub>6</sub>	4	51	I/O <sub>5</sub>
V <sub>SS</sub>	5	50	V <sub>CC</sub>
I/O <sub>7</sub>	6	49	I/O <sub>4</sub>
A <sub>4</sub>	7	48	A <sub>5</sub>
A <sub>3</sub>	8	47	A <sub>6</sub>
A <sub>2</sub>	9	46	A <sub>7</sub>
A <sub>1</sub>	10	45	A <sub>8</sub>
A <sub>0</sub>	11	44	A <sub>9</sub>
NC	12	43	ERR
$\overline{CE}_1$	13	42	$\overline{OE}$
V <sub>CC</sub>	14	41	V <sub>SS</sub>
$\overline{WE}$	15	40	NC
CE <sub>2</sub>	16	39	A <sub>20</sub>
A <sub>19</sub>	17	38	A <sub>10</sub>
A <sub>18</sub>	18	37	A <sub>11</sub>
A <sub>17</sub>	19	36	A <sub>12</sub>
A <sub>16</sub>	20	35	A <sub>13</sub>
A <sub>15</sub>	21	34	A <sub>14</sub>
I/O <sub>0</sub>	22	33	I/O <sub>3</sub>
V <sub>CC</sub>	23	32	V <sub>SS</sub>
I/O <sub>1</sub>	24	31	I/O <sub>2</sub>
NC	25	30	NC
V <sub>SS</sub>	26	29	V <sub>CC</sub>
NC	27	28	NC

### Note

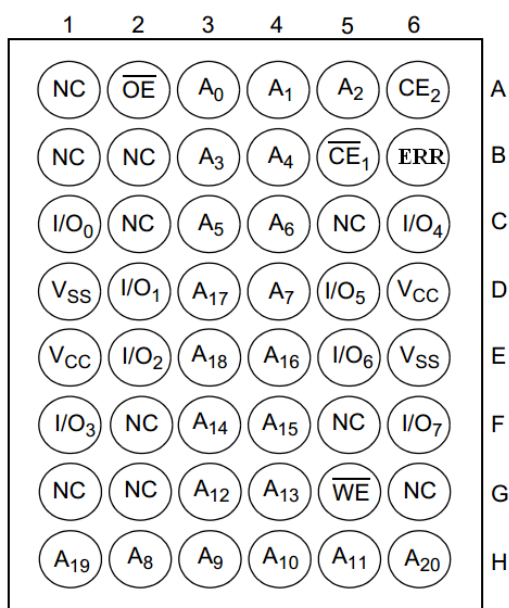
2. NC pins are not connected on the die.
3. ERR is an Output pin. If not used, this pin should be left floating.

## Pin Configurations (continued)

**Figure 3. 48-ball VFBGA pinout (Top View) – CY7C1069G** <sup>[4]</sup>



**Figure 4. 48-ball VFBGA pinout (Top View) – CY7C1069GE** <sup>[4, 5]</sup>



**Note**

4. NC pins are not connected on the die.
5. ERR is an Output pin. If not used, this pin should be left floating.

## Product Portfolio

Product	Features and Options (see the Pin Configurations section)	Range	V <sub>CC</sub> Range (V)	Speed (ns)	Power Dissipation			
					Operating I <sub>CC</sub> , (mA)		Standby, I <sub>SB2</sub> (mA)	
					f = f <sub>max</sub>			
					Typ <sup>[6]</sup>	Max	Typ <sup>[6]</sup>	Max
CY7C1069G18	Dual-chip enable	Industrial	1.65 V–2.2 V	15	70	80	20	30
CY7C1069G30			2.2 V–3.6 V	10	90	110		
CY7C1069G			4.5 V–5.5 V	10	90	110		
CY7C1069GE18	Dual-chip enable and ERR output		1.65 V–2.2 V	15	70	80		
CY7C1069GE30			2.2 V–3.6 V	10	90	110		
CY7C1069GE			4.5 V–5.5 V	10	90	110		

### Notes

6. Typical values are included for reference only and are not guaranteed or tested. Typical values are measured at V<sub>CC</sub> = 1.8 V (for V<sub>CC</sub> range of 1.65 V–2.2 V), V<sub>CC</sub> = 3 V (for V<sub>CC</sub> range of 2.2 V–3.6 V), and V<sub>CC</sub> = 5 V (for V<sub>CC</sub> range of 4.5 V–5.5 V), T<sub>A</sub> = 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  
on  $V_{CC}$  relative to GND ..... -0.5 V to +6.0 V

DC voltage applied to outputs  
in High Z State <sup>[7]</sup> ..... -0.5 V to  $V_{CC} + 0.5$  V

DC input voltage <sup>[7]</sup> ..... -0.5 V to  $V_{CC} + 0.5$  V

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

Static Discharge Voltage  
(MIL-STD-883, Method 3015) ..... > 2001 V

Latch up current ..... > 140 mA

## Operating Range

Grade	Ambient Temperature	$V_{CC}$
Industrial	-40 °C to +85 °C	1.65 V to 2.2 V, 2.2 V to 3.6 V, 4.5 V to 5.5 V

