

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 , CE₂, and \overline{OE} features**
- **Automatic power-down when deselected**
- **Available in Pb-free and non Pb-free 32-lead SOIC, 32-lead TSOP and 32-lead Small TSOP, non Pb-free 32-lead Reverse TSOP packages**

Functional Description^[1]

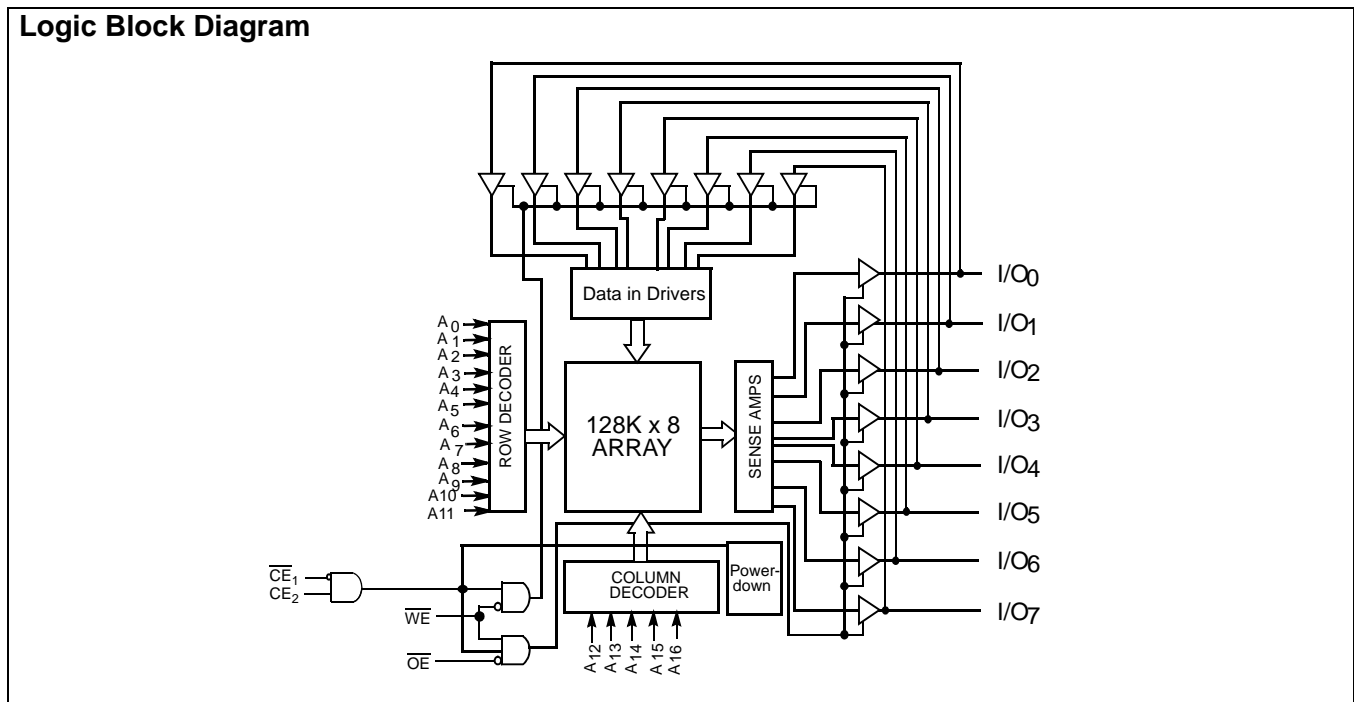
The CY62128DV30 is a high-performance CMOS static RAM organized as 128K words by 8 bits. This device features advanced circuit design to provide ultra-low active current. This is ideal for providing More Battery Life™ (MoBL®) in portable applications such as cellular telephones. The device

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 (CE₂) LOW. The input/output pins (I/O₀ through I/O₇) are placed in a high-impedance state when: deselected Chip Enable 1 (\overline{CE}_1) HIGH or Chip Enable 2 (CE₂) LOW, outputs are disabled (OE HIGH), or during a write operation (Chip Enable 1 (\overline{CE}_1) LOW and Chip Enable 2 (CE₂) HIGH and Write Enable (WE) LOW).

Writing to the device is accomplished by taking Chip Enable 1 (\overline{CE}_1) LOW with Chip Enable 2 (CE₂) HIGH and Write Enable (WE) LOW. Data on the eight I/O pins is then written into the location specified on the Address pin (A₀ through A₁₆).

Reading from the device is accomplished by taking Chip Enable 1 (\overline{CE}_1) LOW with Chip Enable 2 (CE₂) HIGH and Output Enable (\overline{OE}) LOW while forcing the Write Enable (WE) HIGH. Under these conditions, the contents of the memory location specified by the address pins will appear on the I/O pins.

