1-Mbit (128K x 8) Static RAM

Features

- Pin- and function-compatible with CY7C1018CV33
- High speed
  — t_{AA} = 10 ns
- Low Active Power
  — I_{CC} = 60 mA @ 10 ns
- Low CMOS Standby Power
  — I_{SB2} = 3 mA
- 2.0V Data retention
- Automatic power-down when deselected
- CMOS for optimum speed/power
- Center power/ground pinout
- Easy memory expansion with $\overline{CE}$ and $\overline{OE}$ options
- Available in Pb-free 32-pin 300-Mil wide Molded SOJ

Functional Description[1]

The CY7C1018DV33 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 ($\overline{CE}$), an active LOW Output Enable ($\overline{OE}$), and tri-state drivers. This device has an automatic power-down feature that significantly reduces power consumption 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_{16}).

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. 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 CY7C1018DV33 is available in Pb-free 32-pin 300-Mil wide Molded SOJ.

Logic Block Diagram

Pin Configuration

SOJ
Top View
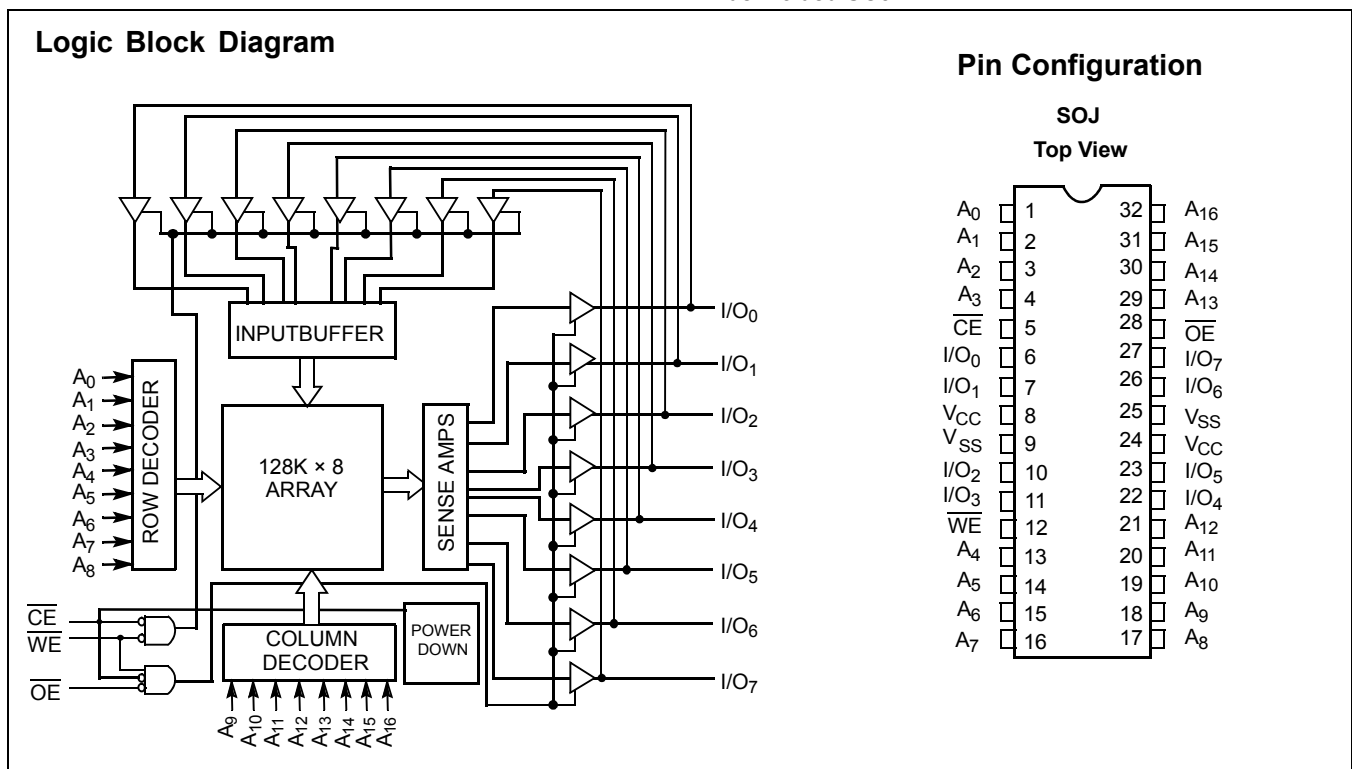
Note
1. For guidelines on SRAM system designs, please refer to the 'System Design Guidelines' Cypress application note, available on the internet at www.cypress.com.

