

1-Mbit (128K x 8) Static RAM

Features

- **Temperature Ranges**
 - Commercial: 0°C to 70°C
 - Industrial: -40°C to 85°C
 - Automotive: -40°C to 125°C
- **4.5V–5.5V operation**
- **CMOS for optimum speed/power**
- **Low active power**
(70 ns, LL version, Commercial, Industrial)
— 82.5 mW (max.) (15 mA)
- **Low standby power**
(70 ns, LL version, Commercial, Industrial)
— 110 μ W (max.) (15 μ A)
- **Automatic power-down when deselected**
- **TTL-compatible inputs and outputs**
- **Easy memory expansion with $\overline{CE}_1$, $\overline{CE}_2$, and $\overline{OE}$ options**

Functional Description^[1]

The CY62128B is a high-performance CMOS static RAM organized as 131,072 words by 8 bits. Easy memory expansion is provided by an active LOW Chip Enable ($\overline{CE}_1$), an active HIGH Chip Enable ($\overline{CE}_2$), an active LOW Output Enable ($\overline{OE}$), and three-state drivers. This device has an automatic power-down feature that reduces power consumption by more than 75% when deselected.

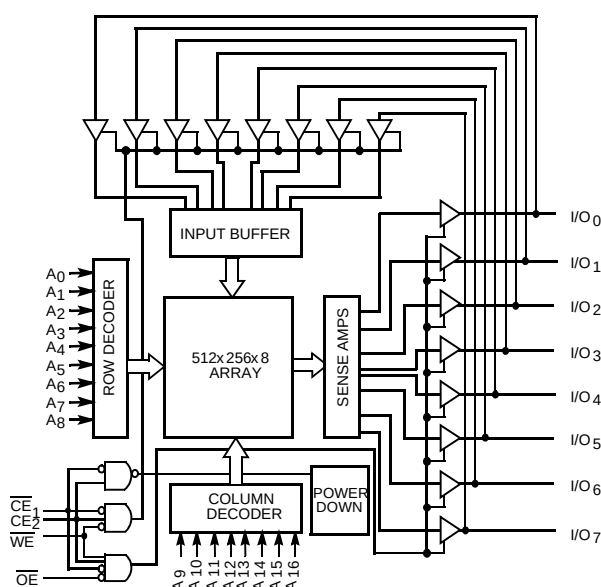
Writing to the device is accomplished by taking Chip Enable One ($\overline{CE}_1$) and Write Enable (WE) inputs LOW and Chip Enable Two ($\overline{CE}_2$) input HIGH. Data on the eight I/O pins (I/O₀ through I/O₇) is then written into the location specified on the address pins (A₀ through A₁₆).

Reading from the device is accomplished by taking Chip Enable One ($\overline{CE}_1$) and Output Enable ($\overline{OE}$) LOW while forcing Write Enable (WE) and Chip Enable Two ($\overline{CE}_2$) HIGH. Under these conditions, the contents of the memory location specified by the address pins will appear on the I/O pins.

The eight input/output pins (I/O₀ through I/O₇) are placed in a high-impedance state when the device is deselected ($\overline{CE}_1$ HIGH or $\overline{CE}_2$ LOW), the outputs are disabled ($\overline{OE}$ HIGH), or during a write operation ($\overline{CE}_1$ LOW, $\overline{CE}_2$ HIGH, and WE LOW).

The CY62128B is available in a standard 450-mil-wide SOIC, 32-pin TSOP type I and STSOP packages.

Logic Block Diagram



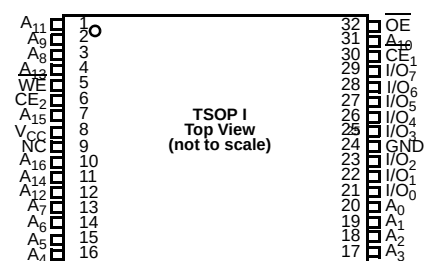
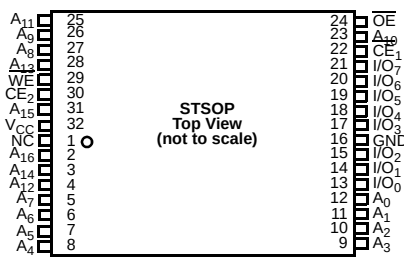
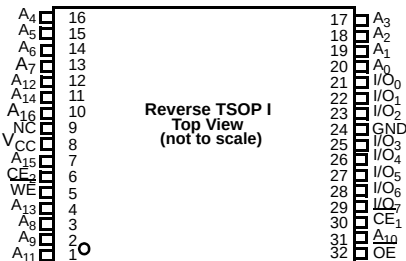
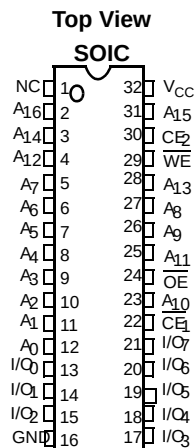
Note:

1. For best-practice recommendations, please refer to the Cypress application note "System Design Guidelines" on <http://www.cypress.com>.