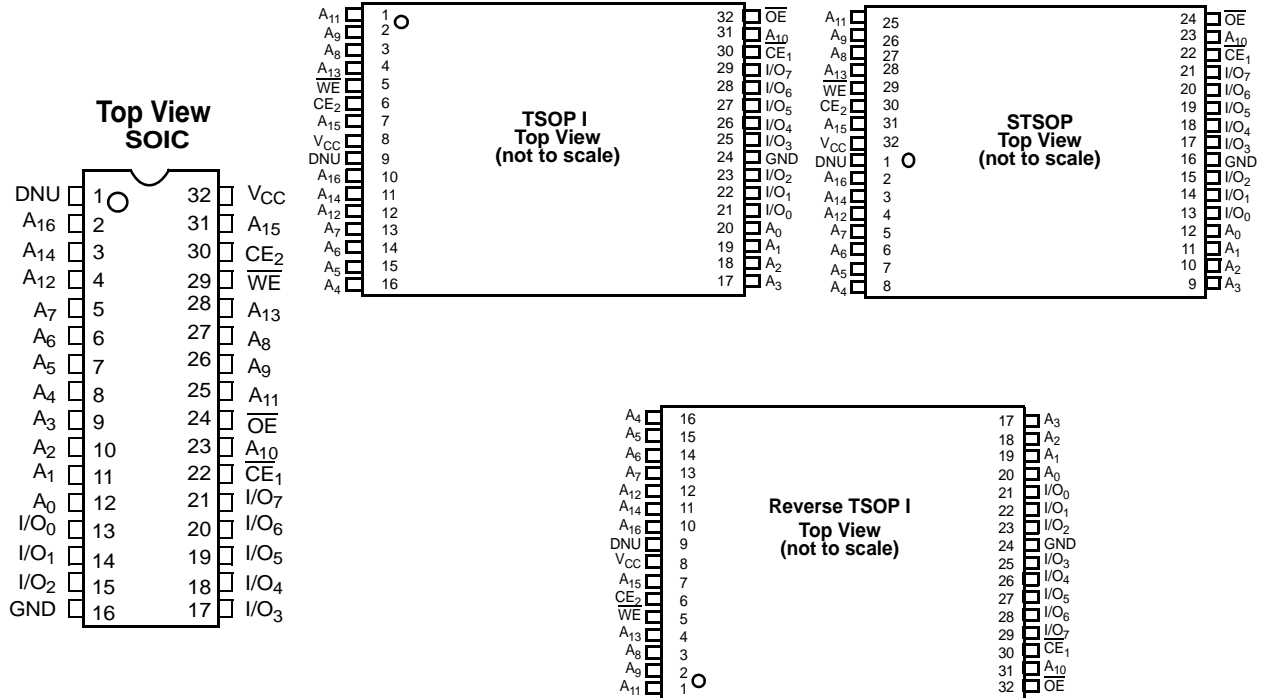
The eight input/output pins (I/O₀ through I/O₇) are placed in a high-impedance state when the device is deselected (\overline{CE}_1 HIGH or CE₂ LOW), the outputs are disabled (OE HIGH) or during a write operation (CE₁ LOW, CE₂ HIGH), and WE LOW).



Note:

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

Pin Configurations^[2]



Product Portfolio

Product	V _{CC} Range (V)			Speed (ns)	Power Dissipation					
					Operating, I _{CC} (mA)				Standby, I _{SB2} (μA)	
	Min.	Typ.	Max.		f = 1 MHz		f = f _{MAX}			
					Typ. ^[4]	Max.	Typ. ^[4]	Max.	Typ. ^[4]	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

Notes:

- NC pins are not connected to the die.
- DNU pins have to be left floating or tied to V_{SS} to ensure proper application.
- 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.

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 ^[5]	-0.3V to V _{CC} + 0.3V

DC Input Voltage ^[5]	-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} ^[6]
Industrial	-40°C to +85°C	2.2V to 3.6V

DC Electrical Characteristics (Over the Operating Range)

Parameter	Description	Test Conditions	CY62128DV30-55/70			Unit	
			Min.	Typ. ^[4]	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}	V _{CC} = 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	$\overline{CE}_1 \geq V_{CC} - 0.2V, CE_2 \leq 0.2V,$ $V_{IN} \geq V_{CC} - 0.2V, V_{IN} \leq 0.2V,$ $f = f_{MAX}$ (Address and Data Only), $f = 0$ (OE, WE,)	L		1.5	5	μA
			LL		1.5	4	
I _{SB2}	Automatic CE Power-down Current – CMOS Inputs	$\overline{CE}_1 \geq V_{CC} - 0.2V, CE_2 \leq 0.2V,$ $V_{IN} \geq V_{CC} - 0.2V$ or $V_{IN} \leq 0.2V,$ $f = 0, V_{CC}=3.6V$	L		1.5	5	μA
			LL		1.5	4	

Capacitance^[7]

