

Features

- Pin and function compatible with CY7C1010CV33
- High speed
 - $t_{AA} = 10 \text{ ns}$
- Low active power
 - $I_{CC} = 90 \text{ mA}$ at 10 ns
- Low CMOS standby power
 - $I_{SB2} = 10 \text{ mA}$
- 2.0V data retention
- Automatic power down when deselected
- TTL-compatible inputs and outputs
- Easy memory expansion with \overline{CE} and \overline{OE} features
- Available in Pb-Free 36-pin SOJ and 44-pin TSOP II packages

Functional Description

The CY7C1010DV33 is a high performance CMOS Static RAM organized as 256K 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. 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_{17}).

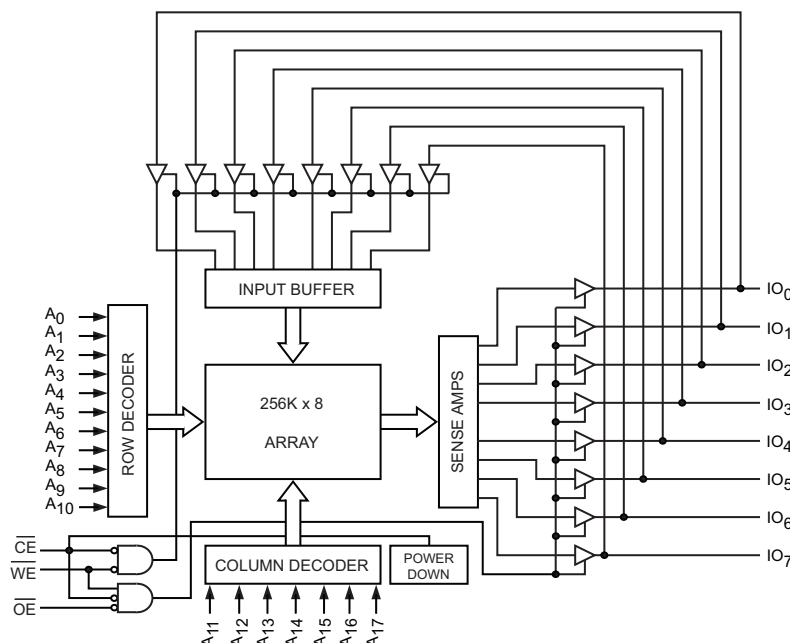
Reading from the device is accomplished by taking Chip Enable (\overline{CE}) and Output Enable (\overline{OE}) LOW while forcing Write Enable (\overline{WE}) HIGH. Under these conditions, the contents of the memory location specified by the address pins will appear on the I/O pins.

The eight input and 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 CY7C1010DV33 is available in 36-pin SOJ and 44-pin TSOP II packages with center power and ground (revolutionary) pinout.

Refer to the Cypress application note [AN1064, SRAM System Guidelines](#) for best practice recommendations.

Logic Block Diagram



Selection Guide

Description	-10	Unit
Maximum Access Time	10	ns
Maximum Operating Current	90	mA
Maximum CMOS Standby Current	10	mA

Pin Configuration

Figure 1. 36-Pin SOJ ^[1]

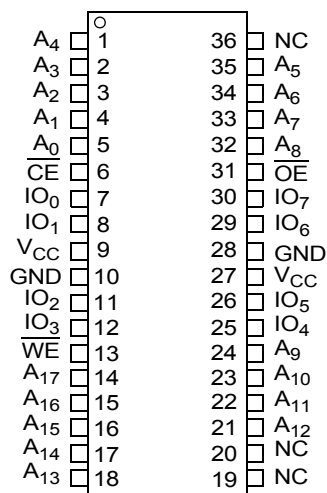
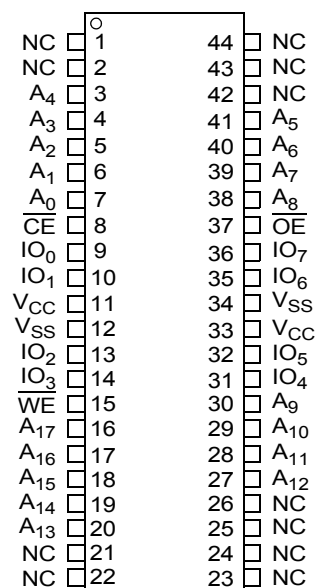


