

8K x 8 Static RAM

Features

- **High speed**
— 20 ns
- **CMOS for optimum speed/power**
- **Low active power**
— 743 mW
- **Low standby Power**
— 220 mW
- **TTL-compatible inputs and outputs**
- **Easy memory expansion with $\overline{CE}_1$, CE_2 and $\overline{OE}$ features**
- **Automatic power-down when deselected**

Functional Description

The CY7C185A is a high-performance CMOS static RAM organized as 8192 words by 8 bits. Easy memory expansion is provided by an active LOW Chip Enable ($\overline{CE}_1$), an active HIGH Chip Enable (CE_2), an active LOW Output Enable ($\overline{OE}$), and

three-state drivers. The device has an automatic power-down feature ($\overline{CE}_1$), reducing the power consumption by over 70% when deselected. The CY7C185A is in the standard 300-mil-wide DIP package and leadless chip carrier.

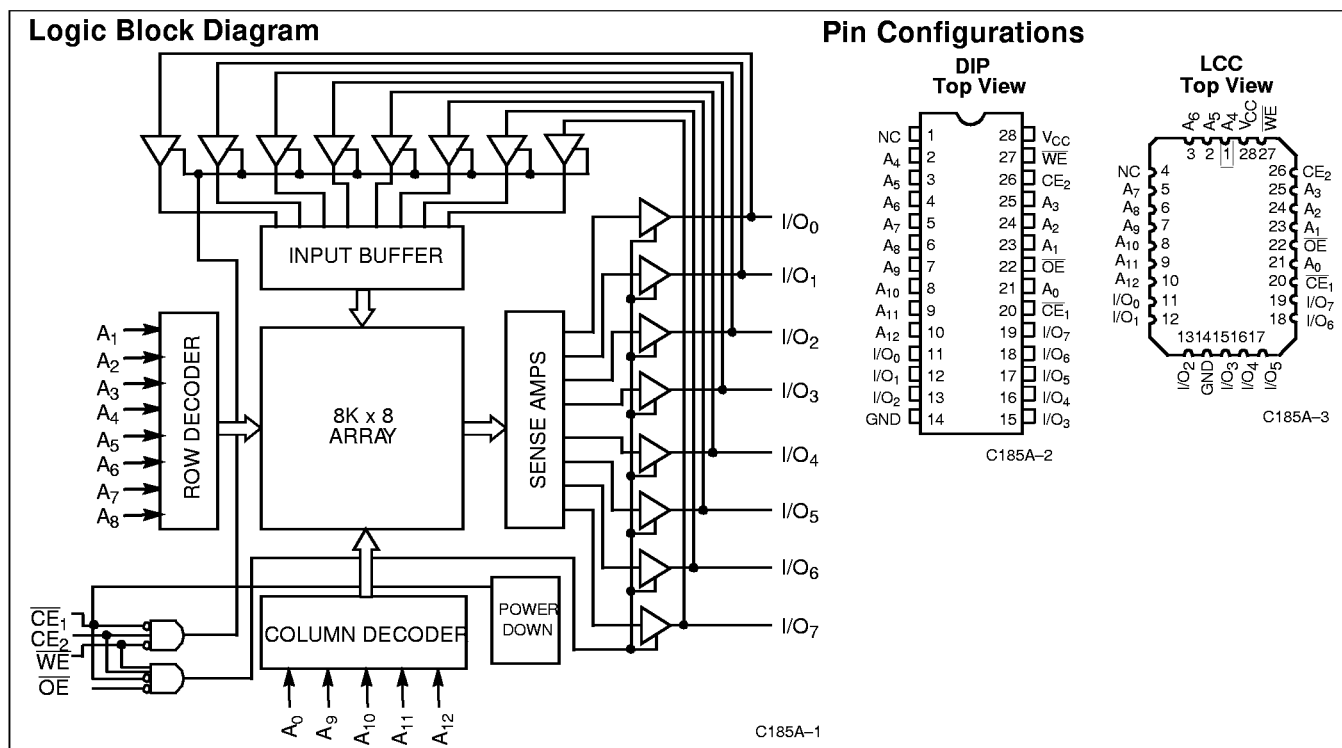
Writing to the device is accomplished when the Chip Enable one ($\overline{CE}_1$) and Write Enable (WE) inputs are both LOW, and the Chip Enable two (CE_2) input is HIGH.

