CY62128DV30

MoBL®

1 Mb (128K x 8) Static RAM

Features

- **Very high speed: 55 and 70 ns**
- **Wide voltage range: 2.2V to 3.6V**
- **Pin compatible with CY62128V**
- **Ultra-low active power**
  - **Typical active current: 0.85 mA @ f = 1 MHz**
  - **Typical active current: 5 mA @ f = f_{MAX}**
- **Ultra-low standby power**
- **Easy memory expansion with $\overline{CE}_1$, CE_2, and $\overline{OE}$ features**
- **Automatic power-down when deselected**
- **Packages offered in a 32-lead SOIC, a 32-lead TSOP, a 32-lead Short TSOP, and a 32-lead Reverse TSOP**

Functional Description[1]

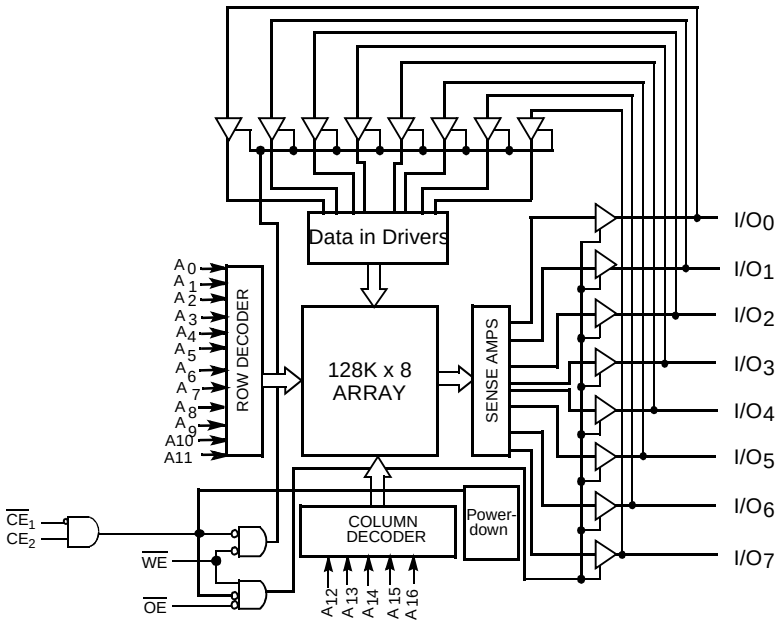
The CY62128DV30 is a high-performance CMOS static RAM organized as 128K words by 8 bits. This device features advanced circuit design to provide ultra-low active current. This is ideal for providing More Battery Life™ (MoBL®) in portable applications such as cellular telephones. The device also has an automatic power-down feature that significantly reduces power consumption by 90% when addresses are not toggling. The device can be put into standby mode reducing power consumption by more than 99% when deselected Chip Enable 1 ($\overline{CE}_1$) HIGH or Chip Enable 2 (CE_2) LOW. The input/output pins (I/O_0 through I/O_7) are placed in a high-impedance state when: deselected Chip Enable 1 ($\overline{CE}_1$) HIGH or Chip Enable 2 (CE_2) LOW, outputs are disabled ($\overline{OE}$ HIGH), or during a write operation (Chip Enable 1 ($\overline{CE}_1$) LOW and Chip Enable 2 (CE_2) HIGH and Write Enable ($\overline{WE}$) LOW).

Writing to the device is accomplished by taking Chip Enable 1 ($\overline{CE}_1$) LOW with Chip Enable 2 (CE_2) HIGH and Write Enable($\overline{WE}$) LOW. Data on the eight I/O pins is then written into the location specified on the Address pin (A_0 thro. A_{16}).

Reading from the device is accomplished by taking Chip Enable 1 ($\overline{CE}_1$) LOW with Chip Enable 2 (CE_2) HIGH and Output Enable ($\overline{OE}$) LOW while forcing the Write Enable ($\overline{WE}$) 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 (OE HIGH) or during a write operation ($\overline{CE}_1$ LOW, CE_2 HIGH), and $\overline{WE}$ LOW).

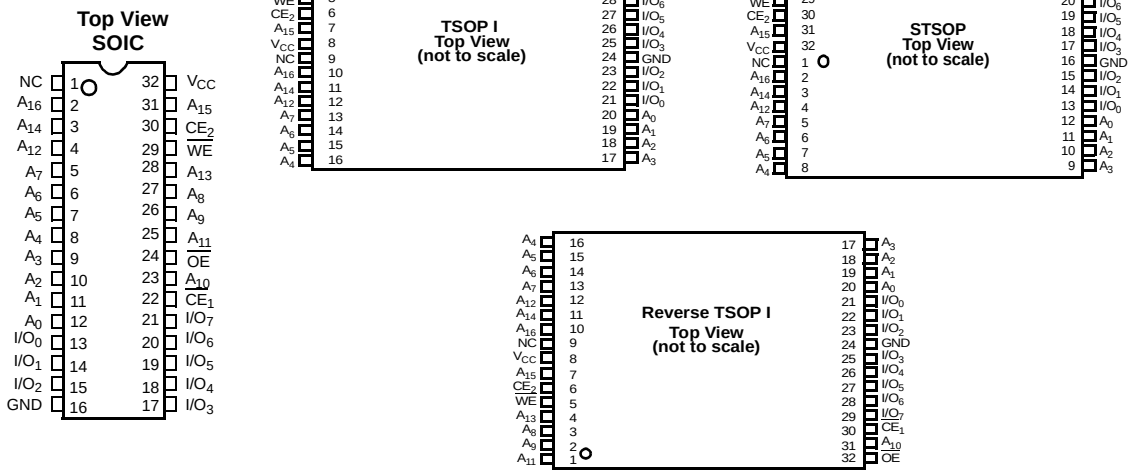
Logic Block Diagram



Note:

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

Pin Configuration[2]



Note:
2. NC pins are not connected to the die.

