



**CY7C09089V/99V**  
**CY7C09179V/99V**

## 3.3 V 32 K/64 K/128 K × 8/9 Synchronous Dual-Port Static RAM

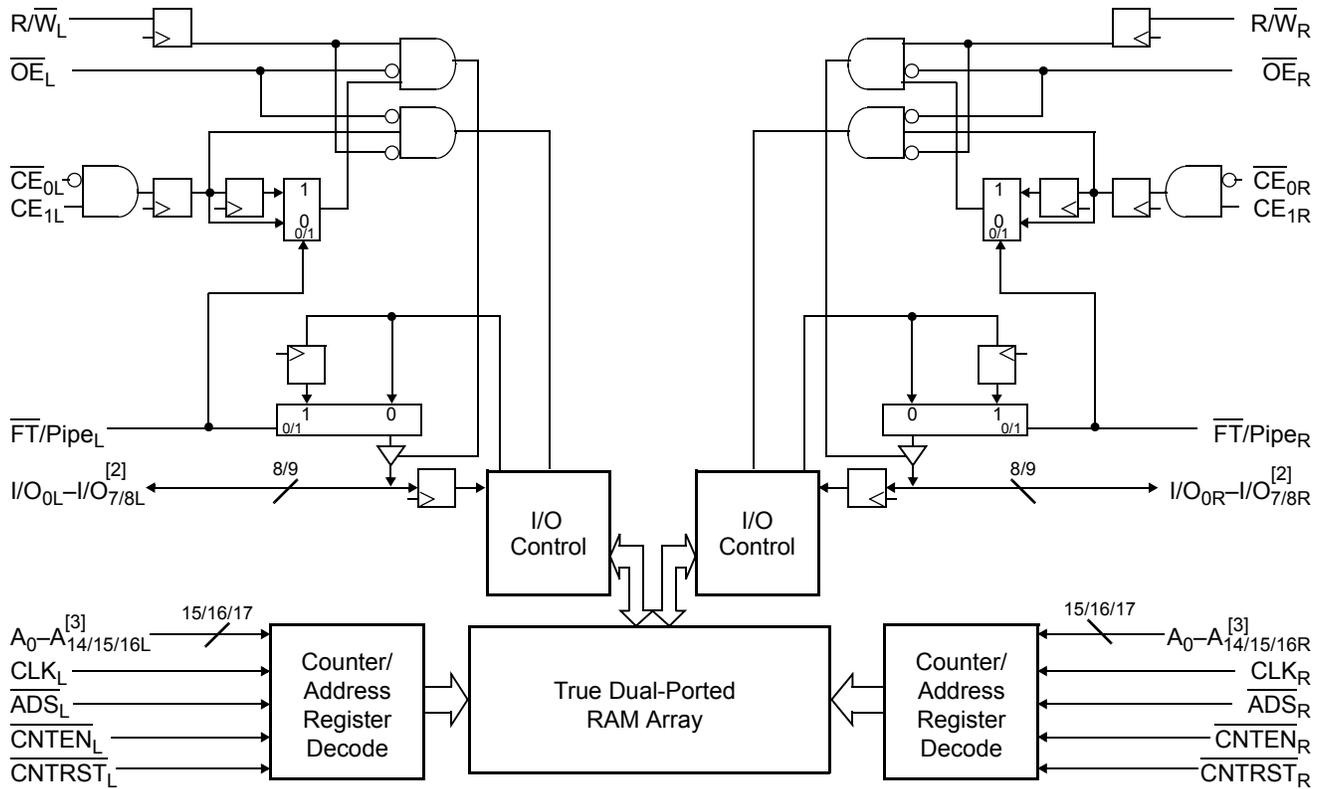
### Features

- True Dual-Ported memory cells which enable simultaneous access of the same memory location
- Flow-through and Pipelined devices
- 32 K × 9 organizations (CY7C09179V)
- 64 K × 8 organizations (CY7C09089V)
- 128 K × 8/9 organizations (CY7C09099V/199V)
- 3 Modes
- Flow-through
- Pipelined
- Burst
- Pipelined output mode on both ports enables fast 100 MHz operation
- 0.35-micron CMOS for optimum speed and power
- High speed clock to data access 6.5<sup>[1]</sup>/7.5<sup>[1]</sup>/9/12 ns (max.)
- 3.3 V low operating power
- Active = 115 mA (typical)
- Standby = 10 μA (typical)
- Fully synchronous interface for easier operation
- Burst counters increment addresses internally
- Shorten cycle times
- Minimize bus noise
- Supported in Flow-through and Pipelined modes
- Dual Chip Enables for easy depth expansion
- Automatic power down
- Commercial and Industrial temperature ranges
- Available in 100-pin TQFP
- Pb-free packages available

#### Note

1. See [page 9](#) and [page 10](#) for Load Conditions.

### Logic Block Diagram



**Notes**

- 2. I/O<sub>0</sub>-I/O<sub>7</sub> for ×8 devices, I/O<sub>0</sub>-I/O<sub>8</sub> for ×9 devices.
- 3. A<sub>0</sub>-A<sub>14</sub> for 32K, A<sub>0</sub>-A<sub>15</sub> for 64K, and A<sub>0</sub>-A<sub>16</sub> for 128K devices.

## Functional Description

The CY7C09089V/99V and CY7C09179V/99V are high speed synchronous CMOS 64 K/128 K × 8 and 32 K/128 K × 9 dual-port static RAMs. Two ports are provided, permitting independent, simultaneous access for reads and writes to any location in memory.<sup>[4]</sup> Registers on control, address, and data lines enable minimal setup and hold times. In pipelined output mode, data is registered for decreased cycle time. Clock to data valid  $t_{CD2} = 6.5 \text{ ns}^{[5]}$  (pipelined). Flow-through mode can also be used to bypass the pipelined output register to eliminate access latency. In flow-through mode, data is available  $t_{CD1} = 18 \text{ ns}$  after the address is clocked into the device. Pipelined output or flow-through mode is selected via the  $\overline{FT/PIPE}$  pin.

Each port contains a burst counter on the input address register. The internal write pulse width is independent of the LOW-to-HIGH transition of the clock signal. The internal write pulse is self-timed to enable the shortest possible cycle times.

A HIGH on  $\overline{CE_0}$  or LOW on  $CE_1$  for one clock cycle powers down the internal circuitry to reduce the static power consumption. The use of multiple Chip Enables enables easier banking of multiple chips for depth expansion configurations. In the pipelined mode, one cycle is required with  $\overline{CE_0}$  LOW and  $CE_1$  HIGH to reactivate the outputs.

Counter enable inputs are provided to stall the operation of the address input and use the internal address generated by the internal counter for fast interleaved memory applications. A port's burst counter is loaded with the port's Address Strobe (ADS). When the port's Count Enable (CNTEN) is asserted, the address counter increments on each LOW-to-HIGH transition of that port's clock signal. This reads/writes one word from/into each successive address location until CNTEN is deasserted. The counter can address the entire memory array and loops back to the start. Counter Reset (CNTRST) is used to reset the burst counter.

All parts are available in 100-pin Thin Quad Plastic Flatpack (TQFP) packages.

### Notes

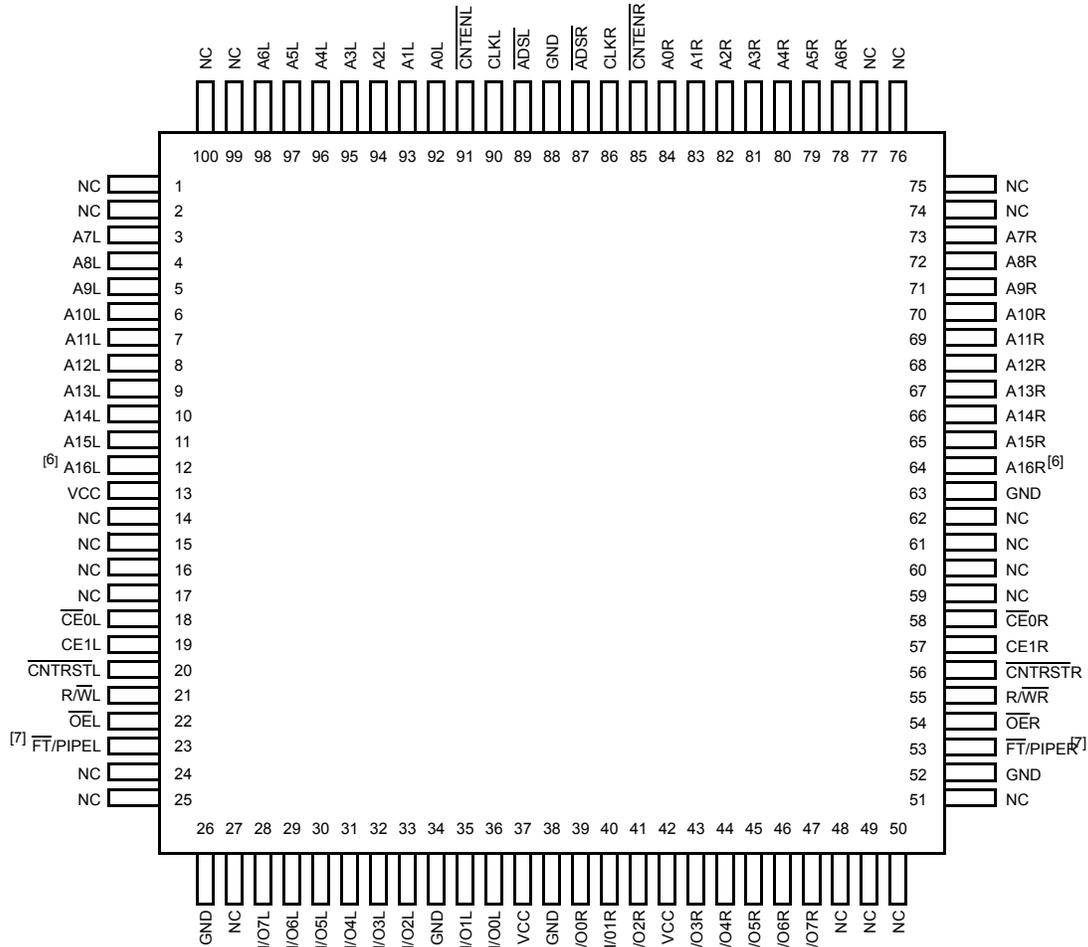
4. When writing simultaneously to the same location, the final value cannot be guaranteed.
5. See [page 9](#) and [page 10](#) for Load Conditions.