Data on the eight I/O pins (I/O_0 through I/O_7) is written into the memory location specified on the address pins (A_0 through A_{12}).

Reading the device is accomplished by taking Chip Enable one ($\overline{CE}_1$) and Output Enable ($\overline{OE}$) LOW, while taking Write Enable (WE) and Chip Enable two (CE_2) HIGH. Under these conditions, the contents of the memory location specified on the address pins will appear on the I/O pins.

The I/O pins remain in a high-impedance state when Chip Enable one ($\overline{CE}_1$) or Output Enable ($\overline{OE}$) is HIGH, or Write Enable (WE) or Chip Enable two (CE_2) is LOW.

A die coat is used to ensure alpha immunity.



Selection Guide^[1]

		7C185A-20	7C185A-25	7C185A-35	7C185A-45
Maximum Access Time (ns)		20	25	35	45
Maximum Operating Current (mA)	Military	135	125	125	125
Maximum Standby Current (mA)	Military	40/20	40/20	30/20	30/20

Note:

1. For commercial specifications, see the CY7C185 data sheet.

Maximum Ratings

(Above which the useful life may be impaired. For user guidelines, not tested.)

Storage Temperature -65°C to +150°C

Ambient Temperature with
Power Applied -55°C to +125°C

Supply Voltage to Ground Potential
(Pin 28 to Pin 14) -0.5V to +7.0V

DC Voltage Applied to Outputs
in High Z State^[2] -0.5V to +7.0V

DC Input Voltage^[2] -0.5V to +7.0V

Output Current into Outputs (LOW) 20 mA

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

Latch-Up Current >200 mA

Operating Range

Range	Ambient Temperature ^[3]	V _{CC}
Military ^[4]	-55°C to +125°C	5V ± 10%

Electrical Characteristics Over the Operating Range^[4]

Parameter	Description	Test Conditions	7C185A-20		Unit
			Min.	Max.	
V _{OH}	Output HIGH Voltage	V _{CC} = Min., I _{OH} = -4.0 mA	2.4		V
V _{OL}	Output LOW Voltage	V _{CC} = Min., I _{OL} = 8.0 mA		0.4	V
V _{IH}	Input HIGH Voltage		2.2	V _{CC}	V
V _{IL}	Input LOW Voltage ^[2]		-0.5	0.8	V
I _{IX}	Input Load Current	GND ≤ V _I ≤ V _{CC}	-10	+10	μA
I _{OZ}	Output Leakage Current	GND ≤ V _I ≤ V _{CC} , Output Disabled	-10	+10	μA
I _{OS}	Output Short Circuit Current ^[5]	V _{CC} = Max., V _{OUT} = GND		-300	mA
I _{CC}	V _{CC} Operating Supply Current	V _{CC} = Max., I _{OUT} = 0 mA		135	mA
I _{SB1}	Automatic $\overline{CE}_1$ Power-Down Current	Max. V _{CC} , $\overline{CE}_1 \geq V_{IH}$, Min. Duty Cycle = 100%		40	mA
I _{SB2}	Automatic $\overline{CE}_1$ Power-Down Current	Max. V _{CC} , $\overline{CE}_1 \geq V_{CC} - 0.3V$, V _{IN} ≥ V _{CC} - 0.3V or V _{IN} ≥ 0.3V		20	mA

Electrical Characteristics Over the Operating Range^[4] (continued)

