CY62148B MoBL™

512K x 8 Static RAM

Features

- 4.5V–5.5V operation
- Low active power
  - Typical active current: 2.5 mA @ f = 1 MHz
  - Typical active current: 12.5 mA @ f = f_{max}
- Low standby current
- Automatic power-down when deselected
- TTL-compatible inputs and outputs
- Easy memory expansion with $\overline{CE}$ and $\overline{OE}$ features
- CMOS for optimum speed/power

Functional Description

The CY62148B is a high-performance CMOS static RAM organized as 512K words by 8 bits. Easy memory expansion is provided by an active LOW Chip Enable ($\overline{CE}$), 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 99% when deselected.

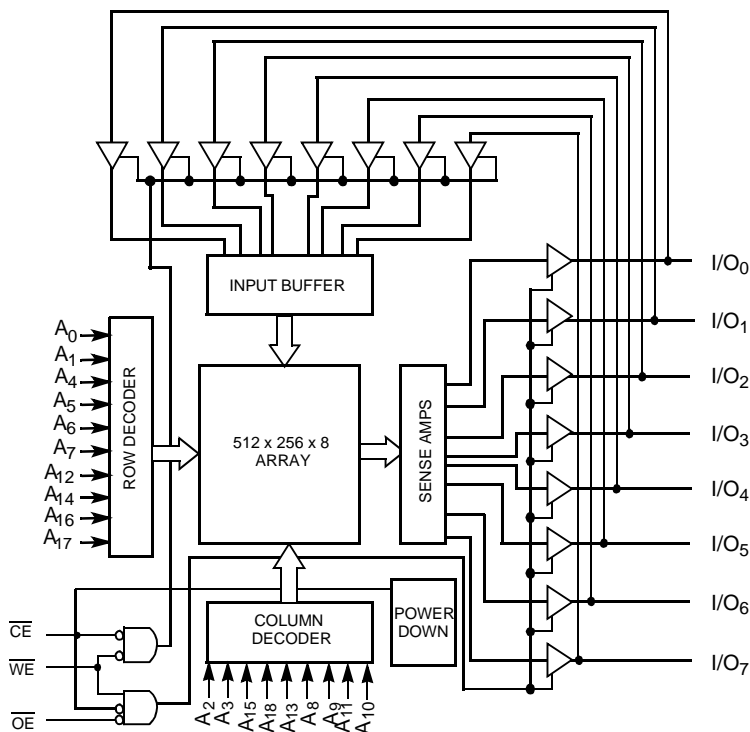Writing to the device is accomplished by taking Chip Enable ($\overline{CE}$) and Write Enable ($\overline{WE}$) inputs LOW. Data on the eight I/O pins (I/O$_0$ through I/O$_7$) is then written into the location specified on the address pins (A$_0$ through A$_{18}$).

Reading from the device is accomplished by taking Chip Enable ($\overline{CE}$) and Output Enable ($\overline{OE}$) LOW while forcing Write Enable ($\overline{WE}$) HIGH for read. 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 ($\overline{CE}$ HIGH), the outputs are disabled ($\overline{OE}$ HIGH), or during a write operation ($\overline{CE}$ LOW, and $\overline{WE}$ LOW).

The CY62148B is available in a standard 32-pin 450-mil-wide body width SOIC, 32-pin TSOP II, and 32-pin Reverse TSOP II packages.

Logic Block Diagram

Pin Configuration

Product Portfolio

Product	V_{CC} Range			Speed	Temp.	Power Dissipation			
						Operating, Icc		Standby (I_{SB2})	
						f = f_{max}			
	Min.	Typ.	Max.			Typ.[3]	Max.	Typ.[3]	Max.
CY62148BLL	4.5 V	5.0V	5.5V	70 ns	Com'l	12.5 mA	20 mA	4 µA	20 µA
					Ind'l				

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 .... –0.5V to +7.0V

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

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[2]	V_{CC}
Commercial	0°C to +70°C	4.5V–5.5V
Industrial	–40°C to +85°C	

Notes:
1. V_{IL} (min.) = –2.0V for pulse durations of less than 20 ns.
2. T_A is the "Instant On" case temperature
3. Typical values are measured at V_{CC} = 5V, T_A = 25°C, and are included for reference only and are not tested or guaranteed.