## DC Electrical Characteristics

Over the Operating Range of -40 °C to 85 °C

Parameter	Description	Test Conditions	10 ns / 15 ns			Unit
			Min	Typ <sup>[8]</sup>	Max	
$V_{OH}$	Output HIGH voltage	1.65 V to 2.2 V $V_{CC} = \text{Min}, I_{OH} = -0.1 \text{ mA}$	1.4	—	—	V
		2.2 V to 2.7 V $V_{CC} = \text{Min}, I_{OH} = -1.0 \text{ mA}$	2.0	—	—	
		2.7 V to 3.0 V $V_{CC} = \text{Min}, I_{OH} = -4.0 \text{ mA}$	2.2	—	—	
		3.0 V to 3.6 V $V_{CC} = \text{Min}, I_{OH} = -4.0 \text{ mA}$	2.4	—	—	
		4.5 V to 5.5 V $V_{CC} = \text{Min}, I_{OH} = -4.0 \text{ mA}$	2.4	—	—	
		4.5 V to 5.5 V $V_{CC} = \text{Min}, I_{OH} = -0.1 \text{ mA}$	$V_{CC} - 0.4$ <sup>[9]</sup>	—	—	
$V_{OL}$	Output LOW voltage	1.65 V to 2.2 V $V_{CC} = \text{Min}, I_{OL} = 0.1 \text{ mA}$	—	—	0.2	V
		2.2 V to 2.7 V $V_{CC} = \text{Min}, I_{OL} = 2 \text{ mA}$	—	—	0.4	
		2.7 V to 3.6 V $V_{CC} = \text{Min}, I_{OL} = 8 \text{ mA}$	—	—	0.4	
		4.5 V to 5.5 V $V_{CC} = \text{Min}, I_{OL} = 8 \text{ mA}$	—	—	0.4	
$V_{IH}$	Input HIGH voltage	1.65 V to 2.2 V —	1.4	—	$V_{CC} + 0.2$	V
		2.2 V to 2.7 V —	2.0	—	$V_{CC} + 0.3$	
		2.7 V to 3.6 V —	2.0	—	$V_{CC} + 0.3$	
		4.5 V to 5.5 V —	2.0	—	$V_{CC} + 0.5$	
$V_{IL}$	Input LOW voltage <sup>[7]</sup>	1.65 V to 2.2 V —	-0.2	—	0.4	V
		2.2 V to 2.7 V —	-0.3	—	0.6	
		2.7 V to 3.6 V —	-0.3	—	0.8	
		4.5 V to 5.5 V —	-0.5	—	0.8	
$I_{IX}$	Input leakage current	$GND \leq V_{IN} \leq V_{CC}$	-1.0	—	+1.0	$\mu\text{A}$
$I_{OZ}$	Output leakage current	$GND \leq V_{OUT} \leq V_{CC}$ , Output disabled	-1.0	—	+1.0	$\mu\text{A}$
$I_{CC}$	Operating supply current	$V_{CC} = \text{Max}, I_{OUT} = 0 \text{ mA}$ , CMOS levels	—	90.0	110.0	mA
		$f = 100 \text{ MHz}$	—	70.0	80.0	
$I_{SB1}$	Automatic CE power down current – TTL inputs	$\text{Max } V_{CC}, \overline{CE} \geq V_{IH}$ <sup>[10]</sup> , $V_{IN} \geq V_{IH}$ or $V_{IN} \leq V_{IL}$ , $f = f_{MAX}$	—	—	40.0	mA
$I_{SB2}$	Automatic CE power down current – CMOS inputs	$\text{Max } V_{CC}, \overline{CE} \geq V_{CC} - 0.2 \text{ V}$ <sup>[10]</sup> , $V_{IN} \geq V_{CC} - 0.2 \text{ V}$ or $V_{IN} \leq 0.2 \text{ V}$ , $f = 0$	—	20.0 <sup>[8]</sup>	30.0	mA

### Notes

7.  $V_{IL(\text{min})} = -2.0 \text{ V}$  and  $V_{IH(\text{max})} = V_{CC} + 2 \text{ V}$  for pulse durations of less than 20 ns.

8. Typical values are included for reference only and are not guaranteed or tested. Typical values are measured at  $V_{CC} = 1.8 \text{ V}$  (for  $V_{CC}$  range of 1.65 V–2.2 V),  $V_{CC} = 3 \text{ V}$  (for  $V_{CC}$  range of 2.2 V–3.6 V), and  $V_{CC} = 5 \text{ V}$  (for  $V_{CC}$  range of 4.5 V–5.5 V),  $T_A = 25 \text{ °C}$ .

9. This parameter is guaranteed by design and is not tested.

10. For all dual chip enable devices,  $\overline{CE}$  is the logical combination of  $\overline{CE}_1$  and  $CE_2$ . When  $\overline{CE}_1$  is LOW and  $CE_2$  is HIGH,  $\overline{CE}$  is LOW; when  $\overline{CE}_1$  is HIGH or  $CE_2$  is LOW,  $\overline{CE}$  is HIGH.

## Capacitance

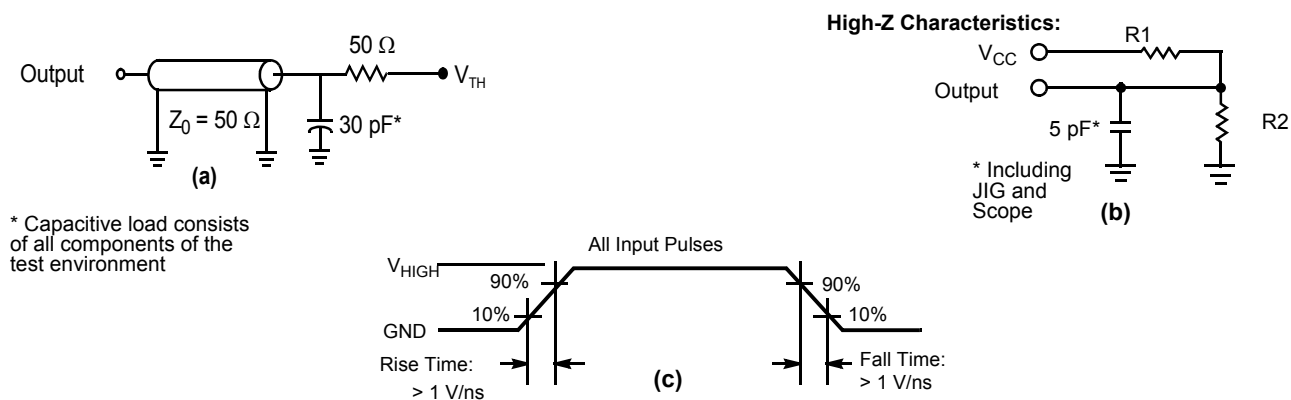
Parameter <sup>[11]</sup>	Description	Test Conditions	54-pin TSOP II	48-ball VFBGA	Unit
$C_{IN}$	Input capacitance	$T_A = 25^\circ\text{C}$ , $f = 1\text{ MHz}$ , $V_{CC} = V_{CC(\text{typ})}$	10	10	pF
$C_{OUT}$	I/O capacitance		10	10	pF

