



CYPRESS

CY62128V

128K x 8 Static RAM

Features

- **High Speed**
 - 55 ns and 70 ns availability
- **Low voltage range:**
 - 2.7V–3.6V
- **Low active power and standby power**
- **Easy memory expansion with CE and OE features**
- **TTL-compatible inputs and outputs**
- **Automatic power-down when deselected**
- **CMOS for optimum speed/power**

Functional Description

The CY62128V is composed of high-performance CMOS static RAMs organized as 128K 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. These devices have an

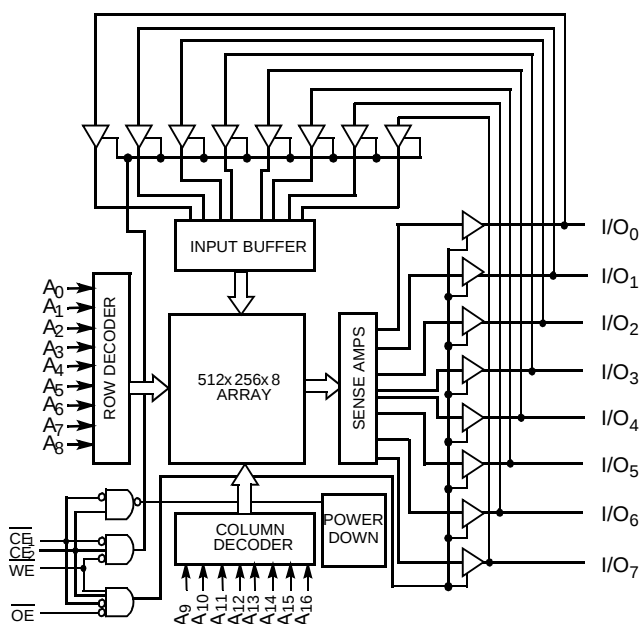
automatic power-down feature, reducing the power consumption by over 99% when deselected. The CY62128V is available in the standard 450-mil-wide SOIC, 32-lead TSOP-I, and STSOP packages.

Writing to the device is accomplished by taking Chip Enable one ($\overline{CE}_1$) and Write Enable (WE) inputs LOW and the Chip Enable two (CE_2) input HIGH. 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_{16}).

Reading from the device is accomplished by taking Chip Enable one ($\overline{CE}_1$) and Output Enable ($\overline{OE}$) LOW while forcing Write Enable ($\overline{WE}$) and Chip Enable two (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/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).

Logic Block Diagram



Pin Configurations

Top View SOIC

NC	1	32	VCC
A ₁₆	2	31	A ₁₅
A ₁₄	3	30	CE ₂
A ₁₂	4	29	WE
A ₇	5	28	A ₁₃
A ₆	6	27	A ₈
A ₅	7	26	A ₉
A ₄	8	25	A ₁₁
A ₃	9	24	OE
A ₂	10	23	A ₁₀
A ₁	11	22	CE ₁
A ₀	12	21	I/O ₇
I/O ₀	13	20	I/O ₆
I/O ₁	14	19	I/O ₅
I/O ₂	15	18	I/O ₄
GND	16	17	I/O ₃

A ₁₆	16	17	A ₃
A ₁₅	15	18	A ₂
A ₁₄	14	19	A ₁
A ₁₃	13	20	A ₀
A ₁₂	12	21	I/O ₇
A ₁₁	11	22	I/O ₆
A ₁₀	10	23	I/O ₅
VCC	9	24	GND
A ₁₅	8	25	I/O ₄
CE ₂	7	26	I/O ₃
WE	6	27	I/O ₂
A ₁₃	5	28	I/O ₁
A ₁₂	4	29	I/O ₀
A ₁₁	3	30	CE ₁
A ₁₀	2	31	A ₁₆
A ₉	1	32	OE

Reverse TSOP I
Top View
(not to scale)

A ₁₁	25	24	OE
A ₁₀	26	23	A ₁₆
A ₉	27	22	CE ₁
A ₈	28	21	I/O ₇
A ₇	29	20	I/O ₆
CE ₂	30	19	I/O ₅
A ₁₅	31	18	I/O ₄
VCC	32	17	I/O ₃
NC	1	16	GND
A ₁₆	2	15	I/O ₂
A ₁₅	3	14	I/O ₁
A ₁₄	4	13	I/O ₀
A ₁₃	5	12	A ₀
A ₁₂	6	11	A ₁
A ₁₁	7	10	A ₂
A ₁₀	8	9	A ₃

STSOP
Top View
(not to scale)

