

Selection Guide

	7C109B-12 7C1009B-12	7C109B-15 7C1009B-15	7C109B-20 7C1009B-20	Unit
Maximum Access Time	12	15	20	ns
Maximum Operating Current	90	80	75	mA
Maximum CMOS Standby Current	10	10	10	mA
Maximum CMOS Standby Current (L)		2		mA

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 on V_{CC} to Relative GND^[3] -0.5V to +7.0V

DC Voltage Applied to Outputs

in High Z State^[3] -0.5V to $V_{CC} + 0.5V$

DC Input Voltage^[3] -0.5V to $V_{CC} + 0.5V$

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	V_{CC}
Commercial	0°C to +70°C	5V ± 10%
Industrial	-40°C to +85°C	5V ± 10%

Electrical Characteristics Over the Operating Range

Parameter	Description	Test Conditions	7C109B-12 7C1009B-12		7C109B-15 7C1009B-15		7C109B-20 7C1009B-20		Unit
			Min.	Max.	Min.	Max.	Min.	Max.	
V_{OH}	Output HIGH Voltage	$V_{CC} = \text{Min.}, I_{OH} = -4.0 \text{ mA}$	2.4		2.4		2.4		V
V_{OL}	Output LOW Voltage	$V_{CC} = \text{Min.}, I_{OL} = 8.0 \text{ mA}$		0.4		0.4		0.4	V
V_{IH}	Input HIGH Voltage		2.2	$V_{CC} + 0.3$	2.2	$V_{CC} + 0.3$	2.2	$V_{CC} + 0.3$	V
V_{IL}	Input LOW Voltage ^[3]		-0.3	0.8	-0.3	0.8	-0.3	0.8	V
I_{IX}	Input Leakage Current	$GND \leq V_I \leq V_{CC}$	-1	+1	-1	+1	-1	+1	μA
I_{OZ}	Output Leakage Current	$GND \leq V_I \leq V_{CC}$, Output Disabled	-5	+5	-5	+5	-5	+5	μA
I_{CC}	V_{CC} Operating Supply Current	$V_{CC} = \text{Max.}, I_{OUT} = 0 \text{ mA}$, $f = f_{MAX} = 1/t_{RC}$		90		80		75	mA
I_{SB1}	Automatic CE Power-Down Current —TTL Inputs	Max. V_{CC} , $\overline{CE}_1 \geq V_{IH}$ or $CE_2 \leq V_{IL}$, $V_{IN} \geq V_{IH}$ or $V_{IN} \leq V_{IL}$, $f = f_{MAX}$		45		40		30	mA
I_{SB2}	Automatic CE Power-Down Current —CMOS Inputs	Max. V_{CC} , $CE_1 \geq V_{CC} - 0.3V$, or $CE_2 \leq 0.3V$, $V_{IN} \geq V_{CC} - 0.3V$, or $V_{IN} \leq 0.3V$, $f = 0$		10		10		10	mA
		L				2			mA

Capacitance^[4]

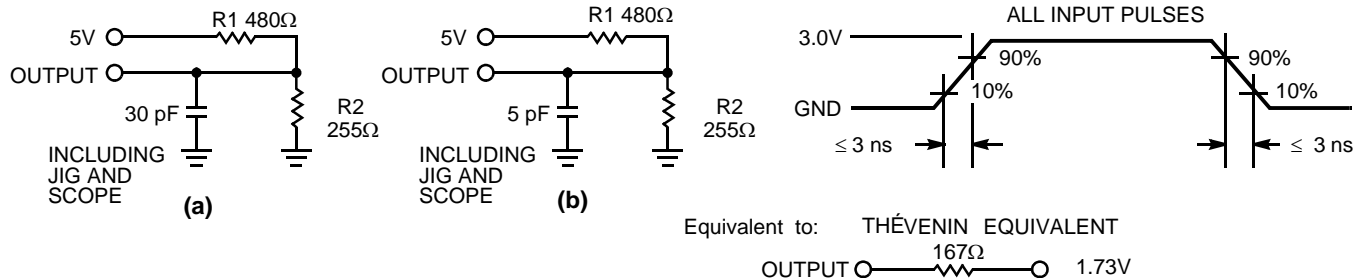
Parameter	Description	Test Conditions	Max.	Unit
C_{IN}	Input Capacitance	$T_A = 25^\circ\text{C}$, $f = 1 \text{ MHz}$, $V_{CC} = 5.0V$	9	pF
C_{OUT}	Output Capacitance		8	pF