Electrical Characteristics Over the Operating Range

Parameter	Description	Test Conditions		CY62148B-70			Unit
				Min.	Typ.[3]	Max.	
V_{OH}	Output HIGH Voltage	V_{CC} = Min., I_{OH} = − 1 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			2.2		V_{CC}+0.3	V
V_{IL}	Input LOW Voltage			−0.3		0.8	V
I_{IX}	Input Leakage Current	GND $\le V_I \le V_{CC}$		−1		+1	μA
I_{OZ}	Output Leakage Current	GND $\le V_I \le V_{CC}$, Output Disabled		−1		+1	μA
I_{CC}	V_{CC} Operating Supply Current	f = f_{MAX} = $1/t_{RC}$	Com/Ind'l I_{OUT} =0 mA V_{CC} = Max.,		12.5	20	mA
		f = 1 MHz			2.5		mA
I_{SB1}	Automatic CE Power-Down Current —TTL Inputs	Max. V_{CC}, $\overline{CE} \ge V_{IH}$ $V_{IN} \ge V_{IH}$ or $V_{IN} \le V_{IL}$, f = f_{MAX}	Com/ Ind'l			1.5	mA
I_{SB2}	Automatic CE Power-Down Current —CMOS Inputs	Max. V_{CC}, $\overline{CE} \ge V_{CC}$ − 0.3V, $V_{IN} \ge V_{CC}$ − 0.3V, or $V_{IN} \le$ 0.3V, f =0	Com/ Ind'l		4	20	μA

Capacitance[4]

Parameter	Description	Test Conditions	Max.	Unit
C_{IN}	Input Capacitance	T_A = 25°C, f = 1 MHz, V_{CC} = 5.0V	6	pF
C_{OUT}	Output Capacitance		8	pF

AC Test Loads and Waveforms
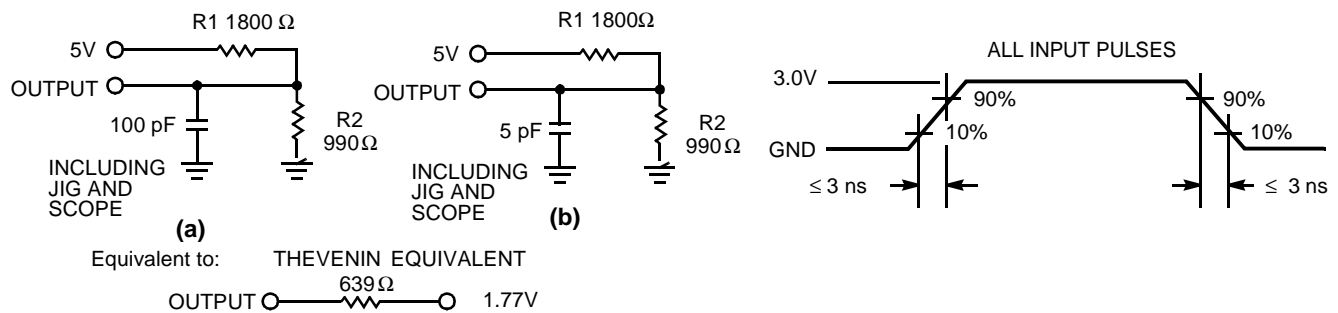
Note:
4. Tested initially and after any design or process changes that may affect these parameters.