Parameter	Description	Test Conditions	7C185A-25		7C185A-35, 45		Unit
			Min.	Max.	Min.	Max.	
V _{OH}	Output HIGH Voltage	V _{CC} = Min., I _{OH} = -4.0 mA	2.4		2.4		V
V _{OL}	Output LOW Voltage	V _{CC} = Min., I _{OL} = 8.0 mA		0.4		0.4	V
V _{IH}	Input HIGH Voltage		2.2	V _{CC}	2.2	V _{CC}	V
V _{IL}	Input LOW Voltage ^[2]		-0.5	0.8	-0.5	0.8	V
I _{IX}	Input Load Current	GND ≤ V _I ≤ V _{CC}	-10	+10	-10	+10	μA
I _{OZ}	Output Leakage Current	GND ≤ V _I ≤ V _{CC} , Output Disabled	-10	+10	-10	+10	μA
I _{OS}	Output Short Circuit Current ^[5]	V _{CC} = Max., V _{OUT} = GND		-300		-300	mA
I _{CC}	V _{CC} Operating Supply Current	V _{CC} = Max., I _{OUT} = 0 mA		125		125	mA
I _{SB1}	Automatic $\overline{CE}_1$ Power-Down Current	Max. V _{CC} , $\overline{CE}_1 \geq V_{IH}$, Min. Duty Cycle = 100%		40		30	mA
I _{SB2}	Automatic $\overline{CE}_1$ Power-Down Current	Max. V _{CC} , $\overline{CE}_1 \geq V_{CC} - 0.3V$, V _{IN} ≥ V _{CC} - 0.3V or V _{IN} ≥ 0.3V		20		20	mA

Notes:

- V_{IL} (min.) = -3.0V for pulse durations less than 30 ns.
- T_A is the case temperature.
- See the last page of this specification for Group A subgroup testing information.
- Not more than one output should be shorted at one time. Duration of the short circuit should not exceed 30 seconds.

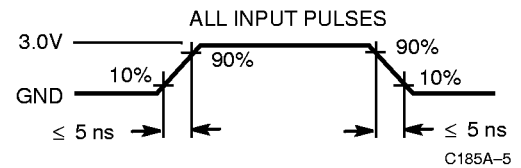
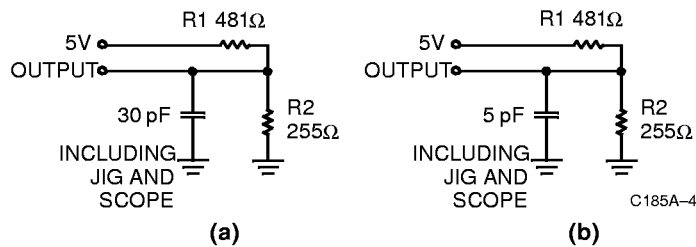
Capacitance^[6]

Parameter	Description	Test Conditions	Max.	Unit
C_{IN}	Input Capacitance	$T_A = 25^\circ\text{C}$, $f = 1\text{ MHz}$, $V_{CC} = 5.0\text{V}$	10	pF
C_{OUT}	Output Capacitance		10	pF

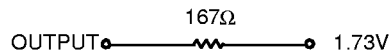
Note:

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

AC Test Loads and Waveforms



Equivalent to: THÉVENIN EQUIVALENT



Switching Characteristics Over the Operating Range^[7]