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 ..... –0.3V to 3.9V

DC Voltage Applied to Outputs in High-Z State[3].....–0.3V to V_{CC} + 0.3V

DC Input Voltage[3] ..... –0.3V to V_{CC} + 0.3V

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 (T_A)	V_{CC}[4]
Industrial	–40°C to +85°C	2.2V to 3.6V

Product Portfolio

Product	V_{CC} Range (V)			Speed (ns)	Power Dissipation					
					Operating, Icc (mA)				Standby, I_{SB2} (µA)	
					f = 1 MHz		f = f_{MAX}			
	Min.	Typ.	Max.		Typ.[5]	Max.	Typ.[5]	Max.	Typ.[5]	Max.
CY62128DV30L	2.2	3.0	3.6	55/70	0.85	1.5	5	10	1.5	5
CY62128DV30LL				55/70	0.85	1.5	5	10	1.5	4

DC Electrical Characteristics (Over the Operating Range)

Parameter	Description	Test Conditions			CY62128DV30-55/70			Unit
					Min.	Typ.[5]	Max.	
V_{OH}	Output HIGH Voltage	2.2 ≤ V_{CC} ≤ 2.7	I_{OH} = –0.1 mA		2.0			V
		2.7 ≤ V_{CC} ≤ 3.6	I_{OH} = –1.0 mA		2.4			
V_{OL}	Output LOW Voltage	2.2 ≤ V_{CC} ≤ 2.7	I_{OL} = 0.1 mA				0.4	V
		2.7 ≤ V_{CC} ≤ 3.6	I_{OL} = 2.1 mA				0.4	
V_{IH}	Input HIGH Voltage	2.2 ≤ V_{CC} ≤ 2.7			1.8		V_{CC} + 0.3	V
		2.7 ≤ V_{CC} ≤ 3.6			2.2		V_{CC} + 0.3	
V_{IL}	Input LOW Voltage	2.2 ≤ V_{CC} ≤ 2.7			–0.3		0.6	V
		2.7 ≤ V_{CC} ≤ 3.6			–0.3		0.8	
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	f = f_{MAX} = $1/t_{RC}$	Vcc = 3.6V, I_{OUT} = 0mA, CMOS level			5	10	mA
		f = 1 MHz				0.85	1.5	
I_{SB1}	Automatic CE Power-down Current – CMOS Inputs	$\overline{CE_1}$ ≥ V_{CC} – 0.2V, CE_2 ≤ 0.2V, V_{IN} ≥ V_{CC} – 0.2V, V_{IN} ≤ 0.2V, f = f_{MAX} (Address and Data Only), f = 0 (OE, $\overline{WE}$,)		L		1.5	5	µA
				LL		1.5	4	
I_{SB2}	Automatic CE Power-down Current – CMOS Inputs	$\overline{CE_1}$ ≥ V_{CC} – 0.2V, CE_2 ≤ 0.2V, V_{IN} ≥ V_{CC} – 0.2V or V_{IN} ≤ 0.2V, f = 0, V_{CC}=3.6V		L		1.5	5	µA
				LL		1.5	4	

Capacitance[6]

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

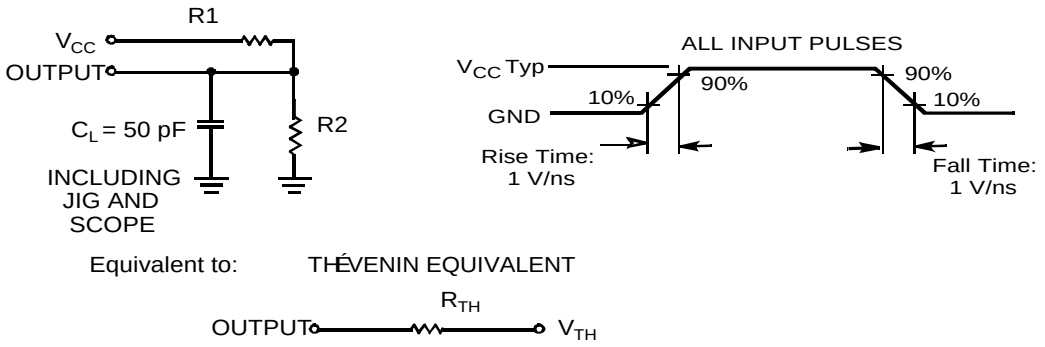
Notes:

3. $V_{IL(min.)}$ = –2.0V for pulse durations less than 20 ns., $V_{IH(max.)}$ = Vcc+0.75V for pulse durations less than 20 ns.
4. Full device operation requires linear ramp of Vcc from 0V to Vcc(min) and Vcc must be stable at Vcc(min) for 500 µ s.
5. 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°C.
6. Tested initially and after any design or proces changes that may affect these parameters.