Switching Characteristics[5] Over the Operating Range

| Parameter	Description	62148BLL-70 Min.	62148BLL-70 Max.	Unit
READ CYCLE				
t_{RC}	Read Cycle Time	70		ns
t_{AA}	Address to Data Valid		70	ns
t_{OHA}	Data Hold from Address Change	10		ns
t_{ACE}	$\overline{CE}$ LOW to Data Valid		70	ns
t_{DOE}	$\overline{OE}$ LOW to Data Valid		35	ns
t_{LZOE}	$\overline{OE}$ LOW to Low Z[6]	5		ns
t_{HZOE}	$\overline{OE}$ HIGH to High Z[6, 7]		25	ns
t_{LZCE}	$\overline{CE}$ LOW to Low Z[6]	10		ns
t_{HZCE}	$\overline{CE}$ HIGH to High Z[6, 7]		25	ns
t_{PU}	$\overline{CE}$ LOW to Power-Up	0		ns
t_{PD}	$\overline{CE}$ HIGH to Power-Down		70	ns
WRITE CYCLE[8]				
t_{WC}	Write Cycle Time	70		ns
t_{SCE}	$\overline{CE}$ LOW to Write End	60		ns
t_{AW}	Address Set-Up to Write End	60		ns
t_{HA}	Address Hold from Write End	0		ns
t_{SA}	Address Set-Up to Write Start	0		ns
t_{PWE}	$\overline{WE}$ Pulse Width	55		ns
t_{SD}	Data Set-Up to Write End	30		ns
t_{HD}	Data Hold from Write End	0		ns
t_{LZWE}	$\overline{WE}$ HIGH to Low Z[6]	5		ns
t_{HZWE}	$\overline{WE}$ LOW to High Z[6, 7]		25	ns

Notes:
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 a load capacitance of 5 pF as in part (b) of AC Test Loads. Transition is measured ±500 mV from steady-state voltage.
8. The internal write time of the memory is defined by the overlap of $\overline{CE}$ LOW, and $\overline{WE}$ LOW. CE and WE must be LOW 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.

## Data Retention Characteristics (Over the Operating Range)

Parameter	Description			Conditions	Min.	Typ.[3]	Max.	Unit
V_{DR}	V_{CC} for Data Retention				2.0			V
I_{CCDR}	Data Retention Current	Com'l	LL	No input may exceed V_{CC} + 0.3V $V_{CC} = V_{DR}$ = 3.0V $\overline{CE}$ > V_{CC} − 0.3V V_{IN} > V_{CC} − 0.3V or V_{IN} < 0.3V			20	µA
		Ind'l	LL				20	µA
t_{CDR}[4]	Chip Deselect to Data Retention Time				0			ns
t_R[9]	Operation Recovery Time				t_{RC}			ns

Data Retention Waveform
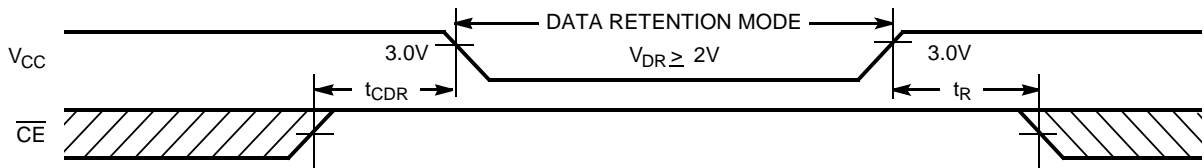
Switching Waveforms