Figure 2. 44-Pin TSOP II ^[1]



Note:

1. NC pins are not connected on the die.

Maximum Ratings

Exceeding the maximum ratings may impair the useful life of the device. These user guidelines are not tested.

Storage Temperature -65°C to +150°C

Ambient Temperature with
Power Applied -55°C to +125°C

Supply Voltage on V_{CC} Relative to GND ^[2] -0.5V to +4.6V

DC Voltage Applied to Outputs
in High Z State ^[2] -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

(MIL-STD-883, Method 3015)

Latch Up Current >200 mA

Operating Range

Range	Ambient Temperature	V_{CC}
Industrial	-40°C to +85°C	3.3V ± 0.3V

Electrical Characteristics

Over the Operating Range

Parameter	Description	Test Conditions	-10		Unit
			Min	Max	
V_{OH}	Output HIGH Voltage	$V_{CC} = \text{Min.}; I_{OH} = -4.0 \text{ mA}$	2.4		V
V_{OL}	Output LOW Voltage	$V_{CC} = \text{Min.}; I_{OL} = 8.0 \text{ mA}$		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	$GND \leq V_{OUT} \leq V_{CC}$, Output Disabled	-1	+1	μA
I_{CC}	V_{CC} Operating Supply Current	$V_{CC} = \text{Max.}, f = f_{MAX} = 1/t_{RC}$	100 MHz	90	mA
			83 MHz	80	
			66 MHz	70	
			40 MHz	60	
I_{SB1}	Automatic CE Power-down Current —TTL Inputs	Max. $V_{CC}, \overline{CE} \geq V_{IH}; V_{IN} \geq V_{IH}$ or $V_{IN} \leq V_{IL}, f = f_{MAX}$		20	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 $V_{IN} \leq 0.3V, f = 0$		10	mA

Capacitance

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

Parameter	Description	Test Conditions	SOJ	TSOP II	Unit
C_{IN}	Input Capacitance	$T_A = 25^\circ\text{C}, f = 1 \text{ MHz}, V_{CC} = 3.3V$	8	8	pF
C_{OUT}	IO Capacitance		8	8	pF

Thermal Resistance

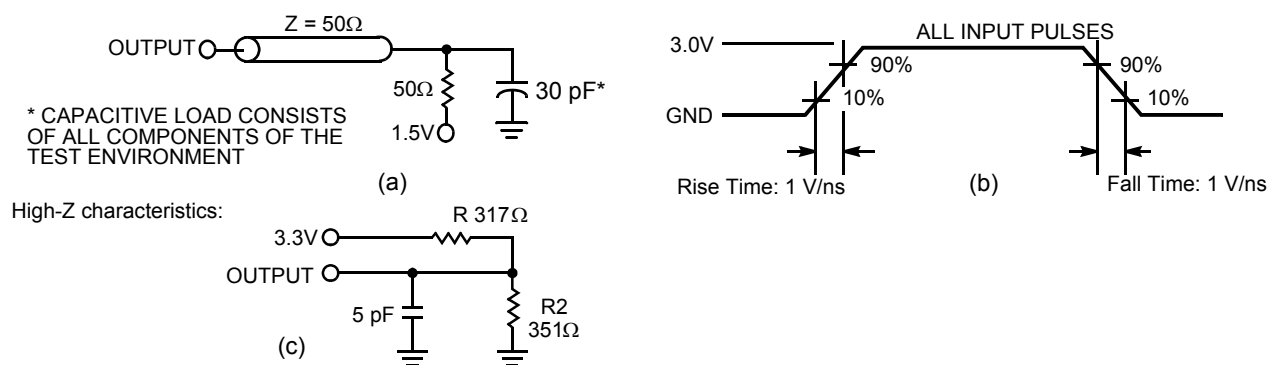
Tested initially and after any design or process changes that may affect these parameters.