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

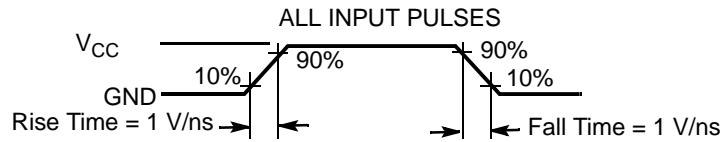
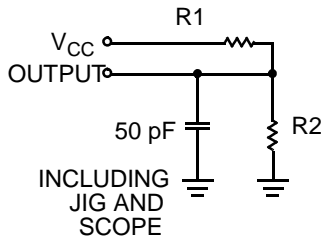
Thermal Resistance^[7]

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

Notes:

5. V_{IL(min.)} = -2.0V for pulse durations less than 20 ns. V_{IH(max.)} = V_{CC}+0.75V for pulse durations less than 20 ns.
6. Full device operation requires linear ramp of V_{CC} from 0V to V_{CC(min)} and V_{CC} must be stable at V_{CC(min)} for 500 μs.
7. Tested initially and after any design or process changes that may affect these parameters.

AC Test Loads and Waveforms^[8]



Equivalent to: THEVENIN EQUIVALENT

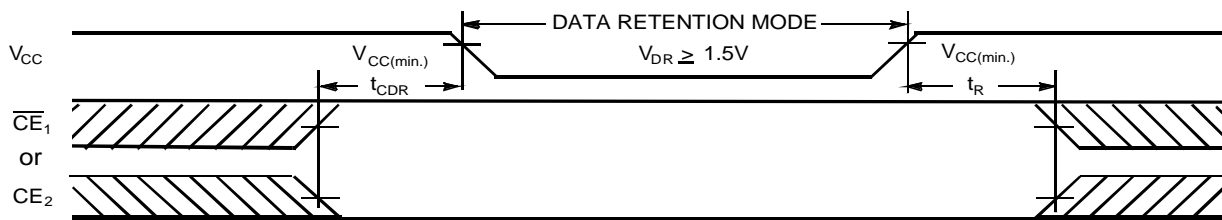


Parameters	2.5V (2.2V - 2.7V)	3.0V (2.7V - 3.6V)	Unit
R1	16600	1103	Ω
R2	15400	1554	Ω
R _{TH}	8000	645	Ω
V _{TH}	1.20	1.75	V

Data Retention Characteristics

Parameter	Description	Conditions	Min.	Typ. ^[4]	Max.	Unit
V _{DR}	V _{CC} for Data Retention		1.5			V
I _{CCDR}	Data Retention Current	V _{CC} = 1.5V, CE ₁ ≥ V _{CC} - 0.2V, CE ₂ ≤ 0.2V, V _{IN} ≥ V _{CC} - 0.2V or V _{IN} ≤ 0.2V	L		4	μA
			LL		3	
t _{CDR} ^[4]	Chip Deselect to Data Retention Time		0			ns
t _R ^[8]	Operation Recovery Time		100			μs

Data Retention Waveform



Note:

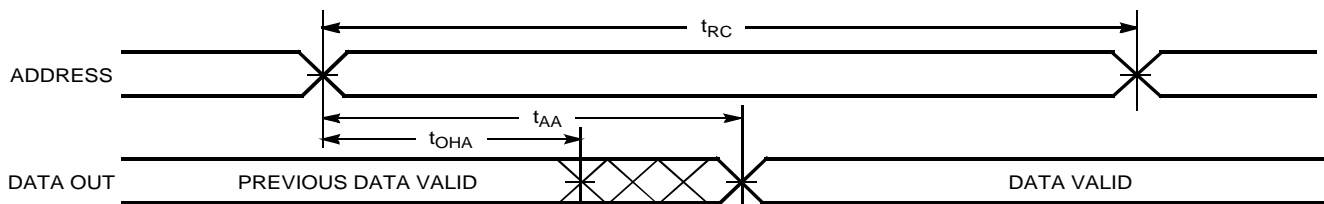
8. Full device operation requires linear V_{CC} ramp from V_{DR} to V_{CC(min.)} > 100 μs.

Switching Characteristics (Over the Operating Range)^[9]

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 ^[10]	5		5		ns
t _{HZOE}	\overline{OE} HIGH to High Z ^[10, 11]		20		25	ns
t _{LZCE}	\overline{CE}_1 LOW or CE ₂ HIGH to Low Z ^[10]	10		10		ns
t _{HZCE}	\overline{CE}_1 HIGH or CE ₂ LOW to High Z ^[10, 11]		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^[12]						
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 ^[10, 11]		20		25	ns
t _{LZWE}	\overline{WE} HIGH to Low Z ^[10]	10		10		ns

Switching Waveforms

Read Cycle No. 1 (Address Transition Controlled)^[13, 14]