[+] Feedback

Selection Guide

	–10 (Industrial)	Unit
Maximum Access Time	10	ns
Maximum Operating Current	60	mA
Maximum Standby Current	3	mA

Maximum Ratings

(Above which the useful life may be impaired. For user guide-lines, 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[2] ... –0.3V to + 4.6V

DC Voltage Applied to Outputs[2]
in High-Z State ....–0.3V to V_{CC} + 0.3V

DC Input Voltage[2] .... –0.3V to V_{CC} + 0.3V

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}	Speed
Industrial	–40°C to +85°C	3.3V $\pm$ 0.3V	10 ns

DC Electrical Characteristics Over the Operating Range

Parameter	Description	Test Conditions		–10 (Industrial)		Unit
				Min.	Max.	
V_{OH}	Output HIGH Voltage	V_{CC} = Min., I_{OH} = –4.0 mA		2.4		V
V_{OL}	Output LOW Voltage	V_{CC} = Min., I_{OL} = 8.0 mA			0.4	V
V_{IH}	Input HIGH Voltage			2.0	V_{CC} + 0.3	V
V_{IL}	Input LOW Voltage[2]			–0.3	0.8	V
I_{IX}	Input Leakage Current	GND $\leq V_I \leq V_{CC}$		–1	+1	μA
I_{OZ}	Output Leakage Current	GND $\leq V_I \leq V_{CC}$, 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}	100MHz		60	mA
			83MHz		55	mA
			66MHz		45	mA
			40MHz		30	mA
I_{SB1}	Automatic CE Power-down Current—TTL Inputs	Max. V_{CC}, $\overline{CE} \geq V_{IH}$ $V_{IN} \geq V_{IH}$ or $V_{IN} \leq V_{IL}$, f = f_{MAX}			10	mA
I_{SB2}	Automatic CE Power-down Current—CMOS Inputs	Max. V_{CC}, $\overline{CE} \geq V_{CC}$ – 0.3V, $V_{IN} \geq V_{CC}$ – 0.3V, or $V_{IN} \leq$ 0.3V, f = 0			3	mA

Note
2. V_{IL} (min.) = –2.0V and V_{IH}(max) = V_{CC} + 1V for pulse durations of less than 5 ns.

Capacitance[3]

Parameter	Description	Test Conditions	Max.	Unit
C_{IN}	Input Capacitance	$T_A = 25 ~ C, f = 1 MHz, V_{CC} = 3.3V$	8	pF
C_{OUT}	Output Capacitance		8	pF

Thermal Resistance[3]

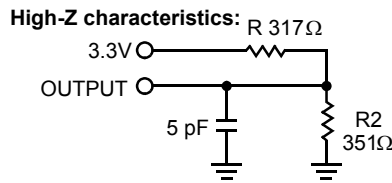| Parameter	Description	Test Conditions	400-Mil Wide SOJ	Unit
Θ_{JA}	Thermal Resistance (Junction to Ambient)	Still Air, soldered on a 3 × 4.5 inch, four-layer printed circuit board	57.61	°C/W
Θ_{JC}	Thermal Resistance (Junction to Case)		40.53	°C/W

AC Test Loads and Waveforms[4]
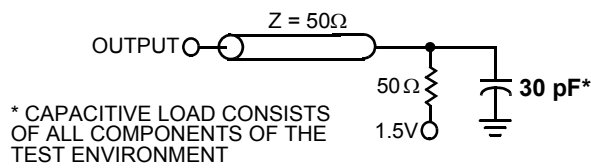
(a)
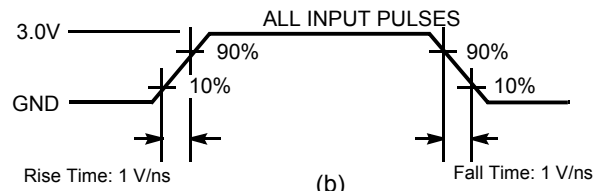
(b)