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## Pin Configurations

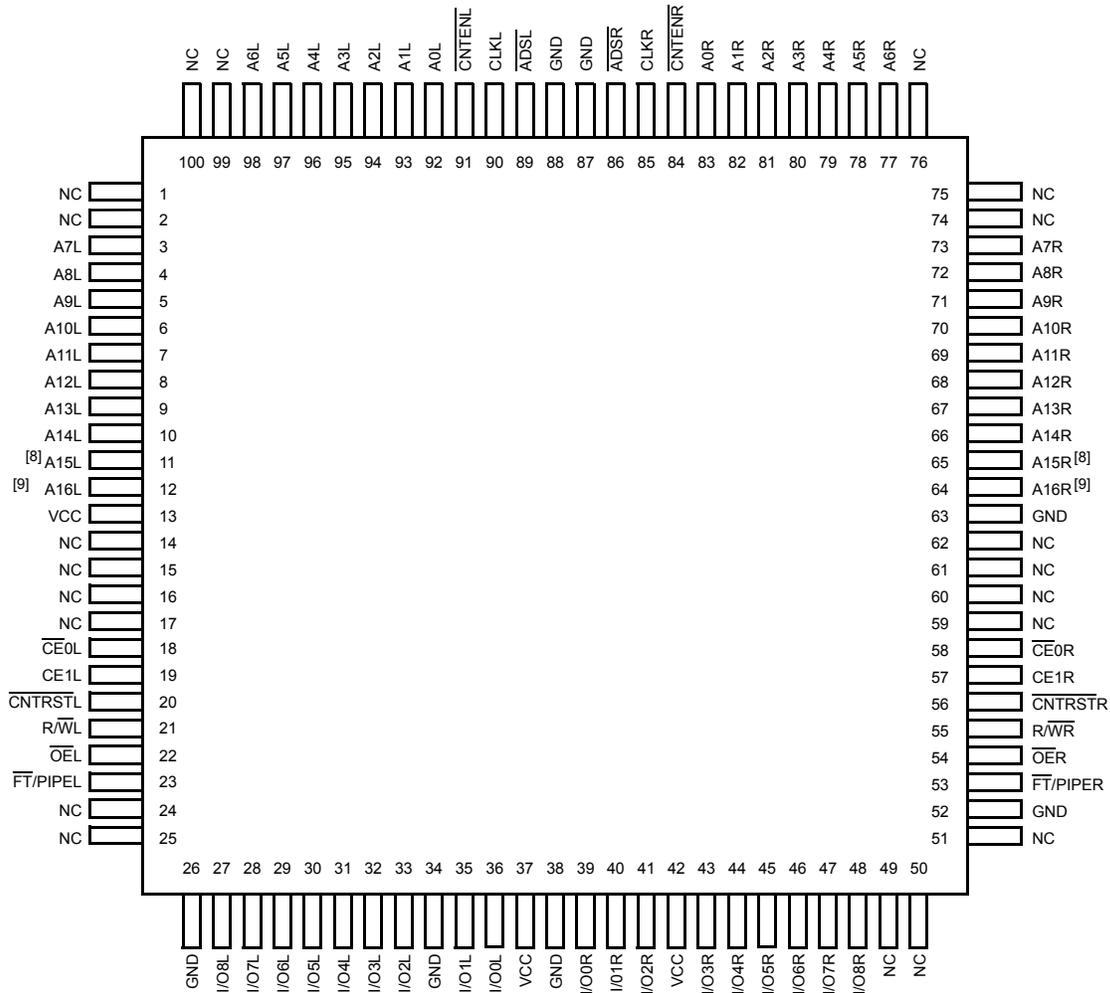
**Figure 1. 100-pin TQFP (Top View) - CY7C09089V (64 K × 8), CY7C09099V (128 K × 8)**



**Notes**

- 6. This pin is NC for CY7C09089V.
- 7. For CY7C09089V, pin #23 connected to V<sub>CC</sub> is pin compatible with an IDT 5 V, ×8 pipelined device; connecting pin #23 and #53 to GND is pin compatible with an IDT 5 V, ×16 flow-through device.

**Figure 2. 100-pin TQFP (Top View) - CY7C09179V (32 K × 9), CY7C09199V (128 K × 9)**



**Notes**

- 8. This pin is NC for CY7C09179V.
- 9. This pin is NC for CY7C09179V and CY7C09189V.

## Selection Guide

Description	CY7C09179V -6 <sup>[10]</sup>	CY7C09099V -7 <sup>[10]</sup>	CY7C09199V -9	CY7C09089V/99V CY7C09179V -12
f <sub>MAX2</sub> (MHz) (Pipelined)	100	83	67	50
Max. Access Time (ns) (Clock to Data, Pipelined)	6.5	7.5	9	12
Typical Operating Current I <sub>CC</sub> (mA)	175	155	135	115
Typical Standby Current for I <sub>SB1</sub> (mA) (Both Ports TTL Level)	25	25	20	20
Typical Standby Current for I <sub>SB3</sub> (μA) (Both Ports CMOS Level)	10	10	10	10

## Pin Definitions

Left Port	Right Port	Description
A <sub>0L</sub> -A <sub>16L</sub>	A <sub>0R</sub> -A <sub>16R</sub>	Address Inputs (A <sub>0</sub> -A <sub>14</sub> for 32K; A <sub>0</sub> -A <sub>15</sub> for 64K; and A <sub>0</sub> -A <sub>16</sub> for 128K devices).
ADS <sub>L</sub>	ADS <sub>R</sub>	Address Strobe Input. Used as an address qualifier. This signal should be asserted LOW to access the part using an externally supplied address. Asserting this signal LOW also loads the burst counter with the address present on the address pins.
$\overline{CE}_{0L}$ , CE <sub>1L</sub>	$\overline{CE}_{0R}$ , CE <sub>1R</sub>	Chip Enable Input. To select either the left or right port, both $\overline{CE}_0$ AND CE <sub>1</sub> must be asserted to their active states ( $\overline{CE}_0 \leq V_{IL}$ and CE <sub>1</sub> ≥ V <sub>IH</sub> ).
CLK <sub>L</sub>	CLK <sub>R</sub>	Clock Signal. This input can be free running or strobed. Maximum clock input rate is f <sub>MAX</sub> .
CNTEN <sub>L</sub>	CNTEN <sub>R</sub>	Counter Enable Input. Asserting this signal LOW increments the burst address counter of its respective port on each rising edge of CLK. CNTEN is disabled if ADS or CNTRST are asserted LOW.
CNTRST <sub>L</sub>	CNTRST <sub>R</sub>	Counter Reset Input. Asserting this signal LOW resets the burst address counter of its respective port to zero. CNTRST is not disabled by asserting ADS or CNTEN.
I/O <sub>0L</sub> -I/O <sub>8L</sub>	I/O <sub>0R</sub> -I/O <sub>8R</sub>	Data Bus Input/Output (I/O <sub>0</sub> -I/O <sub>7</sub> for ×8 devices; I/O <sub>0</sub> -I/O <sub>8</sub> for ×9 devices).
$\overline{OE}_L$	$\overline{OE}_R$	Output Enable Input. This signal must be asserted LOW to enable the I/O data pins during read operations.
R $\overline{W}_L$	R $\overline{W}_R$	Read/Write Enable Input. This signal is asserted LOW to write to the dual port memory array. For read operations, assert this pin HIGH.
$\overline{FT}/PIPE_L$	$\overline{FT}/PIPE_R$	Flow-Through/Pipelined Select Input. For flow-through mode operation, assert this pin LOW. For pipelined mode operation, assert this pin HIGH.
GND		Ground Input.
NC		No Connect.
V <sub>CC</sub>		Power Input.

### Note

10. See [page 9](#) and [page 10](#) for Load Conditions.

## Maximum Ratings

Exceeding maximum ratings may impair the useful life of the device. These user guidelines are not tested.<sup>[11]</sup>

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 +4.6 V
DC Voltage Applied to Outputs in High Z State .....	-0.5 V to V <sub>CC</sub> + 0.5 V
DC Input Voltage .....	-0.5 V to V <sub>CC</sub> + 0.5 V

Output Current into Outputs (LOW) .....	20 mA
Static Discharge Voltage .....	> 2001 V
Latch-Up Current .....	> 200 mA

## Operating Range

Range	Ambient Temperature	V <sub>CC</sub>
Commercial	0 °C to +70 °C	3.3 V ± 300 mV
Industrial <sup>[12]</sup>	-40 °C to +85 °C	3.3 V ± 300 mV

## Electrical Characteristics

Over the Operating Range

Parameter	Description	CY7C09079V/89V/99V CY7C09179V/89V/99V												Unit	
		-6 <sup>[13]</sup>			-7 <sup>[13]</sup>			-9			-12				
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max		
V <sub>OH</sub>	Output HIGH Voltage (V <sub>CC</sub> = Min., I <sub>OH</sub> = -4.0 mA)	2.4	-	-	2.4	-	-	2.4	-	-	2.4	-	-	V	
V <sub>OL</sub>	Output LOW Voltage (V <sub>CC</sub> = Min., I <sub>OH</sub> = +4.0 mA)	-	-	0.4	-	-	0.4	-	-	0.4	-	-	0.4	V	
V <sub>IH</sub>	Input HIGH Voltage	2.0	-	-	2.0	-	-	2.0	-	-	2.0	-	-	V	
V <sub>IL</sub>	Input LOW Voltage	-	-	0.8	-	-	0.8	-	-	0.8	-	-	0.8	V	
I <sub>OZ</sub>	Output Leakage Current	-10	-	10	-10	-	10	-10	-	10	-10	-	10	µA	
I <sub>CC</sub>	Operating Current (V <sub>CC</sub> = Max., I <sub>OUT</sub> = 0 mA) Outputs Disabled	Commercial	-	175	320	-	155	275	-	135	225	-	115	205	mA
		Industrial <sup>[12]</sup>	-	-	-	-	275	390	-	185	295	-	-	-	mA
I <sub>SB1</sub>	Standby Current (Both Ports TTL Level) <sup>[14]</sup> CE <sub>L</sub> & CE <sub>R</sub> ≥ V <sub>IH</sub> , f = f <sub>MAX</sub>	Commercial	-	25	95	-	25	85	-	20	65	-	20	50	mA
		Industrial <sup>[12]</sup>	-	-	-	-	85	120	-	35	75	-	-	-	mA
I <sub>SB2</sub>	Standby Current (One Port TTL Level) <sup>[14]</sup> CE <sub>L</sub>   CE <sub>R</sub> ≥ V <sub>IH</sub> , f = f <sub>MAX</sub>	Commercial	-	115	175	-	105	165	-	95	150	-	85	140	mA
		Industrial <sup>[12]</sup>	-	-	-	-	165	210	-	105	160	-	-	-	mA
I <sub>SB3</sub>	Standby Current (Both Ports CMOS Level) <sup>[14]</sup> CE <sub>L</sub> & CE <sub>R</sub> ≥ V <sub>CC</sub> - 0.2 V, f = 0	Commercial	-	10	250	-	10	250	-	10	250	-	10	250	µA
		Industrial <sup>[12]</sup>	-	-	-	-	10	250	-	10	250	-	-	-	µA
I <sub>SB4</sub>	Standby Current (One Port CMOS Level) <sup>[14]</sup> CE <sub>L</sub>   CE <sub>R</sub> ≥ V <sub>IH</sub> , f = f <sub>MAX</sub>	Commercial	-	105	135	-	95	125	-	85	115	-	75	100	mA
		Industrial <sup>[12]</sup>	-	-	-	-	125	170	-	95	125	-	-	-	mA