Thermal Resistance

Parameter	Description	Test Conditions	SOIC	TSOP I	STSOP	Unit
θ_{JA}	Thermal Resistance (Junction to Ambient)[6]	Still Air, soldered on a 3 x 4.5 inch, two-layer printed circuit board	69	93	65	°C/W
θ_{JC}	Thermal Resistance (Junction to Case)[6]		34	17	15	°C/W

AC Test Loads and Waveforms

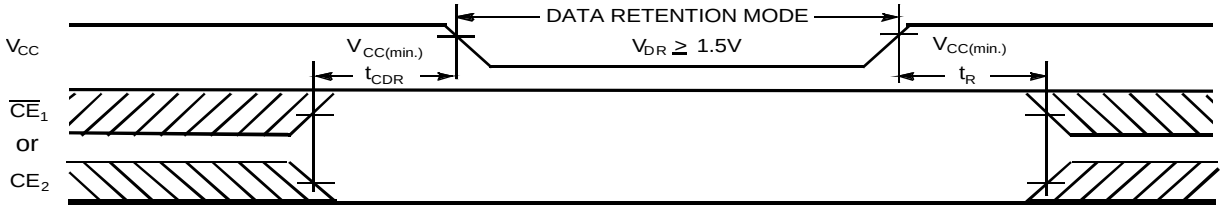


Parameters	2.5V (2.2–2.7V)	3.0V (2.7–3.6V)	Unit
R1	16600	1103	Ω
R2	15400	1554	Ω
R_{TH}	8000	645	Ω
V_{TH}	1.2	1.75	V

Data Retention Characteristics

Parameter	Description	Conditions		Min.	Typ.[5]	Max.	Unit
V_{DR}	V_{CC} for Data Retention			1.5			V
I_{CCDR}	Data Retention Current	V_{CC} = 1.5V, $\overline{CE_1} \geq V_{CC} - 0.2V$, $CE_2 \leq 0.2V$, $V_{IN} \geq V_{CC} - 0.2V$ or $V_{IN} \leq 0.2V$	L			4	µA
			LL			3	
t_{CDR}[5]	Chip Deselect to Data Retention Time			0			ns
t_R[7]	Operation Recovery Time			100			µs

Data Retention Waveform



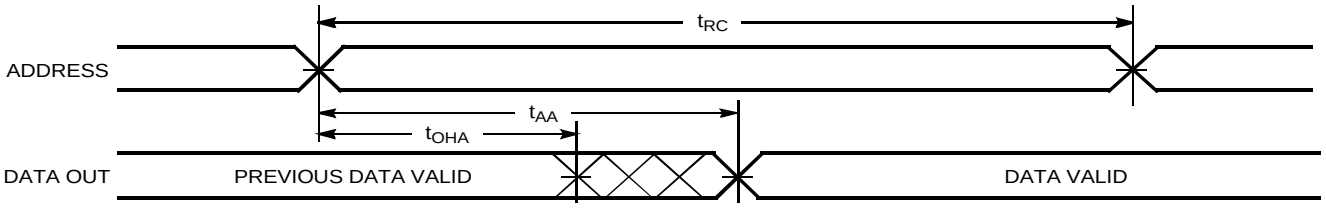
Note:
7. Full device operation requires linear V_{CC} ramp from V_{DR} to $V_{CC(min.)}$ > 100 us.

Switching Characteristics (Over the Operating Range)[8]

Parameter	Description	CY62128DV30-55		CY62128DV30-70		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	10		10		ns
t_{ACE}	$\overline{CE}_1$ LOW or CE_2 HIGH to Data Valid		55		70	ns
t_{DOE}	$\overline{OE}$ LOW to Data Valid		25		35	ns
t_{LZOE}	$\overline{OE}$ LOW to Low Z[9]	5		5		ns
t_{HZOE}	$\overline{OE}$ HIGH to High Z[9,10]		20		25	ns
t_{LZCE}	$\overline{CE}_1$ LOW or CE_2 HIGH to Low Z[9]	10		10		ns
t_{HZCE}	$\overline{CE}_1$ HIGH or CE_2 LOW to High Z[9,10]		20		25	ns
t_{PU}	$\overline{CE}_1$ LOW or CE_2 HIGH to Power-up	0		0		ns
t_{PD}	$\overline{CE}_1$ HIGH or CE_2 LOW to Power-down		55		70	ns
Write Cycle[11]						
t_{WC}	Write Cycle Time	55		70		ns
t_{SCE}	$\overline{CE}_1$ LOW or CE_2 HIGH to Write End	40		60		ns
t_{AW}	Address Set-up to Write End	40		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	40		50		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[9,10]		20		25	ns
t_{LZWE}	$\overline{WE}$ HIGH to Low Z[9]	10		10		ns

Switching Waveforms

Read Cycle No. 1 (Address Transition Controlled)[12, 13]