## Thermal Resistance

Parameter <sup>[11]</sup>	Description	Test Conditions	54-pin TSOP II	48-ball VFBGA	Unit
$\Theta_{JA}$	Thermal resistance (junction to ambient)	Still air, soldered on a 3 × 4.5 inch, four-layer printed circuit board	93.63	31.50	$^\circ\text{C/W}$
$\Theta_{JC}$	Thermal resistance (junction to case)		21.58	15.75	$^\circ\text{C/W}$

## AC Test Loads and Waveforms

Figure 5. AC Test Loads and Waveforms<sup>[12]</sup>



Parameters	1.8 V	3.0 V	5.0 V	Unit
R1	1667	317	317	$\Omega$
R2	1538	351	351	$\Omega$
$V_{TH}$	0.9	1.5	1.5	V
$V_{HIGH}$	1.8	3	3	V

### Notes

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

12. Full device AC operation assumes a 100- $\mu\text{s}$  ramp time from 0 to  $V_{CC(\text{min})}$  and 100- $\mu\text{s}$  wait time after  $V_{CC}$  stabilization.



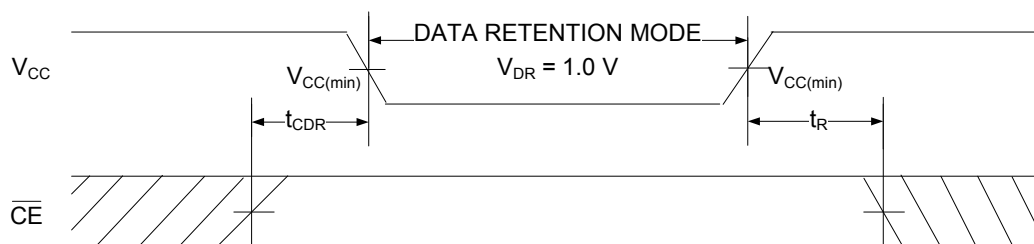
## Data Retention Characteristics

Over the Operating Range of  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$

Parameter	Description	Conditions	Min	Max	Unit
$V_{\text{DR}}$	$V_{\text{CC}}$ for data retention	–	1.0	–	V
$I_{\text{CCDR}}$	Data retention current	$V_{\text{CC}} = V_{\text{DR}}$ , $\overline{\text{CE}} \geq V_{\text{CC}} - 0.2 \text{ V}$ <sup>[13]</sup> , $V_{\text{IN}} \geq V_{\text{CC}} - 0.2 \text{ V}$ or $V_{\text{IN}} \leq 0.2 \text{ V}$	–	30.0	mA
$t_{\text{CDR}}$ <sup>[14]</sup>	Chip deselect to data retention time	–	0	–	ns
$t_{\text{R}}$ <sup>[14, 15]</sup>	Operation recovery time	$V_{\text{CC}} \geq 2.2 \text{ V}$	10.0	–	ns
		$V_{\text{CC}} < 2.2 \text{ V}$	15.0	–	ns

## Data Retention Waveform

Figure 6. Data Retention Waveform <sup>[13]</sup>



### Notes

13. For all dual chip enable devices,  $\overline{\text{CE}}$  is the logical combination of  $\overline{\text{CE}}_1$  and  $\text{CE}_2$ . When  $\overline{\text{CE}}_1$  is LOW and  $\text{CE}_2$  is HIGH,  $\overline{\text{CE}}$  is LOW; when  $\overline{\text{CE}}_1$  is HIGH or  $\text{CE}_2$  is LOW,  $\overline{\text{CE}}$  is HIGH.
14. This parameter is guaranteed by design and is not tested.
15. Full device operation requires linear  $V_{\text{CC}}$  ramp from  $V_{\text{DR}}$  to  $V_{\text{CC(min.)}} \geq 100 \mu\text{s}$  or stable at  $V_{\text{CC(min.)}} \geq 100 \mu\text{s}$ .

## AC Switching Characteristics

Over the Operating Range of  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$