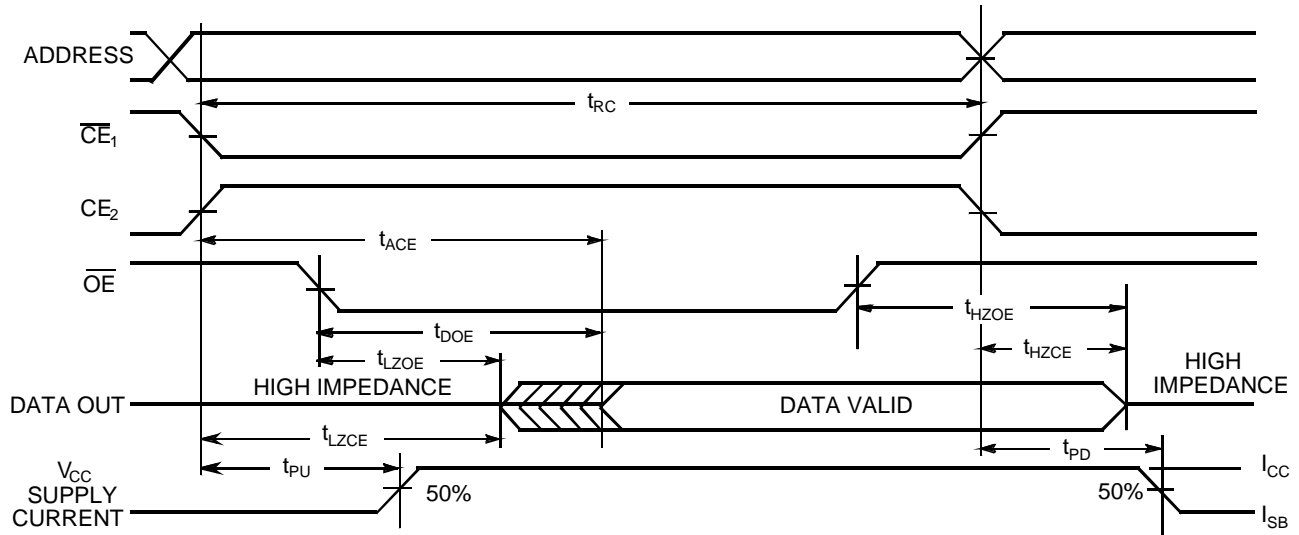


Notes:

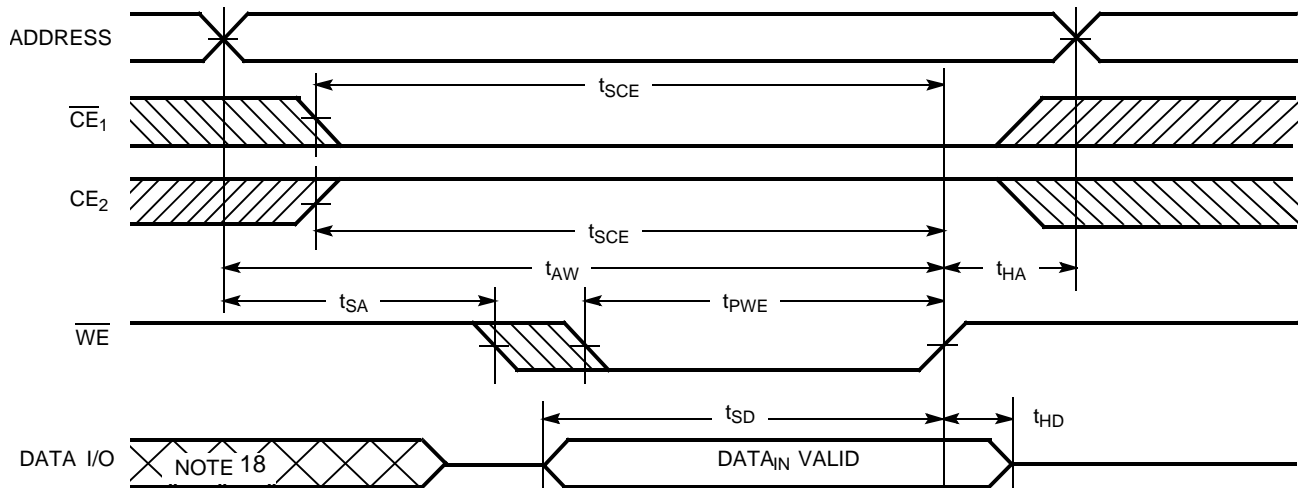
9. Test conditions assume signal transition time of 1V/ns or less, timing reference levels of $V_{CC(typ.)}/2$, input pulse levels of 0 to $V_{CC(typ.)}$, and output loading of the specified I_{OL} .
10. At any given temperature and voltage condition, t_{HZCE} is less than t_{LZCE}, t_{HZBE} is less than t_{LZBE}, t_{HZOE} is less than t_{LZOE}.
11. t_{HZOE}, t_{HZCE}, t_{HZBE}, and t_{HZWE} transitions are measured when the outputs enter a high-impedance state.
12. 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.
13. Device is continuously selected. \overline{OE} , $CE_1 = V_{IL}$, $CE_2 = V_{IH}$.
14. \overline{WE} is HIGH for Read cycle.