Product Portfolio

Product		V _{CC} Range (V)			Speed (ns)	Power Dissipation			
						Operating, I _{CC} (mA)		Standby, I _{SB2} (μA)	
		Min.	Typ. ^[2]	Max.		Typ. ^[2]	Max.	Typ. ^[2]	Max.
CY62128BLL	Industrial	4.5	5.0	5.5	55	7.5	20	2.5	15
	Industrial				70	6	15	2.5	15
	Automotive				70	6	25	2.5	25

Pin Configurations



Pin Definitions

Input	A₀-A₁₆ . Address Inputs
Input/Output	I/O₀-I/O₇ . Data lines. Used as input or output lines depending on operation
Input/Control	WE . Write Enable, Active LOW. When selected LOW, a WRITE is conducted. When selected HIGH, a READ is conducted.
Input/Control	CE₁ . Chip Enable 1, Active LOW.
Input/Control	CE₂ . Chip Enable 2, Active HIGH.
Input/Control	OE . Output Enable, Active LOW. Controls the direction of the I/O pins. When LOW, the I/O pins behave as outputs. When deasserted HIGH, I/O pins are three-stated, and act as input data pins
Ground	GND . Ground for the device
Power Supply	V_{CC} . Power supply for the device

Note:

- Typical values are included for reference only and are not tested or guaranteed. Typical values are an average of the distribution across normal production variations as measured at V_{CC} = 5.0V, T_A = 25°C, and t_{AA} = 70 ns.

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 (T_A) ^[4]	V_{CC}
Commercial	0°C to +70°C	5V ± 10%
Industrial	-40°C to +85°C	5V ± 10%
Automotive	-40°C to +125°C	5V ± 10%

Electrical Characteristics Over the Operating Range

Parameter	Description	Test Conditions	CY62128B-55			CY62128B-70			Unit
			Min.	Typ. ^[2]	Max.	Min.	Typ. ^[2]	Max.	
V_{OH}	Output HIGH Voltage	$V_{CC} = \text{Min.}, I_{OH} = -1.0 \text{ mA}$	2.4			2.4			V
V_{OL}	Output LOW Voltage	$V_{CC} = \text{Min.}, I_{OL} = 2.1 \text{ mA}$			0.4			0.4	V
V_{IH}	Input HIGH Voltage		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	V
I_{IX}	Input Load Current	$GND \leq V_I \leq V_{CC}$	-1		+1	-1		+1	μA
		Automotive				-10		+10	μA
I_{OZ}	Output Leakage Current	$GND \leq V_I \leq V_{CC}$, Output Disabled	-1		+1	-1		+1	μA
		Automotive				-10		+10	μA
I_{OS}	Output Short Circuit Current ^[5]	$V_{CC} = \text{Max.}, V_{OUT} = GND$			-300			-300	mA
I_{CC}	V_{CC} Operating Supply Current	$V_{CC} = \text{Max.}, I_{OUT} = 0 \text{ mA}, f = f_{MAX} = 1/t_{RC}$		7.5	20		6	15	mA
		Industrial, Commercial					6	25	mA
		Automotive					6	25	mA
I_{SB1}	Automatic CE Power-down Current —TTL Inputs	Max. V_{CC} , $\overline{CE}_1 \geq V_{IH}$ or $\overline{CE}_2 \leq V_{IL}$, $V_{IN} \geq V_{IH}$ or $V_{IN} \leq V_{IL}$, $f = f_{MAX}$		0.1	2		0.1	1	mA
		Industrial Commercial					0.1	2	mA
		Automotive					0.1	2	mA
I_{SB2}	Automatic CE Power-down Current —CMOS Inputs	Max. V_{CC} , $\overline{CE}_1 \geq V_{CC} - 0.3V$, or $\overline{CE}_2 \leq 0.3V$, $V_{IN} \geq V_{CC} - 0.3V$, or $V_{IN} \leq 0.3V$, $f = 0$		2.5	15		2.5	15	μA
		Industrial Commercial					2.5	15	μA
		Automotive					2.5	25	μA

Notes:

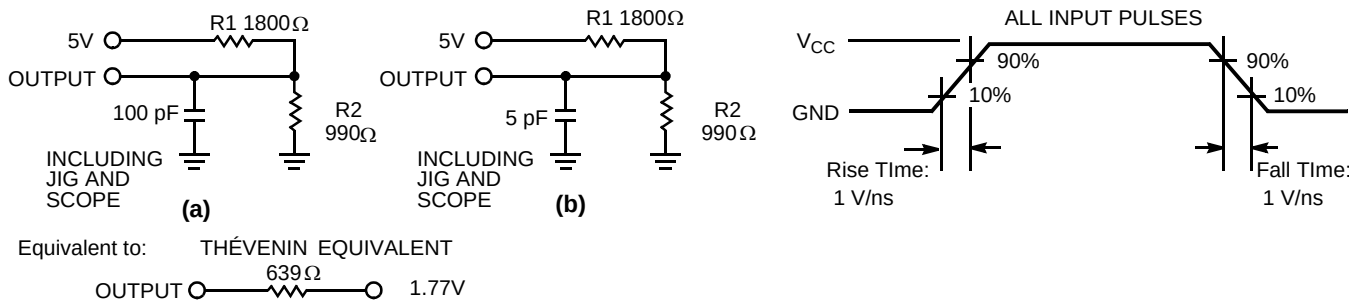
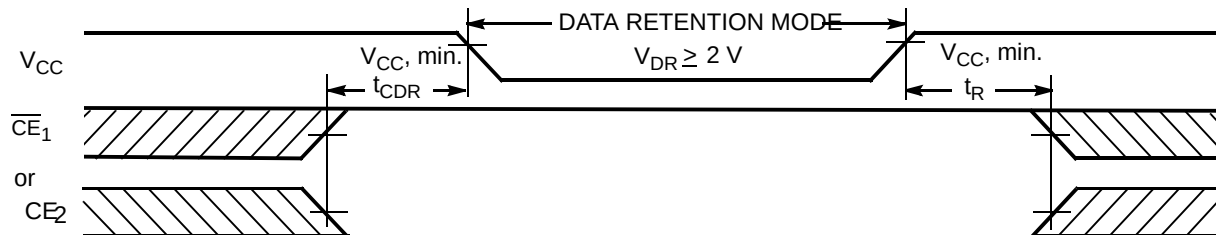
- V_{IL} (min.) = -2.0V for pulse durations of less than 20 ns.
- T_A is the "Instant On" case temperature.
- Not more than one output should be shorted at one time. Duration of the short circuit should not exceed 30 seconds.