A ₁₁	1	32	OE
A ₁₀	2	31	A ₁₆
A ₉	3	30	CE ₁
A ₈	4	29	I/O ₇
A ₇	5	28	I/O ₆
CE ₂	6	27	I/O ₅
A ₁₅	7	26	I/O ₄
VCC	8	25	I/O ₃
NC	9	24	GND
A ₁₆	10	23	I/O ₂
A ₁₅	11	22	I/O ₁
A ₁₄	12	21	I/O ₀
A ₁₃	13	20	A ₀
A ₁₂	14	19	A ₁
A ₁₁	15	18	A ₂
A ₁₀	16	17	A ₃

TSOP I
Top View
(not to scale)

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 +4.6V

DC Voltage Applied to Outputs
in High Z State^[1] -0.5V to $V_{CC} + 0.5V$

DC Input Voltage^[1] -0.5V to $V_{CC} + 0.5V$

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	V_{CC}
Commercial	0°C to +70°C	2.7V to 3.6V
Industrial	-40°C to +85°C	2.7V to 3.6V

Product Portfolio

Product	V_{CC} Range			Speed	Power Dissipation (Commercial)			
					Operating (I_{CC})		Standby (I_{SB2})	
	Min.	Typ. ^[2]	Max.		Typ. ^[2]	Maximum	Typ. ^[2]	Maximum
CY62128V	2.7V	3.0V	3.6V	70 ns	20 mA	40 mA	0.4 μA	100 μA
				55 ns				

Notes:

- V_{IL} (min.) = -2.0V for pulse durations of less than 20 ns.
- Typical values are included for reference only and are not guaranteed or tested. Typical values are measured at $V_{CC} = V_{CC}$ Typ., $T_A = 25^\circ C$

Electrical Characteristics Over the Operating Range

Parameter	Description	Test Conditions	CY62128V-55/70			Unit
			Min.	Typ. ^[2]	Max.	
V _{OH}	Output HIGH Voltage	V _{CC} = Min., I _{OH} = -1.0 mA	2.4			V
V _{OL}	Output LOW Voltage	V _{CC} = Min., I _{OL} = 2.1 mA			0.4	V
V _{IH}	Input HIGH Voltage		2		V _{CC} + 0.5V	V
V _{IL}	Input LOW Voltage		-0.5		0.8	V
I _{IX}	Input Leakage Current	GND ≤ V _I ≤ V _{CC}	-1		1	μA
I _{OZ}	Output Leakage Current	GND ≤ V _O ≤ V _{CC} , Output Disabled	-1		1	μA
I _{CC}	V _{CC} Operating Supply Current	V _{CC} = Max., I _{OUT} = 0 mA, f = f _{MAX} = 1/t _{RC}	Com'l, 70 ns	20	40	mA
			Ind'l, 55 ns	23	50	
			Ind'l, 70 ns	20	40	
I _{SB1}	Automatic CE Power-Down Current—TTL Inputs	Max. V _{CC} , $\overline{CE} \geq V_{IH}$, V _{IN} ≥ V _{IH} or V _{IN} ≤ V _{IL} , f = f _{MAX}	Com'l, 70 ns	15	300	μA
			Com'l, 55 ns	17	350	
			Ind'l, 70ns	15	300	
I _{SB2}	Automatic CE Power-Down Current—CMOS Inputs	Max. V _{CC} , $\overline{CE} \geq V_{CC} - 0.3V$ V _{IN} ≥ V _{CC} - 0.3V or V _{IN} ≤ 0.3V, f = 0	Com'l	0.4	15	μA
			Ind'l		30	

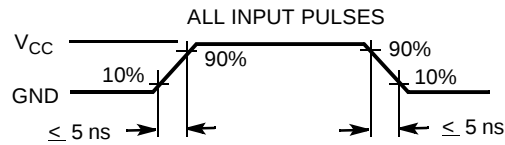
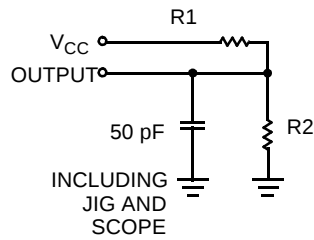
Capacitance^[3]

Parameter	Description	Test Conditions	Max.	Unit
C _{IN}	Input Capacitance	T _A = 25°C, f = 1 MHz, V _{CC} = 3.0V	6	pF
C _{OUT}	Output Capacitance		8	pF

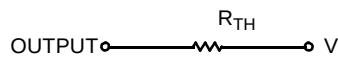
Note:

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

AC Test Loads and Waveforms



Equivalent to: THÉVENIN EQUIVALENT

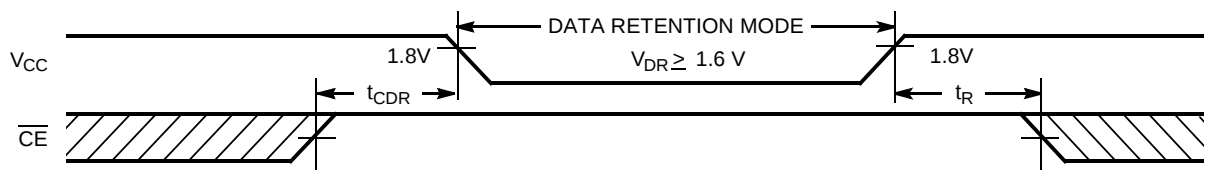


Parameters	3.3V	Unit
R1	1213	Ohms
R2	1378	Ohms
R _{TH}	645	Ohms
V _{TH}	1.75V	Volts

Data Retention Characteristics (Over the Operating Range)

Parameter	Description	Conditions ^[4]	Min.	Typ. ^[2]	Max.	Unit
V _{DR}	V _{CC} for Data Retention		1.6			V
I _{CCDR}	Data Retention Current	Com'l		0.4	10	μA
		Ind'l			20	
t _{CDR} ^[3]	Chip Deselect to Data Retention Time	V _{CC} = 2V CE ≥ V _{CC} - 0.3V, V _{IN} ≥ V _{CC} - 0.3V or V _{IN} ≤ 0.3V No input may exceed V _{CC} + 0.3V	0			ns
t _R	Operation Recovery Time		t _{RC}			ns

Data Retention Waveform



Note:

4. No input may exceed V_{CC} + 0.3V.

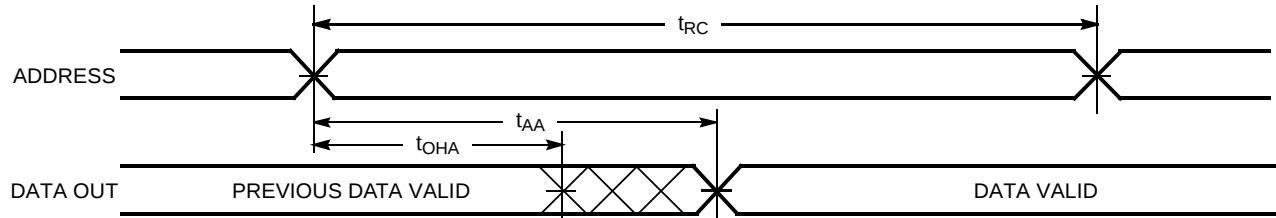
Switching Characteristics Over the Operating Range^[5]

Parameter	Description	CY62128V-55		CY62128V-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		10		ns
t _{ACE}	$\overline{CE}$ LOW 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 ^[6]	10		10		ns
t _{HZOE}	$\overline{OE}$ HIGH to High Z ^[6, 7]		20		25	ns
t _{LZCE}	$\overline{CE}$ LOW to Low Z ^[6]	10		10		ns
t _{HZCE}	$\overline{CE}$ HIGH to High Z ^[6, 7]		20		25	ns
t _{PU}	$\overline{CE}$ LOW to Power-Up	0		0		ns
t _{PD}	$\overline{CE}$ HIGH to Power-Down		55		70	ns
WRITE CYCLE ^[8, 9]						
t _{WC}	Write Cycle Time	55		70		ns
t _{SCE}	$\overline{CE}$ LOW 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		55		ns
t _{SD}	Data Set-Up to Write End	25		30		ns
t _{HD}	Data Hold from Write End	0		0		ns
t _{HZWE}	$\overline{WE}$ LOW to High Z ^[6, 7]		20		25	ns
t _{LZWE}	$\overline{WE}$ HIGH to Low Z ^[6]	5		5		ns