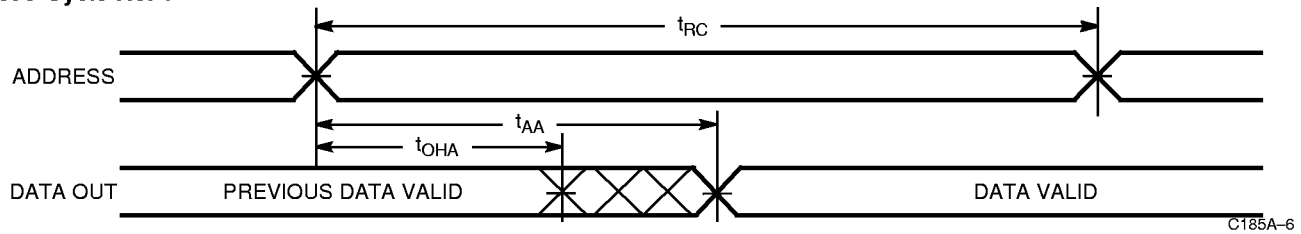
Parameter	Description	7C185A–20		7C185A–25		7C185A–35		7C185A–45		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
READ CYCLE										
t _{RC}	Read Cycle Time	20		25		35		45		ns
t _{AA}	Address to Data Valid		20		25		35		45	ns
t _{OHA}	Data Hold from Address Change	3		3		3		3		ns
t _{ACE1}	$\overline{CE}_1$ LOW to Data Valid		20		25		35		45	ns
t _{ACE2}	CE ₂ HIGH to Data Valid		20		25		35		30	ns
t _{DOE}	$\overline{OE}$ LOW to Data Valid		10		12		15		20	ns
t _{LZOE}	$\overline{OE}$ LOW to Low Z	3		3		3		3		ns
t _{HZOE}	$\overline{OE}$ HIGH to High Z ^[8]		8		10		12		15	ns
t _{LZCE1}	$\overline{CE}_1$ LOW to Low Z ^[9]	5		5		5		5		ns
t _{LZCE2}	CE ₂ HIGH to Low Z	3		3		3		3		ns
t _{HZCE}	$\overline{CE}_1$ HIGH to High Z ^[8, 9] CE ₂ LOW to High Z		8		10		15		15	ns
t _{PU}	$\overline{CE}_1$ LOW to Power-Up	0		0		0		0		ns
t _{PD}	$\overline{CE}_1$ HIGH to Power-Down		20		20		20		25	ns
WRITE CYCLE ^[10]										
t _{WC}	Write Cycle Time	20		20		25		40		ns
t _{SCE1}	$\overline{CE}_1$ LOW to Write End	15		20		25		30		ns
t _{SCE2}	CE ₂ HIGH to Write End	15		20		25		30		ns
t _{AW}	Address Set-Up to Write End	15		20		25		30		ns
t _{HA}	Address Hold from Write End	0		0		0		0		ns
t _{SA}	Address Set-Up to Write Start	0		0		0		0		ns
t _{PWE}	$\overline{WE}$ Pulse Width	15		15		20		20		ns
t _{SD}	Data Set-Up to Write End	10		10		15		15		ns
t _{HD}	Data Hold from Write End	0		0		0		0		ns
t _{LZWE}	$\overline{WE}$ HIGH to Low Z	3		5		5		5		ns
t _{HZWE}	$\overline{WE}$ LOW to High Z ^[8]		7		7		10		15	ns

Notes:

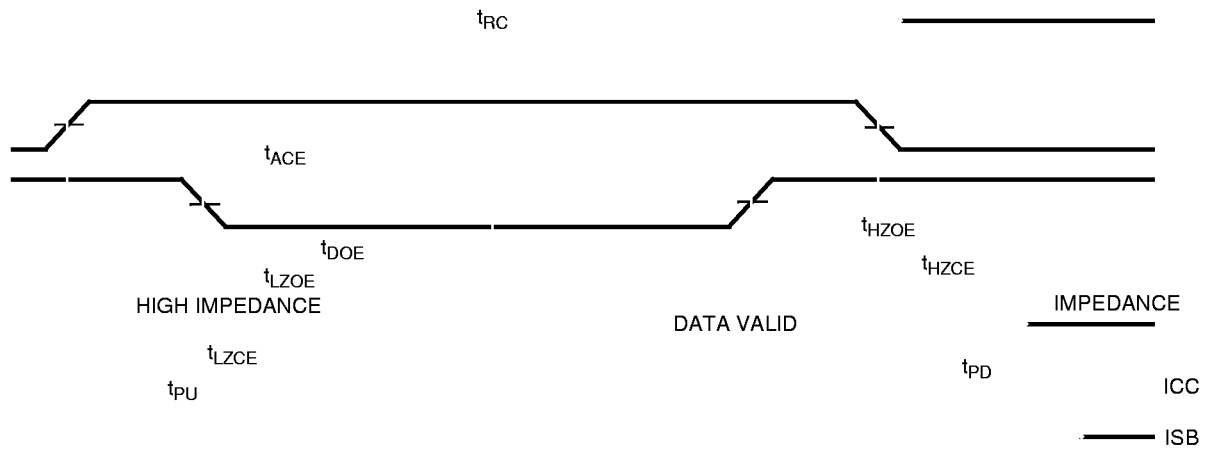
7. Test conditions assume signal transition time of 5 ns or less, timing reference levels of 1.5V, input pulse levels of 0 to 3.0V, and output loading of the specified I_{OL}/I_{OH} and 30-pF load capacitance.
8. t_{HZOE} , t_{HZCE} , and t_{HZWE} are specified with $C_L = 5$ pF as in part (b) of AC Test Loads. Transition is measured ± 500 mV from steady-state voltage.
9. At any given temperature and voltage condition, t_{HZCE} is less than t_{LZCE} for any given device.
10. Device is continuously selected. $\overline{OE}$, $\overline{CE} = V_{IL}$. $CE_2 = V_{IH}$.