Parameter	Description	Test Conditions	SOJ	TSOP II	Unit
Θ_{JA}	Thermal Resistance (Junction to Ambient)	Still air, soldered on a 3 × 4.5 inch, four layer printed circuit board	59.17	50.66	°C/W
Θ_{JC}	Thermal Resistance (Junction to Case)		32.63	17.77	°C/W

Note

2. V_{IL} (min.) = -2.0V and V_{IH} (max.) = $V_{CC} + 2.0V$ for pulse durations of less than 20 ns.

Figure 3. AC Test Loads and Waveforms^[3]



Note

3. AC characteristics (except High-Z) are tested using the load conditions shown in Figure (a). High-Z characteristics are tested for all speeds using the test load shown in Figure (c).

AC Switching Characteristics

Over the Operating Range ^[4]

Parameter	Description	-10		Unit
		Min.	Max.	
Read Cycle				
t _{power} ^[5]	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}	$\overline{\text{CE}}$ LOW to Data Valid		10	ns
t _{DOE}	$\overline{\text{OE}}$ LOW to Data Valid		5	ns
t _{LZOE}	$\overline{\text{OE}}$ LOW to Low-Z	0		ns
t _{HZOE}	$\overline{\text{OE}}$ HIGH to High-Z ^[6, 7]		5	ns
t _{LZCE}	$\overline{\text{CE}}$ LOW to Low-Z ^[7]	3		ns
t _{HZCE}	$\overline{\text{CE}}$ HIGH to High-Z ^[6, 7]		5	ns
t _{PU}	$\overline{\text{CE}}$ LOW to Power-up	0		ns
t _{PD}	$\overline{\text{CE}}$ HIGH to Power-down		10	ns
Write Cycle ^[8, 9]				
t _{WC}	Write Cycle Time	10		ns
t _{SCE}	$\overline{\text{CE}}$ LOW to Write End	7		ns
t _{AW}	Address Set-up to Write End	7		ns
t _{HA}	Address Hold from Write End	0		ns
t _{SA}	Address Set-up to Write Start	0		ns
t _{PWE}	$\overline{\text{WE}}$ 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}	$\overline{\text{WE}}$ HIGH to Low-Z ^[7]	3		ns
t _{HZWE}	$\overline{\text{WE}}$ LOW to High-Z ^[6, 7]		5	ns

Notes:

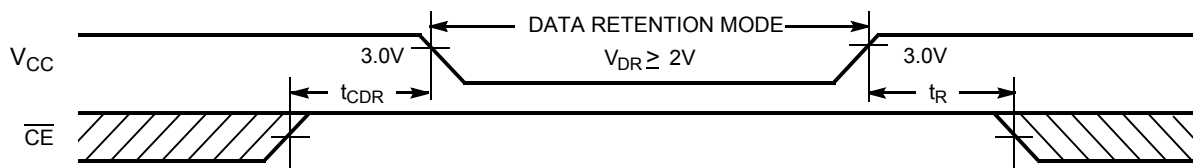
- Test conditions assume signal transition time of 3 ns or less, timing reference levels of 1.5V, input pulse levels of 0 to 3.0V.
- t_{POWER} gives the minimum amount of time that the power supply should be at stable, typical V_{CC} values until the first memory access can be performed.
- t_{HZOE} , t_{HZCE} , and t_{HZWE} are specified with a load capacitance of 5 pF as in part (d) of AC Test Loads. Transition is measured when the outputs enter a high impedance state.
- 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.
- The internal Write time of the memory is defined by the overlap of $\overline{\text{CE}}$ LOW, and $\overline{\text{WE}}$ LOW. $\overline{\text{CE}}$ and $\overline{\text{WE}}$ must be LOW to initiate a Write, and the transition of either 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.
- The minimum Write cycle time for Write Cycle No. 3 ($\overline{\text{WE}}$ controlled, $\overline{\text{OE}}$ LOW) is the sum of t_{HZWE} and t_{SD} .