Switching Waveforms (continued)

Read Cycle No. 2 (\overline{OE} Controlled)^[11, 14, 15]



Write Cycle No. 1 (\overline{WE} Controlled)^[12, 16, 17, 18]

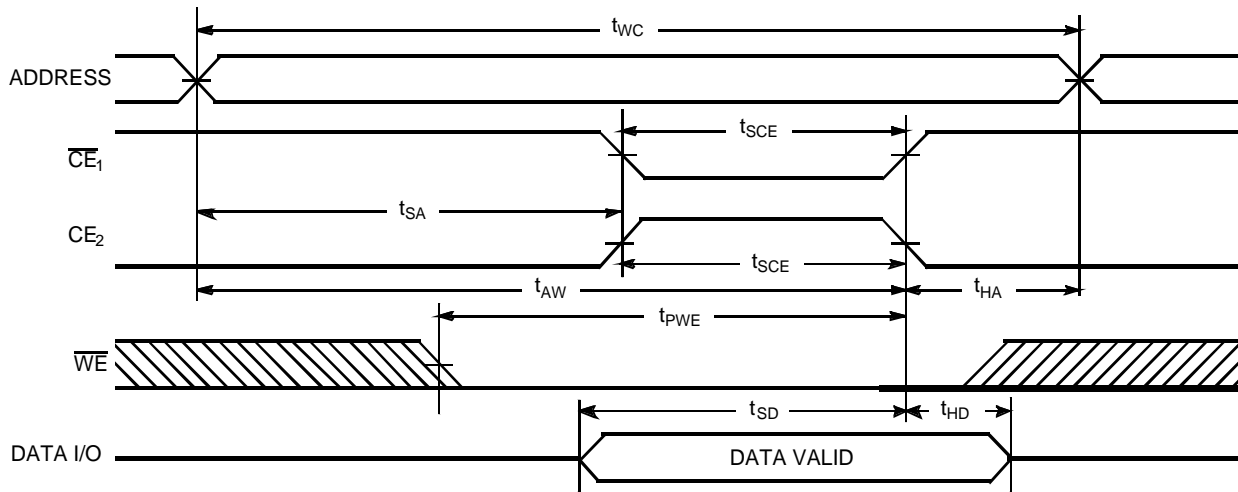


Notes:

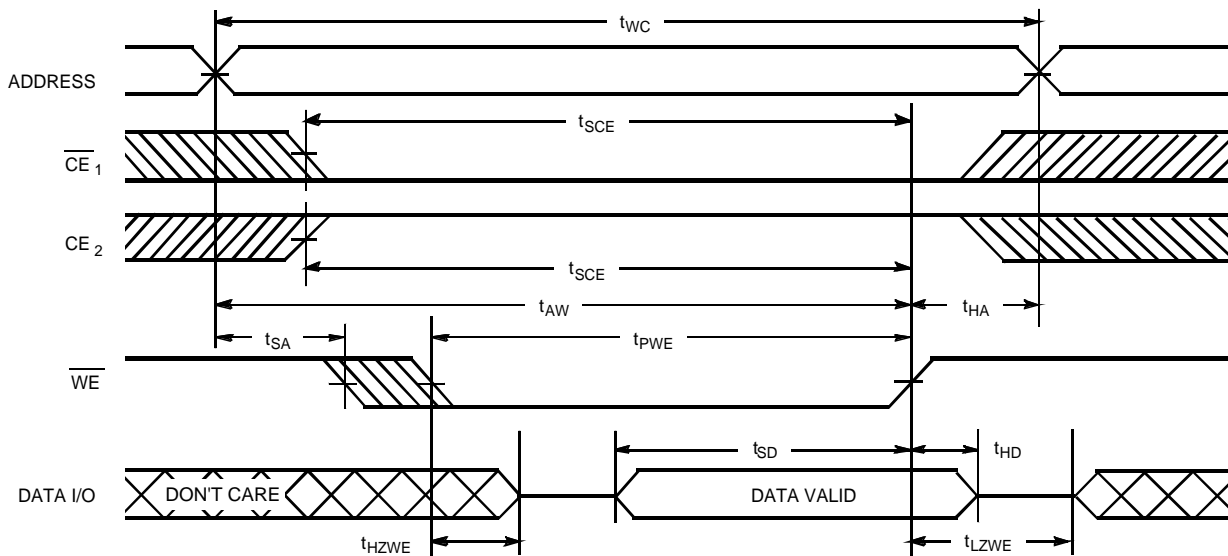
- 15. Address valid prior to or coincident with \overline{CE}_1 transition LOW and CE_2 transition HIGH.
- 16. Data I/O is high-impedance if $\overline{OE} = V_{IH}$.
- 17. If \overline{CE}_1 goes HIGH or CE_2 goes LOW simultaneously with \overline{WE} HIGH, the output remains in a high-impedance state.
- 18. 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 \overline{CE}_2 Controlled)^[12, 16, 17, 18]