(c)

AC Switching Characteristics Over the Operating Range [5]

| Parameter	Description	−10 (Industrial)		Unit
		Min.	Max.	
Read Cycle				
t_{power}[6]	V_{CC}(typical) to the first access	100		μs
t_{RC}	Read Cycle Time	10		ns
t_{AA}	Address to Data Valid		10	ns
t_{OHA}	Data Hold from Address Change	3		ns
t_{ACE}	$\overline{CE}$ LOW to Data Valid		10	ns
t_{DOE}	$\overline{OE}$ LOW to Data Valid		5	ns
t_{LZOE}	$\overline{OE}$ LOW to Low-Z	0		ns
t_{HZOE}	$\overline{OE}$ HIGH to High-Z[7, 8]		5	ns
t_{LZCE}	$\overline{CE}$ LOW to Low-Z[8]	3		ns
t_{HZCE}	$\overline{CE}$ HIGH to High-Z[7, 8]		5	ns
t_{PU}[9]	$\overline{CE}$ LOW to Power-up	0		ns
t_{PD}[9]	$\overline{CE}$ HIGH to Power-down		10	ns
Write Cycle[10, 11]				
t_{WC}	Write Cycle Time	10		ns
t_{SCE}	$\overline{CE}$ LOW to Write End	8		ns
t_{AW}	Address Set-up to Write End	8		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	7		ns
t_{SD}	Data Set-up to Write End	5		ns
t_{HD}	Data Hold from Write End	0		ns
t_{LZWE}	$\overline{WE}$ HIGH to Low-Z[8]	3		ns
t_{HZWE}	$\overline{WE}$ LOW to High-Z[7, 8]		5	ns

Notes
5. Test conditions assume signal transition time of 3 ns or less, timing reference levels of 1.5V, input pulse levels of 0 to 3.0V.
6. t_{POWER} gives the minimum amount of time that the power supply should be at typical V_{CC} values until the first memory access can be performed.
7. t_{HZOE}, t_{HZCE}, and t_{HZWE} are specified with a load capacitance of 5 pF as in (c) of AC Test Loads. Transition is measured when the outputs enter a high impedance state.
8. 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.
9. This parameter is guaranteed by design and is not tested.
10. The internal Write time of the memory is defined by the overlap of $\overline{CE}$ LOW and $\overline{WE}$ LOW. $\overline{CE}$ and $\overline{WE}$ 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.
11. The minimum Write cycle time for Write Cycle No. 3 ($\overline{WE}$ controlled, $\overline{OE}$ LOW) is the sum of t_{HZWE} and t_{SD}.

[+] Feedback

Data Retention Characteristics (Over the Operating Range)

Parameter	Description	Conditions	Min.	Max.	Unit
V_{DR}	V_{CC} for Data Retention		2		V
I_{CCDR}	Data Retention Current	$V_{CC} = V_{DR} = 2.0V, \overline{CE} \geq V_{CC} - 0.3V,$ $V_{IN} \geq V_{CC} - 0.3V$ or $V_{IN} \leq 0.3V$		3	mA
t_{CDR} [3]	Chip Deselect to Data Retention Time		0		ns
t_R [12]	Operation Recovery Time		t_{RC}		ns