Data Retention Characteristics

Over the Operating Range ^[10]

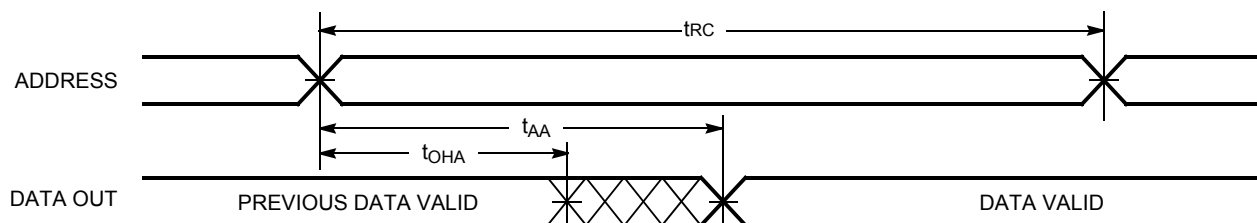
Parameter	Description	Conditions	Min	Max	Unit
V_{DR}	V_{CC} for Data Retention		2		V
I_{CCDR}	Data Retention Current	$V_{CC} = V_{DR} = 2.0V$, $\overline{CE} \geq V_{CC} - 0.3V$, $V_{IN} \geq V_{CC} - 0.3V$ or $V_{IN} \leq 0.3V$		10	mA
$t_{CDR}^{[11]}$	Chip Deselect to Data Retention Time		0		ns
$t_R^{[12]}$	Operation Recovery Time		t_{RC}		ns