### Notes

11. The Voltage on any input or I/O pin cannot exceed the power pin during power-up.

12. Industrial parts are available in CY7C09099V and CY7C09199V only.

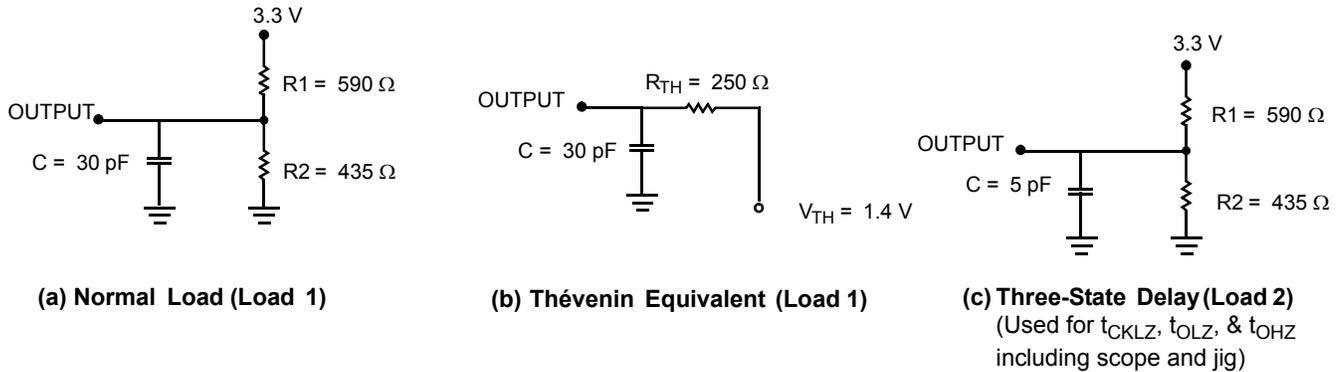
13. See page 9 and page 10 for Load Conditions.

14. CE<sub>L</sub> and CE<sub>R</sub> are internal signals. To select either the left or right port, both CE<sub>0</sub> AND CE<sub>1</sub> must be asserted to their active states (CE<sub>0</sub> ≤ V<sub>IL</sub> and CE<sub>1</sub> ≥ V<sub>IH</sub>).

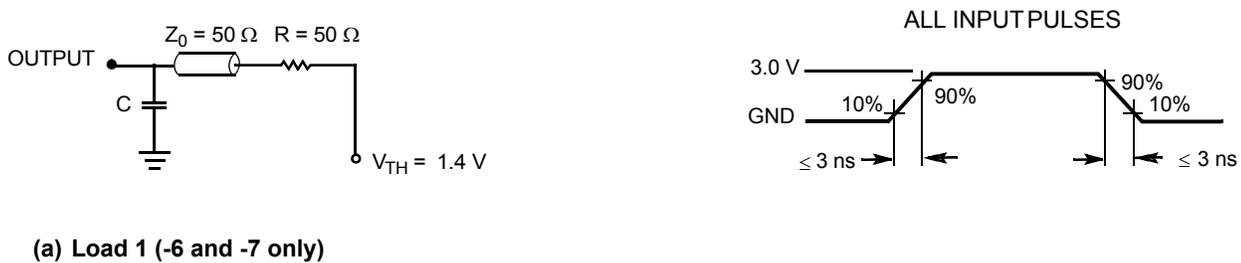
## Capacitance

Parameter	Description	Test Conditions	Max	Unit
$C_{IN}$	Input Capacitance	$T_A = 25\text{ }^\circ\text{C}$ , $f = 1\text{ MHz}$ , $V_{CC} = 3.3\text{ V}$	10	pF
$C_{OUT}$	Output Capacitance		10	pF

**Figure 3. AC Test Loads**



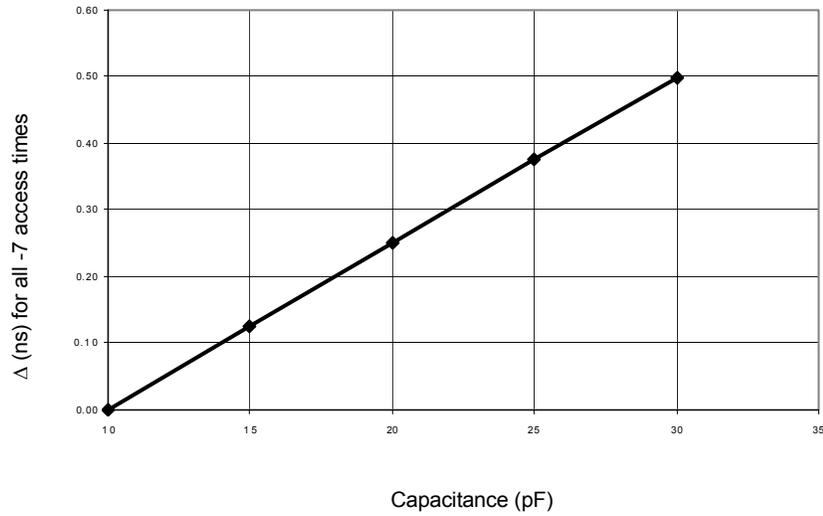
**Figure 4. AC Test Loads (Applicable to -6 and -7 only)<sup>[15]</sup>**



**Note**

15. Test Conditions:  $C = 10\text{ pF}$ .

Figure 5. Load Derating Curve



## Switching Characteristics

Over the Operating Range

Parameter	Description	CY7C09079V/89V/99V CY7C09179V/89V/99V								Unit
		-6 <sup>[16]</sup>		-7 <sup>[16]</sup>		-9		-12		
		Min	Max	Min	Max	Min	Max	Min	Max	
f <sub>MAX1</sub>	f <sub>Max</sub> Flow-through	–	53	–	45	–	40	–	33	MHz
f <sub>MAX2</sub>	f <sub>Max</sub> Pipelined	–	100	–	83	–	67	–	50	MHz
t <sub>CYC1</sub>	Clock Cycle Time - Flow-through	19	–	22	–	25	–	30	–	ns
t <sub>CYC2</sub>	Clock Cycle Time - Pipelined	10	–	12	–	15	–	20	–	ns
t <sub>CH1</sub>	Clock HIGH Time - Flow-through	6.5	–	7.5	–	12	–	12	–	ns
t <sub>CL1</sub>	Clock LOW Time - Flow-through	6.5	–	7.5	–	12	–	12	–	ns
t <sub>CH2</sub>	Clock HIGH Time - Pipelined	4	–	5	–	6	–	8	–	ns
t <sub>CL2</sub>	Clock LOW Time - Pipelined	4	–	5	–	6	–	8	–	ns
t <sub>R</sub>	Clock Rise Time	–	3	–	3	–	3	–	3	ns
t <sub>F</sub>	Clock Fall Time	–	3	–	3	–	3	–	3	ns
t <sub>SA</sub>	Address Set-Up Time	3.5	–	4	–	4	–	4	–	ns
t <sub>HA</sub>	Address Hold Time	0	–	0	–	1	–	1	–	ns
t <sub>SC</sub>	Chip Enable Set-Up Time	3.5	–	4	–	4	–	4	–	ns
t <sub>HC</sub>	Chip Enable Hold Time	0	–	0	–	1	–	1	–	ns
t <sub>SW</sub>	R/W Set-Up Time	3.5	–	4	–	4	–	4	–	ns
t <sub>HW</sub>	R/W Hold Time	0	–	0	–	1	–	1	–	ns
t <sub>SD</sub>	Input Data Set-Up Time	3.5	–	4	–	4	–	4	–	ns
t <sub>HD</sub>	Input Data Hold Time	0	–	0	–	1	–	1	–	ns
t <sub>SAD</sub>	ADS Set-Up Time	3.5	–	4	–	4	–	4	–	ns
t <sub>HAD</sub>	ADS Hold Time	0	–	0	–	1	–	1	–	ns
t <sub>SCN</sub>	CNTEN Set-Up Time	3.5	–	4.5	–	5	–	5	–	ns
t <sub>HCN</sub>	CNTEN Hold Time	0	–	0	–	1	–	1	–	ns
t <sub>SRST</sub>	CNTRST Set-Up Time	3.5	–	4	–	4	–	4	–	ns
t <sub>HRST</sub>	CNTRST Hold Time	0	–	0	–	1	–	1	–	ns
t <sub>OE</sub>	Output Enable to Data Valid	–	8	–	9	–	10	–	12	ns
t <sub>OLZ</sub> <sup>[17, 18]</sup>	OE to Low Z	2	–	2	–	2	–	2	–	ns
t <sub>OHZ</sub> <sup>[17, 18]</sup>	OE to High Z	1	7	1	7	1	7	1	7	ns
t <sub>CD1</sub>	Clock to Data Valid - Flow-through	–	15	–	18	–	20	–	25	ns
t <sub>CD2</sub>	Clock to Data Valid - Pipelined	–	6.5	–	7.5	–	9	–	12	ns
t <sub>DC</sub>	Data Output Hold After Clock HIGH	2	–	2	–	2	–	2	–	ns
t <sub>CKHZ</sub> <sup>[17, 18]</sup>	Clock HIGH to Output High Z	2	9	2	9	2	9	2	9	ns
t <sub>CKLZ</sub> <sup>[17, 18]</sup>	Clock HIGH to Output Low Z	2	–	2	–	2	–	2	–	ns