Notes:

3. Minimum voltage is -2.0V for pulse durations of less than 20 ns.

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

AC Test Loads and Waveforms



Switching Characteristics^[5]

Parameter	Description	7C109B-12 7C1009B-12		7C109B-15 7C1009B-15		7C109B-20 7C1009B-20		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Read Cycle								
t _{RC}	Read Cycle Time	12		15		20		ns
t _{AA}	Address to Data Valid		12		15		20	ns
t _{OHA}	Data Hold from Address Change	3		3		3		ns
t _{ACE}	\overline{CE}_1 LOW to Data Valid, CE ₂ HIGH to Data Valid		12		15		20	ns
t _{DOE}	\overline{OE} LOW to Data Valid		6		7		8	ns
t _{LZOE}	\overline{OE} LOW to Low Z	0		0		0		ns
t _{HZOE}	\overline{OE} HIGH to High Z ^[6, 7]		6		7		8	ns
t _{LZCE}	\overline{CE}_1 LOW to Low Z, CE ₂ HIGH to Low Z ^[7]	3		3		3		ns
t _{HZCE}	\overline{CE}_1 HIGH to High Z, CE ₂ LOW to High Z ^[6, 7]		6		7		8	ns
t _{PU}	\overline{CE}_1 LOW to Power-Up, CE ₂ HIGH to Power-Up	0		0		0		ns
t _{PD}	\overline{CE}_1 HIGH to Power-Down, CE ₂ LOW to Power-Down		12		15		20	ns
Write Cycle ^[8]								
t _{WC}	Write Cycle Time ^[9]	12		15		20		ns
t _{SCE}	\overline{CE}_1 LOW to Write End, CE ₂ HIGH to Write End	10		12		15		ns
t _{AW}	Address Set-Up to Write End	10		12		15		ns
t _{HA}	Address Hold from Write End	0		0		0		ns
t _{SA}	Address Set-Up to Write Start	0		0		0		ns
t _{PWE}	\overline{WE} Pulse Width	10		12		12		ns
t _{SD}	Data Set-Up to Write End	7		8		10		ns
t _{HD}	Data Hold from Write End	0		0		0		ns
t _{LZWE}	\overline{WE} HIGH to Low Z ^[7]	3		3		3		ns
t _{HZWE}	\overline{WE} LOW to High Z ^[6, 7]		6		7		8	ns

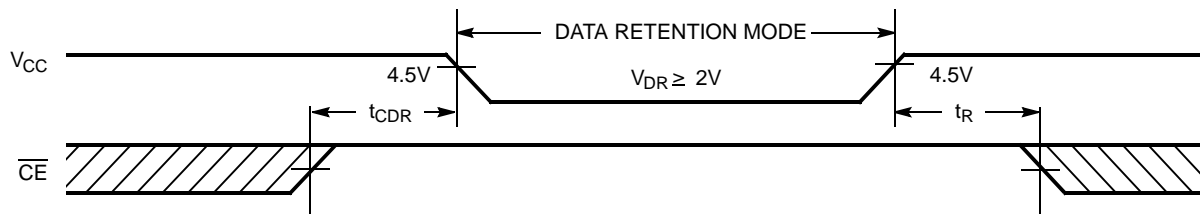
Notes:

- Test conditions assume signal transition time of 3 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.
- t_{HZOE} , t_{HZCE} , and t_{HZWE} are specified with a load capacitance of 5 pF as in part (b) of AC Test Loads. Transition is measured ± 500 mV from steady-state voltage.
- 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.
- The internal write time of the memory is defined by the overlap of \overline{CE}_1 LOW, CE_2 HIGH, and \overline{WE} LOW. \overline{CE}_1 and \overline{WE} must be LOW and CE_2 HIGH to initiate a write, and the transition of any 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.
- The minimum write cycle time for Write Cycle No. 3 (\overline{WE} controlled, \overline{OE} LOW) is the sum of t_{HZWE} and t_{SD} .