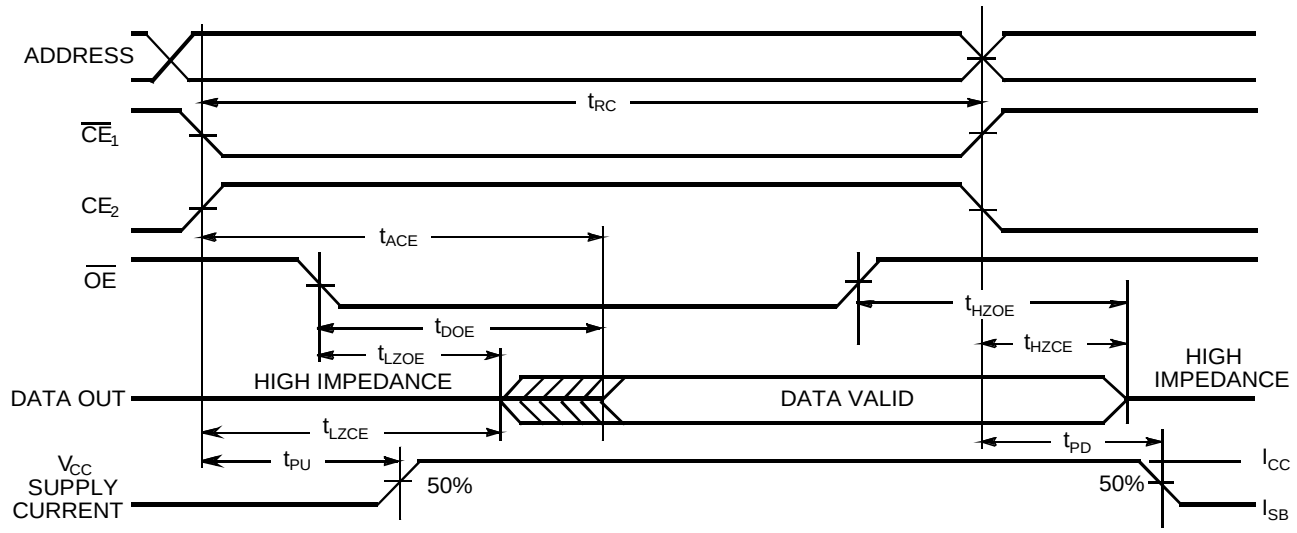


Notes:

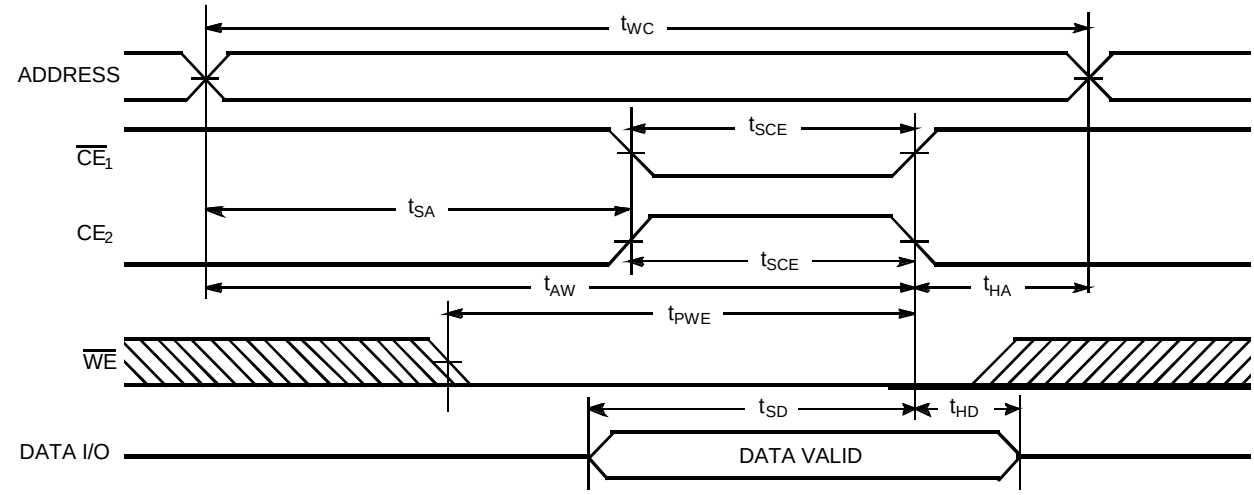
8. Test conditions assume signal transition time of 1V/ns or less, timing reference levels of $V_{CC(typ.)}/2$, input pulse levels of 0 to $V_{CC(typ.)}$, and output loading of the specified I_{OL}.
9. At any given temperature and voltage condition, t_{HZCE} is less than t_{LZCE}, t_{HZBE} is less than t_{LZBE}, t_{HZOE} is less than t.
10. t_{HZOE}, t_{HZCE}, t_{HZBE}, and t_{HZWE} transitions are measured when the outputs enter a high-impedance state.
11. The internal write time of the memory is defined by the overlap of $\overline{WE}$, $\overline{CE}_1 = V_{IL}$, and $CE_2 = V_{IH}$. All signals.
12. Device is continuously selected. $\overline{OE}$, $\overline{CE}_1 = V_{IL}$, $CE_2 = V_{IH}$.
13. $\overline{WE}$ is HIGH for Read cycle.