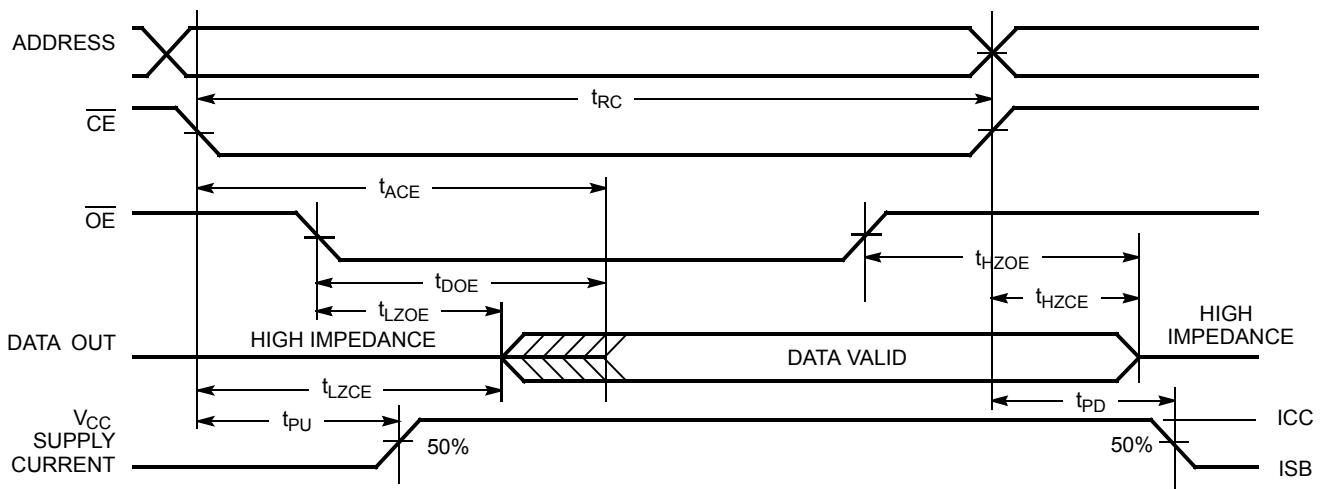## Data Retention Waveform
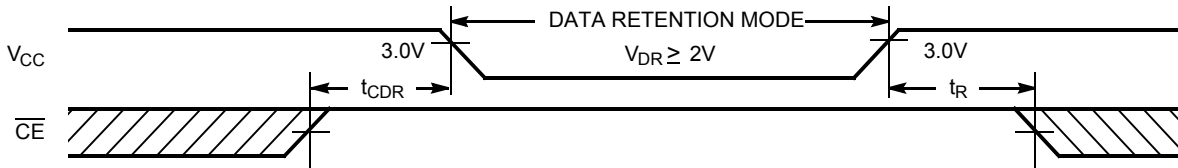
Switching Waveforms

Read Cycle No. 1 (Address Transition Controlled)[13, 14]
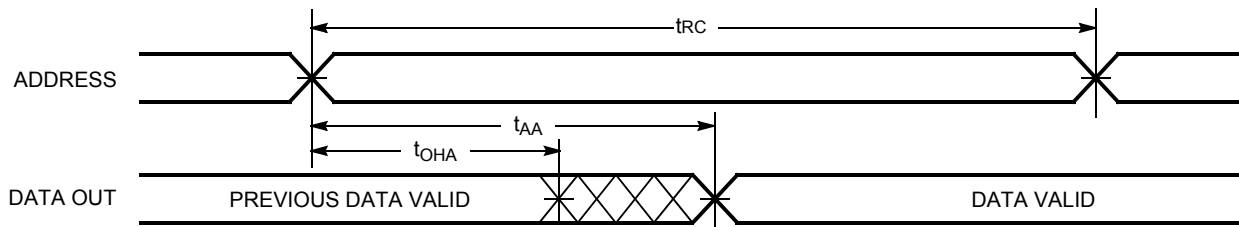
Read Cycle No. 2 ($\overline{OE}$ Controlled)[14, 15]