### Notes

16. See page 9 and page 10 for Load Conditions.

17. Test conditions used are Load 2.

18. This parameter is guaranteed by design, but it is not production tested.

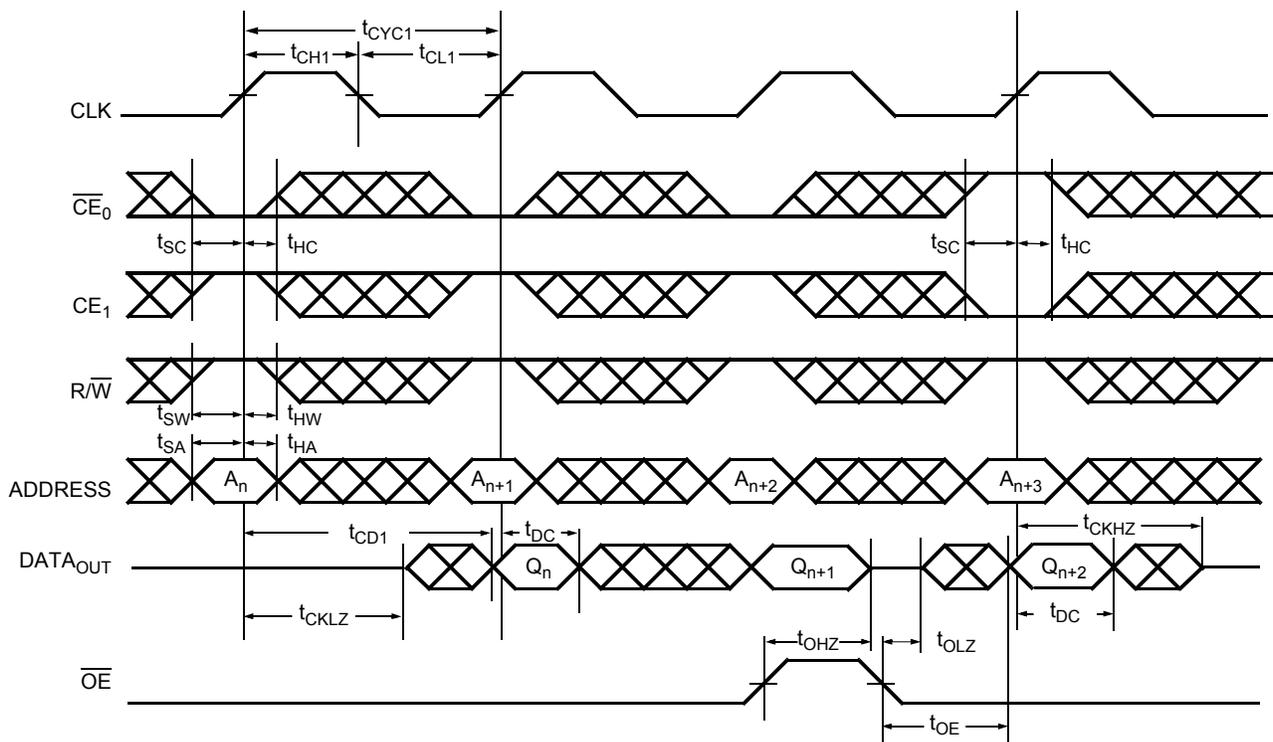
## Switching Characteristics (continued)

Over the Operating Range

Parameter	Description	CY7C09079V/89V/99V CY7C09179V/89V/99V								Unit
		-6 <sup>[16]</sup>		-7 <sup>[16]</sup>		-9		-12		
		Min	Max	Min	Max	Min	Max	Min	Max	
<b>Port to Port Delays</b>										
t <sub>CWDD</sub>	Write Port Clock HIGH to Read Data Delay	–	30	–	35	–	40	–	40	ns
t <sub>CCS</sub>	Clock to Clock Set-Up Time	–	9	–	10	–	15	–	15	ns

## Switching Waveforms

Figure 6. Read Cycle for Flow-through Output ( $\overline{\text{FT/PIPE}} = V_{\text{IL}}$ )<sup>[19, 20, 21, 22]</sup>

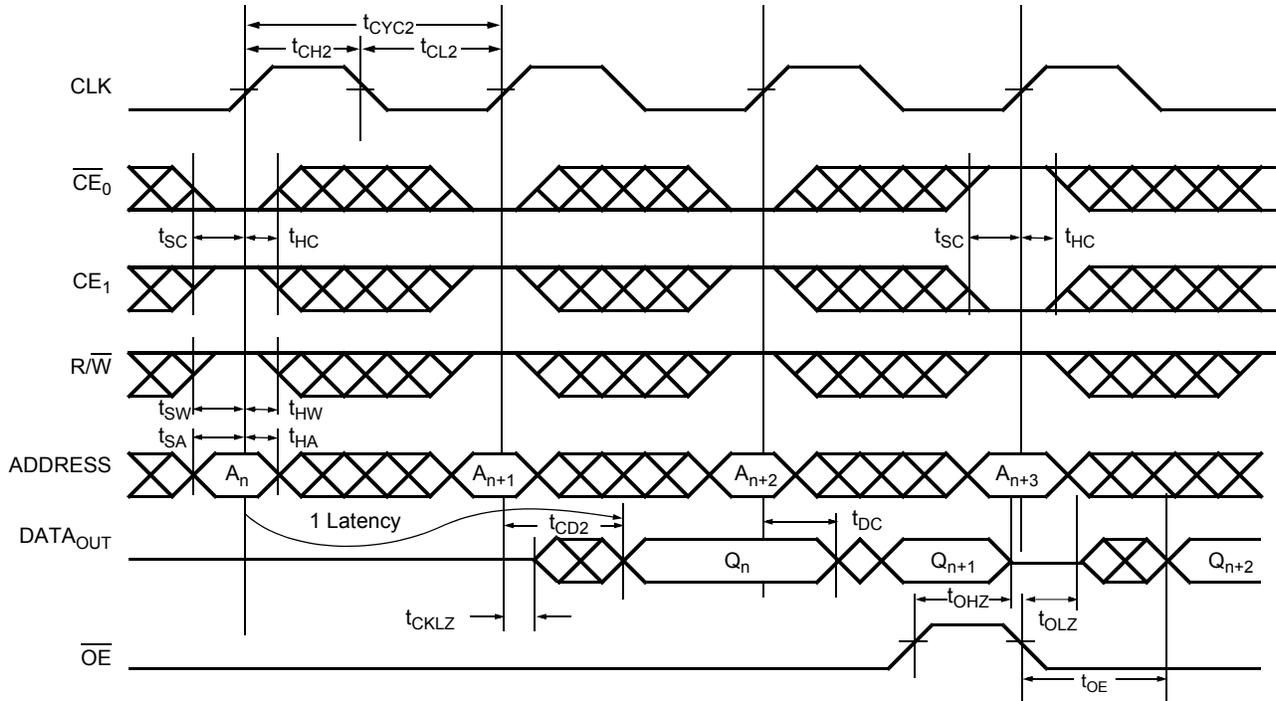


### Notes

19.  $\overline{\text{OE}}$  is asynchronously controlled; all other inputs are synchronous to the rising clock edge.
20.  $\text{ADS} = V_{\text{IL}}$ ,  $\text{CNTEN}$  and  $\text{CNRST} = V_{\text{IH}}$ .
21. The output is disabled (high-impedance state) by  $\overline{\text{CE}}_0 = V_{\text{IH}}$  or  $\text{CE}_1 = V_{\text{IL}}$  following the next rising edge of the clock.
22. Addresses do not have to be accessed sequentially since  $\text{ADS} = V_{\text{IL}}$  constantly loads the address on the rising edge of the CLK. Numbers are for reference only.

**Switching Waveforms (continued)**

**Figure 7. Read Cycle for Pipelined Operation ( $\overline{FT}/PIPE = V_{IH}$ )<sup>[23, 24, 25, 26]</sup>**

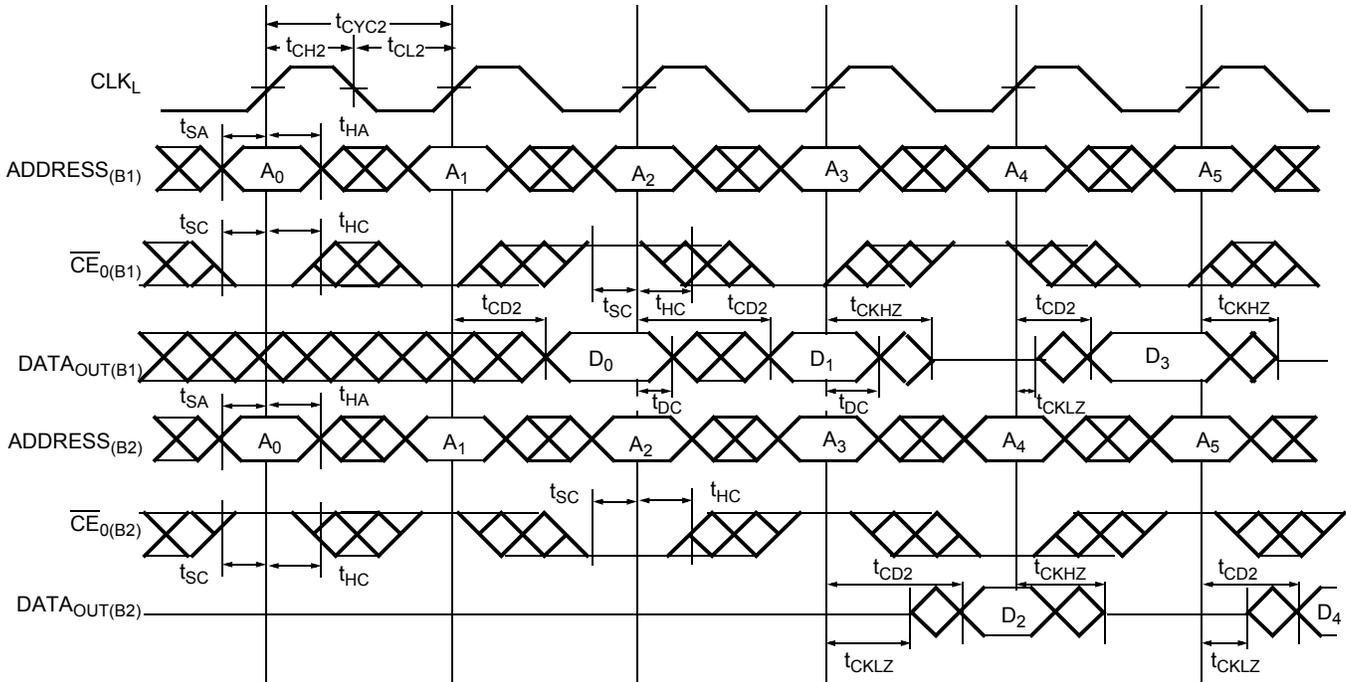


**Notes**

- 23.  $\overline{OE}$  is asynchronously controlled; all other inputs are synchronous to the rising clock edge.
- 24.  $ADS = V_{IL}$ ,  $\overline{CNTEN}$  and  $\overline{CNTRST} = V_{IH}$ .
- 25. The output is disabled (high-impedance state) by  $\overline{CE}_0 = V_{IH}$  or  $CE_1 = V_{IL}$  following the next rising edge of the clock.
- 26. Addresses do not have to be accessed sequentially since  $ADS = V_{IL}$  constantly loads the address on the rising edge of the CLK. Numbers are for reference only.