Switching Waveforms (continued)

Read Cycle No. 2 ($\overline{OE}$ Controlled)[10, 13, 14]



Write Cycle No. 1 ($\overline{WE}$ Controlled) [11, 15, 16, 17]

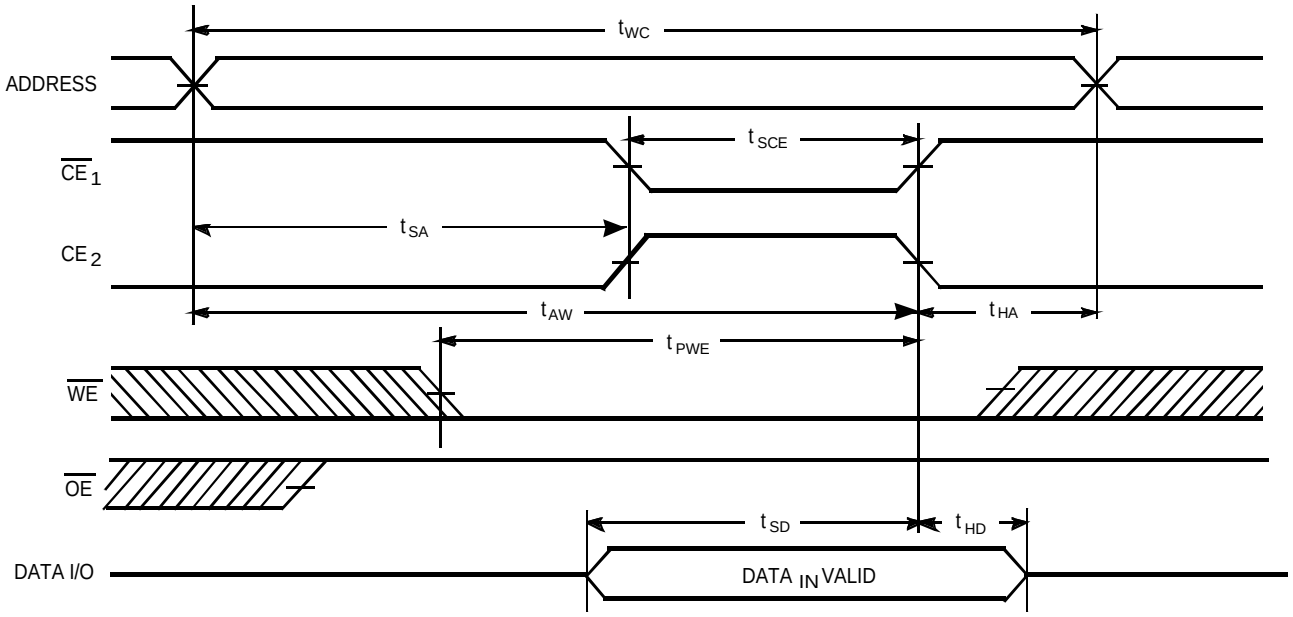


Notes:

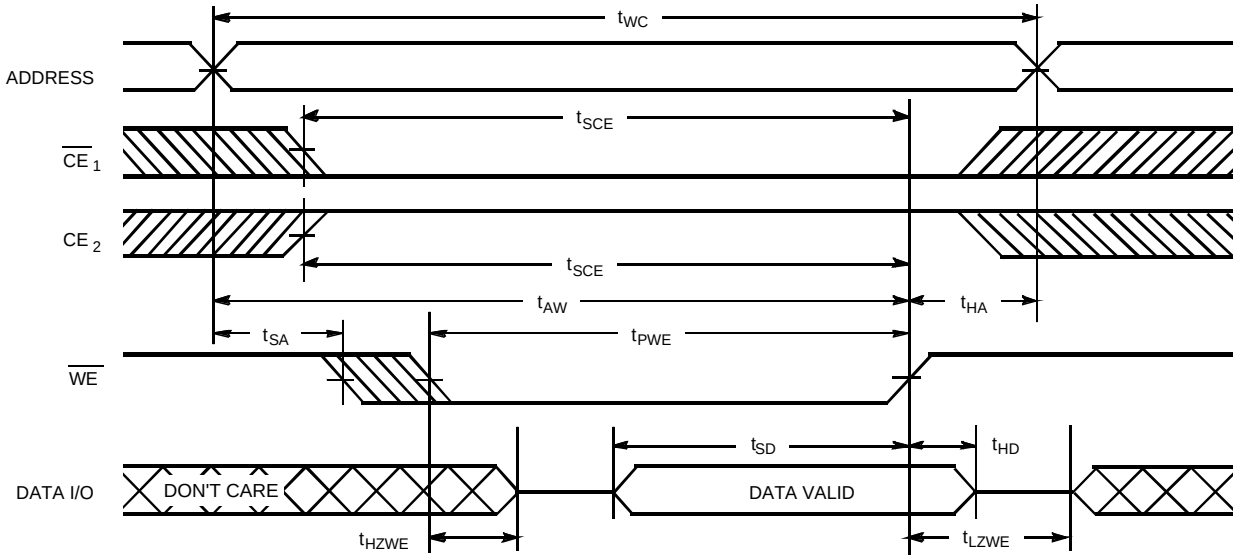
14. Address valid prior to or coincident with $\overline{CE}_1$ transition LOW and CE_2 transition HIGH.
15. Data I/O is high-impedance if $\overline{OE} = V_{IH}$.
16. If $\overline{CE}_1$ goes HIGH or CE_2 goes LOW simultaneously with $\overline{WE}$ HIGH, the output remains in a high-impedance state.
17. During the DON'T CARE period in the DATA I/O waveform, the I/Os are in output state and input signals should not be applied.