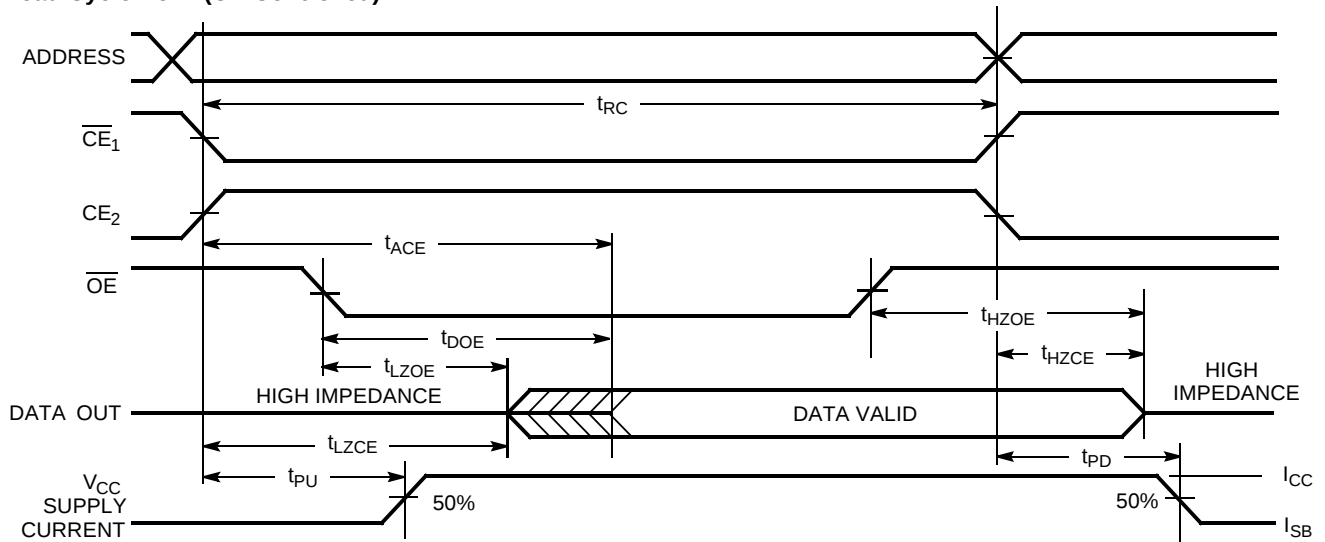
5. Test conditions assume signal transition time of 5 ns or less timing reference levels of 1.5V, input pulse levels of 0 to 3.0V, and output loading of the specified I_{OL}/I_{OH} and 100-pF load capacitance.
6. At any given temperature and voltage condition, t_{HZCE} is less than t_{LZCE} , t_{HZOE} is less than t_{LZOE} , and t_{HZWE} is less than t_{LZWE} for any given device.
7. 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 ± 200 mV from steady-state voltage.
8. 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. $\overline{CE}_1$ and $\overline{WE}$ signals must be LOW and $\overline{CE}_2$ HIGH 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.
9. The minimum write cycle time for write cycle #3 ($\overline{WE}$ controlled, $\overline{OE}$ LOW) is the sum of t_{HZWE} and t_{SD} .

Switching Waveforms

Read Cycle No. 1^[10, 11]