Switching Waveforms (continued)

Figure 8. Bank Select Pipelined Read<sup>[27, 28]</sup>



Notes

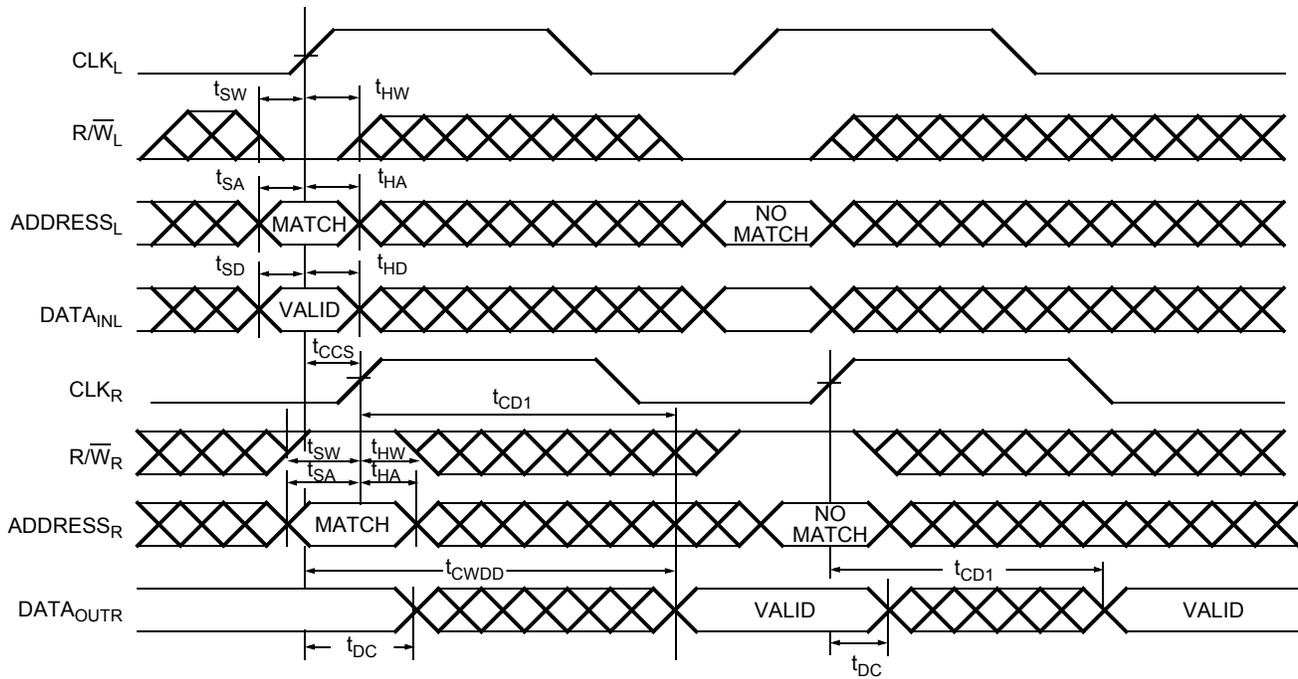
27. In this depth expansion example, B1 represents Bank #1 and B2 is Bank #2; Each Bank consists of one Cypress dual-port device from this datasheet.

ADDRESS<sub>(B1)</sub> = ADDRESS<sub>(B2)</sub>.

28. OE and ADS = V<sub>IL</sub>; CE<sub>1(B1)</sub>, CE<sub>1(B2)</sub>, R/W, CNTEN, and CNTRST = V<sub>IH</sub>.

## Switching Waveforms (continued)

**Figure 9. Left Port Write to Flow-through Right Port Read**<sup>[29, 30, 31, 32]</sup>



### Notes

29. The same waveforms apply for a right port write to flow-through left port read.

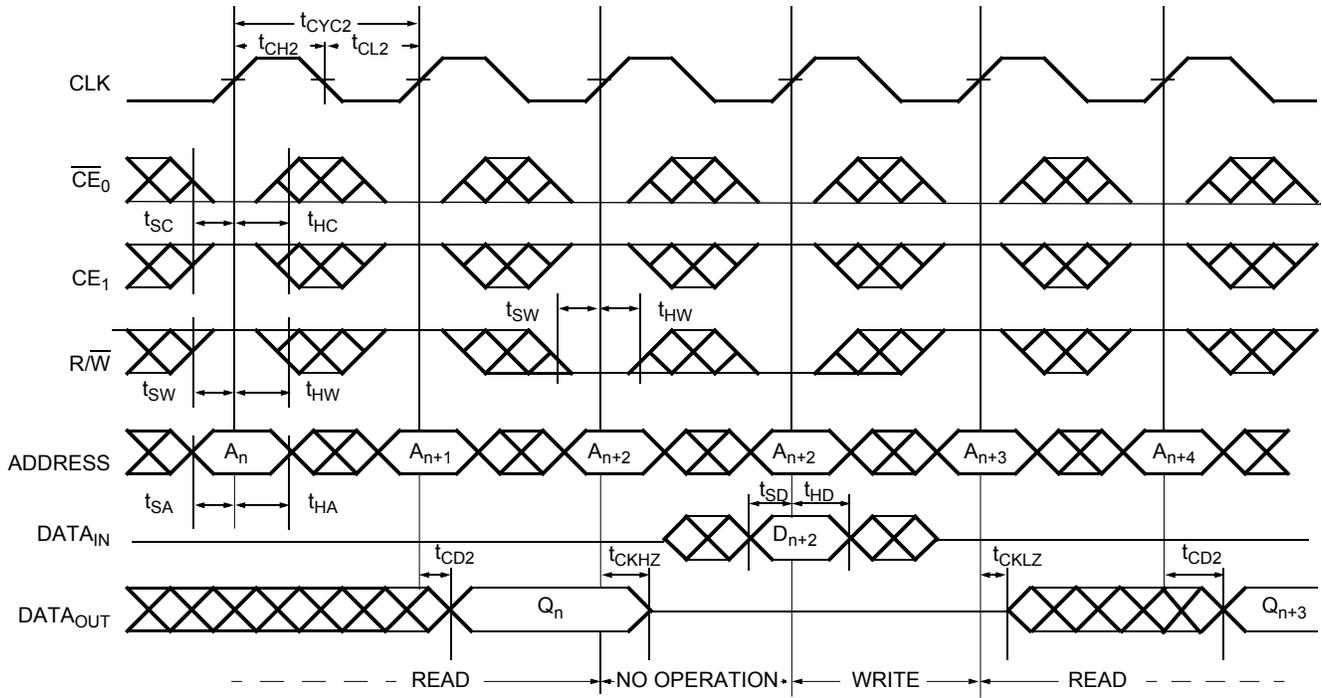
30.  $\overline{CE}_0$  and  $\overline{ADS} = V_{IL}$ ;  $CE_1$ ,  $\overline{CNTEN}$ , and  $\overline{CNRST} = V_{IH}$ .

31.  $\overline{OE} = V_{IL}$  for the right port, which is being read from.  $\overline{OE} = V_{IH}$  for the left port, which is being written to.

32. If  $t_{CCS} \leq$  maximum specified, then data from right port READ is not valid until the maximum specified for  $t_{CWDD}$ . If  $t_{CCS} >$  maximum specified, then data is not valid until  $t_{CCS} + t_{CD1}$ .  $t_{CWDD}$  does not apply in this case.

Switching Waveforms (continued)

Figure 10. Pipelined Read-to-Write-to-Read ( $\overline{OE} = V_{IL}$ )<sup>[33, 34, 35, 36]</sup>

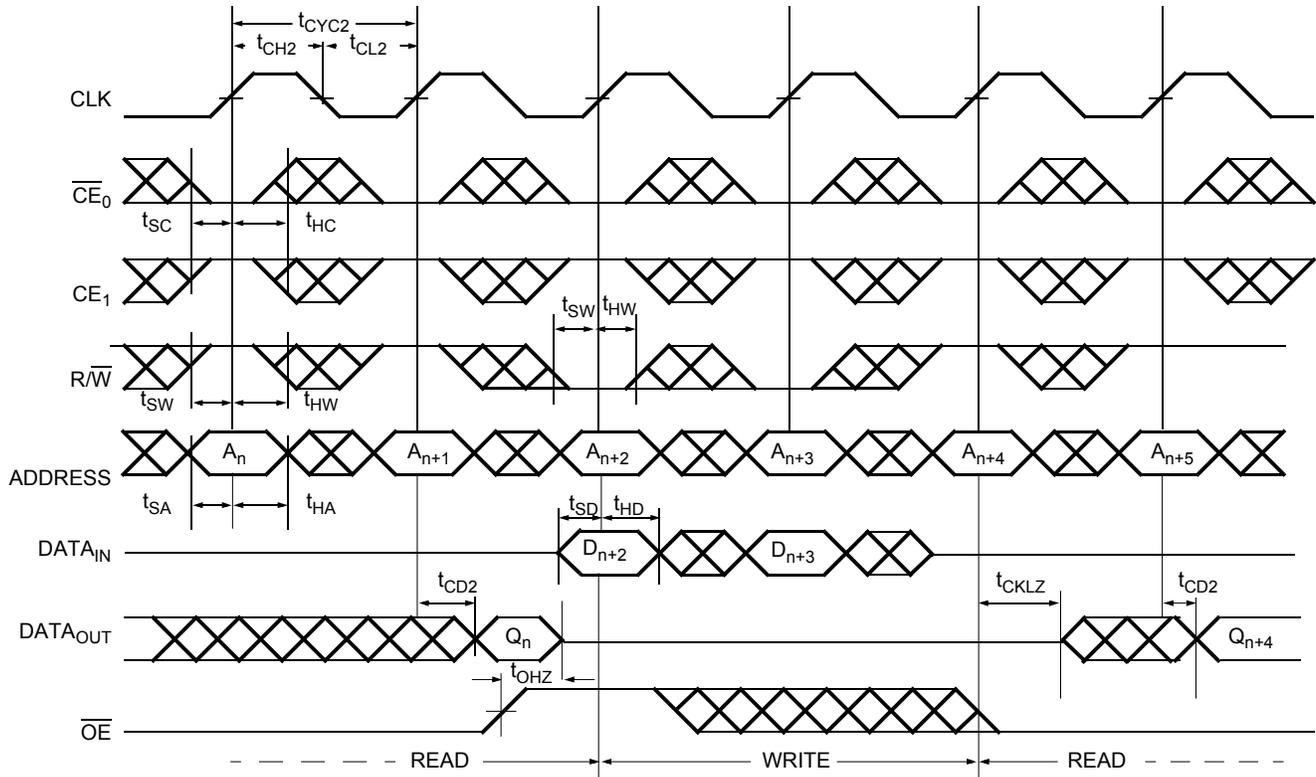


Notes

- 33. Addresses do not have to be accessed sequentially since  $\overline{ADS} = V_{IL}$  constantly loads the address on the rising edge of the CLK. Numbers are for reference only.
- 34. Output state (HIGH, LOW, or high-impedance) is determined by the previous cycle control signals.
- 35.  $\overline{CE}_0$  and  $\overline{ADS} = V_{IL}$ ;  $CE_1$ ,  $CNTEN$ , and  $CNTRST = V_{IH}$ .
- 36. During "No Operation", data in memory at the selected address may be corrupted and should be re-written to ensure data integrity.