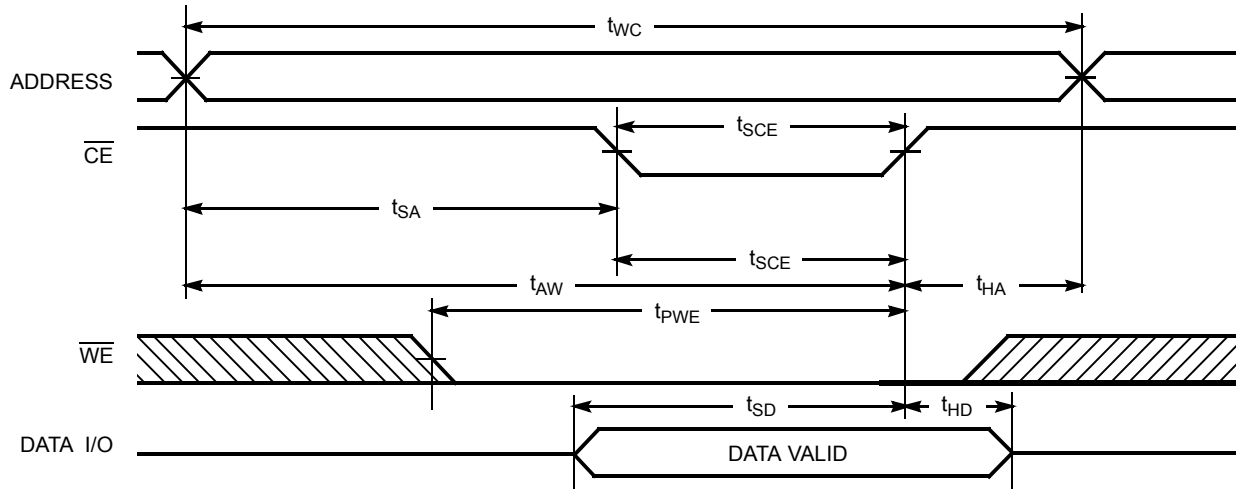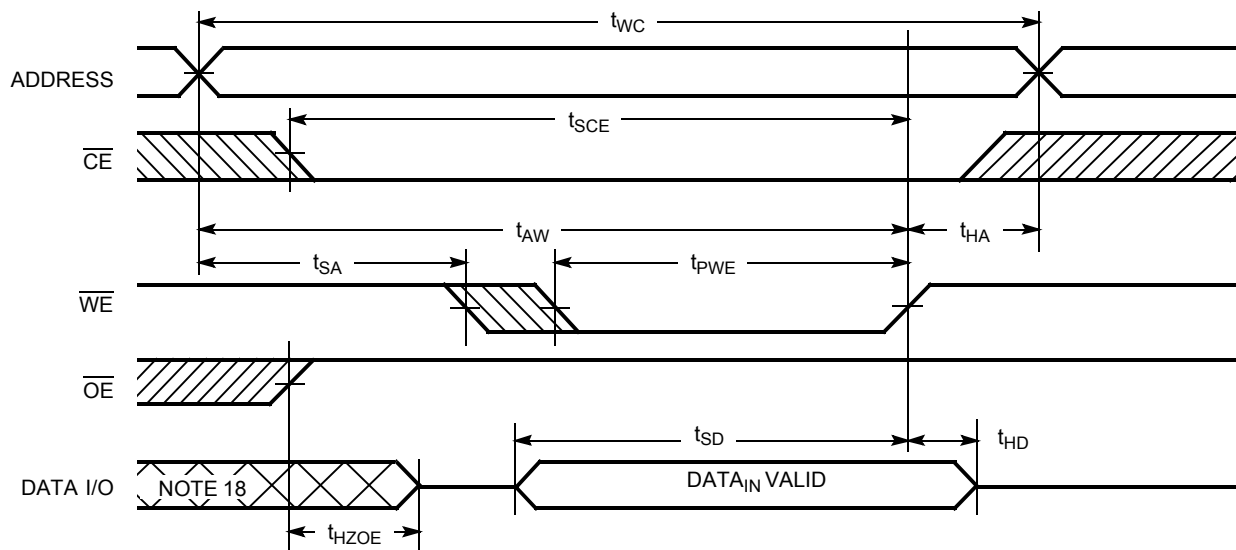**Notes**
12. Full device operation requires linear V_{CC} ramp from V_{DR} to $V_{CC(min.)} \geq 50$ µs or stable at $V_{CC(min.)} \geq 50$ µs.
13. Device is continuously selected. $\overline{OE}, \overline{CE} = V_{IL}$.
14. $\overline{WE}$ is HIGH for Read cycle.
15. Address valid prior to or coincident with $\overline{CE}$ transition LOW.