Data Retention Waveform



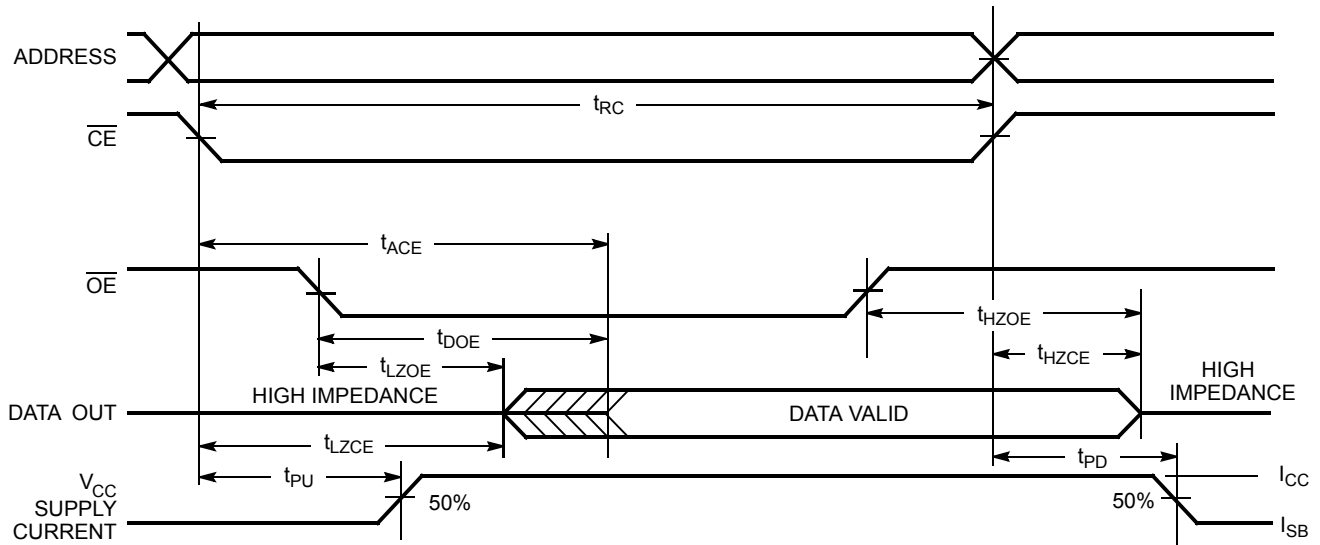
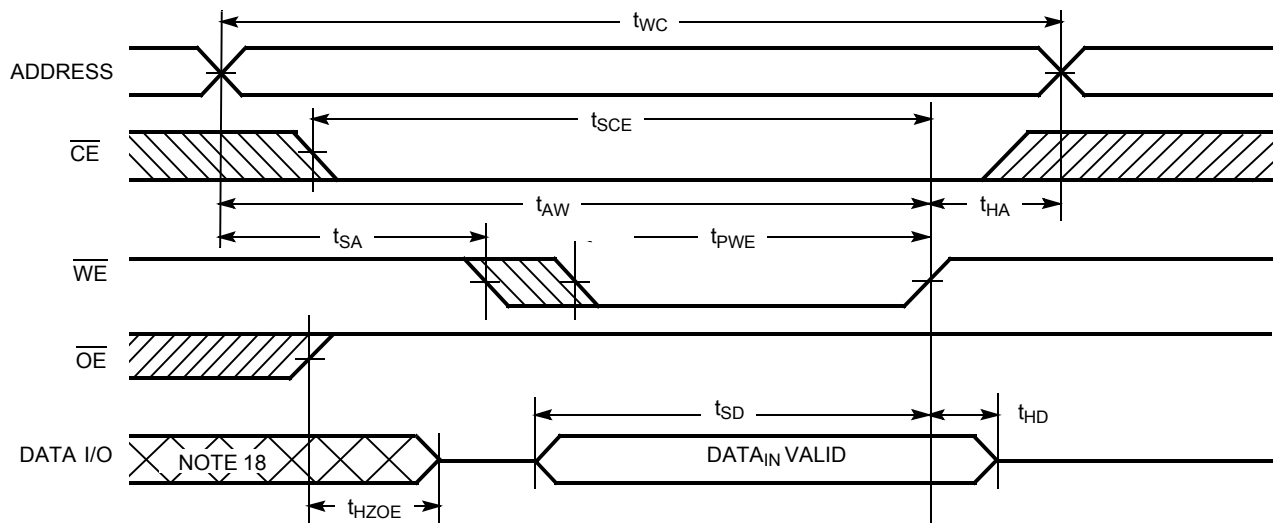
Switching Waveforms

Figure 4. Read Cycle No. 1 ^[13, 14]