Data Retention Characteristics Over the Operating Range (Low Power version only)

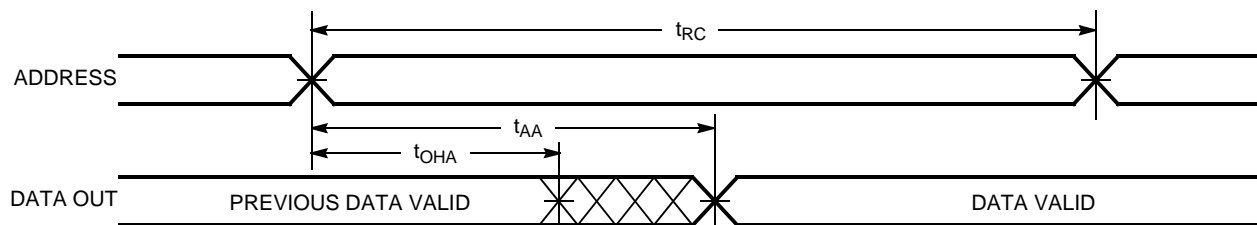
Parameter	Description	Conditions	Min.	Max.	Unit
V_{DR}	V_{CC} for Data Retention	No input may exceed $V_{CC} + 0.5V$	2.0		V
I_{CCDR}	Data Retention Current	$V_{CC} = V_{DR} = 2.0V$, $CE_1 \geq V_{CC} - 0.3V$ or $CE_2 \leq 0.3V$,		150	μA
t_{CDR}	Chip Deselect to Data Retention Time	$V_{IN} \geq V_{CC} - 0.3V$ or $V_{IN} \leq 0.3V$	0		ns
t_R	Operation Recovery Time		200		μs

Data Retention Waveform

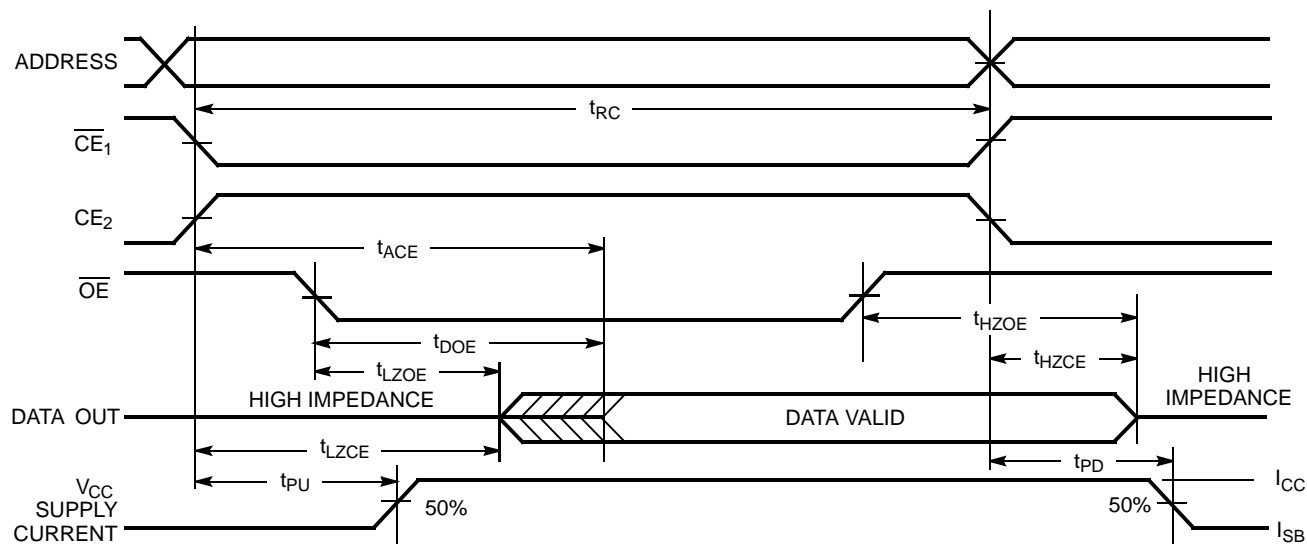


Switching Waveforms

Read Cycle No. 1^[10, 11]