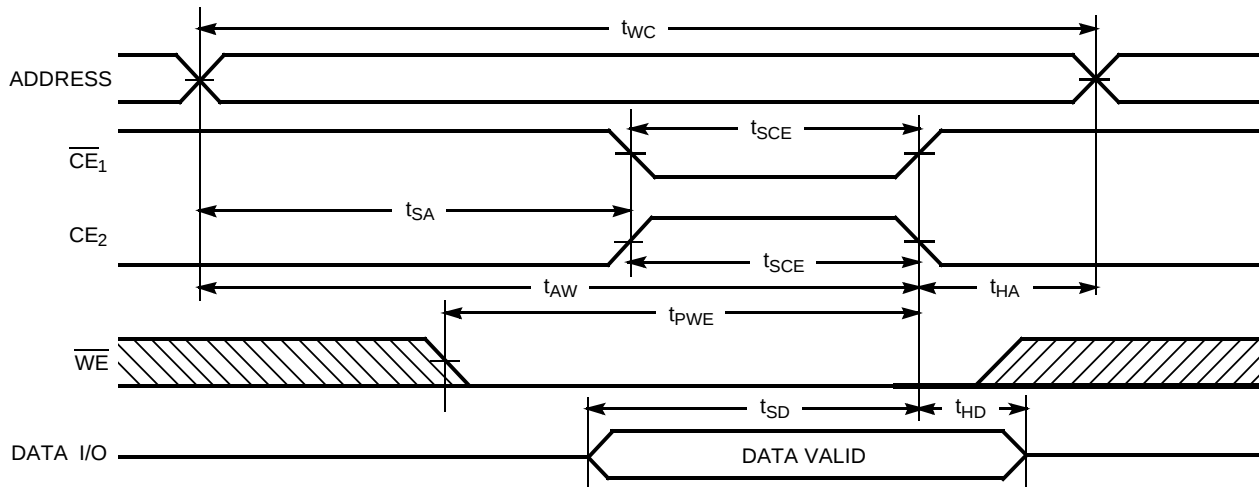
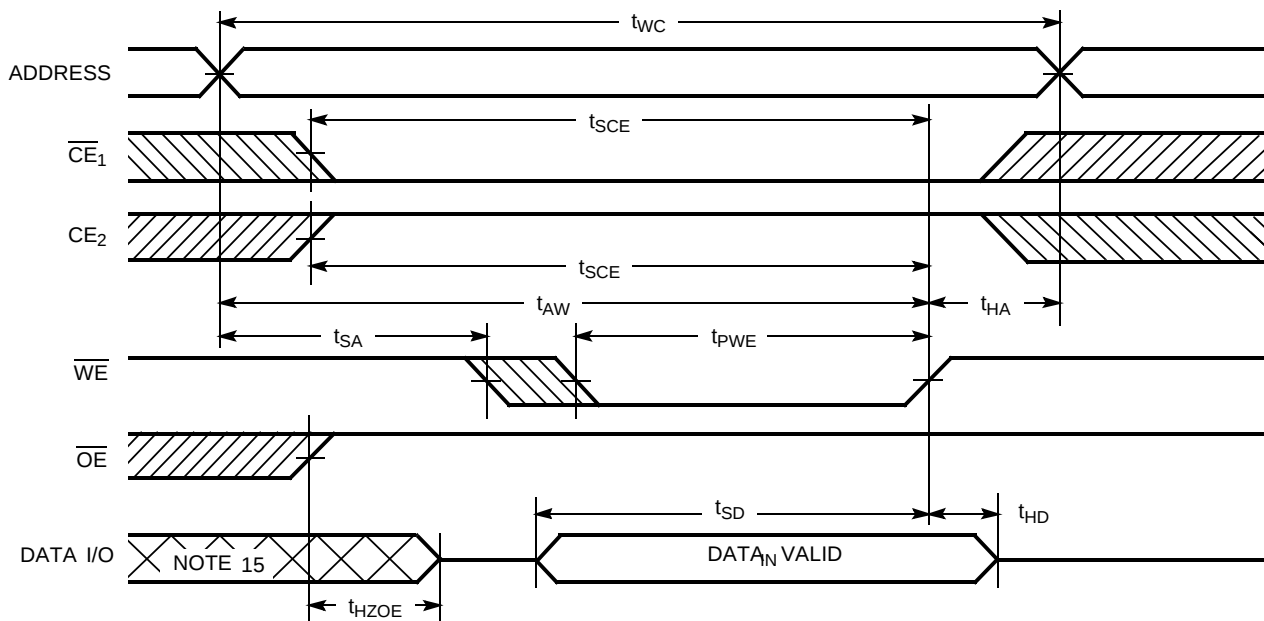


Read Cycle No. 2 ($\overline{OE}$ Controlled)^[11, 12]



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 $\overline{WE}$ HIGH, the output remains in a high-impedance state.
15. During this period, the I/Os are in output state and input signals should not be applied.