Switching Waveforms (continued)

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

Write Cycle No. 2 ($\overline{WE}$ Controlled, $\overline{OE}$ HIGH During Write)[16, 17]

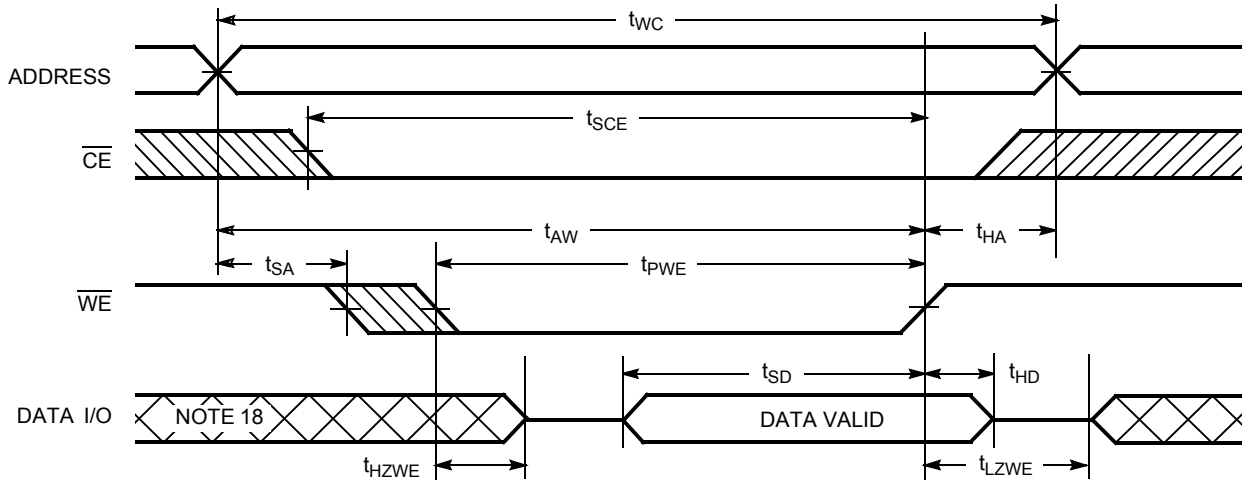**Notes**
16. Data I/O is high impedance if $\overline{OE} = V_{IH}$.
17. If $\overline{CE}$ goes HIGH simultaneously with $\overline{WE}$ going HIGH, the output remains in a high-impedance state.
18. During this period the I/Os are in the output state and input signals should not be applied.

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Switching Waveforms (continued)

Write Cycle No. 3 (WE Controlled, OE LOW)[11, 17]

Truth Table

CE	OE	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 Diagram	Package Type	Operating Range
10	CY7C1018DV33-10VXI	51-85041	32-pin (300-Mil) Molded SOJ (Pb-free)	Industrial

Ordering Code Definitions

CY 7 C 1 018 D V33 - 10 VX I

Temperature Range:
I = Industrial

Package Type:
VX = 32-pin Molded SOJ (Pb-free)

Speed: 10 ns

Voltage range: V33 = 3 V to 3.6 V

D = C9, 90 nm Technology

018 = 1-Mbit density

1 = Fast Asynchronous SRAM family

Technology Code: C = CMOS

7 = SRAM
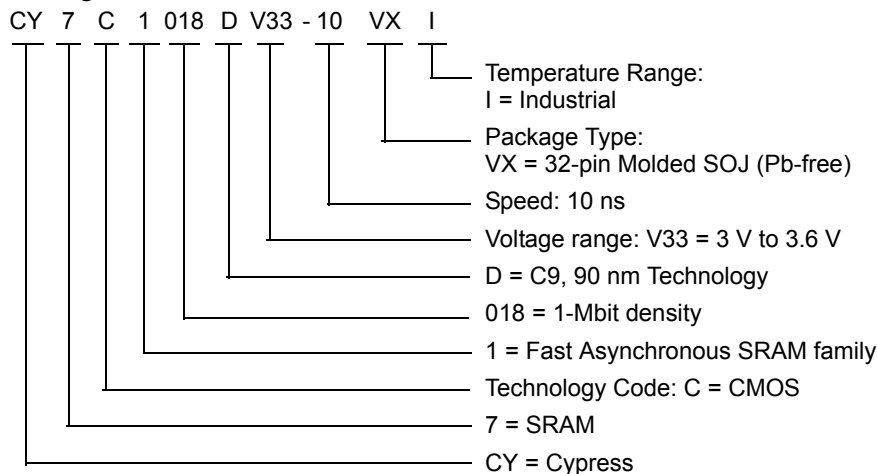
CY = Cypress

Please contact your local Cypress sales representative for availability of these parts.