Switching Waveforms

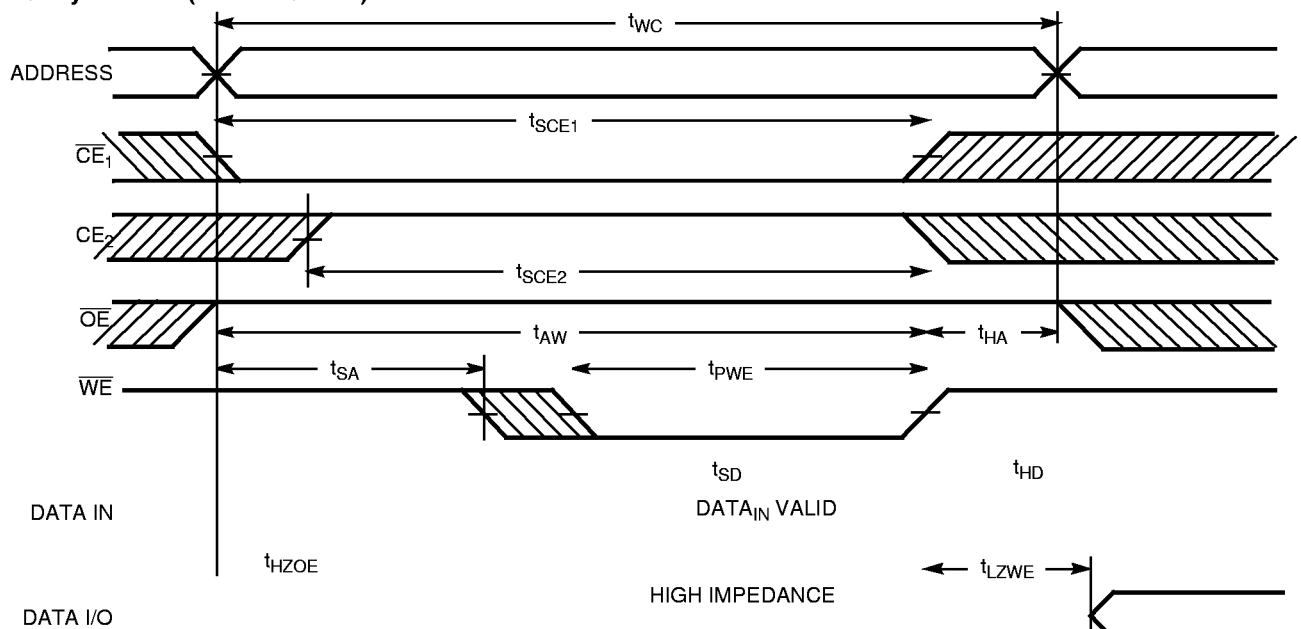
Read Cycle No. 1^[10, 11]



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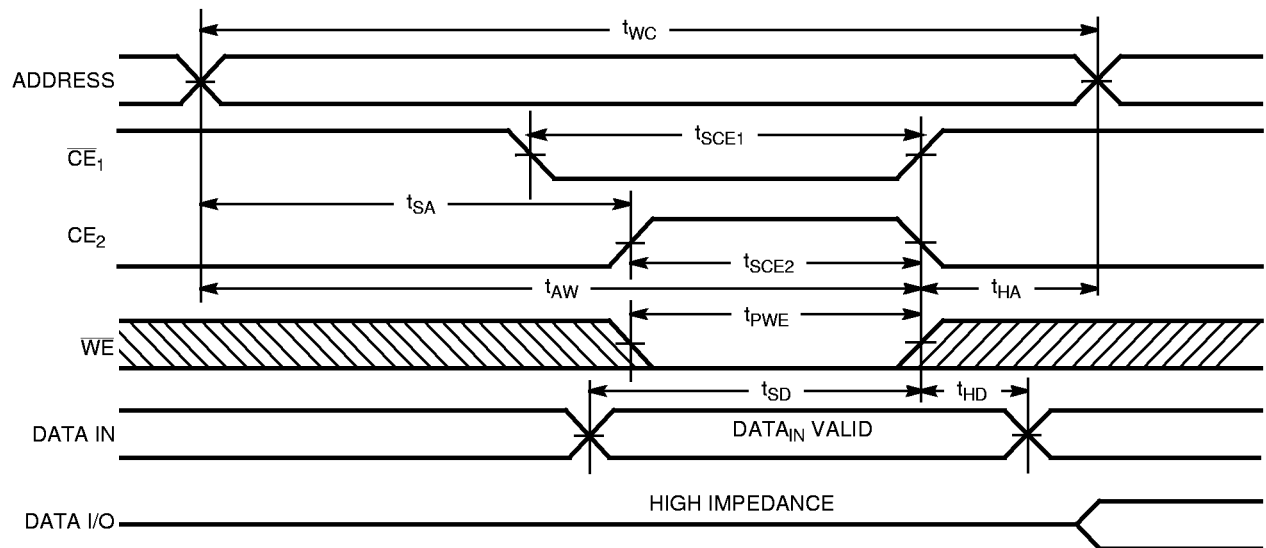
Write Cycle No. 1 ($\overline{WE}$ Controlled)^[13, 14]