Read Cycle No. 2 (\overline{OE} Controlled)^[11, 12]

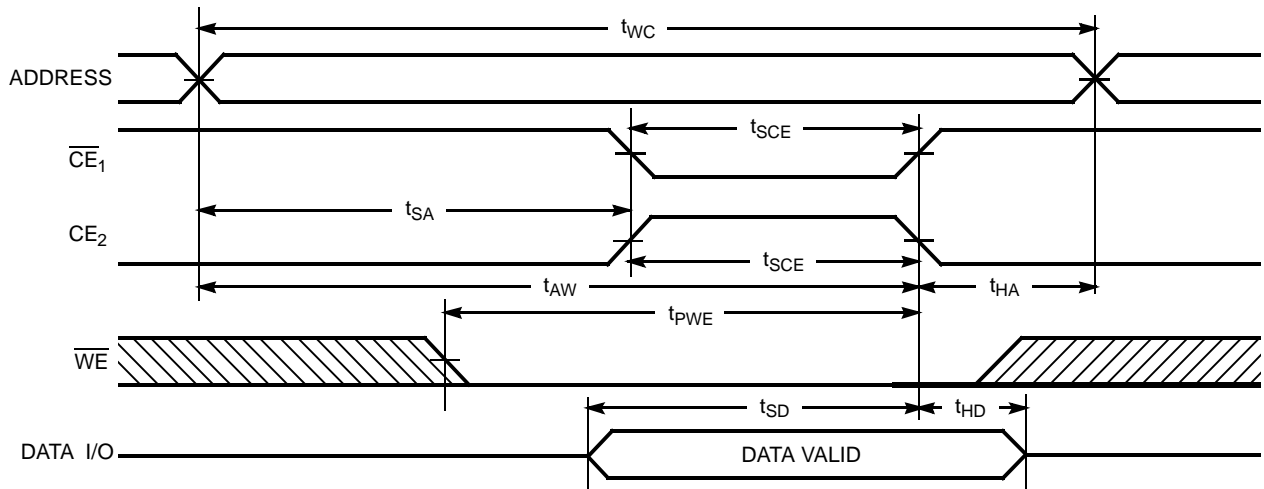


Notes:

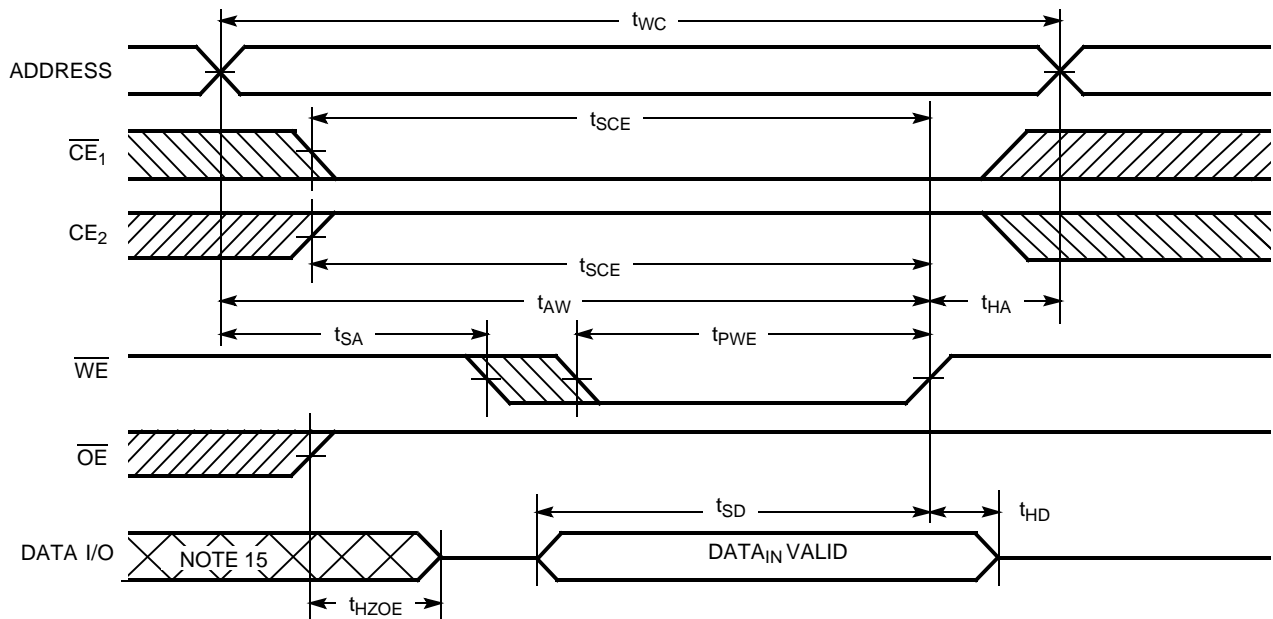
10. Device is continuously selected. \overline{OE} , $\overline{CE}_1 = V_{IL}$, $CE_2 = V_{IH}$.
11. \overline{WE} is HIGH for read cycle.
12. Address valid prior to or coincident with \overline{CE}_1 transition LOW and CE_2 transition HIGH.

Switching Waveforms (continued)

Write Cycle No. 1 (\overline{CE}_1 or CE_2 Controlled)^[13, 14]



Write Cycle No. 2 (\overline{WE} Controlled, \overline{OE} HIGH During Write)^[13, 14]



Notes:

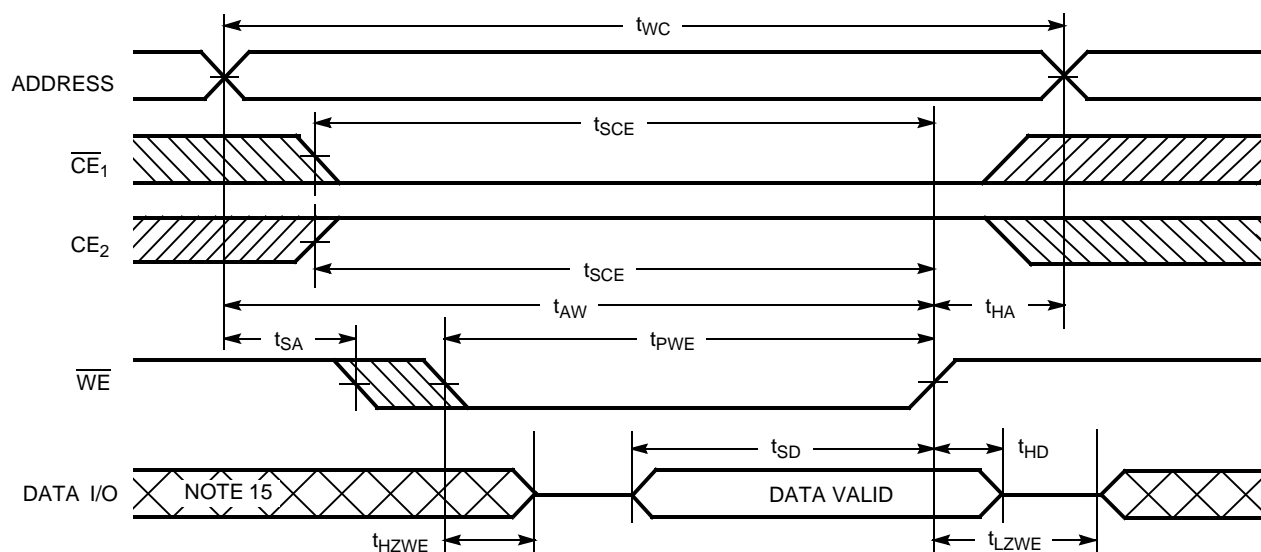
13. Data I/O is high impedance if $\overline{OE} = V_{IH}$.