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Package Diagram

Figure 1. 32-pin (300-Mil) Molded SOJ (51-85041)

PIN 1 I.D

0.292
0.305

0.330
0.340

DIMENSIONS IN INCHES MIN.
MAX.

LEAD COPLANARITY 0.004 MAX.

0.810
0.830

0.128*
0.140

0.050
TYP.

0.026
0.032

0.014
0.020

*
0.025
MIN.

0.006
0.012

0.260*
0.275
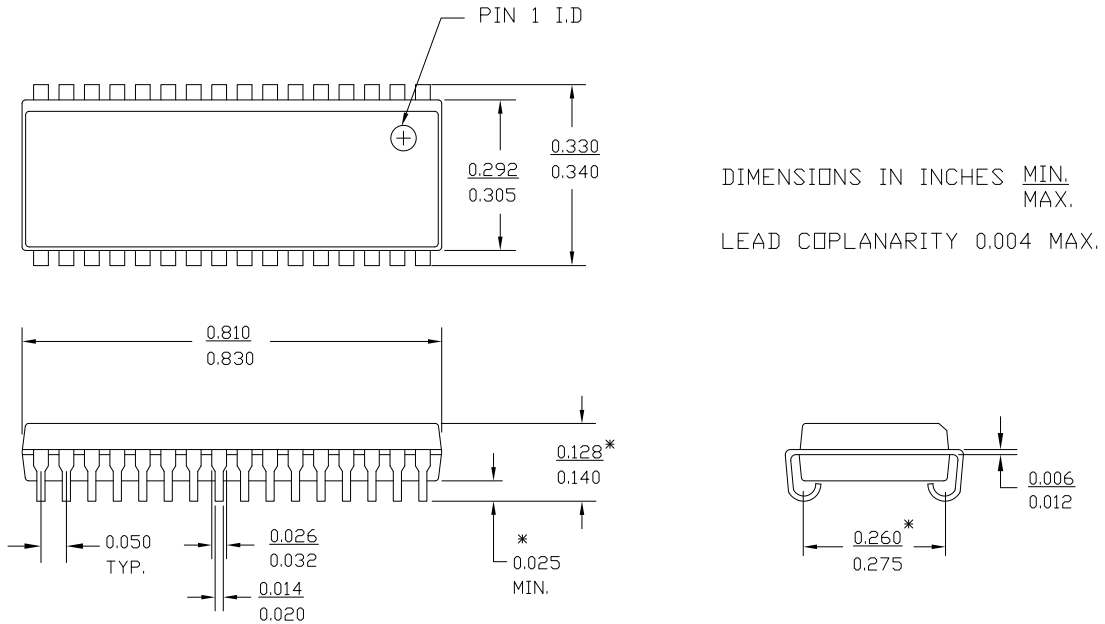
51-85041 *B

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Document History Page

Document Title: CY7C1018DV33, 1-Mbit (128K x 8) Static RAM Document Number: 38-05465				
REV.	ECN NO.	Issue Date	Orig. of Change	Description of Change
**	201560	See ECN	SWI	Advance Information data sheet for C9 IPP
*A	238471	See ECN	RKF	DC parameters modified as per EROS (Spec # 01-02165) Pb-free Offering in the Ordering Information
*B	262950	See ECN	RKF	Added Data Retention Characteristics table Added T_{power} Spec in Switching Characteristics table Shaded Ordering Information
*C	307598	See ECN	RKF	Reduced Speed bins to -8 and -10 ns
*D	520647	See ECN	VKN	Converted from Preliminary to Final Removed Commercial Operating range Removed 8 ns speed bin Added I_{CC} values for the frequencies 83MHz, 66MHz and 40MHz Updated Thermal Resistance table Updated Ordering Information Table Changed Overshoot spec from V_{CC}+2V to V_{CC}+1V in footnote #2
*E	3104943	12/08/2010	AJU	Added Ordering Code Definitions. Updated Package Diagram.

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