C185A-8

Notes:

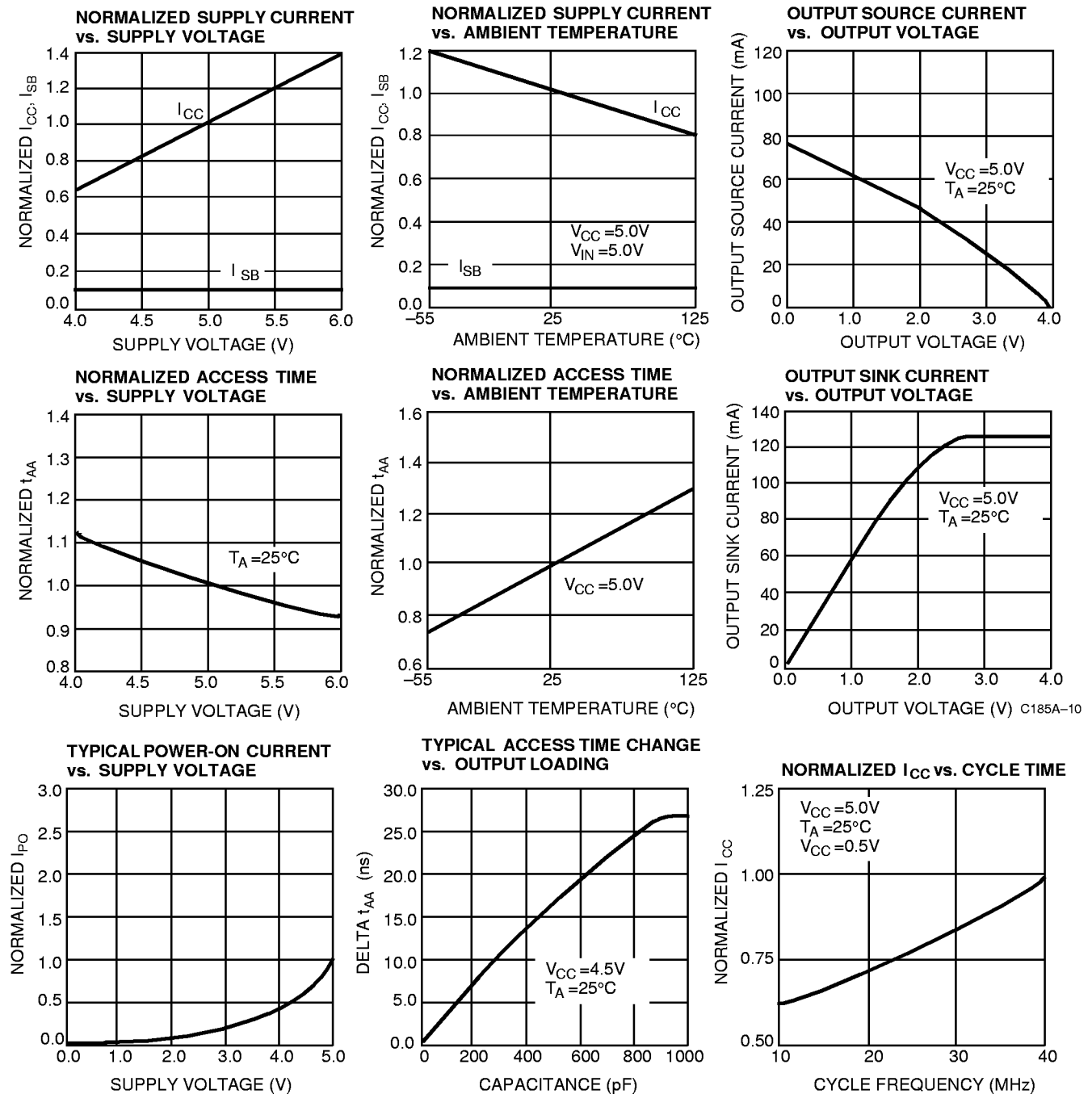
11. Address valid prior to or coincident with $\overline{CE}$ transition LOW.
12. $\overline{WE}$ is HIGH for read cycle.
13. The internal write time of the memory is defined by the overlap of $\overline{CE}_1$ LOW, $\overline{CE}_2$ HIGH, and $\overline{WE}$ LOW. Both signals must be LOW to initiate a write and either signal can terminate a write by going HIGH. The data input set-up and hold timing should be referenced to the rising edge of the signal that terminates the write.
14. Data I/O is high impedance if $\overline{OE} = V_{IH}$.