Truth Table

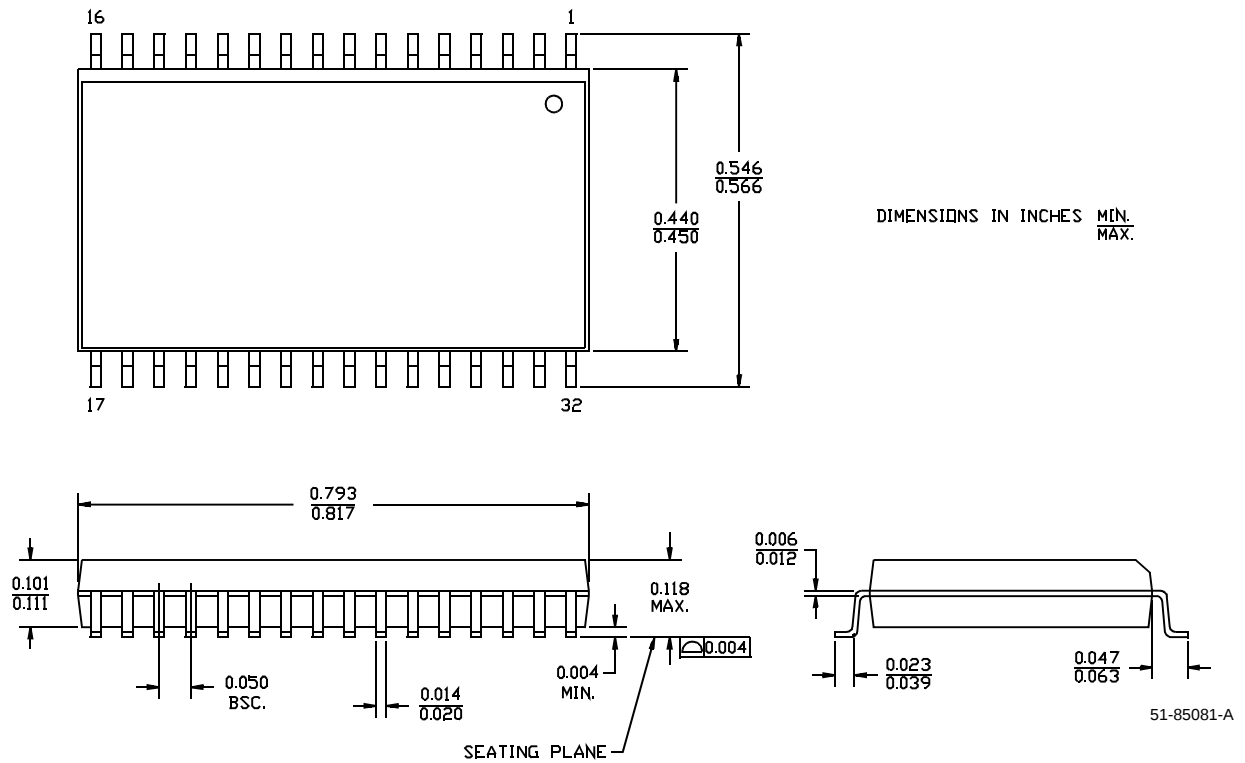
$\overline{CE}_1$	$\overline{CE}_2$	$\overline{OE}$	$\overline{WE}$	I/O ₀ –I/O ₇	Mode	Power
H	X	X	X	High Z	Power-Down	Standby (I _{SB})
X	L	X	X	High Z	Power-Down	Standby (I _{SB})
L	H	L	H	Data Out	Read	Active (I _{CC})
L	H	X	L	Data In	Write	Active (I _{CC})
L	H	H	H	High Z	Selected, Outputs Disabled	Active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

Ordering Information

Speed (ns)	Ordering Code	Package Name	Package Type	Operating Range
55	CY62128VLL-55SC	S34	32-Lead 450-Mil SOIC	Commercial
	CY62128VLL-55ZAI	ZA32	32-Lead STSOP Type 1	Industrial
	CY62128VLL-55ZI	Z32	32-Lead TSOP Type 1	
70	CY62128VLL-70SC	S34	32-Lead 450-Mil SOIC	Commercial
	CY62128VLL-70ZC	Z32	32-Lead TSOP Type 1	
	CY62128VLL-70ZAC	ZA32	32-Lead STSOP Type 1	
	CY62128VLL-70ZRC	ZR32	32-Lead Reverse TSOP Type 1	
	CY62128VLL-70SI	S34	32-Lead 450-Mil SOIC	Industrial
	CY62128VLL-70ZI	Z32	32-Lead TSOP Type 1	
	CY62128VLL-70ZAI	ZA32	32-Lead STSOP Type 1	
	CY62128VLL-70ZRI	ZR32	32-Lead Reverse TSOP Type 1	