14. If \overline{CE}_1 goes HIGH or CE_2 goes LOW simultaneously with \overline{WE} going HIGH, the output remains in a high-impedance state.

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

Switching Waveforms (continued)

Write Cycle No. 3 ($\overline{\text{WE}}$ Controlled, $\overline{\text{OE}}$ LOW)^[14]



Truth Table

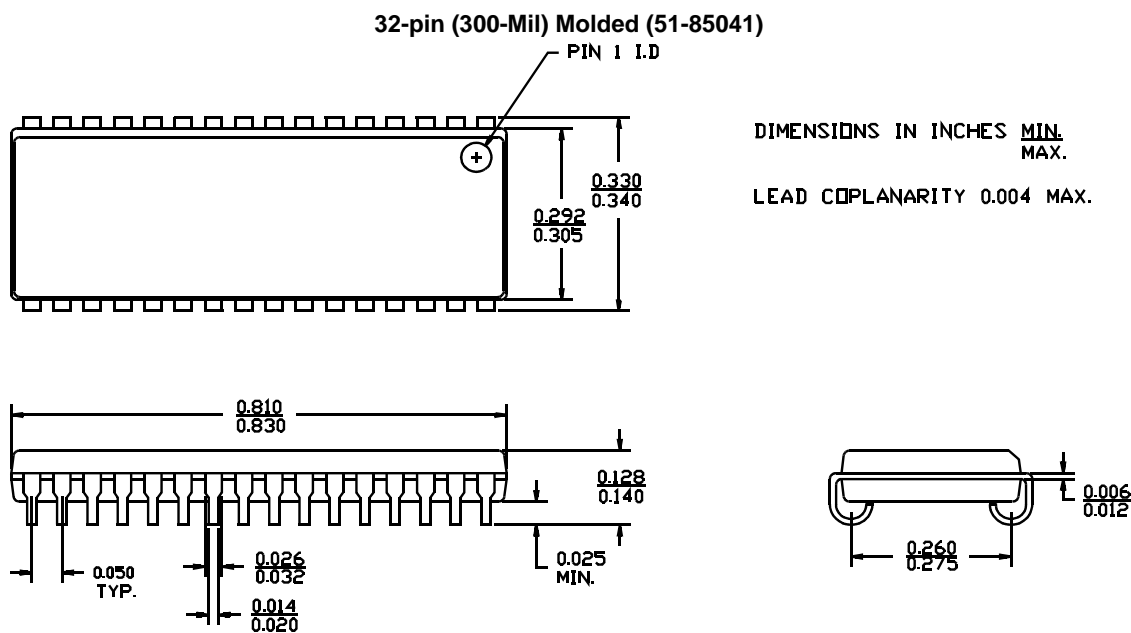
$\overline{\text{CE}}_1$	$\overline{\text{CE}}_2$	$\overline{\text{OE}}$	$\overline{\text{WE}}$	I/O ₀ -I/O ₇	Mode	Power
H	X	X	X	High Z	Power-Down	Standby (I_{SB})
X	L	X	X	High Z	Power-Down	Standby (I_{SB})
L	H	L	H	Data Out	Read	Active (I_{CC})
L	H	X	L	Data In	Write	Active (I_{CC})
L	H	H	H	High Z	Selected, Outputs Disabled	Active (I_{CC})