Thermal Resistance^[6]

Parameter	Description	Test Conditions	32 SOIC	32 TSOP	32 STSOP	32 RTSOP	Unit
Θ_{JA}	Thermal Resistance (Junction to Ambient)	Test conditions follow standard test methods and procedures for measuring thermal impedance, per EIA / JESD51.	66.17	97.44	105.14	97.44	°C/W
Θ_{JC}	Thermal Resistance (Junction to Case)		30.87	26.05	14.09	26.05	°C/W

Capacitance^[6]

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

AC Test Loads and Waveforms

Data Retention Waveform

Data Retention Characteristics (Over the Operating Range for "LL" version only)

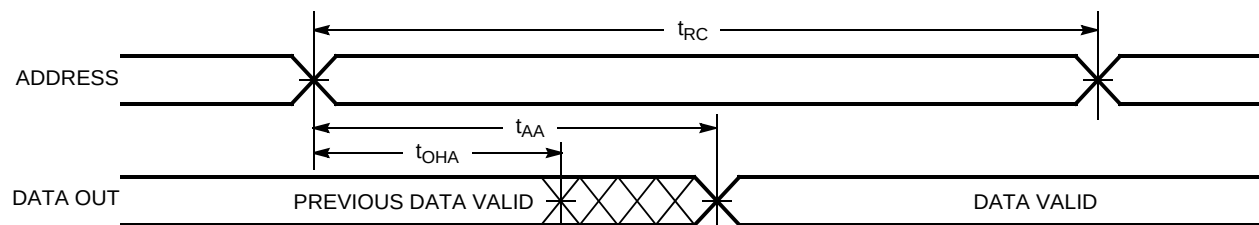
Parameter	Description	Conditions	Min.	Typ.	Max.	Unit
V_{DR}	V_{CC} for Data Retention		2.0			V
I_{CCDR}	Data Retention Current	$V_{CC} = V_{DR} = 2.0\text{V}$, $\overline{CE}_1 \geq V_{CC} - 0.3\text{V}$, or $CE_2 \leq 0.3\text{V}$, $V_{IN} \geq V_{CC} - 0.3\text{V}$ or, $V_{IN} \leq 0.3\text{V}$		1.5	15	μA
t_{CDR}	Chip Deselect to Data Retention Time		0			ns
t_R	Operation Recovery Time		70			ns

Note:

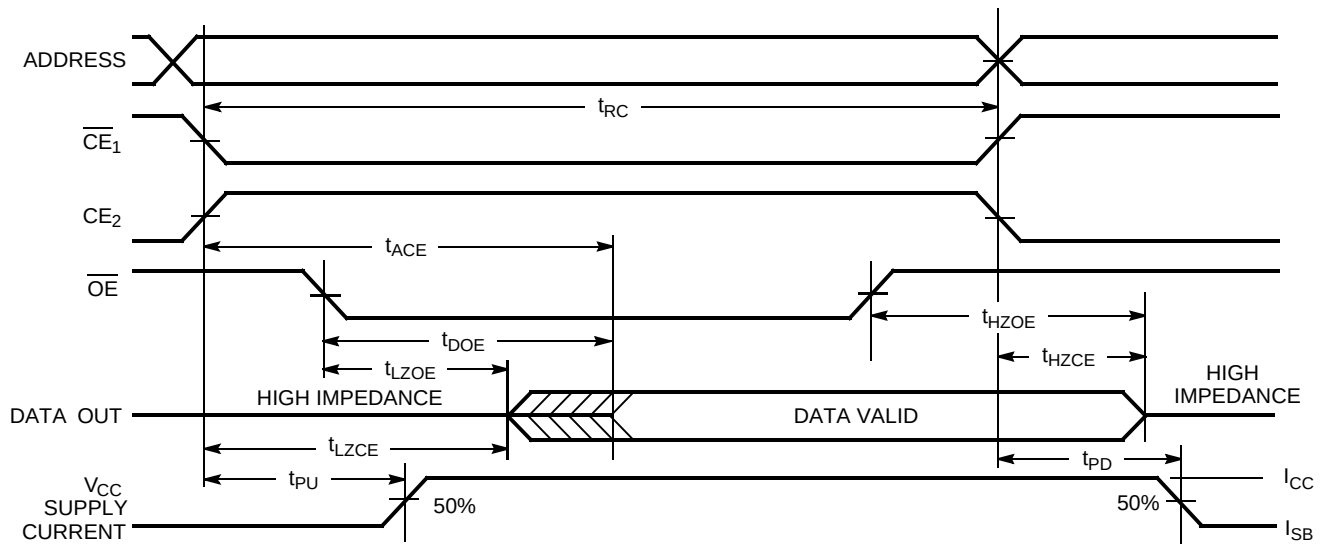
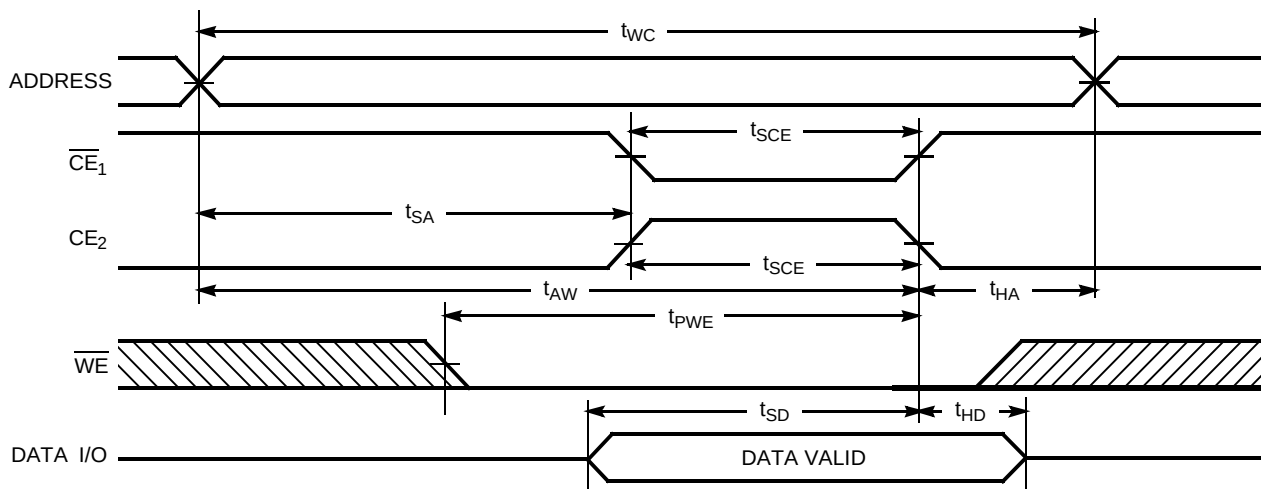
6. Tested initially and after any design or process changes that may affect these parameters.