Switching Waveforms (continued)

Figure 11. Pipelined Read-to-Write-to-Read ( $\overline{\text{OE}}$  Controlled)<sup>[37, 38, 39, 40]</sup>

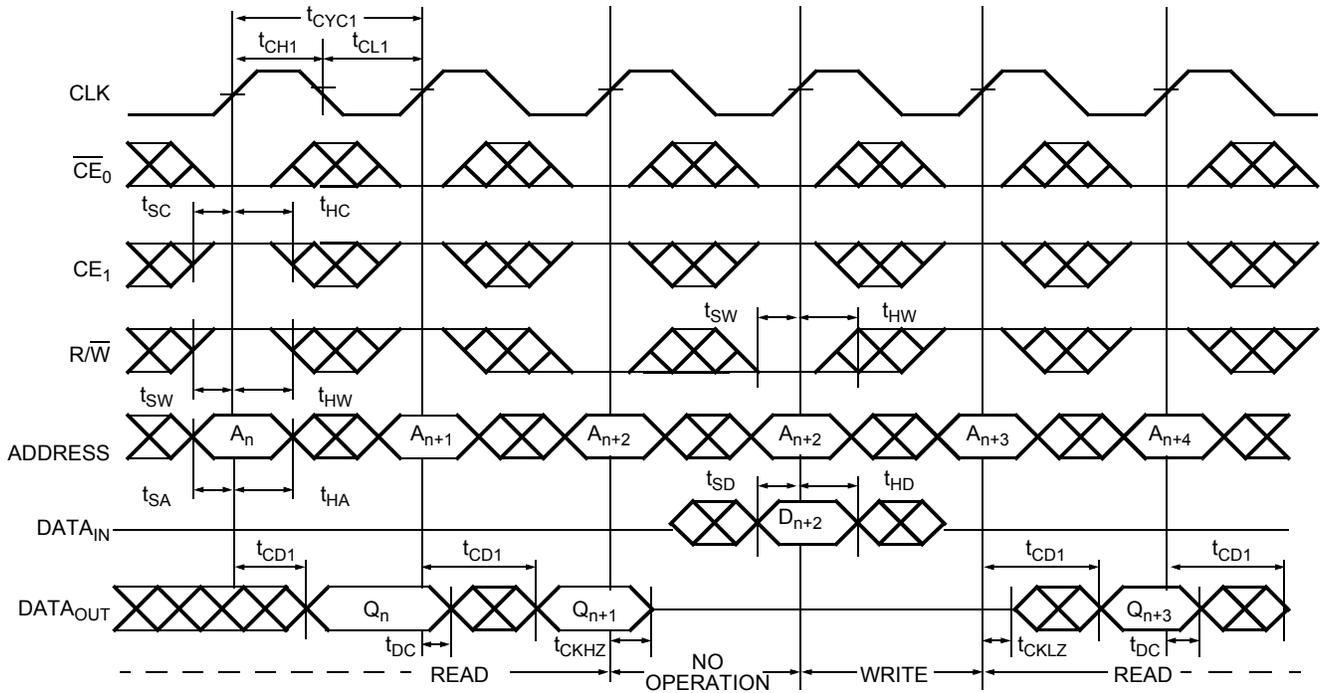


Notes

- 37. Addresses do not have to be accessed sequentially since  $\overline{\text{ADS}} = V_{\text{IL}}$  constantly loads the address on the rising edge of the CLK. Numbers are for reference only.
- 38. Output state (HIGH, LOW, or high-impedance) is determined by the previous cycle control signals.
- 39.  $\overline{\text{CE}}_0$  and  $\overline{\text{ADS}} = V_{\text{IL}}$ ;  $\text{CE}_1$ ,  $\text{CNTEN}$ , and  $\text{CNTRST} = V_{\text{IH}}$ .
- 40. During "No Operation", data in memory at the selected address may be corrupted and should be re-written to ensure data integrity.

Switching Waveforms (continued)

Figure 12. Flow-through Read-to-Write-to-Read ( $\overline{OE} = V_{IL}$ )<sup>[41, 42, 43, 44, 45]</sup>

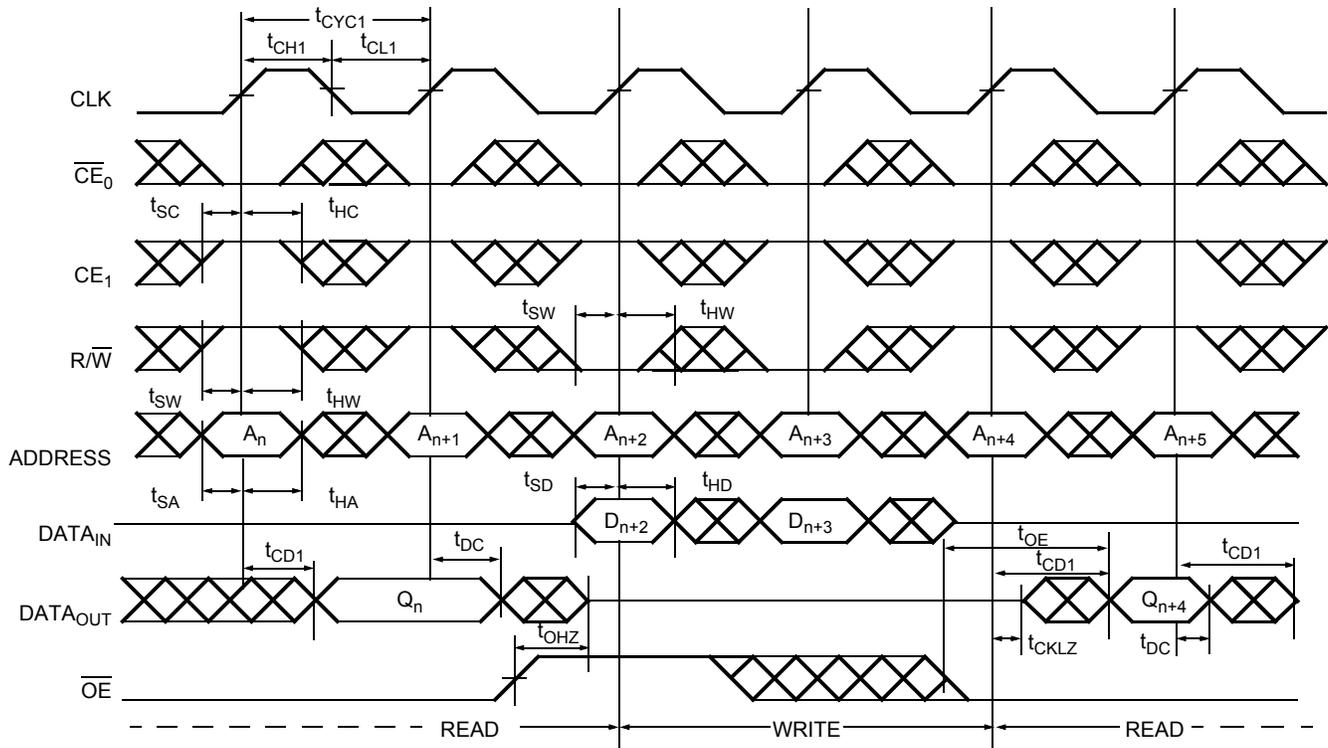


Notes

- 41.  $\overline{ADS} = V_{IL}$ ,  $\overline{CNTEN}$  and  $\overline{CNTRST} = V_{IH}$ .
- 42. Addresses do not have to be accessed sequentially since  $\overline{ADS} = V_{IL}$  constantly loads the address on the rising edge of the CLK. Numbers are for reference only.
- 43. Output state (HIGH, LOW, or high-impedance) is determined by the previous cycle control signals.
- 44.  $\overline{CE}_0$  and  $\overline{ADS} = V_{IL}$ ;  $\overline{CE}_1$ ,  $\overline{CNTEN}$ , and  $\overline{CNTRST} = V_{IH}$ .
- 45. During "No Operation", data in memory at the selected address may be corrupted and should be re-written to ensure data integrity.

## Switching Waveforms (continued)

**Figure 13. Flow-through Read-to-Write-to-Read ( $\overline{\text{OE}}$  Controlled)**<sup>[46, 47, 48, 49, 50]</sup>



### Notes

46.  $\overline{\text{ADS}} = V_{\text{IL}}$ ,  $\overline{\text{CNTEN}}$  and  $\overline{\text{CNRST}} = V_{\text{IH}}$ .

47. In this depth expansion example, B1 represents Bank #1 and B2 is Bank #2; Each Bank consists of one Cypress dual-port device from this datasheet.

$\text{ADDRESS}_{(\text{B}1)} = \text{ADDRESS}_{(\text{B}2)}$ .

48. Output state (HIGH, LOW, or high-impedance) is determined by the previous cycle control signals.

49.  $\overline{\text{CE}}_0$  and  $\overline{\text{ADS}} = V_{\text{IL}}$ ;  $\overline{\text{CE}}_1$ ,  $\overline{\text{CNTEN}}$ , and  $\overline{\text{CNRST}} = V_{\text{IH}}$ .