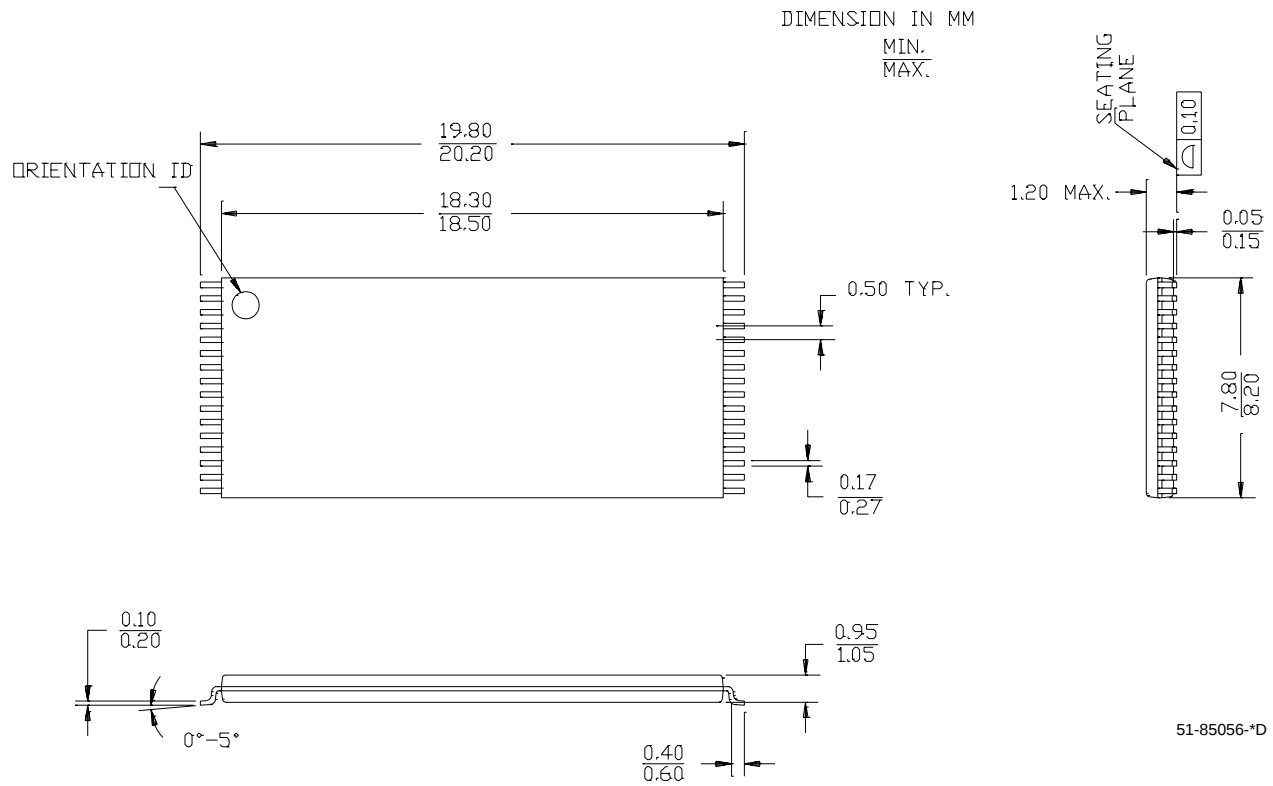
Package Diagrams

32-Lead (450 MIL) Molded SOIC S34



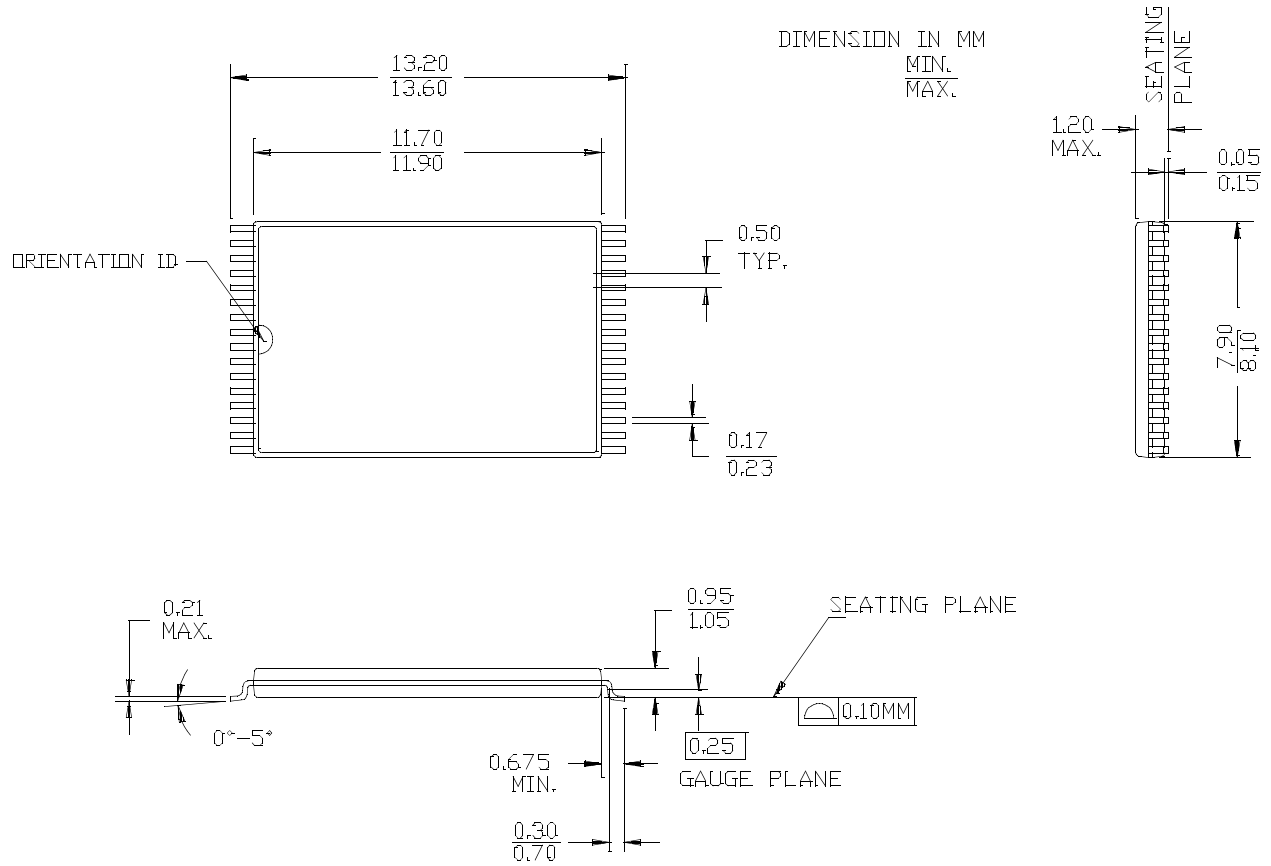
Package Diagrams

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



Package Diagrams

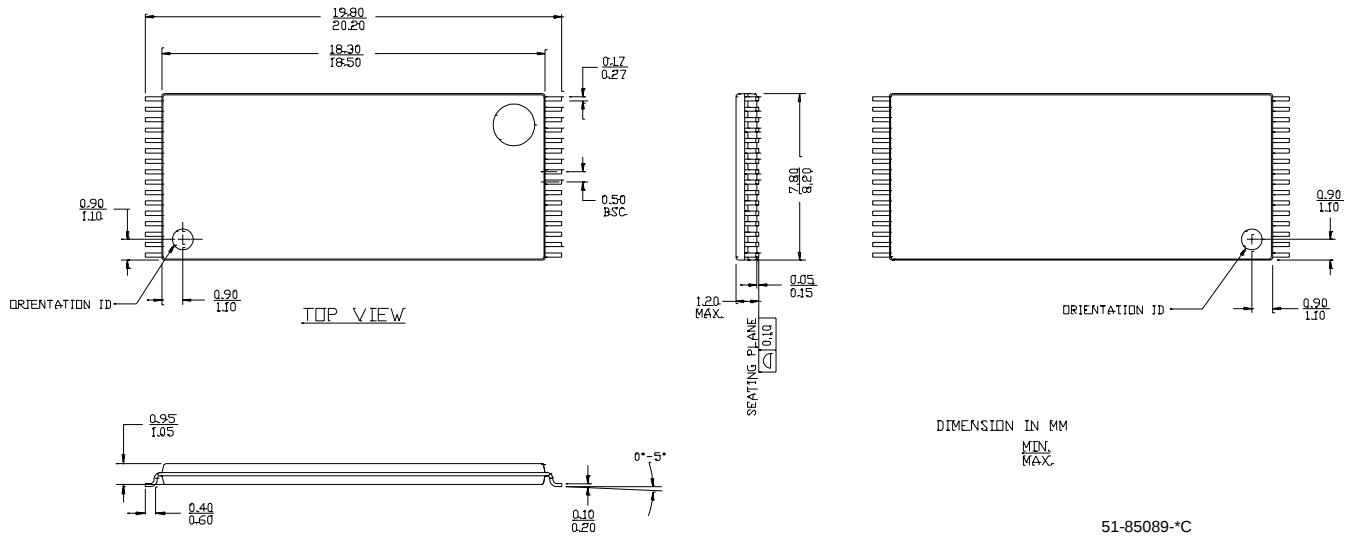
32-Lead Shrink Thin Small Outline Package (8x13.4 mm) ZA32



51-85094-*D

Package Diagrams

32-Lead Reverse Thin Small Outline Package ZR32



Document Title: CY62128V 128K x 8 Static RAM
Document Number: 38-05061

REV.	ECN NO.	Issue Date	Orig. of Change	Description of Change
**	107252	09/10/01	SZV	Change Spec number from 38-00547 to 38-05061
*A	111446	03/01/02	MGN	Remove obsolete parts. Change to standardized format.