Switching Characteristics^[7] Over the Operating Range

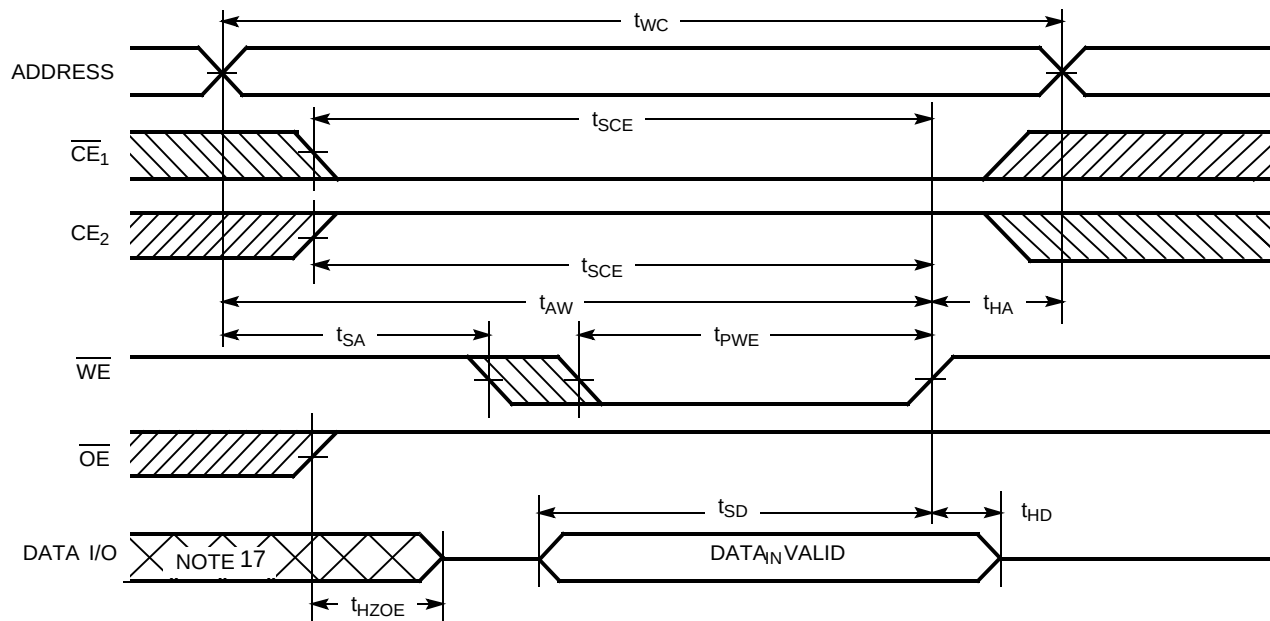
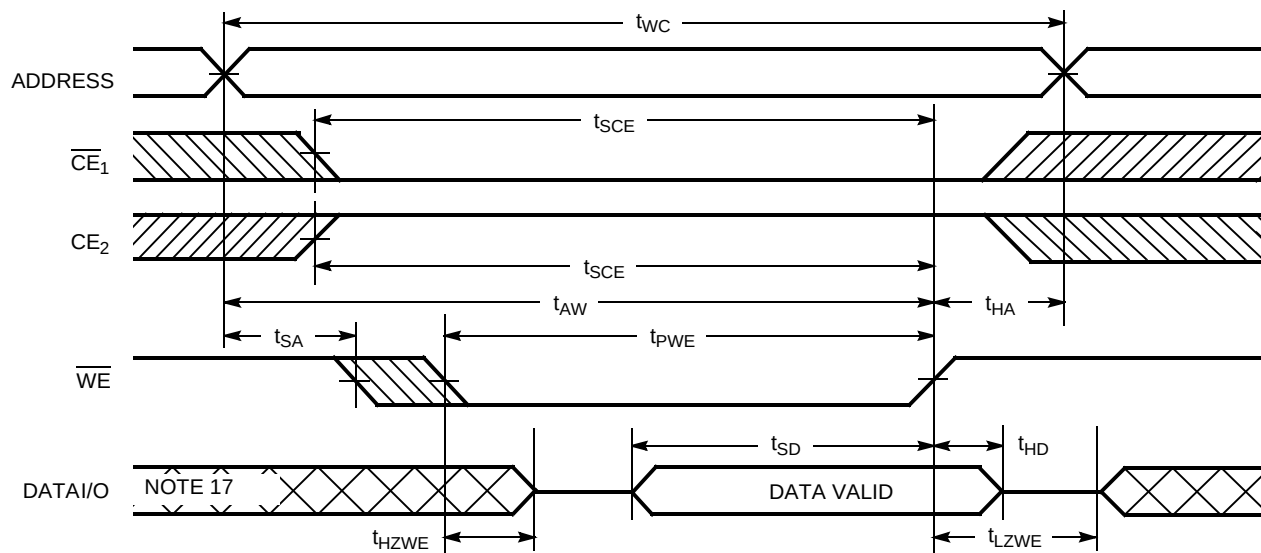
Parameter	Description	62128B-55		62128B-70		Unit
		Min.	Max.	Min.	Max.	
READ CYCLE						
t _{RC}	Read Cycle Time	55		70		ns
t _{AA}	Address to Data Valid		55		70	ns
t _{OHA}	Data Hold from Address Change	5		5		ns
t _{ACE}	$\overline{CE}_1$ LOW to Data Valid, CE ₂ HIGH to Data Valid		55		70	ns
t _{DOE}	$\overline{OE}$ LOW to Data Valid		20		35	ns
t _{LZOE}	$\overline{OE}$ LOW to Low Z	0		0		ns
t _{HZOE}	$\overline{OE}$ HIGH to High Z ^[7, 9]		20		25	ns
t _{LZCE}	$\overline{CE}_1$ LOW to Low Z, CE ₂ HIGH to Low Z ^[9]	5		5		ns
t _{HZCE}	$\overline{CE}_1$ HIGH to High Z, CE ₂ LOW to High Z ^[8, 9]		20		25	ns
t _{PU}	$\overline{CE}_1$ LOW to Power-up, CE ₂ HIGH to Power-up	0		0		ns
t _{PD}	$\overline{CE}_1$ HIGH to Power-down, CE ₂ LOW to Power-down		55		70	ns
WRITE CYCLE ^[10]						
t _{WC}	Write Cycle Time	55		70		ns
t _{SCE}	$\overline{CE}_1$ LOW to Write End, CE ₂ HIGH to Write End	45		60		ns
t _{AW}	Address Set-up to Write End	45		60		ns
t _{HA}	Address Hold from Write End	0		0		ns
t _{SA}	Address Set-up to Write Start	0		0		ns
t _{PWE}	$\overline{WE}$ Pulse Width	45		50		ns
t _{SD}	Data Set-up to Write End	25		30		ns
t _{HD}	Data Hold from Write End	0		0		ns
t _{LZWE}	$\overline{WE}$ HIGH to Low Z ^[9]	5		5		ns
t _{HZWE}	$\overline{WE}$ LOW to High Z ^[8, 9]		20		25	ns

Switching Waveforms
Read Cycle No.1^[12, 13]

Notes:

- 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 100-pF load capacitance.
- t_{HZOE} , t_{HZCE} , and t_{HZWE} are specified with a load capacitance of 5 pF as in (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.
- No input may exceed $V_{CC} + 0.5V_{CC}$.
- Device is continuously selected. $\overline{OE}$, $\overline{CE}_1 = V_{IL}$, $CE_2 = V_{IH}$.
- $\overline{WE}$ is HIGH for read cycle.

Switching Waveforms (continued)
Read Cycle No. 2 ($\overline{\text{OE}}$ Controlled)^[13, 14]

Write Cycle No. 1 ($\overline{\text{CE}}_1$ or CE_2 Controlled)^[15, 16]

Notes:

14. Address valid prior to or coincident with $\overline{\text{CE}}_1$ transition LOW and CE_2 transition HIGH.
15. Data I/O is high impedance if $\overline{\text{OE}} = V_{IH}$.
16. If $\overline{\text{CE}}_1$ goes HIGH or CE_2 goes LOW simultaneously with $\overline{\text{WE}}$ going HIGH, the output remains in a high-impedance state.