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



Truth Table

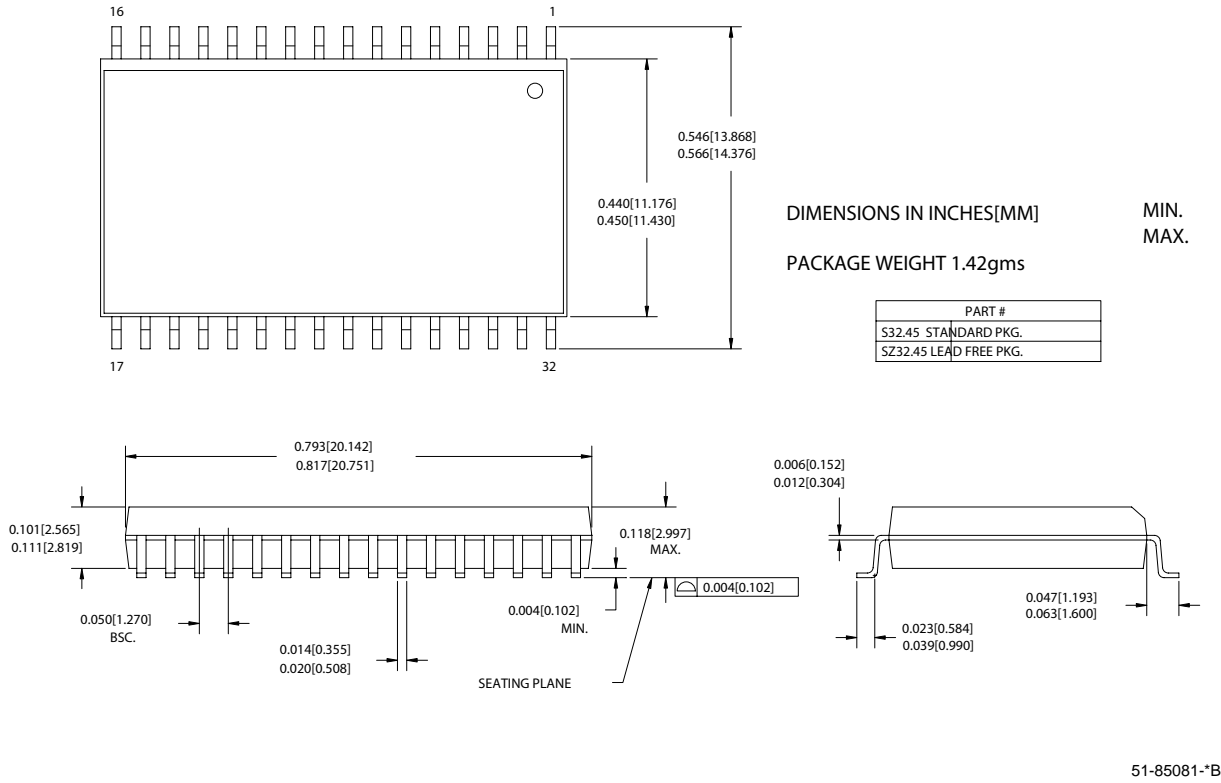
\overline{CE}_1	\overline{CE}_2	\overline{WE}	\overline{OE}	I/O ₀ -I/O ₇	M _{ODE}	Power
H	X	X	X	High Z	Deselet/Power-down	Standby (I _{SB})
X	L	X	X	High Z	Deselet/Power-down	Standby (I _{SB})
L	H	H	L	Data out	Read	Active (I _{CC})
L	H	H	H	High Z	Output Disabled	Active (I _{CC})
L	H	L	X	Data In	Write	Active (I _{CC})