Read Cycle No.1[10, 11]
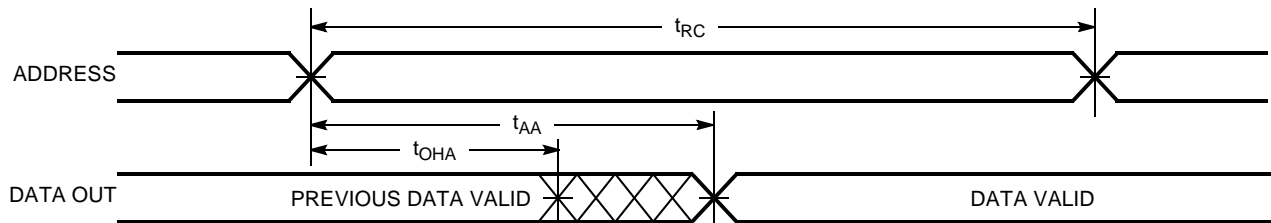
Read Cycle No. 2 ($\overline{OE}$ Controlled)[11, 12]
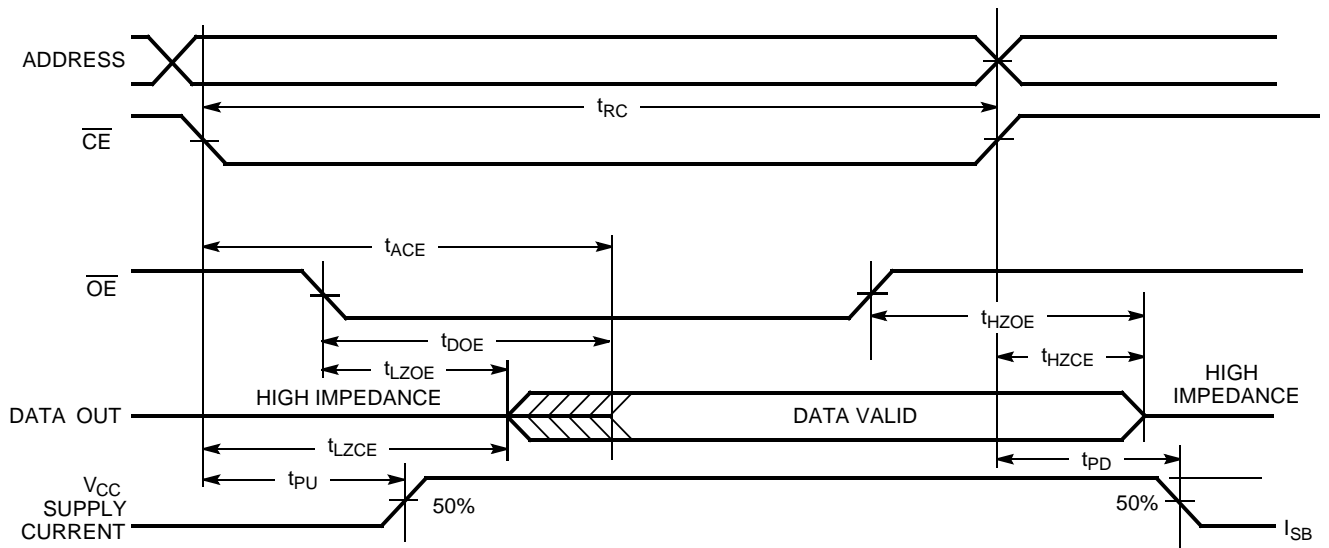
Notes:
9. Full Device operatin requires linear V_{CC} ramp from V_{DR} to $V_{CC(min)}$ ≥ 100 µs or stable at $V_{cc(min)}$ ≥ 100 µs.
10. Device is continuously selected. $\overline{OE}$, $\overline{CE}$ = V_{IL}.
11. $\overline{WE}$ is HIGH for read cycle.
12. Address valid prior to or coincident with $\overline{CE}$ transition LOW.

Switching Waveforms (continued)