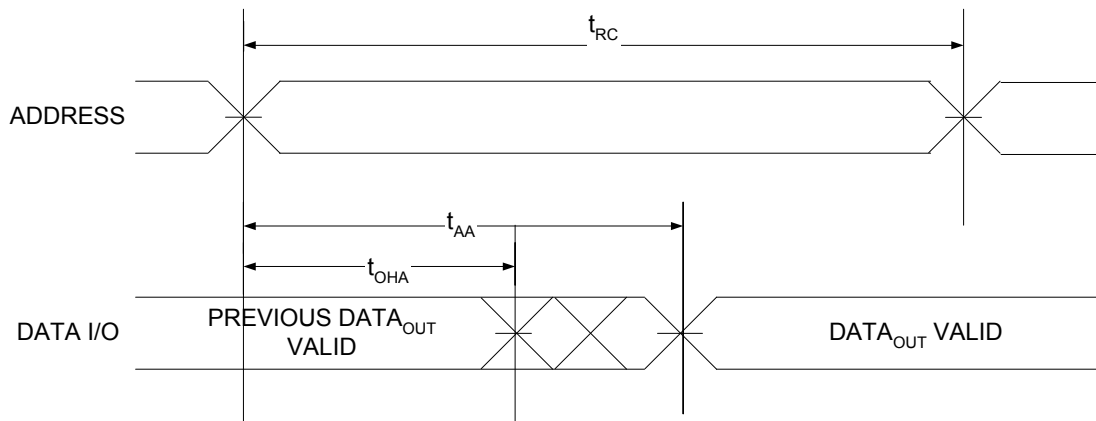
Parameter <sup>[16]</sup>	Description	10 ns		15 ns		Unit
		Min	Max	Min	Max	
Read Cycle						
t <sub>POWER</sub>	V <sub>CC</sub> stable to first access <sup>[17, 18]</sup>	100.0	–	100.0	–	μs
t <sub>RC</sub>	Read cycle time	10.0	–	15.0	–	ns
t <sub>AA</sub>	Address to data / ERR valid	–	10.0	–	15.0	ns
t <sub>OHA</sub>	Data / ERR hold from address change	3.0	–	3.0	–	ns
t <sub>ACE</sub>	$\overline{\text{CE}}$ LOW to data / ERR valid <sup>[19]</sup>	–	10.0	–	15.0	ns
t <sub>DOE</sub>	$\overline{\text{OE}}$ LOW to data / ERR valid	–	5.0	–	8.0	ns
t <sub>LZOE</sub>	$\overline{\text{OE}}$ LOW to low Z <sup>[20, 21, 22]</sup>	0	–	1.0	–	ns
t <sub>HZOE</sub>	$\overline{\text{OE}}$ HIGH to high Z <sup>[20, 21, 22]</sup>	–	5.0	–	8.0	ns
t <sub>LZCE</sub>	$\overline{\text{CE}}$ LOW to low Z <sup>[19, 20, 21, 22]</sup>	3.0	–	3.0	–	ns
t <sub>HZCE</sub>	$\overline{\text{CE}}$ HIGH to high Z <sup>[19, 20, 21, 22]</sup>	–	5.0	–	8.0	ns
t <sub>PU</sub>	$\overline{\text{CE}}$ LOW to power-up <sup>[18, 19]</sup>	0	–	0	–	ns
t <sub>PD</sub>	$\overline{\text{CE}}$ HIGH to power-down <sup>[18, 19]</sup>	–	10.0	–	15.0	ns
Write Cycle <sup>[23, 24]</sup>						
t <sub>WC</sub>	Write cycle time	10.0	–	15.0	–	ns
t <sub>SCE</sub>	$\overline{\text{CE}}$ LOW to write end <sup>[19]</sup>	7.0	–	12.0	–	ns
t <sub>AW</sub>	Address setup to write end	7.0	–	12.0	–	ns
t <sub>HA</sub>	Address hold from write end	0	–	0	–	ns
t <sub>SA</sub>	Address setup to write start	0	–	0	–	ns
t <sub>PWE</sub>	$\overline{\text{WE}}$ pulse width	7.0	–	12.0	–	ns
t <sub>SD</sub>	Data setup to write end	5.0	–	8.0	–	ns
t <sub>HD</sub>	Data hold from write end	0	–	0	–	ns
t <sub>LZWE</sub>	$\overline{\text{WE}}$ HIGH to low Z <sup>[20, 21, 22]</sup>	3.0	–	3.0	–	ns
t <sub>HZWE</sub>	$\overline{\text{WE}}$ LOW to high Z <sup>[20, 21, 22]</sup>	–	5.0	–	8.0	ns