Ordering Information

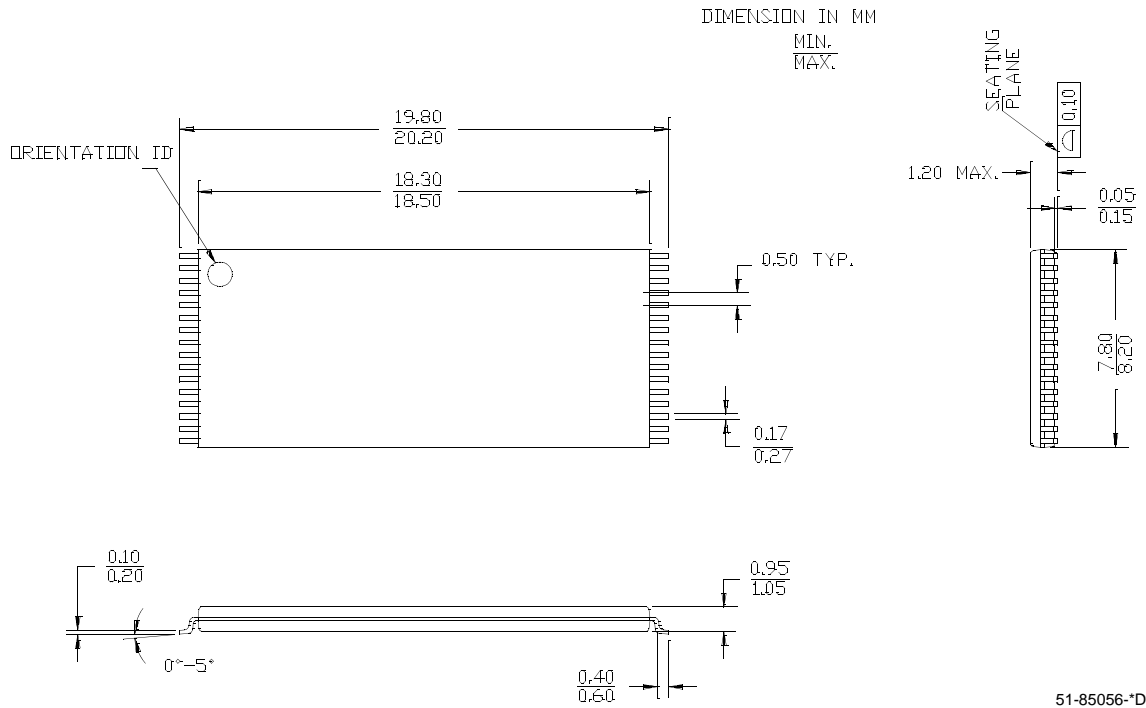
Speed (ns)	Ordering Code	Package Diagram	Package Type	Operating Range
55	CY62128DV30L-55SI	51-85081	32-lead SOIC	Industrial
	CY62128DV30LL-55SI	51-85081	32-lead SOIC	
	CY62128DV30LL-55SXI	51-85081	32-lead SOIC (Pb-Free)	
	CY62128DV30L-55ZI	51-85056	32-lead TSOP Type 1	
	CY62128DV30LL-55ZI	51-85056	32-lead TSOP Type 1	
	CY62128DV30LL-55ZXI	51-85056	32-lead TSOP Type 1 (Pb-Free)	
	CY62128DV30L-55ZAI	51-85094	32-lead Small TSOP	
	CY62128DV30LL-55ZAI	51-85094	32-lead Small TSOP	
	CY62128DV30LL-55ZAXI	51-85094	32-lead Small TSOP (Pb-Free)	
	CY62128DV30L-55ZRI	51-85089	32-lead Reverse TSOP	
	CY62128DV30LL-55ZRI	51-85089	32-lead Reverse TSOP	
	CY62128DV30LL-55ZRXI	51-85089	32-lead Reverse TSOP	
	70	CY62128DV30L-70SI	51-85081	
CY62128DV30LL-70SI		51-85081	32-lead SOIC	
CY62128DV30LL-70SXI		51-85081	32-lead SOIC (Pb-Free)	
CY62128DV30L-70ZI		51-85056	32-lead TSOP Type 1	
CY62128DV30LL-70ZI		51-85056	32-lead TSOP Type 1	
CY62128DV30LL-70ZXI		51-85056	32-lead TSOP Type 1 (Pb-Free)	
CY62128DV30L-70ZAI		51-85094	32-lead Small TSOP	
CY62128DV30LL-70ZAI		51-85094	32-lead Small TSOP	
CY62128DV30LL-70ZAXI		51-85094	32-lead Small TSOP (Pb-Free)	
CY62128DV30L-70ZRI		51-85089	32-lead Reverse TSOP	
CY62128DV30LL-70ZRI		51-85089	32-lead Reverse TSOP	

Package Diagrams

32-Lead (450-Mil) SOIC (51-85081)

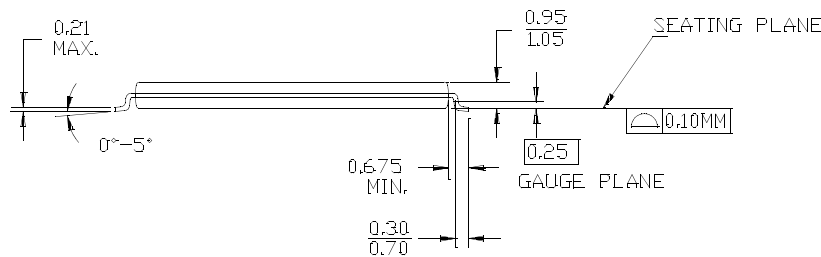
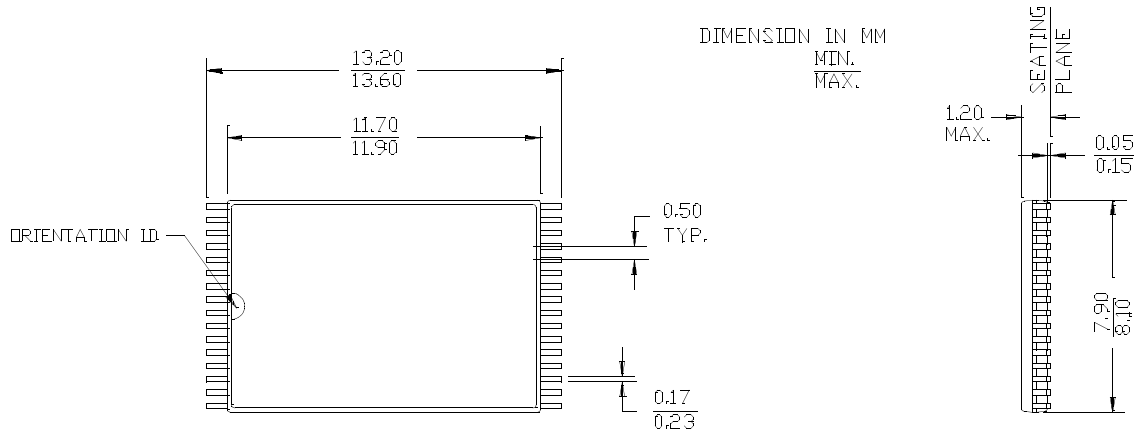