Switching Waveforms (continued)
Write Cycle No. 2 ($\overline{WE}$ Controlled, $\overline{OE}$ HIGH During Write)^[15, 16]

Write Cycle No.3 ($\overline{WE}$ Controlled, $\overline{OE}$ LOW)^[15, 16]

Note:

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

Truth Table

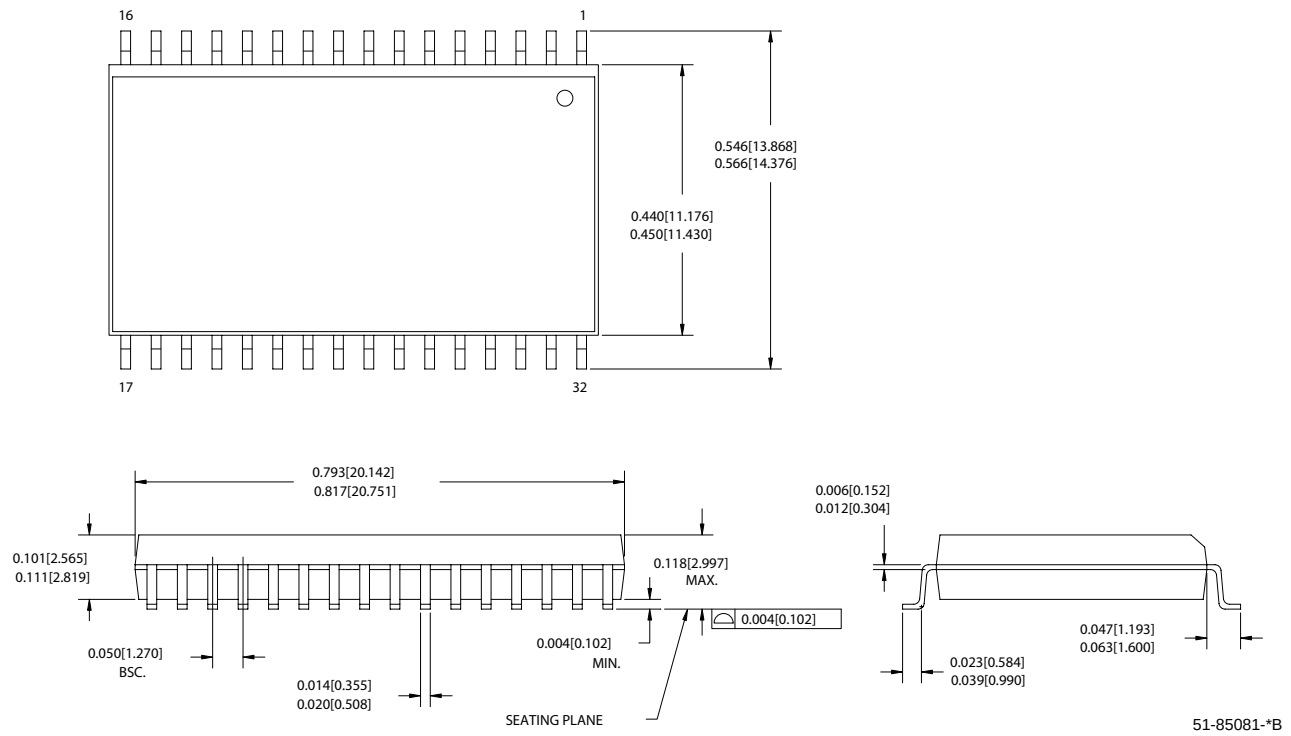
$\overline{CE}_1$	$\overline{CE}_2$	$\overline{OE}$	$\overline{WE}$	I/O ₀ –I/O ₇	Mode	Power
H	X	X	X	High Z	Power-down	Standby (I _{SB})
X	L	X	X	High Z	Power-down	Standby (I _{SB})
L	H	L	H	Data Out	Read	Active (I _{CC})
L	H	X	L	Data In	Write	Active (I _{CC})
L	H	H	H	High Z	Selected, Outputs Disabled	Active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