Ordering Information

Speed (ns)	Ordering Code	Package Diagram	Package Type	Operating Range
12	CY7C109B-12VC	51-85033	32-pin (400-Mil) Molded SOJ	Commercial
	CY7C1009B-12VC	51-85041	32-pin (300-Mil) Molded SOJ	
	CY7C109B-12ZC	51-85056	32-pin TSOP Type I	
	CY7C109B-12ZXC		32-pin TSOP Type I (Pb-Free)	
15	CY7C109BL-15VC	51-85033	32-pin (400-Mil) Molded SOJ	Commercial
	CY7C109B-15VC		32-pin (400-Mil) Molded SOJ	
	CY7C109B-15VXC		32-pin (400-Mil) Molded SOJ (Pb-Free)	
	CY7C1009B-15VC	51-85041	32-pin (300-Mil) Molded SOJ	
	CY7C1009B-15VXC		32-pin (300-Mil) Molded SOJ (Pb-Free)	
	CY7C109B-15ZC	51-85056	32-pin TSOP Type I	
	CY7C109B-15ZXC		32-pin TSOP Type I (Pb-Free)	
	CY7C109B-15VI	51-85033	32-pin (400-Mil) Molded SOJ	Industrial
	CY7C1009B-15VI	51-85041	32-pin (300-Mil) Molded SOJ	
20	CY7C109B-20ZC	51-85056	32-pin TSOP Type I	Commercial
	CY7C1009B-20VC	51-85041	32-pin (300-Mil) Molded SOJ	
	CY7C109B-20VI	51-85033	32-pin (400-Mil) Molded SOJ	Industrial