Switching Waveforms (continued)
Write Cycle No. 2 ($\overline{CE}$ Controlled)^[13, 14, 15]


C185A-9

Note:

15. If $\overline{CE}$ goes HIGH simultaneously with $\overline{WE}$ HIGH, the output remains in a high-impedance state.

Typical DC and AC Characteristics


C185A-11

Truth Table

CE₁	CE₂	WE	OE	Input/Output	Mode
H	X	X	X	High Z	Deselect/ Power-Down
X	L	X	X	High Z	Deselect
L	H	H	L	Data Out	Read
L	H	L	X	Data In	Write
L	H	H	H	High Z	Deselect

Address Designators

Address Name	Address Function	Pin Number
A4	X3	2
A5	X4	3
A6	X5	4
A7	X6	5
A8	X7	6
A9	Y1	7
A10	Y4	8
A11	Y3	9
A12	Y0	10
A0	Y2	21
A1	X0	23
A2	X1	24

Ordering Information

Speed (ns)	Ordering Code	Package Name	Package Type	Operating Range
20	CY7C185A-20DMB	D22	28-Lead (300-Mil) CerDIP	Military
25	CY7C185A-25DMB	D22	28-Lead (300-Mil) CerDIP	Military
35	CY7C185A-35DMB	D22	28-Lead (300-Mil) CerDIP	Military
45	CY7C185A-45DMB	D22	28-Lead (300-Mil) CerDIP	Military

MILITARY SPECIFICATIONS
Group A Subgroup Testing
DC Characteristics

Parameter	Subgroups
V_{OH}	1, 2, 3
V_{OL}	1, 2, 3
V_{IH}	1, 2, 3
V_{IL} Max.	1, 2, 3
I_{IX}	1, 2, 3
I_{OZ}	1, 2, 3
I_{OS}	1, 2, 3
I_{CC}	1, 2, 3
I_{SB1}	1, 2, 3
I_{SB2}	1, 2, 3

Switching Characteristics

Parameter	Subgroups
READ CYCLE	
t_{RC}	7, 8, 9, 10, 11
t_{AA}	7, 8, 9, 10, 11
t_{OHA}	7, 8, 9, 10, 11
t_{ACE1}	7, 8, 9, 10, 11
t_{ACE2}	7, 8, 9, 10, 11
t_{DOE}	7, 8, 9, 10, 11
WRITE CYCLE	
t_{WC}	7, 8, 9, 10, 11
t_{SCE1}	7, 8, 9, 10, 11
t_{SCE2}	7, 8, 9, 10, 11
t_{AW}	7, 8, 9, 10, 11
t_{HA}	7, 8, 9, 10, 11
t_{SA}	7, 8, 9, 10, 11
t_{PWE}	7, 8, 9, 10, 11
t_{SD}	7, 8, 9, 10, 11
t_{HD}	7, 8, 9, 10, 11

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Package Diagram