Write Cycle No. 1 ($\overline{CE}$ Controlled)[13]
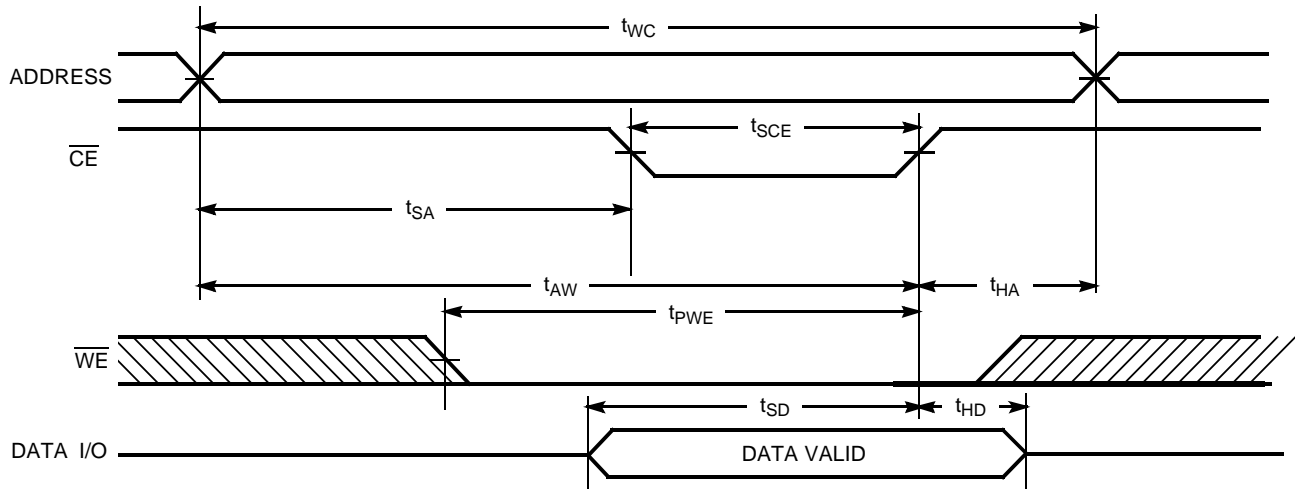
Write Cycle No. 2 ($\overline{WE}$ Controlled, $\overline{OE}$ HIGH During Write)[13, 14]
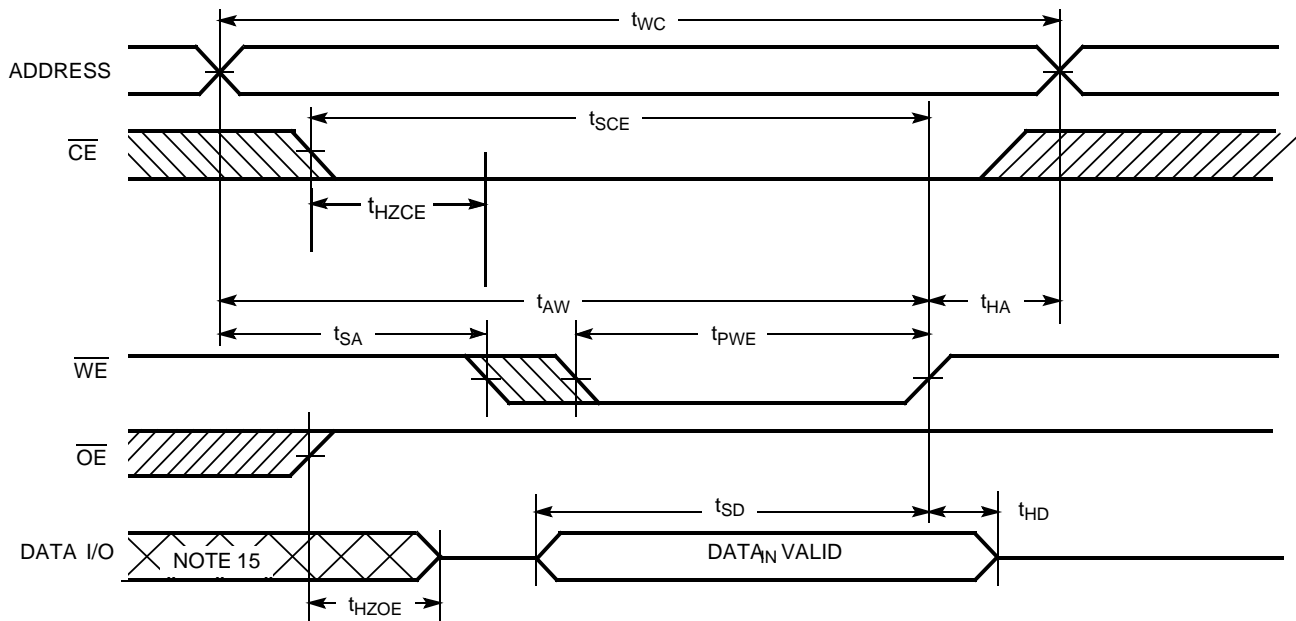
Notes:
13. If $\overline{CE}$ goes HIGH simultaneously with $\overline{WE}$ going HIGH, the output remains in a high-impedance state.
14. Data I/O is high-impedance if $\overline{OE} = V_{IH}$.
15. During this period the I/Os are in the output state and input signals should not be applied.