Notes

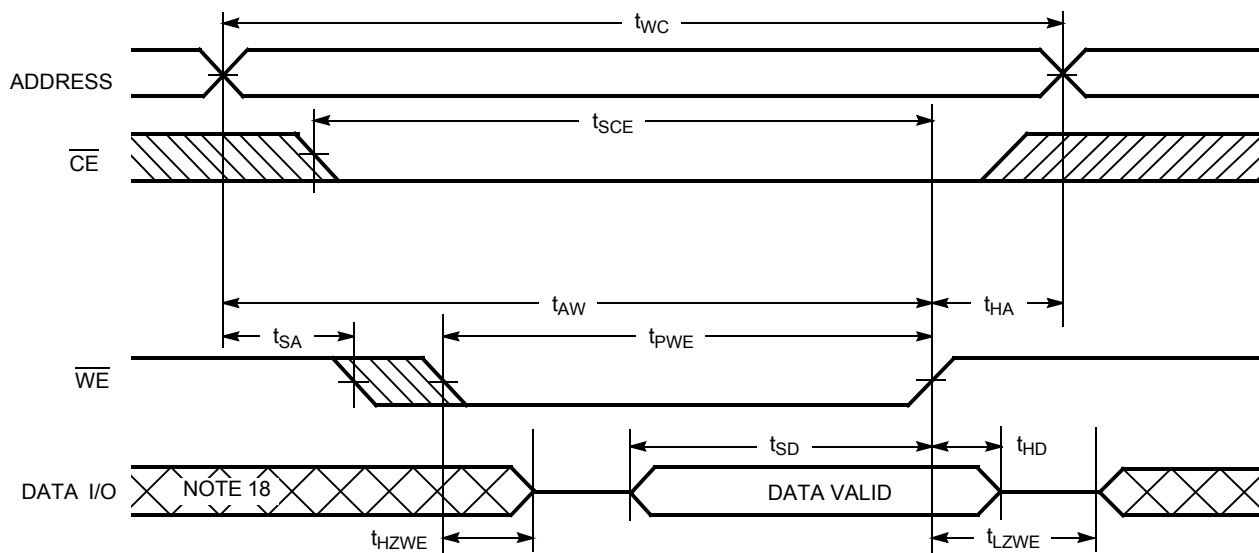
10. No inputs may exceed $V_{CC} + 0.3V$
11. Tested initially and after any design or process changes that may affect these parameters.
12. Full device operation requires linear V_{CC} ramp from V_{DR} to $V_{CC(min.)} \geq 50 \mu s$ or stable at $V_{CC(min.)} \geq 50 \mu s$.
13. The device is continuously selected. OE, CE = V_{IL} .
14. WE is HIGH for read cycle.

Switching Waveforms (continued)
Figure 5. Read Cycle No. 2 ($\overline{\text{OE}}$ Controlled) [14, 15]

Figure 6. Write Cycle No. 1 ($\overline{\text{WE}}$ Controlled, $\overline{\text{OE}}$ HIGH During Write) [16, 17]

Notes

15. Address valid before or similar to $\overline{\text{CE}}$ transition LOW.
16. Data IO is high impedance if $\overline{\text{OE}} = V_{\text{IH}}$.
17. If $\overline{\text{CE}}$ goes HIGH simultaneously with $\overline{\text{WE}}$ going HIGH, the output remains in a high impedance state.
18. During this period, the I/Os are in output state and input signals should not be applied.

Switching Waveforms (continued)

Figure 7. Write Cycle No. 2 ($\overline{\text{WE}}$ Controlled, $\overline{\text{OE}}$ LOW) ^[17]