50. During "No Operation", data in memory at the selected address may be corrupted and should be re-written to ensure data integrity.

Switching Waveforms (continued)

Figure 14. Pipelined Read with Address Counter Advance<sup>[51]</sup>

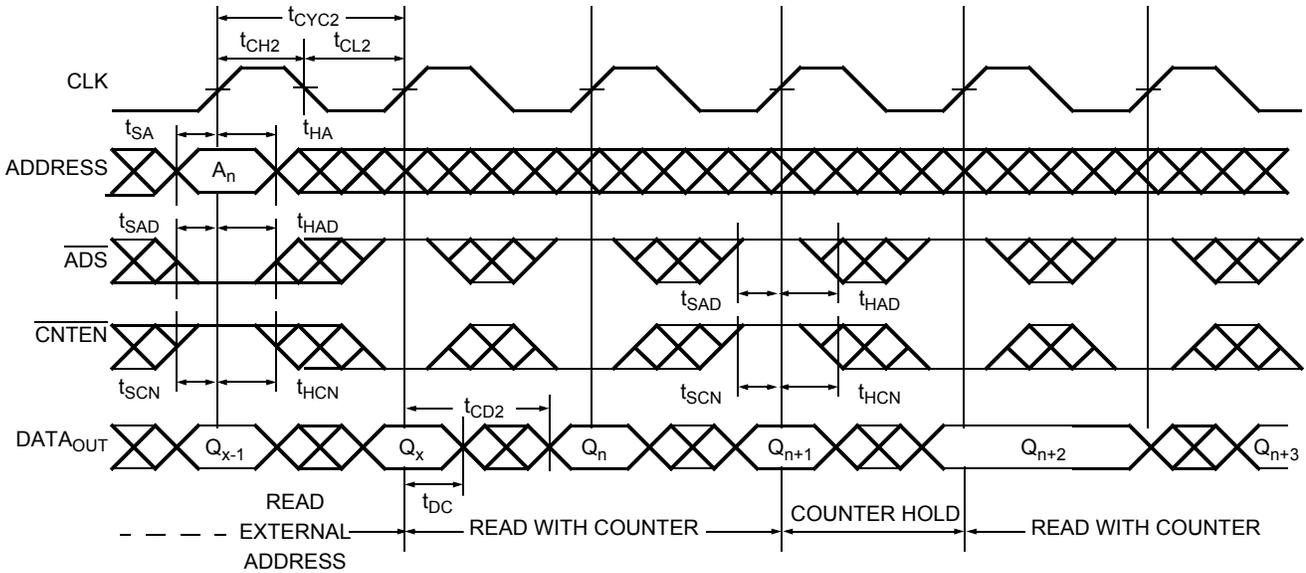
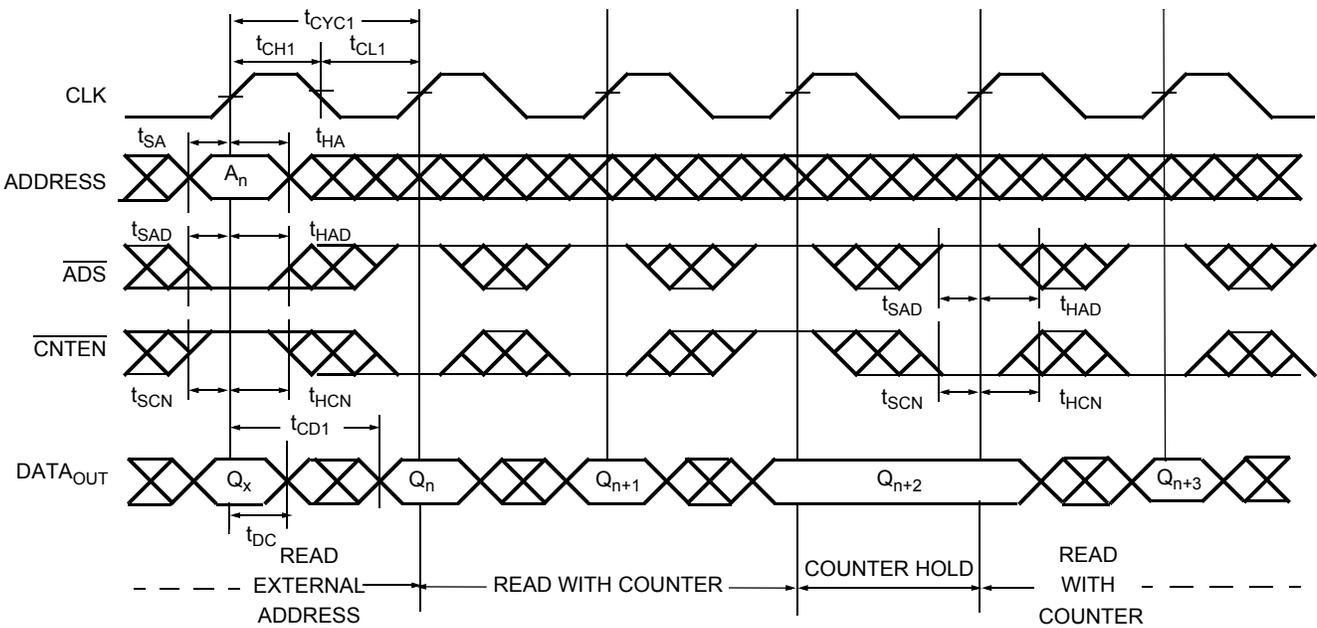


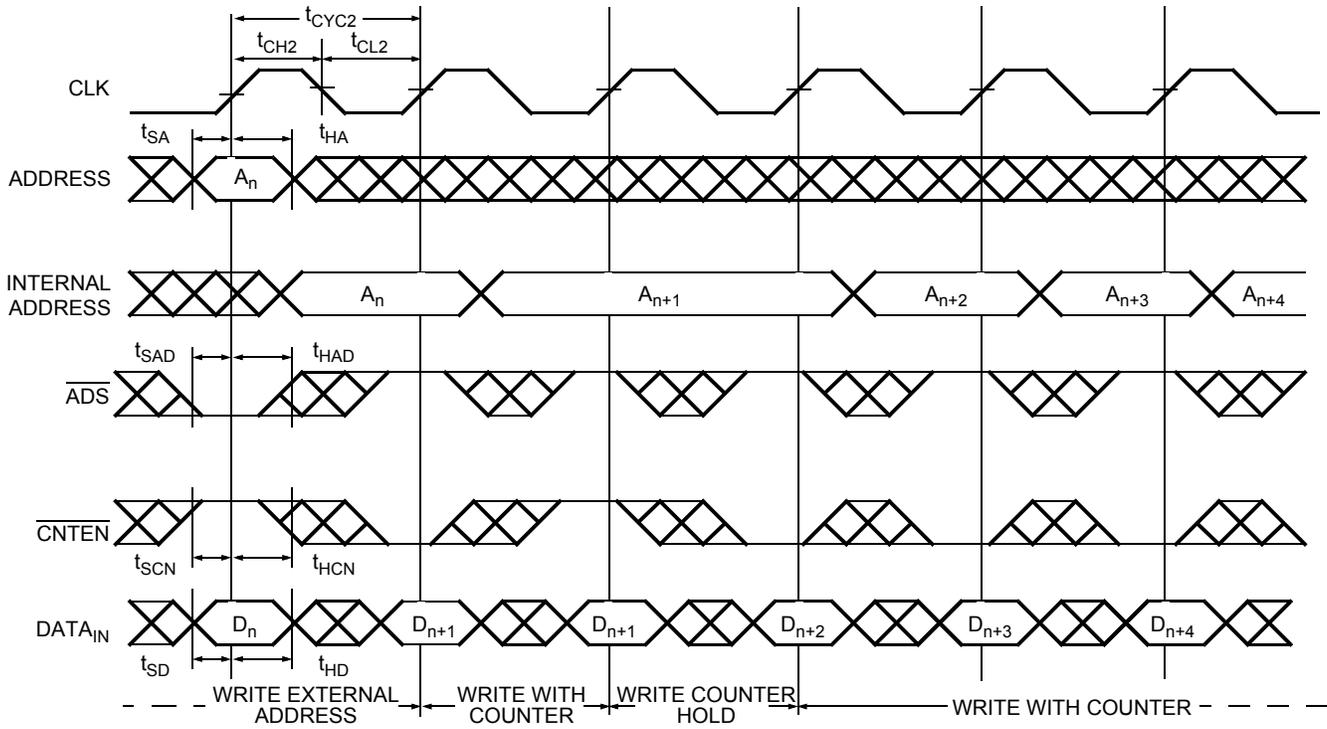
Figure 15. Flow-through Read with Address Counter Advance<sup>[51]</sup>



Note  
51.  $\overline{\text{CE}}_0$  and  $\overline{\text{OE}} = V_{\text{IL}}$ ;  $\text{CE}_1$ ,  $\text{R}/\overline{\text{W}}$  and  $\overline{\text{CNT}}\text{RST} = V_{\text{IH}}$ .