### Notes

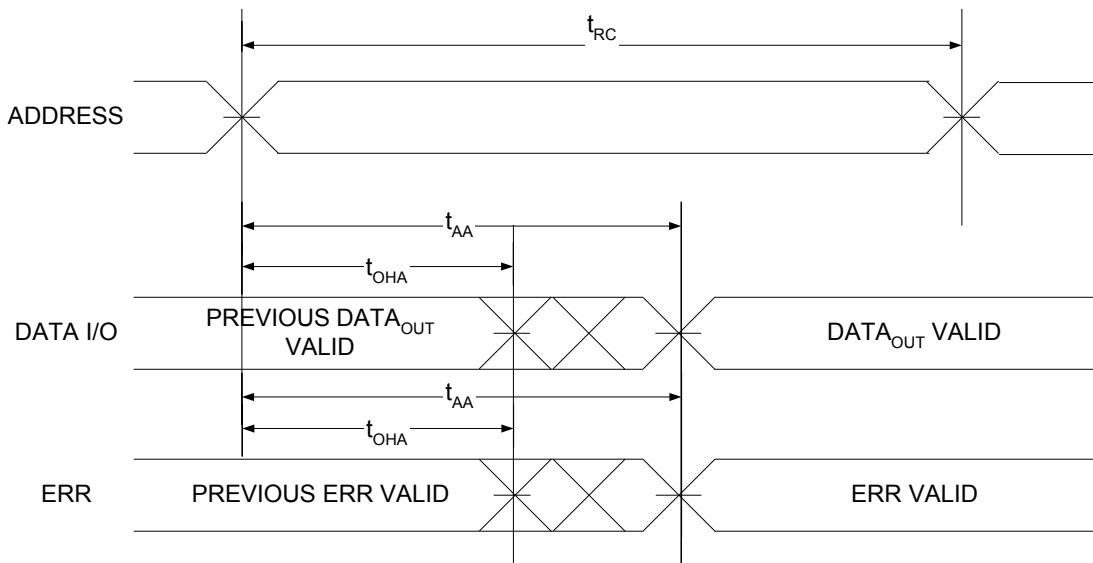
16. Test conditions assume signal transition time (rise/fall) of 3 ns or less, timing reference levels of 1.5 V (for  $V_{\text{CC}} \geq 3\text{ V}$ ) and  $V_{\text{CC}}/2$  (for  $V_{\text{CC}} < 3\text{ V}$ ), and input pulse levels of 0 to 3 V (for  $V_{\text{CC}} \geq 3\text{ V}$ ) and 0 to  $V_{\text{CC}}$  (for  $V_{\text{CC}} < 3\text{ V}$ ). Test conditions for the read cycle use output loading shown in part (a) of Figure 5 on page 8, unless specified otherwise.
17.  $t_{\text{POWER}}$  gives minimum amount of time that the power supply is at stable  $V_{\text{CC}}$  until first memory access is performed.
18. These parameters are guaranteed by design and are not tested.
19. For all dual chip enable devices,  $\overline{\text{CE}}$  is the logical combination of  $\overline{\text{CE}}_1$  and  $\text{CE}_2$ . When  $\overline{\text{CE}}_1$  is LOW and  $\text{CE}_2$  is HIGH,  $\overline{\text{CE}}$  is LOW; when  $\overline{\text{CE}}_1$  is HIGH or  $\text{CE}_2$  is LOW,  $\overline{\text{CE}}$  is HIGH.
20.  $t_{\text{HZOE}}$ ,  $t_{\text{HZCE}}$ ,  $t_{\text{HZWE}}$ ,  $t_{\text{LZOE}}$ ,  $t_{\text{LZCE}}$ , and  $t_{\text{LZWE}}$  are specified with a load capacitance of 5 pF as in (b) of Figure 5 on page 8. Transition is measured  $\pm 200\text{ mV}$  from steady state voltage.
21. At any temperature and voltage condition,  $t_{\text{HZCE}}$  is less than  $t_{\text{LZCE}}$ ,  $t_{\text{HZBE}}$  is less than  $t_{\text{LZBE}}$ ,  $t_{\text{HZOE}}$  is less than  $t_{\text{LZOE}}$ , and  $t_{\text{HZWE}}$  is less than  $t_{\text{LZWE}}$  for any device.
22. Tested initially and after any design or process changes that may affect these parameters.
23. The internal write time of the memory is defined by the overlap of  $\overline{\text{WE}} = V_{\text{IL}}$ ,  $\overline{\text{CE}} = V_{\text{IL}}$ . These signals must be LOW to initiate a write, and the HIGH transition of any of these signals can terminate the operation. The input data setup and hold timing should be referenced to the edge of the signal that terminates the write.
24. The minimum write pulse width for write cycle No.2 ( $\overline{\text{WE}}$  Controlled,  $\overline{\text{OE}}$  LOW) should be sum of  $t_{\text{HZWE}}$  and  $t_{\text{SD}}$ .

## Switching Waveforms

**Figure 7. Read Cycle No. 1 of CY7C1069G (Address Transition Controlled)** [25, 26]



**Figure 8. Read Cycle No. 2 of CY7C1069GE (Address Transition Controlled)** [25, 26]

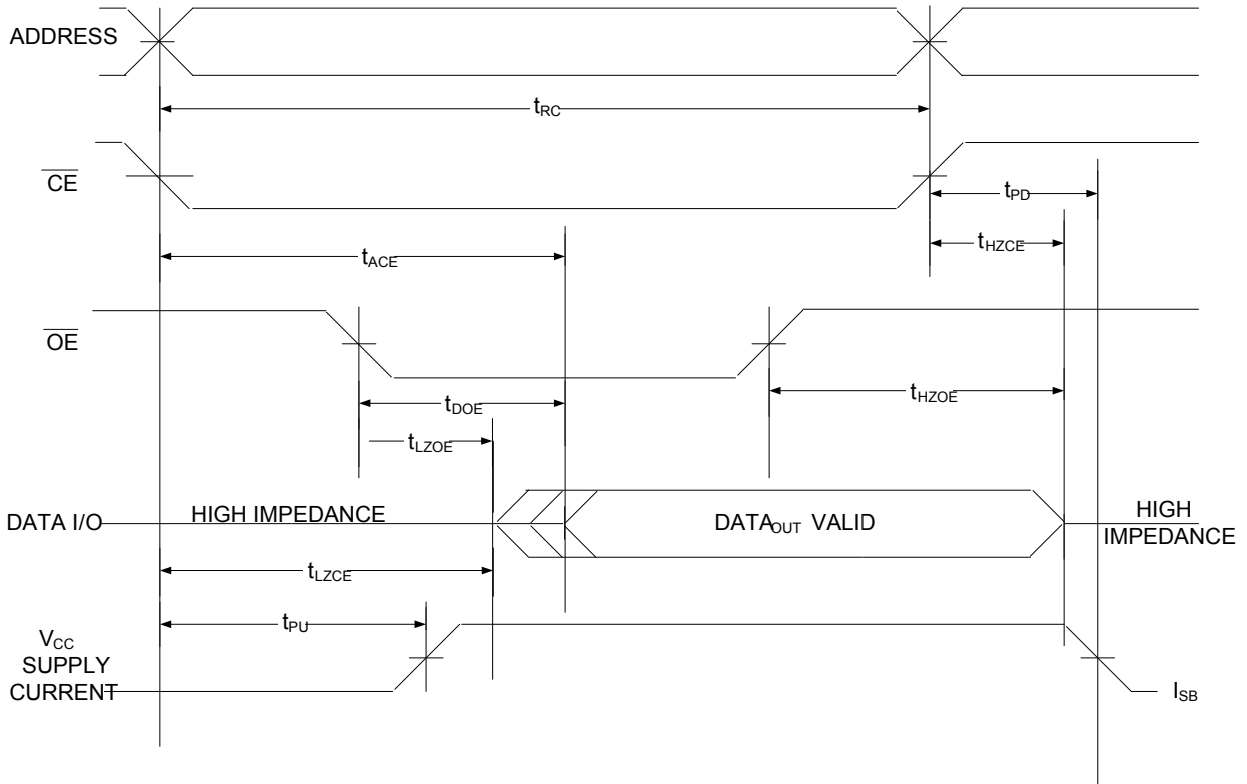


### Notes

25. The device is continuously selected,  $\overline{OE} = V_{IL}$ ,  $\overline{CE} = V_{IL}$ .  
 26.  $\overline{WE}$  is HIGH for read cycle.