Ordering Information

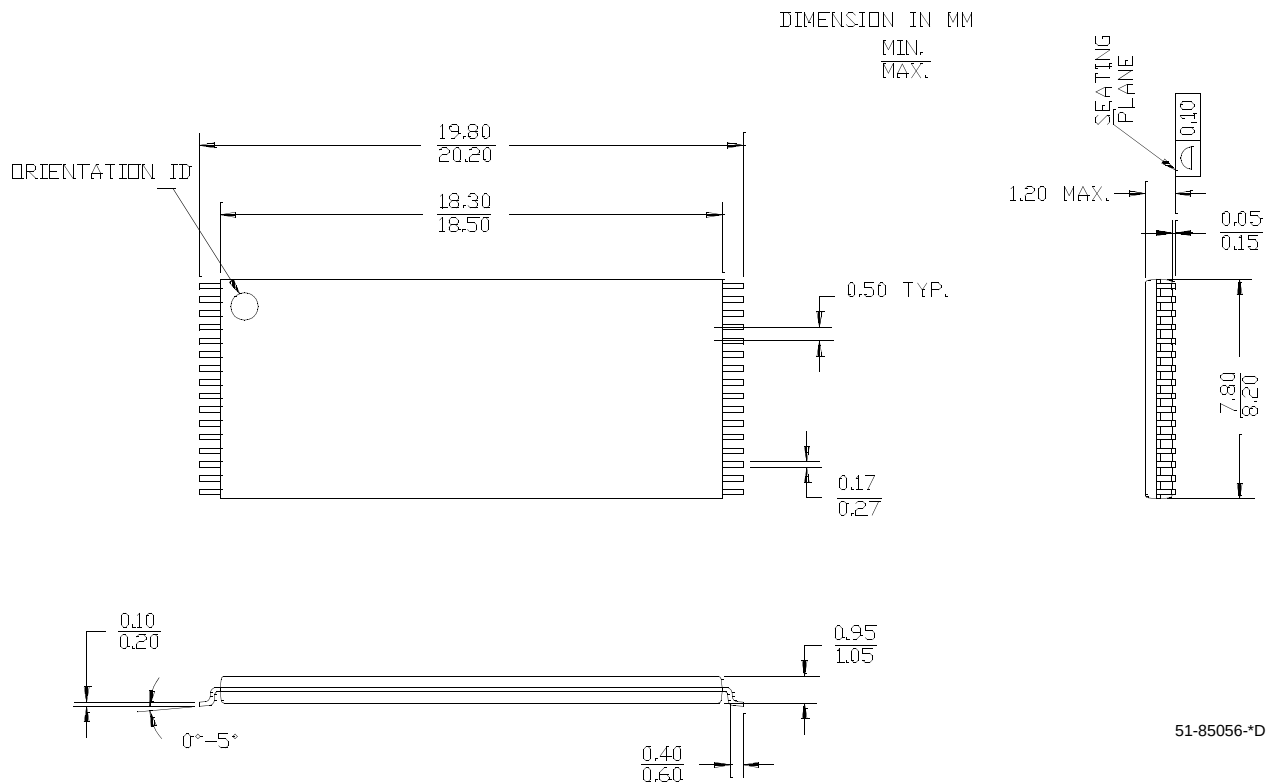
Speed (ns)	Ordering Code	Package Name	Package Type	Operating Range
55	CY62128BLL-55SI	S34	32-Lead 450-Mil SOIC	Industrial
	CY62128BLL-55SXI	S34	32-Lead 450-Mil SOIC (Pb-Free)	Industrial
	CY62128BLL-55SC	S34	32-Lead 450-Mil SOIC	Commercial
	CY62128BLL-55SXC	S34	32-Lead 450-Mil SOIC (Pb-Free)	Commercial
	CY62128BLL-55ZI	Z32	32-Lead TSOP Type I	Industrial
	CY62128BLL-55ZXI	Z32	32-Lead TSOP Type I (Pb-Free)	Industrial
	CY62128BLL-55ZAI	ZA32	32-Lead STSOP Type I	Industrial
	CY62128BLL-55ZAXI	ZA32	32-Lead STSOP Type I (Pb-Free)	Industrial
	CY62128BLL-55ZRI	ZR32	32-Lead Reverse TSOP Type I	Industrial
70	CY62128BLL-70SI	S34	32-Lead 450-Mil SOIC I	Industrial
	CY62128BLL-70SXI	S34	32-Lead 450-Mil SOIC I (Pb-Free)	Industrial
	CY62128BLL-70SC	S34	32-Lead 450-Mil SOIC I	Commercial
	CY62128BLL-70SXC	S34	32-Lead 450-Mil SOIC I (Pb-Free)	Commercial
	CY62128BLL-70SE	S34	32-Lead 450-Mil SOIC I	Automotive
	CY62128BLL-70SXE	S34	32-Lead 450-Mil SOIC I (Pb-Free)	Automotive
	CY62128BLL-70ZI	Z32	32-Lead TSOP Type I	Industrial
	CY62128BLL-70ZC	Z32	32-Lead TSOP Type I	Commercial
	CY62128BLL-70ZE	Z32	32-Lead TSOP Type I	Automotive
	CY62128BLL-70ZXE	Z32	32-Lead TSOP Type I (Pb-Free)	Automotive
	CY62128BLL-70ZAI	ZA32	32-Lead STSOP Type I	Industrial
	CY62128BLL-70ZAXI	ZA32	32-Lead STSOP Type I (Pb-Free)	Industrial
	CY62128BLL-70ZAE	ZA32	32-Lead STSOP Type I	Automotive
	CY62128BLL-70ZAXE	ZA32	32-Lead STSOP Type I (Pb-Free)	Automotive
	CY62128BLL-70ZRXE	ZR32	32-Lead Reverse TSOP Type I (Pb-Free)	Automotive