**Switching Waveforms (continued)**

**Figure 16. Write with Address Counter Advance (Flow-through or Pipelined Outputs)<sup>[52, 53]</sup>**



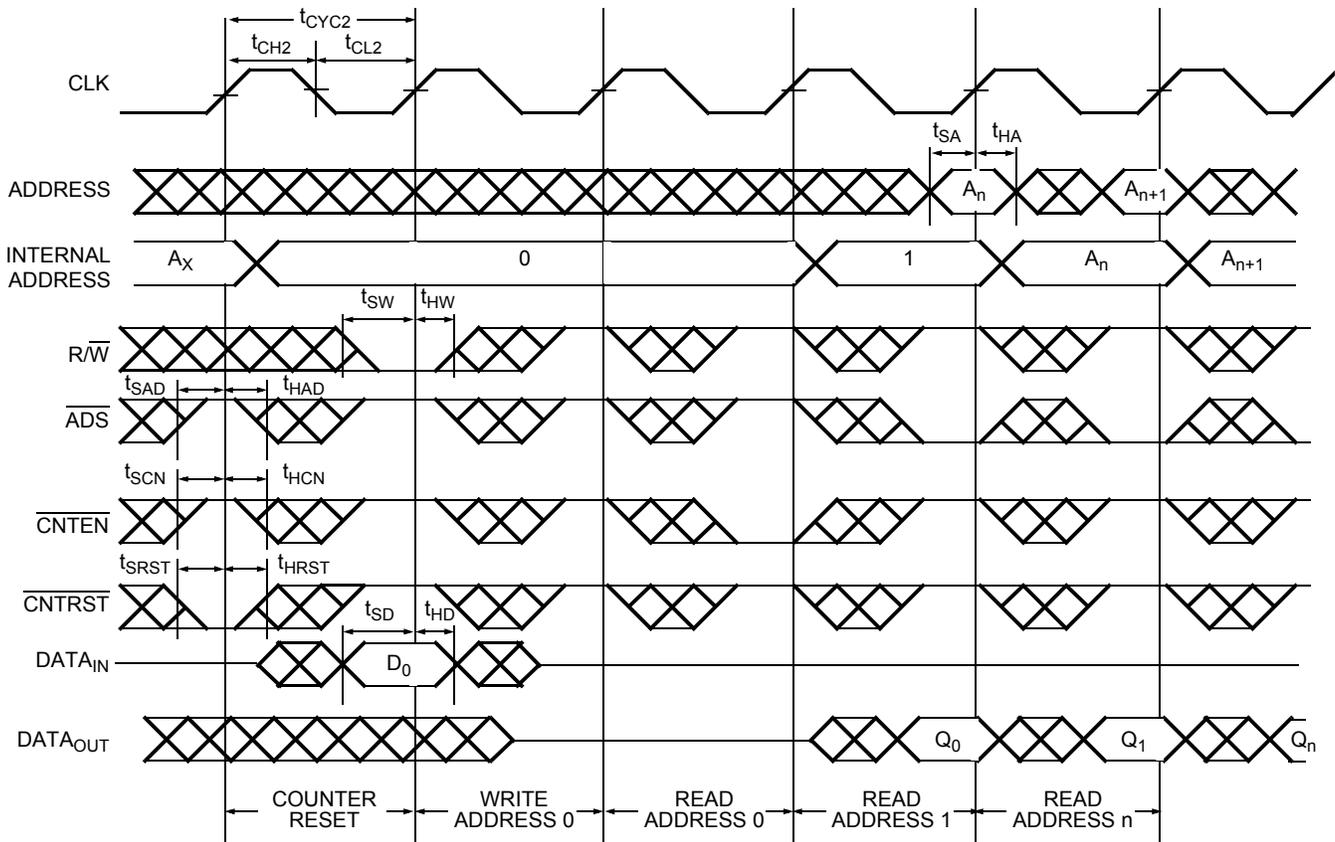
**Notes**

52.  $\overline{CE}_0$  and  $R/\overline{W} = V_{IL}$ ;  $CE_1$  and  $\overline{CNTRST} = V_{IH}$ .

53. The "Internal Address" is equal to the "External Address" when  $\overline{ADS} = V_{IL}$  and equals the counter output when  $\overline{ADS} = V_{IH}$ .

### Switching Waveforms (continued)

Figure 17. Counter Reset (Pipelined Outputs)<sup>[54, 55, 56, 57]</sup>



#### Notes

54. Addresses do not have to be accessed sequentially since  $\overline{\text{ADS}} = V_{\text{IL}}$  constantly loads the address on the rising edge of the CLK. Numbers are for reference only.
55. Output state (HIGH, LOW, or high-impedance) is determined by the previous cycle control signals.
56.  $\overline{\text{CE}}_0 = V_{\text{IL}}$ ;  $\text{CE}_1 = V_{\text{IH}}$ .
57. No dead cycle exists during counter reset. A READ or WRITE cycle may be coincidental with the counter reset.

### Read/Write and Enable Operation <sup>[58, 59, 60]</sup>

Inputs					Outputs	Operation
OE	CLK	CE <sub>0</sub>	CE <sub>1</sub>	R/W	I/O <sub>0</sub> –I/O <sub>9</sub>	
X		H	X	X	High Z	Deselected <sup>[61]</sup>
X		X	L	X	High Z	Deselected <sup>[61]</sup>
X		L	H	L	D <sub>IN</sub>	Write
L		L	H	H	D <sub>OUT</sub>	Read <sup>[61]</sup>
H	X	L	H	X	High Z	Outputs Disabled

### Address Counter Control Operation <sup>[58, 62, 63, 64]</sup>

Address	Previous Address	CLK	ADS	CNTEN	CNTRST	I/O	Mode	Operation
X	X		X	X	L	D <sub>out(0)</sub>	Reset	Counter Reset to Address 0
A <sub>n</sub>	X		L	X	H	D <sub>out(n)</sub>	Load	Address Load into Counter
X	A <sub>n</sub>		H	H	H	D <sub>out(n)</sub>	Hold	External Address Blocked—Counter Disabled
X	A <sub>n</sub>		H	L	H	D <sub>out(n+1)</sub>	Increment	Counter Enabled—Internal Address Generation

**Notes**

- 58. "X" = "Don't Care", "H" = V<sub>IH</sub>, "L" = V<sub>IL</sub>.
- 59. ADS, CNTEN, CNTRST = "Don't Care."
- 60. OE is an asynchronous input signal.
- 61. When CE changes state in the pipelined mode, deselection and read happen in the following clock cycle.
- 62. CE<sub>0</sub> and OE = V<sub>IL</sub>; CE<sub>1</sub> and R/W = V<sub>IH</sub>.
- 63. Data shown for flow-through mode; pipelined mode output will be delayed by one cycle.
- 64. Counter operation is independent of CE<sub>0</sub> and CE<sub>1</sub>.

## Ordering Information

The following table contains only the parts that are currently available. If you do not see what you are looking for, contact your local sales representative. For more information, visit the Cypress website at [www.cypress.com](http://www.cypress.com) and refer to the product summary page at <http://www.cypress.com/products>

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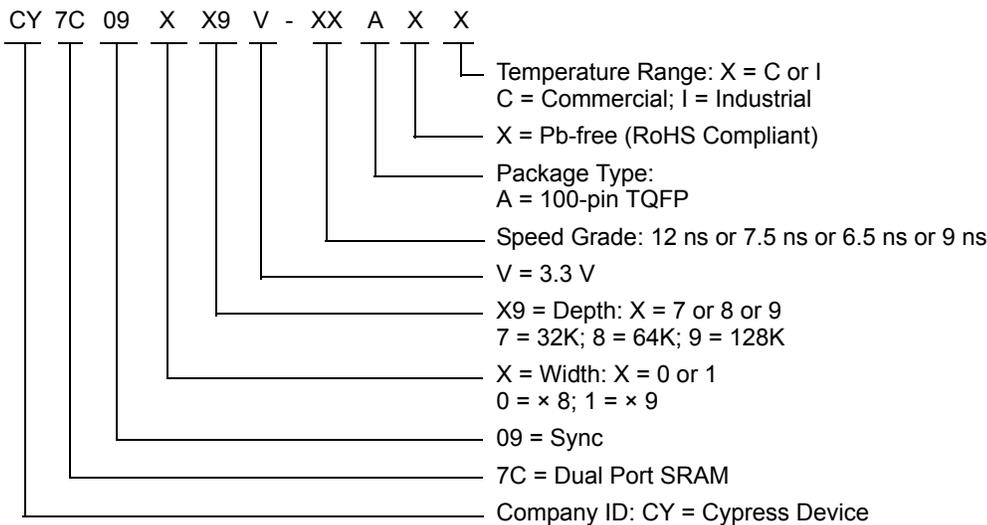
### 128 K × 8 3.3 V Synchronous Dual-Port SRAM

Speed (ns)	Ordering Code	Package Name	Package Type	Operating Range
7.5 <sup>[65]</sup>	CY7C09099V-7AXI	A100	100-pin Thin Quad Flat Pack (Pb-free)	Industrial
12	CY7C09099V-12AXC	A100	100-pin Thin Quad Flat Pack (Pb-free)	Commercial

### 32 K × 9 3.3 V Synchronous Dual-Port SRAM

Speed (ns)	Ordering Code	Package Name	Package Type	Operating Range
12	CY7C09179V-12AXC	A100	100-pin Thin Quad Flat Pack (Pb-free)	Commercial

## Ordering Code Definitions



**Note**

65. See [page 9](#) and [page 10](#) for Load Conditions.



## Acronyms

Acronym	Description
CMOS	complementary metal oxide semiconductor
I/O	input/output
OE	output enable
SRAM	static random access memory
TQFP	thin quad flat pack
TTL	transistor transistor logic
WE	write enable

## Document Conventions

### Units of Measure

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

## Document History Page

Document Title: CY7C09089V/99V, CY7C09179V/99V, 3.3 V 32 K/64 K/128 K × 8/9 Synchronous Dual-Port Static RAM Document Number: 38-06043				
Rev.	ECN No.	Orig. of Change	Orig. of Change	Description of Change
**	110191	SZV	09/29/01	Change from Spec number: 38-00667 to 38-06043
*A	122293	RBI	12/27/02	Power up requirements added to Operating Conditions Information
*B	365034	PCN	See ECN	Added Pb-Free Logo Added Pb-Free Part Ordering Information: CY7C09089V-6AXC, CY7C09089V-12AXC, CY7C09099V-6AXC, CY7C09099V-7AI, CY7C09099V-7AXI, CY7C09099V-12AXC, CY7C09179V-6AXC, CY7C09179V-12AXC, CY7C09189V-6AXC, CY7C09189V-12AXC, CY7C09199V-6AXC, CY7C09199V-7AXC, CY7C09199V-9AXC, CY7C09199V-9AXI, CY7C09199V-12AXC
*C	2623658	VKN/PYRS	12/17/08	Added CY7C09089V-12AXI part in the Ordering information table
*D	2897159	RAME	03/22/10	Removed inactive parts from ordering information table. Updated package diagram. Added Note in ordering information section.
*E	3110406	ADMU	12/14/2010	Updated <a href="#">Ordering Information</a> . Added <a href="#">Ordering Code Definitions</a> .
*F	3264673	ADMU	05/24/2011	Updated Document Title to read "CY7C09089V/99V, CY7C09179V/99V, 3.3 V 32 K/64 K/128 K × 8/9 Synchronous Dual-Port Static RAM". Updated <a href="#">Features</a> . Updated <a href="#">Pin Configurations</a> (Removed the Note "This pin is NC for CY7C09079V." in page 5). Updated <a href="#">Selection Guide</a> . Updated <a href="#">Package Diagram</a> . Added <a href="#">Acronyms</a> and <a href="#">Units of Measure</a> . Updated in new template.
*G	3849285	ADMU	12/21/2012	Updated <a href="#">Ordering Information</a> (Updated part numbers). Updated <a href="#">Package Diagram</a> : spec 51-85048 – Changed revision from *E to *G.

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