Switching Waveforms (continued)

Write Cycle No.3 ($\overline{WE}$ Controlled, $\overline{OE}$ LOW)[13, 14]
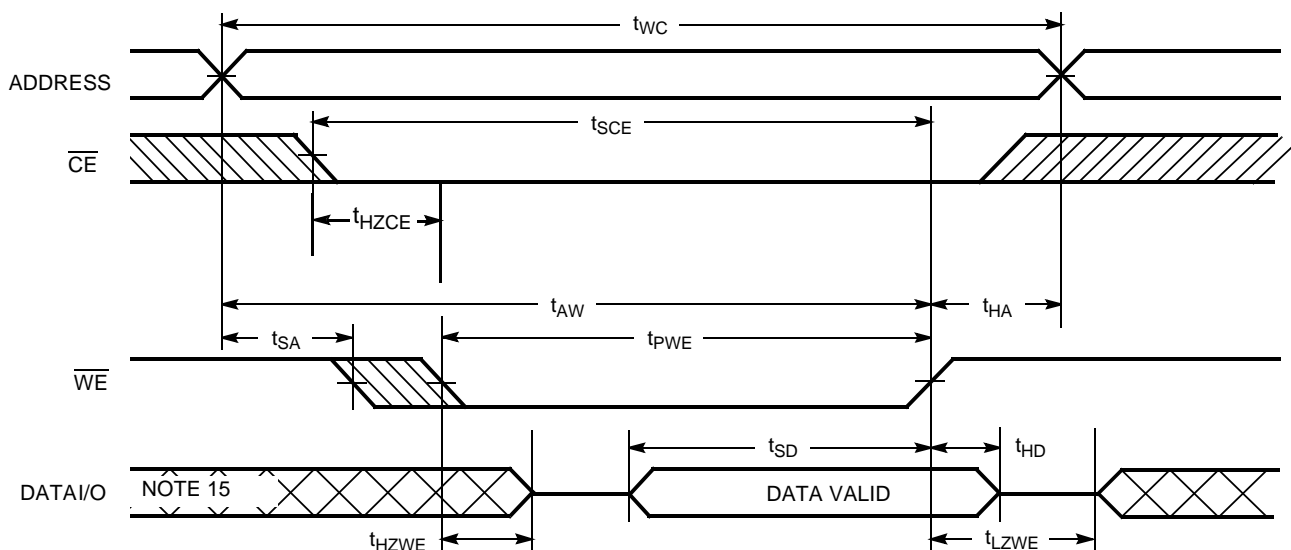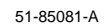

Truth Table

$\overline{CE}$	$\overline{OE}$	$\overline{WE}$	I/O$_0$ – I/O$_7$	Mode	Power
H	X	X	High Z	Power-Down	Standby (I_{SB})
L	L	H	Data Out	Read	Active (I_{CC})
L	X	L	Data In	Write	Active (I_{CC})
L	H	H	High Z	Selected, Outputs Disabled	Active (I_{CC})

Ordering Information

Speed (ns)	Ordering Code	Package Name	Package Type	Operating Range
70	CY62148BLL-70SC	S34	32-Lead (450-Mil) Molded SOIC	Commercial
	CY62148BLL-70ZC	ZS32	32-Lead TSOP II	
	CY62148BLL-70ZRC	ZU32	32-Lead RTSOP II	
	CY62148BLL-70SI	S34	32-Lead (450-Mil) Molded SOIC	Industrial
	CY62148BLL-70ZI	ZS32	32-Lead TSOP II	
	CY62148BLL-70ZRI	ZU32	32-Lead RTSOP II	

Package Diagrams

32-Lead (450 MIL) Molded SOIC S34

DIMENSIONS IN INCHES $\frac{MIN.}{MAX.}$

51-85081-A

Package Diagrams (continued)

32-Lead TSOP II ZS32

TOP VIEW

DIMENSIONS IN MILLIMETERS $\frac{MIN.}{MAX.}$

DETAIL 'A'

51-85095
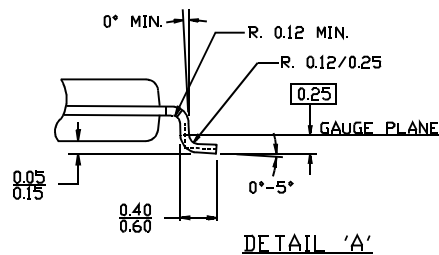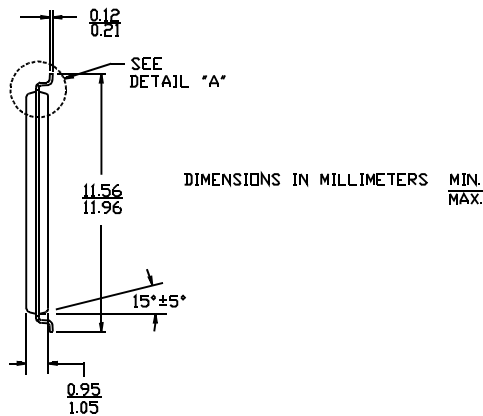
Package Diagrams (continued)