Truth Table

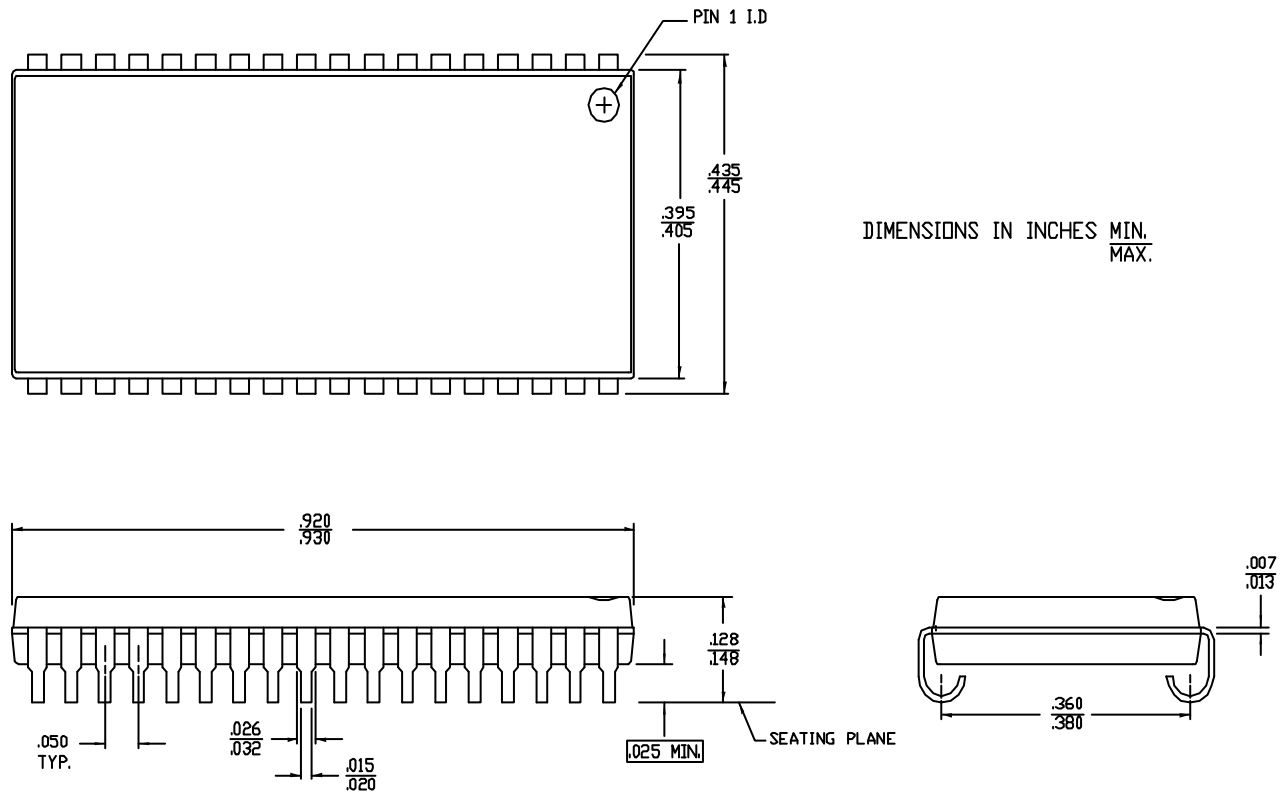
$\overline{\text{CE}}$	$\overline{\text{OE}}$	$\overline{\text{WE}}$	$\text{IO}_0\text{--}\text{IO}_7$	$\text{IO}_8\text{--}\text{IO}_{15}$	Mode	Power
H	X	X	High-Z	High-Z	Power Down	Standby (I_{SB})
L	L	H	Data Out	Data Out	Read All Bits	Active (I_{CC})
L	X	L	Data In	Data In	Write All Bits	Active (I_{CC})
L	H	H	High-Z	High-Z	Selected, Outputs Disabled	Active (I_{CC})

Ordering Information

Speed (ns)	Ordering Code	Package Diagram	Package Type	Operating Range
10	CY7C1010DV33-10VXI	51-85090	36-pin (400-Mil) Molded SOJ (Pb-free)	Industrial
	CY7C1010DV33-10ZSXI	51-85087	44-pin TSOP II (Pb-Free)	