## Switching Waveforms (continued)

**Figure 9. Read Cycle No. 3 ( $\overline{OE}$  Controlled,  $\overline{WE}$  HIGH)** [27, 28, 29]



### Notes

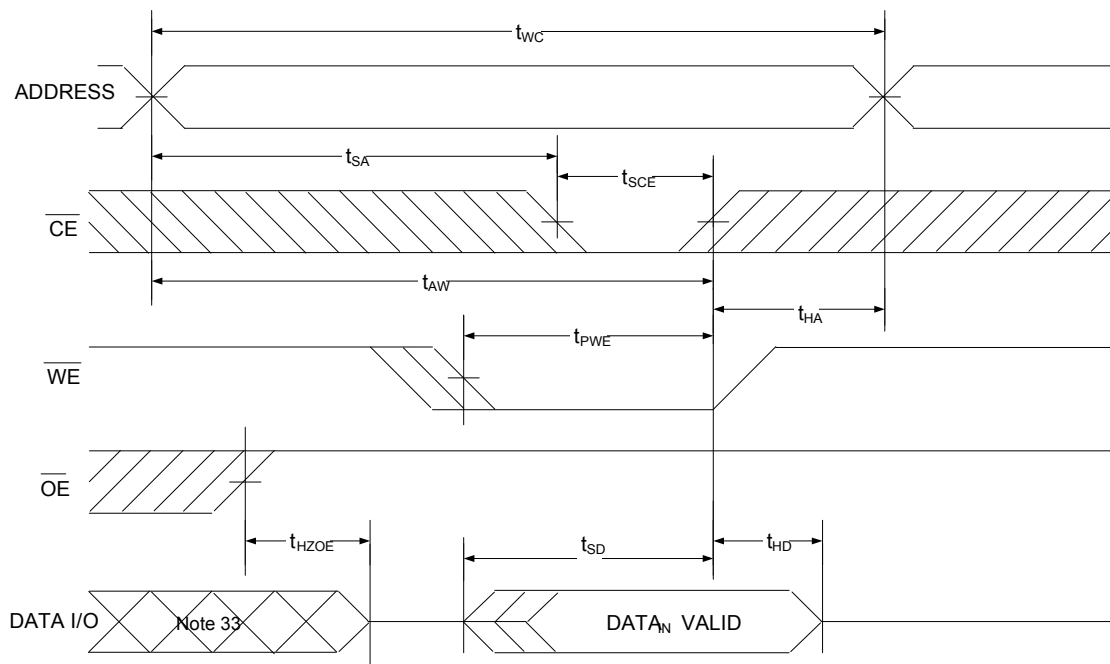
27. For all dual chip enable devices,  $\overline{CE}$  is the logical combination of  $\overline{CE}_1$  and  $CE_2$ . When  $\overline{CE}_1$  is LOW and  $CE_2$  is HIGH,  $\overline{CE}$  is LOW; when  $\overline{CE}_1$  is HIGH or  $CE_2$  is LOW,  $\overline{CE}$  is HIGH.

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

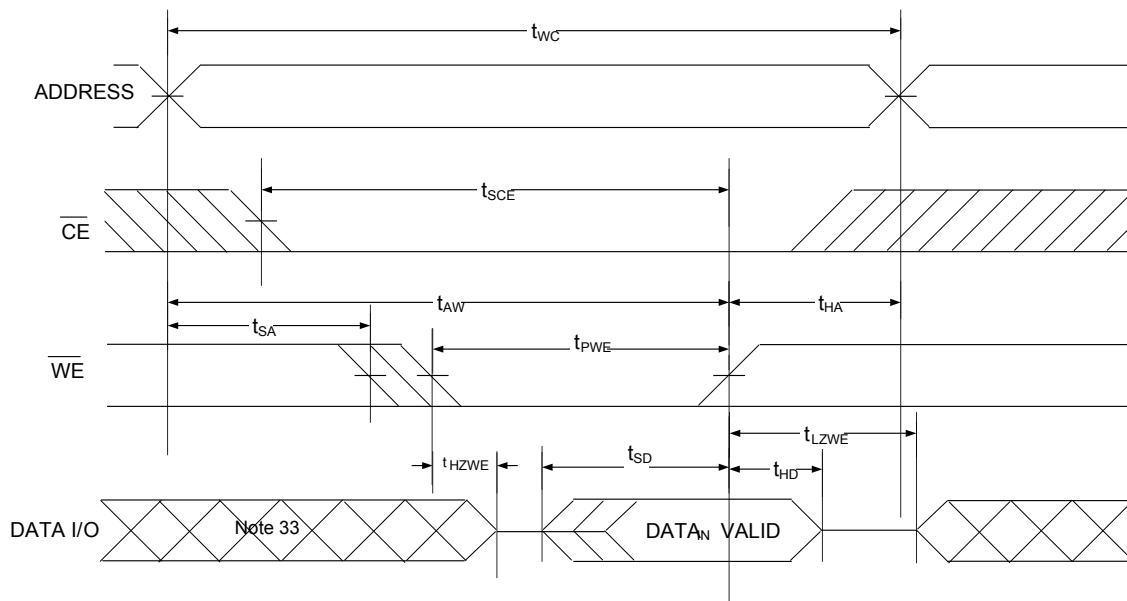
29. Address valid prior to or coincident with  $\overline{CE}$  LOW transition.