Switching Waveforms (continued)

Write Cycle No. 2 ($\overline{CE}_1$ or CE_2 Controlled) [11, 15, 16, 17]



Write Cycle No. 3 ($\overline{WE}$ Controlled, $\overline{OE}$ LOW)[10, 16, 17]



Truth Table

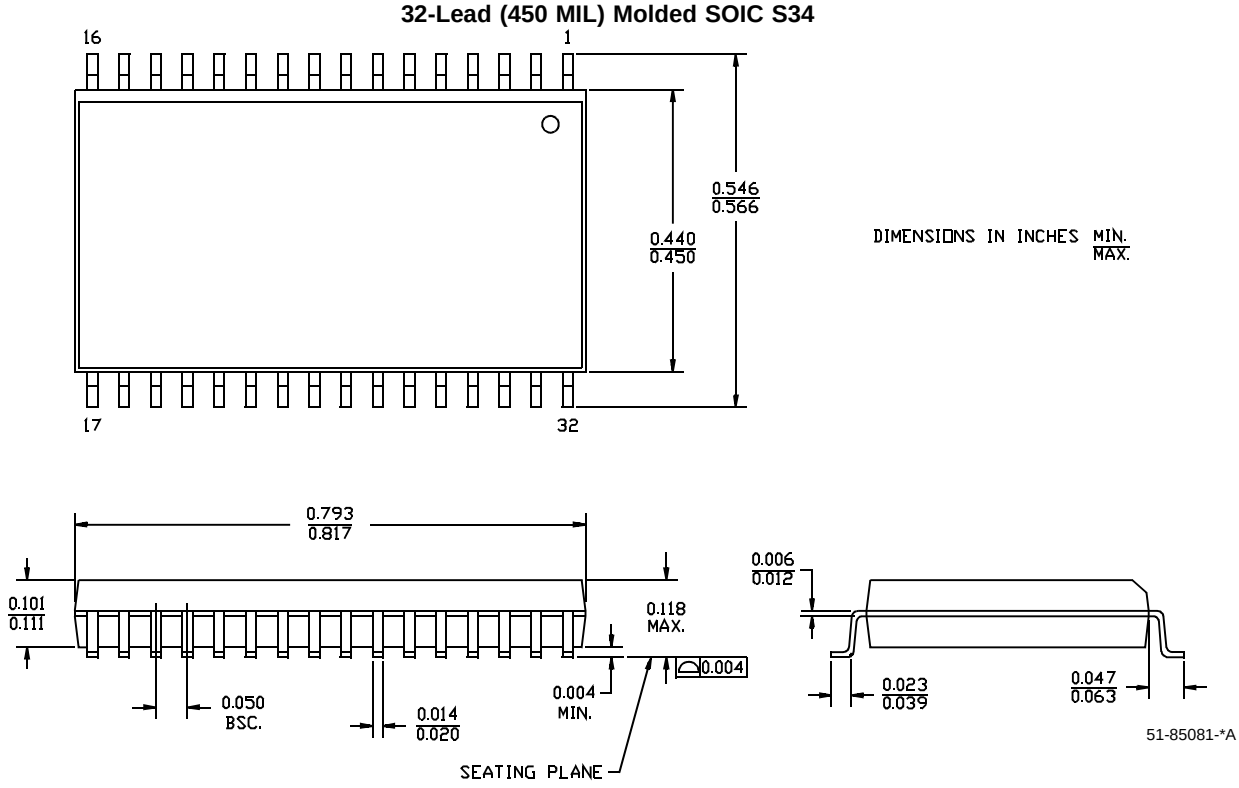
$\overline{CE}_1$	CE_2	$\overline{WE}$	$\overline{OE}$	I/O_0–I/O_7	Mode	Power
H	X	X	X	High Z	Deselect/Power-down	Standby (I_{SB})
X	L	X	X	High Z	Deselect/Power-down	Standby (I_{SB})
L	H	H	L	Data Out	Read	Active (I_{CC})
L	H	H	H	High Z	Output Disabled	Active (I_{CC})
L	H	L	X	Data In	Write	Active (I_{CC})