32-Lead Reverse Thin Small Outline Package Type II ZU32

DIMENSIONS IN MILLIMETERS $\frac{MIN.}{MAX.}$

TOP VIEW

BOTTOM VIEW

DETAIL 'A'
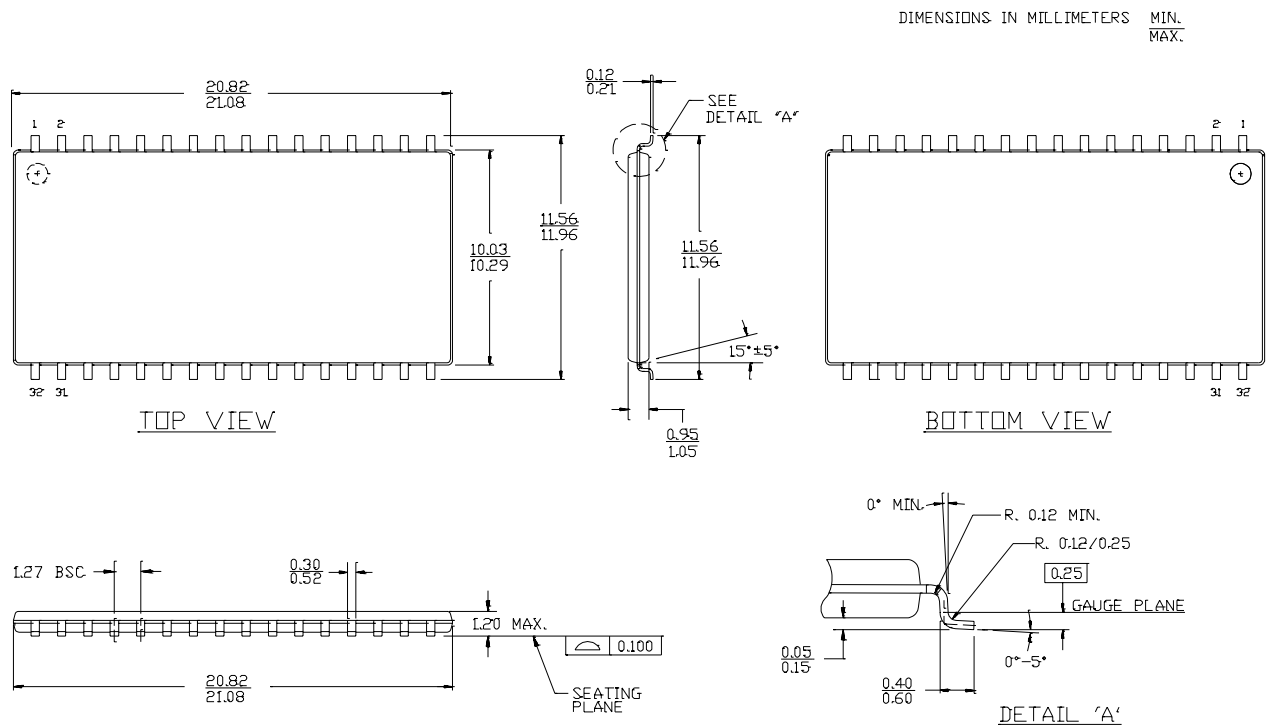
51-85138-**

Document Title: CY62148B 512K x 8 Static RAM				
Document Number: 38-05039				
REV.	**ECN NO.**	**Issue Date**	**Orig. of Change**	**Description of Change**
**	106833	05/01/01	SZV	Change from Spec number 38-01104 to 38-05039
*A	106970	07/16/01	GAV	Modified annotations on Pin Configurations; t_{SD} = 30 ns
*B	109766	10/09/01	MGN	Remove 55-ns devices