32-Lead TSOP Type I (8 x 20 mm) (51-85056)

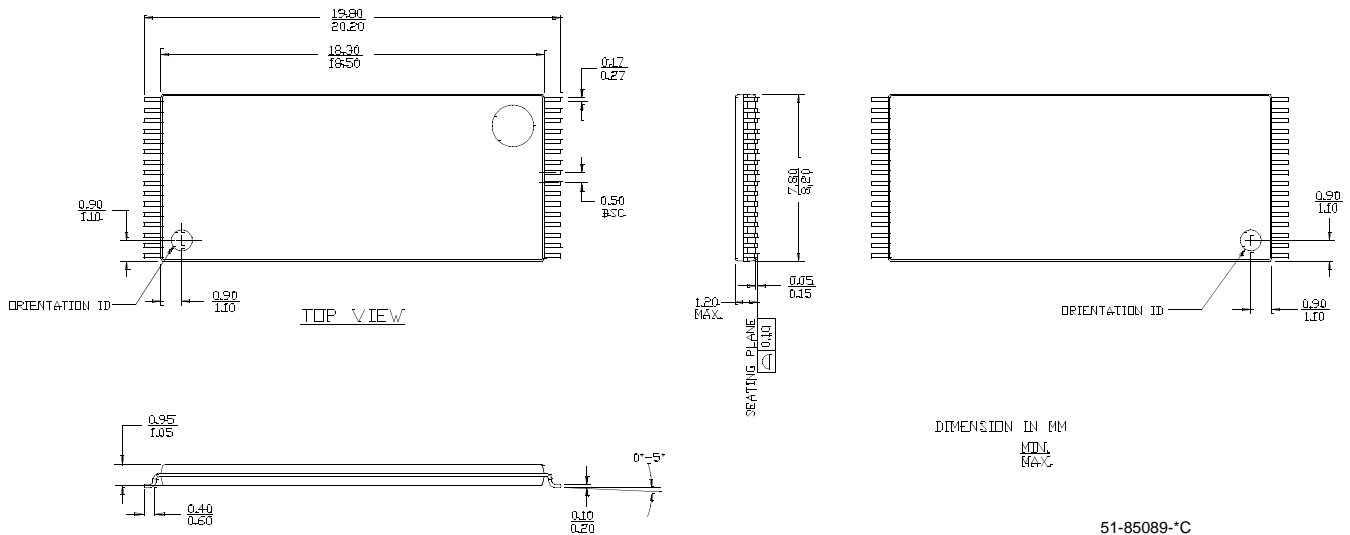


Package Diagrams (continued)

32-Lead STSOP (8 x 13.4 mm) (51-85094)



32-Lead RTSOP (51-85089)



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Document History Page

Document Title: CY62128DV30 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 μ A (L), 4 μ A (LL) Changed Iccdr to 4 μ A (L), 3 μ A (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
*D	347394	See ECN	PCI	Added Lead-Free Packages in Ordering Information Table
*E	395936	See ECN	SYT	Changed address of Cypress Semiconductor Corporation on Page# 1 from "3901 North First Street" to "198 Champion Court" Corrected CE ₁ and CE ₂ waveforms on Write Cycle No.1 on Page# 6. Edited the Write Cycle No.1 switching waveform Data I/O to include Don't Care Condition on Page# 6 Updated the ordering information on Page # 8
*F	428906	See ECN	AJU	Added Thermal Resistance numbers for RTSOP package Updated Ordering Information table by replacing Package Name column with Package Diagram
*G	464721	See ECN	NXR	Updated the Block Diagram on page # 1
*H	470383	See ECN	NXR	Changed pin# 1 of SOIC and STSOP I, pin # 9 of TSOP I and RTSOP I from NC to DNU and added footnote# 3