Ordering Information

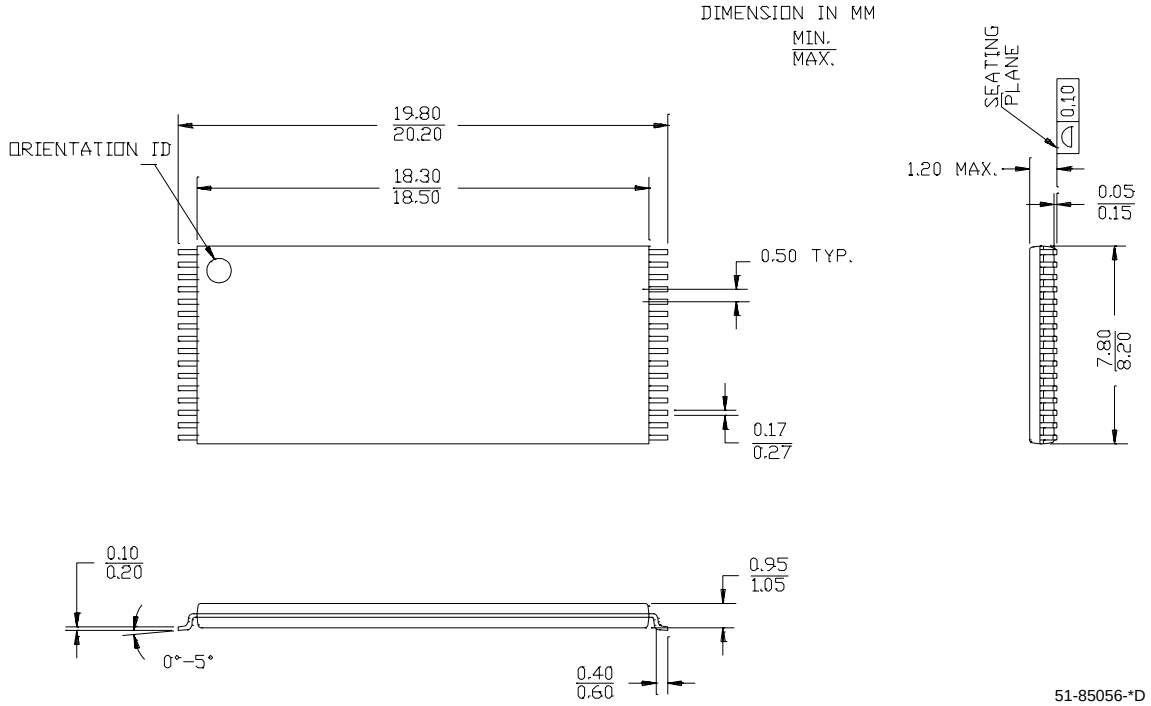
Speed (ns)	Ordering Code	Package Name	Package Type	Operating Range
55	CY62128DV30L-55SI	S34	32-lead SOIC	Industrial
	CY62128DV30LL-55SI	S34	32-lead SOIC	
	CY62128DV30L-55ZI	Z32	32-lead TSOP Type 1	
	CY62128DV30LL-55ZI	Z32	32-lead TSOP Type 1	
	CY62128DV30L-55ZAI	ZA32	32-lead Short TSOP Type 1	
	CY62128DV30LL-55ZAI	ZA32	32-lead Short TSOP Type 1	
	CY62128DV30L-55ZRI	ZR32	32-lead Reverse TSOP Type 1	
	CY62128DV30LL-55ZRI	ZR32	32-lead Reverse TSOP Type 1	
70	CY62128DV30L-70SI	S34	32-lead SOIC	Industrial
	CY62128DV30LL-70SI	S34	32-lead SOIC	
	CY62128DV30L-70ZI	Z32	32-lead TSOP Type 1	
	CY62128DV30LL-70ZI	Z32	32-lead TSOP Type 1	
	CY62128DV30L-70ZAI	ZA32	32-lead Short TSOP Type 1	
	CY62128DV30LL-70ZAI	ZA32	32-lead Short TSOP Type 1	
	CY62128DV30L-70ZRI	ZR32	32-lead Reverse TSOP Type 1	
	CY62128DV30LL-70ZRI	ZR32	32-lead Reverse TSOP Type 1	