## Switching Waveforms (continued)

**Figure 10. Write Cycle No. 1 ( $\overline{\text{CE}}$  Controlled)** [30, 31, 32]



**Figure 11. Write Cycle No. 2 ( $\overline{\text{WE}}$  Controlled,  $\overline{\text{OE}}$  Low)** [30, 31, 32, 34]



### Notes

30. For all dual chip enable devices,  $\overline{\text{CE}}$  is the logical combination of  $\overline{\text{CE}}_1$  and  $\text{CE}_2$ . When  $\overline{\text{CE}}_1$  is LOW and  $\text{CE}_2$  is HIGH,  $\overline{\text{CE}}$  is LOW; when  $\overline{\text{CE}}_1$  is HIGH or  $\text{CE}_2$  is LOW,  $\overline{\text{CE}}$  is HIGH.

31. The internal write time of the memory is defined by the overlap of  $\overline{\text{WE}} = V_{IL}$ ,  $\overline{\text{CE}} = V_{IL}$ . These signals must be LOW to initiate a write, and the HIGH transition of any of these signals can terminate the operation. The input data setup and hold timing should be referenced to the edge of the signal that terminates the write.

32. Data I/O is in high impedance state if  $\overline{\text{CE}} = V_{IH}$ , or  $\overline{\text{OE}} = V_{IH}$ .

33. During this time I/O are in output put state. Do not apply input signals.

34. The minimum write cycle width should be sum of  $t_{HZWE}$  and  $t_{SD}$ .

**Truth Table – CY7C1069G/CY7C1069GE**

$\overline{CE}_1$	$CE_2$	$\overline{OE}$	$\overline{WE}$	I/O <sub>0</sub> –I/O <sub>7</sub>	Mode	Power
H	X <sup>[35]</sup>	X <sup>[35]</sup>	X <sup>[35]</sup>	High Z	Power-down	Standby (I <sub>SB</sub> )
X <sup>[35]</sup>	L	X <sup>[35]</sup>	X <sup>[35]</sup>	High Z	Power-down	Standby (I <sub>SB</sub> )
L	H	L	H	Data out	Read all bits	Active (I <sub>CC</sub> )
L	H	X <sup>[35]</sup>	L	Data in	Write all bits	Active (I <sub>CC</sub> )
L	H	H	H	High Z	Selected, outputs disabled	Active (I <sub>CC</sub> )

**ERR Output – CY7C1069GE**

Output <sup>[36]</sup>	Mode
0	Read Operation, no single bit error in the stored data.
1	Read Operation, single bit error detected and corrected.
High Z	Device deselected or Outputs disabled or Write Operation

**Note**

35. The input voltage levels on these pins should be either at V<sub>IH</sub> or V<sub>IL</sub>.

36. ERR is an Output pin. If not used, this pin should be left floating.

## Ordering Information

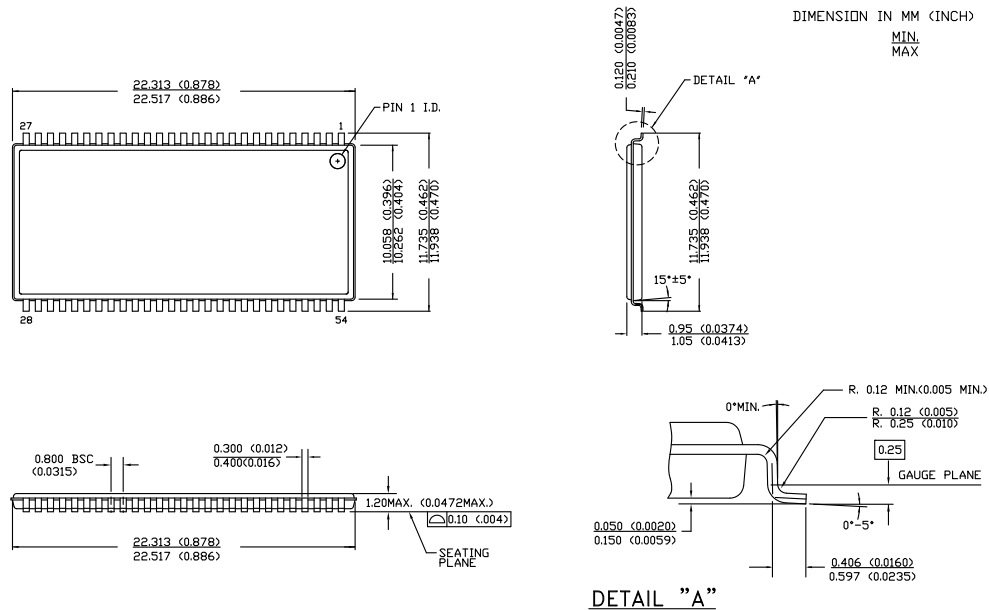
Speed (ns)	Voltage Range	Ordering Code	Package Diagram	Package Type (All Pb-free)	ERR Pin / Ball	Operating Range
10	2.2 V–3.6 V	CY7C1069G30-10BVXI	51-85150	48-ball VFBGA	No	Industrial
		CY7C1069G30-10BVXIT	51-85150	48-ball VFBGA, Tape and Reel	No	
		CY7C1069G30-10ZSXI	51-85160	54-pin TSOP II	No	
		CY7C1069G30-10ZSXIT	51-85160	54-pin TSOP II, Tape and Reel	No	
		CY7C1069GE30-10ZSXI	51-85160	54-pin TSOP II	Yes	
		CY7C1069GE30-10ZSXIT	51-85160	54-pin TSOP II, Tape and Reel	Yes	
	4.5 V–5.5 V	CY7C1069G-10BVXI	51-85150	48-ball VFBGA	No	
		CY7C1069G-10BVXIT	51-85150	48-ball VFBGA, Tape and Reel	No	
		CY7C1069G-10ZSXI	51-85160	54-pin TSOP II	No	
		CY7C1069G-10ZSXIT	51-85160	54-pin TSOP II, Tape and Reel	No	