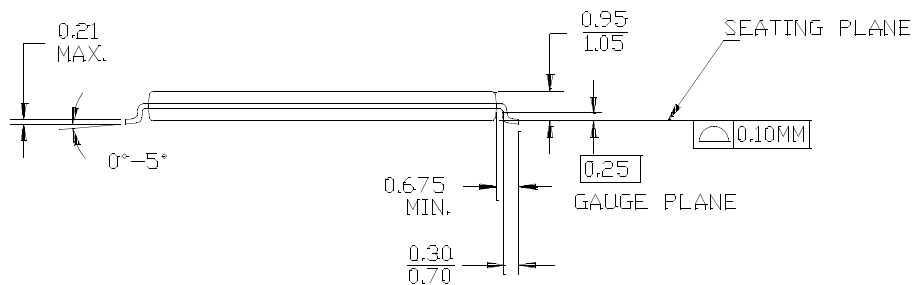
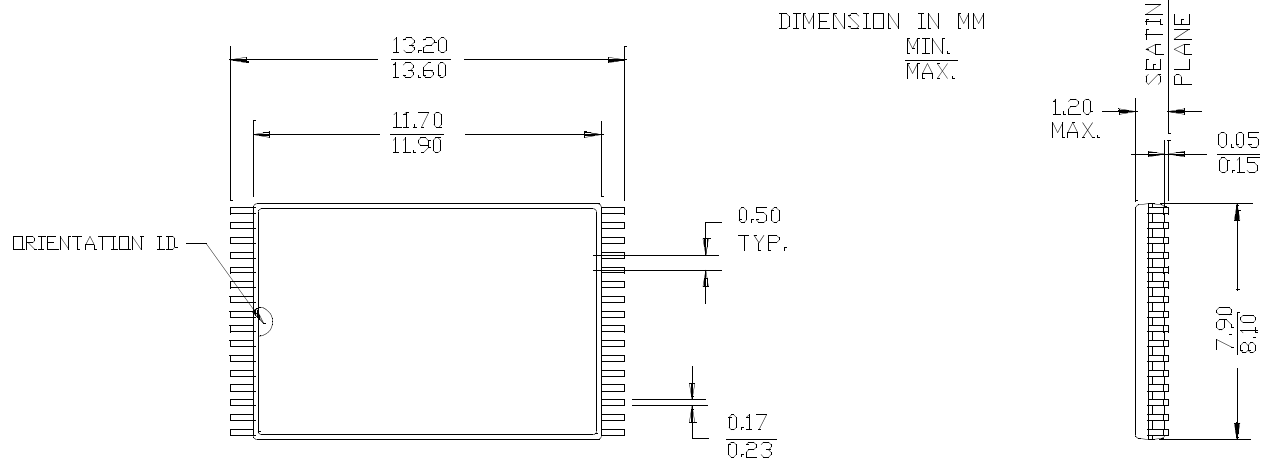
Package Diagrams

32-Lead (450 MIL) Molded SOIC S34

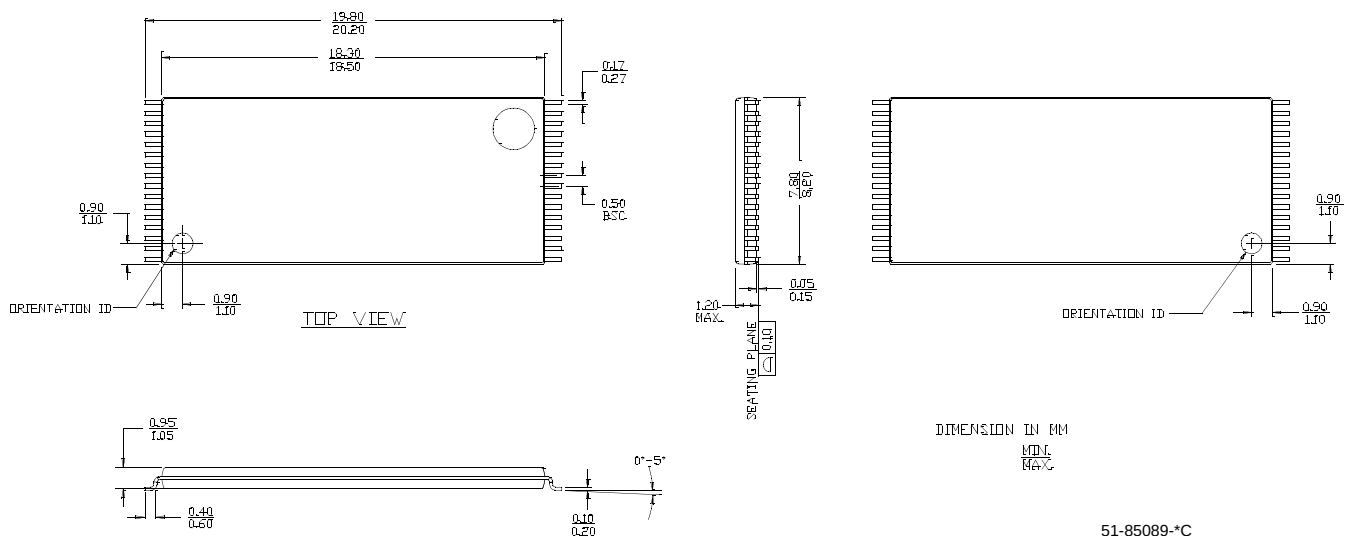


32-Lead Thin Small Outline Package Type I (8x20 mm) Z32



Package Diagrams (continued)
32-Lead Shrunken Thin Small Outline Package (8x13.4 mm) ZA32


51-85094-*D

32-Lead Reverse Thin Small Outline Package ZR32


51-85089-*C

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Document History Page

Document Title: CY62128B MoBL [®] 1-Mbit (128K x 8) Static RAM Document Number: 38-05300				
REV.	ECN NO.	Issue Date	Orig. of Change	Description of Change
**	116566	06/20/02	DSG	Changed from Spec number: 38-00524 to 38-05300
*A	126601	06/09/03	JUI	Changed CE to CE ₁ and added CE ₂ ≤ 0.3V in Data Retention Characteristics table Removed these part numbers from Ordering Information table: CY62128BLL-55ZC, CY62128BLL-55ZAC, CY62128BLL-55ZRC, CY62128BLL-70ZAC, CY62128BLL-70ZRI, CY62128BLL-70ZRC
*B	239134	See ECN	AJU	Added Thermal Resistance table Added Automotive product information
*C	334398	See ECN	SYT	Added Pb-Free part numbers to the Ordering info on Page #8