Package Diagrams

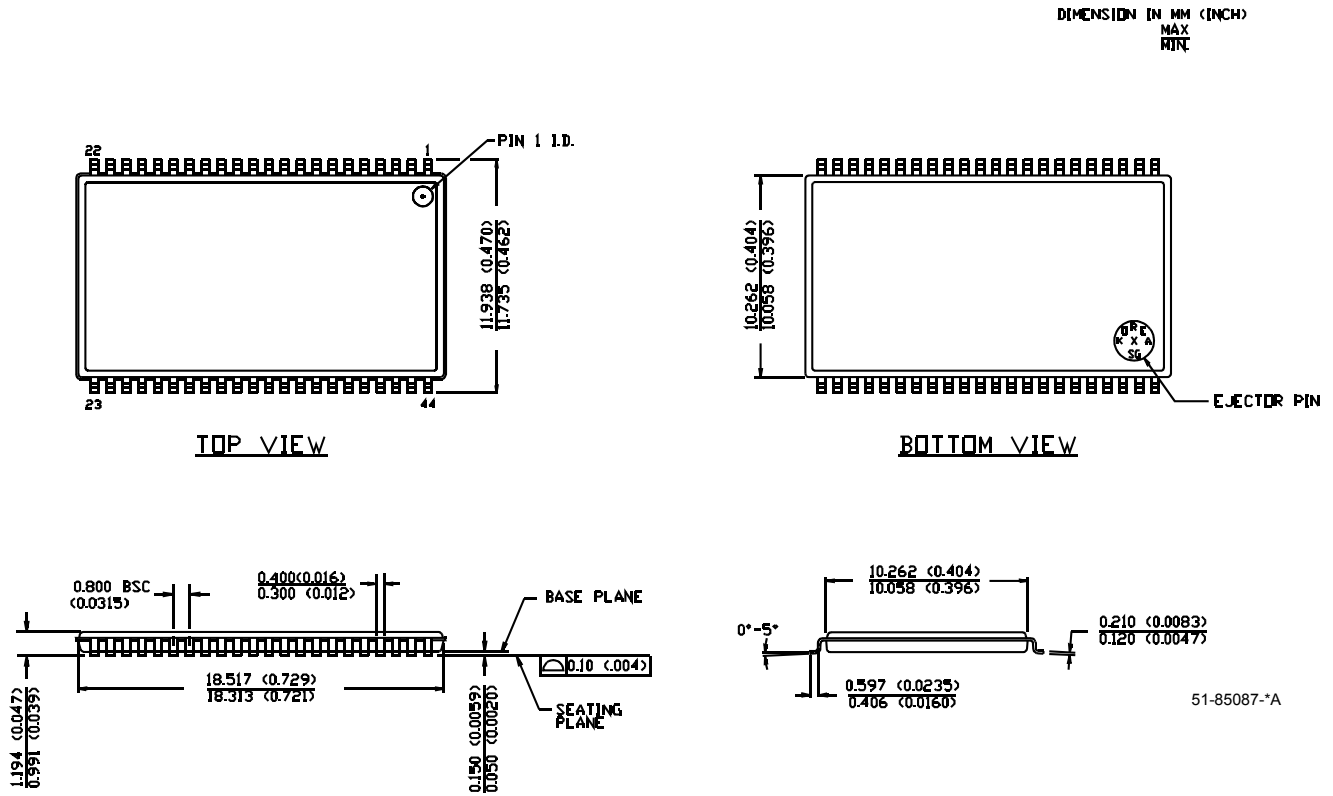
Figure 8. 36-Pin (400-Mil) Molded SOJ (51-85090)



51-85090-°C

Package Diagrams (continued)

Figure 9. 44-Pin TSOP II (51-85087)



Document History Page

Document Title: CY7C1010DV33, 2-Mbit (256K x 8) Static RAM Document Number: 001-00062				
REV.	ECN NO.	Submission Date	Orig. of Change	Description of Change
**	342195	See ECN	PCI	New Data sheet
*A	459073	See ECN	NXR	Converted Preliminary to Final. Removed Commercial Operating Range from product offering. Removed -8 ns and -12 speed bin Removed the Pin definitions table. Modified Maximum Ratings for DC input voltage from -0.5V to -0.3V and $V_{CC} + 0.5V$ to $V_{CC} + 0.3V$ Changed I_{CC} max from 65 mA to 90 mA Changed the description of I_{IX} from "Input Load Current" to "Input Leakage Current" Updated the Thermal Resistance table. Updated footnote #7 on High-Z parameter measurement Added footnote #12 Updated the Ordering Information and replaced Package Name column with Package Diagram in the Ordering Information table.
*B	2602853	11/07/08	VKN/PYRS	Added 36-pin SOJ package and its related information

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