## Ordering Code Definitions

CY	7	C	1	06	9	G	E	XX	-	XX	XX	X	I	X	
															X = blank or T blank = Bulk; T = Tape and Reel
															Temperature Range: I = Industrial
															Pb-free
															Package Type: XX = BV or ZS BV = 48-ball VFBGA; ZS = 54-pin TSOP II
															Speed: XX = 10 ns or 15 ns
															Voltage Range: 18 = 1.65 V–2.2 V; 30 = 2.2 V–3.6 V; no character = 4.5 V–5.5 V
															X = blank or E blank = without ERR output; E = with ERR output, single bit error indication
															Process Technology: G = ULL65, 65 nm
															Data Width: 9 = × 8-bits
															Density: 06 = 16-Mbit
															Family Code: 1 = Fast Asynchronous SRAM family
															Technology Code: C = CMOS
															Marketing Code: 7 = SRAM
															Company ID: CY = Cypress

## Package Diagrams

Figure 12. 54-pin TSOP II (22.4 × 11.84 × 1.0 mm) Z54-II Package Outline, 51-85160

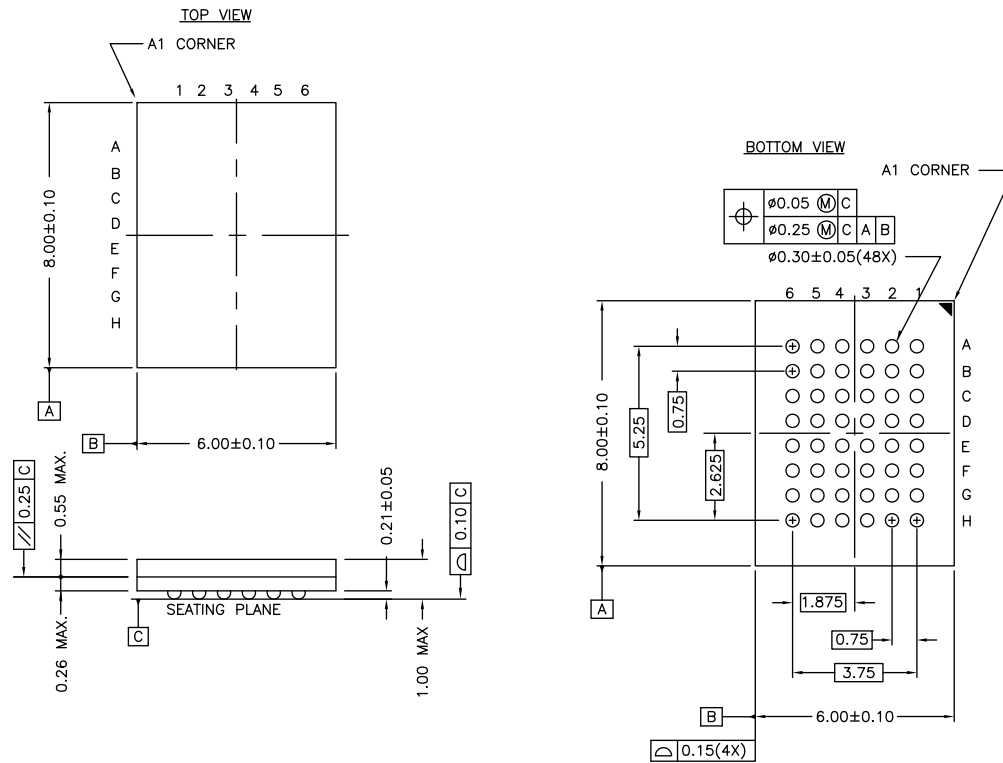


51-85160 \*E



## Package Diagrams (continued)

**Figure 13. 48-ball VFBGA (6 × 8 × 1.0 mm) BV48/BZ48 Package Outline, 51-85150**



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

51-85150 \*H

## Acronyms

Acronym	Description
$\overline{\text{CE}}$	Chip Enable
CMOS	Complementary Metal Oxide Semiconductor
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
μA	microampere
μs	microsecond
mA	milliampere
mm	millimeter
ns	nanosecond
Ω	ohm
%	percent
pF	picofarad
V	volt
W	watt

## Document History Page

Document Title: CY7C1069G/CY7C1069GE, 16-Mbit (2M words × 8 bit) Static RAM with Error-Correcting Code (ECC) Document Number: 001-81539				
Rev.	ECN No.	Orig. of Change	Submission Date	Description of Change
*H	4800609	NILE	07/31/2015	Changed status from Preliminary to Final.
*I	5436514	NILE	09/14/2016	Updated <a href="#">Maximum Ratings</a> : Updated Note 7 (Replaced “2 ns” with “20 ns”). Updated <a href="#">DC Electrical Characteristics</a> : Removed Operating Range “2.7 V to 3.6 V” and all values corresponding to V <sub>OH</sub> parameter. Included Operating Ranges “2.7 V to 3.0 V” and “3.0 V to 3.6 V” and all values corresponding to V <sub>OH</sub> parameter. Changed minimum value of V <sub>IH</sub> parameter from 2.2 V to 2 V corresponding to Operating Range “4.5 V to 5.5 V”. Updated <a href="#">Ordering Information</a> : Updated part numbers. Updated to new template.
*J	5984763	AESATMP9	12/05/2017	Updated logo and copyright.

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