Package Diagrams

32-Lead (450 MIL) Molded SOIC S34

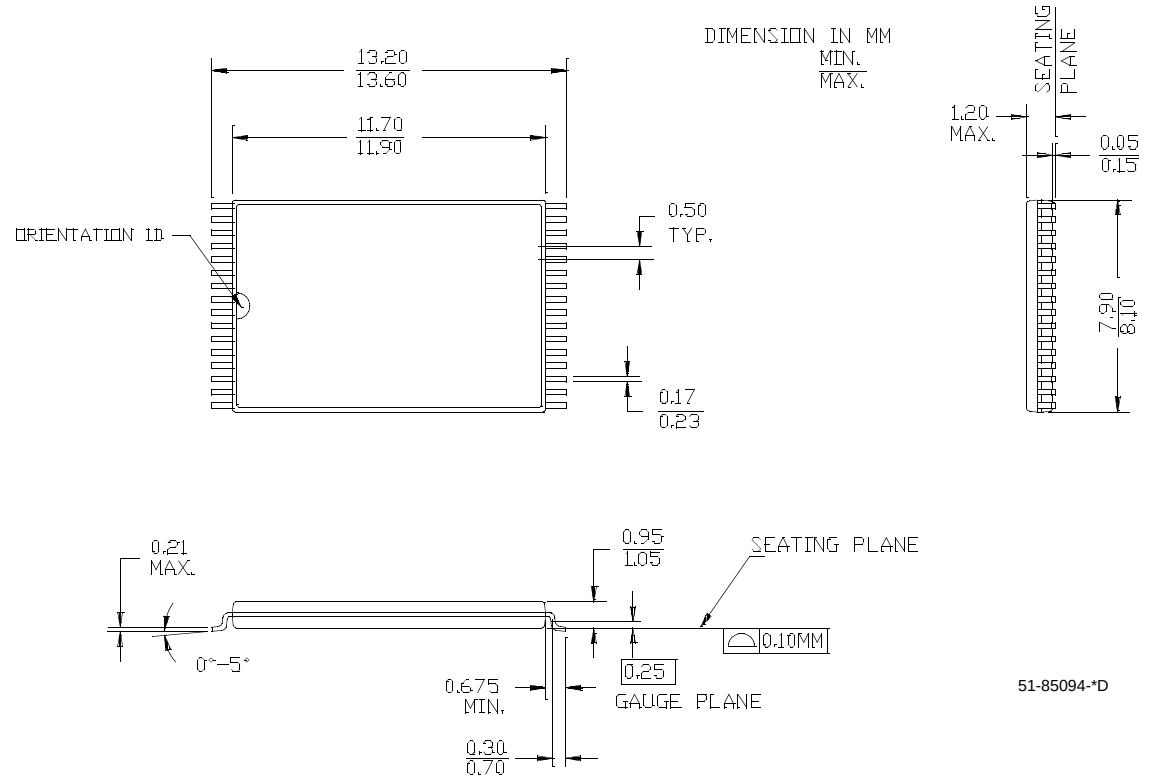


32-Lead Thin Small Outline Package Type I (8 x 20 mm) Z32



51-85056-*D

32-Lead Shrunk Thin Small Outline Package (8 x 13.4 mm) ZA32



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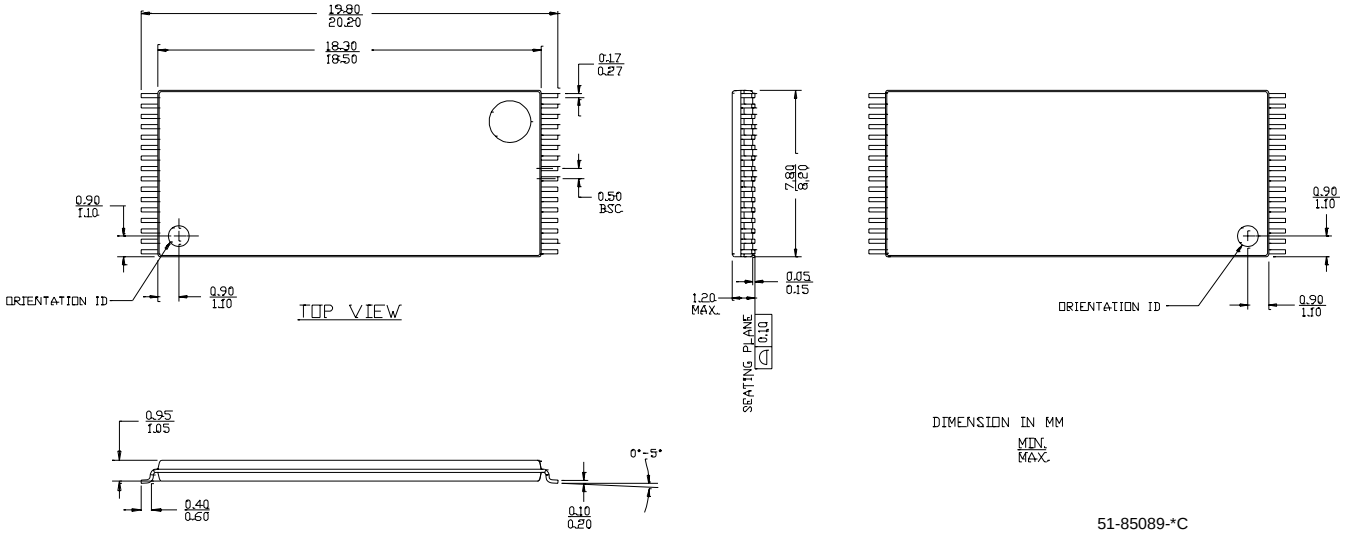
32-Lead Reverse Thin Small Outline Package ZR32



Document History Page

Document Title: CY62128DV30 MoBL® 1 Mb (128K x 8) Static RAM Document Number: 38-05231				
REV.	**ECN NO.**	**Issue Date**	**Orig. of Change**	**Description of Change**
**	117691	08/27/02	JUI	New Data Sheet
*A	127314	5/27/03	MPR	Changed from Advance Information to Preliminary Changed Isb2 to 5 uA (L), 4 uA (LL) Changed Iccdr to 4 uA (L), 3 uA (LL) Changed Cin from 6 pF to 8 pF
*B	128342	07/23/03	JUI	Changed from Preliminary to Final Add 70-ns speed, updated ordering information
*C	129002	08/29/03	CDY	Changed Icc 1 MHz typ from 0.5 mA to 0.85 mA