Please contact local sales representative regarding availability of parts

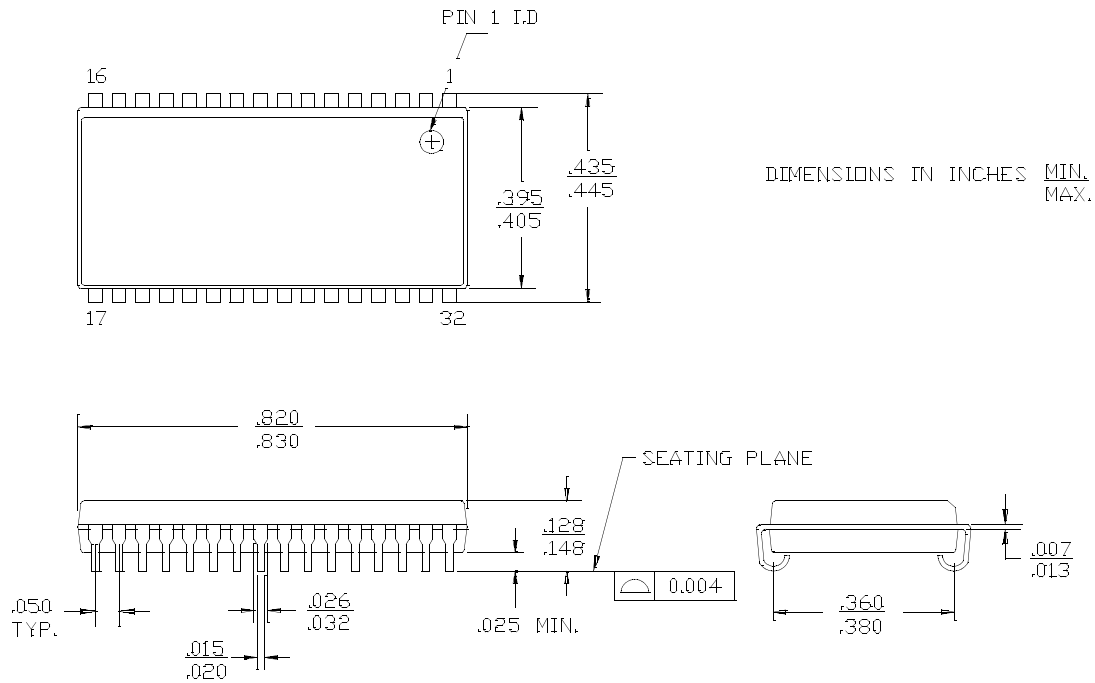
Package Diagrams



51-85041-*A

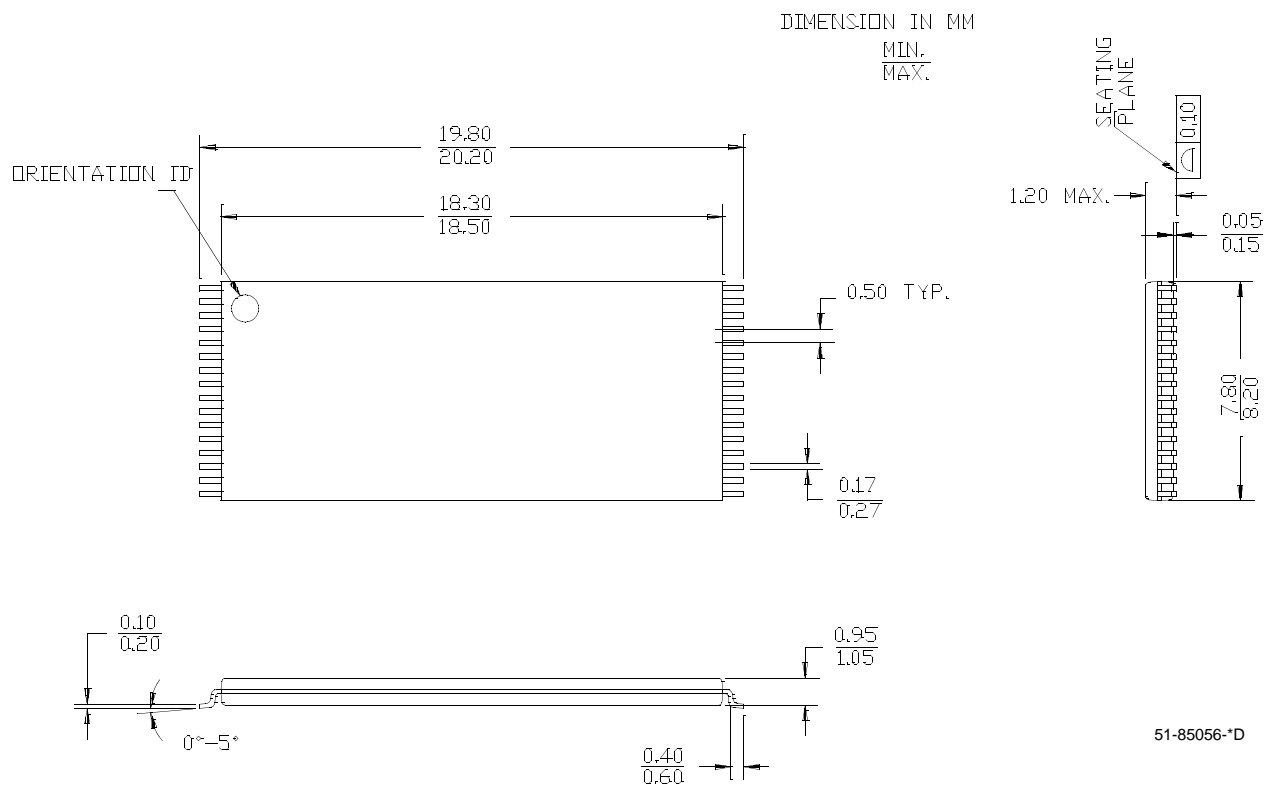
Package Diagrams (continued)

32-pin (400-Mil) Molded SOJ (51-85033)



Package Diagrams (continued)

32-pin TSOP Type I (8 x 20 mm) (51-85056)



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Document History Page

Document Title: CY7C109B/CY7C1009B 128K x 8 Static RAM Document Number: 38-05038				
REV.	ECN NO.	Issue Date	Orig. of Change	Description of Change
**	106832	09/22/01	SZV	Change from Spec number: 38-00971 to 38-05038
*A	116467	09/16/02	CEA	Added applications foot note to data sheet, page 1
*B	397875	See ECN	NXR	Changed address of Cypress Semiconductor Corporation on Page# 1 from "3901 North First Street" to "198 Champion Court" Updated the Ordering Information Table on page 7
*C	493543	See ECN	NXR	Removed 25 ns and 35 ns speed bin from product offering Added note# 2 on page# 1 Changed the description of I_{IX} from Input Load Current to Input Leakage Current in DC Electrical Characteristics table Removed I_{OS} parameter from DC Electrical Characteristics table Updated the Ordering Information Table