CYM1831

64K x 32 Static RAM Module

Features

- **High-density 2-Mbit SRAM module**
- **32-bit standard footprint supports densities from 16K x 32 through 1M x 32**
- **High-speed CMOS SRAMs**
  - **Access time of 15 ns**
- **Low active power**
  - **5.3W (max.)**
- **SMD technology**
- **TTL-compatible inputs and outputs**
- **Low profile**
  - **Max. height of .50 in.**
- **Small PCB footprint**
  - **1.2 sq. in.**

Functional Description

The CYM1831 is a high-performance 2-Mbit static RAM module organized as 64K words by 32 bits. This module is constructed from eight 64K x 4 SRAMs in SOJ packages mounted on an epoxy laminate board with pins. Four chip selects ($\overline{CS}_1$, CS_2, CS_3, and $\overline{CS}_4$) are used to independently enable the four bytes. Reading or writing can be executed on individual bytes or any combination of multiple bytes through proper use of selects.

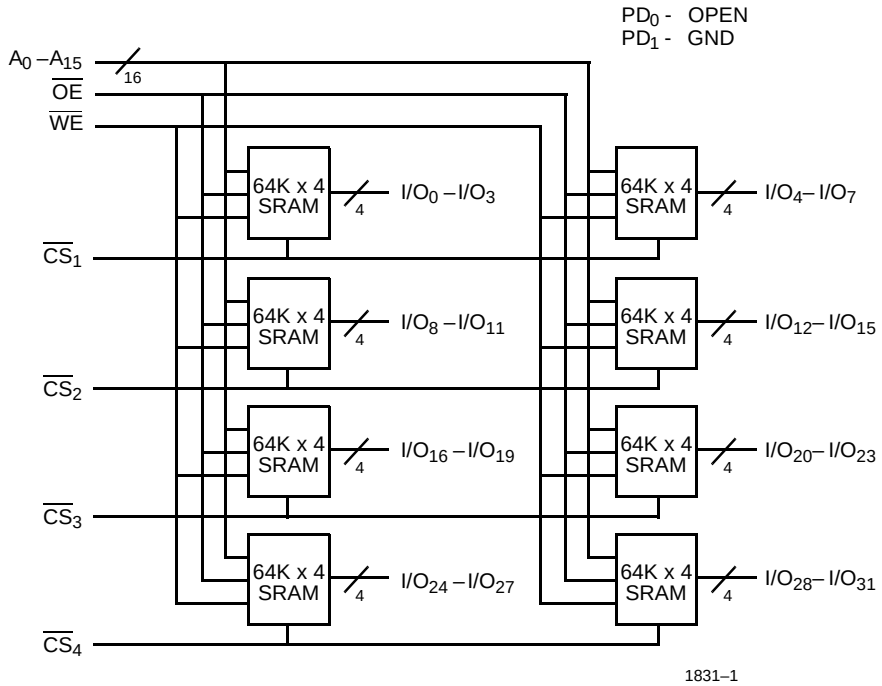
Writing to each byte is accomplished when the appropriate Chip Selects ($\overline{CS}_N$) and Write Enable ($\overline{WE}$) inputs are both LOW. Data on the input/output pins (I/O_X) is written into the memory location specified on the address pins (A_0 through A_{15}).

Reading the device is accomplished by taking the Chip Selects ($\overline{CS}_N$) LOW and Output Enable ($\overline{OE}$) LOW while Write Enable ($\overline{WE}$) remains HIGH. Under these conditions the contents of the memory location specified on the address pins will appear on the data input/output pins (I/O_X).

The data input/output pins stay in the high-impedance state when Write Enable ($\overline{WE}$) is LOW or the appropriate chip selects are HIGH.

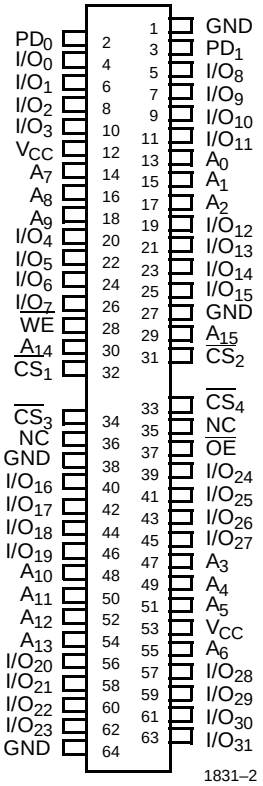
Two pins (PD_0 and PD_1) are used to identify module memory density in applications where alternate versions of the JEDEC-standard modules can be interchanged.

Logic Block Diagram



Pin Configuration

ZIP/SIMM Top View



Selection Guide

	1831–15	1831–20	1831–25	1831–30	1831–35	1831–45
Maximum Access Time (ns)	15	20	25	30	35	45
Maximum Operating Current (mA)	1120	960	720	720	720	720
Maximum Standby Current (mA)	160	160	160	160	160	160

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 ..... –0.5V to +7.0V

DC Voltage Applied to Outputs in High Z State ..... –0.5V to +7.0V

DC Input Voltage ..... –0.5V to +7.0V

Output Current into Outputs (LOW) ..... 20 mA

Operating Range

Range	Ambient Temperature	V_{CC}
Commercial	0°C to +70°C	5V ± 10%

Electrical Characteristics Over the Operating Range

Parameter	Description	Test Conditions	1831–15		1831–20		1831–25, 30, 35, 45		Unit
			Min.	Max.	Min.	Max.	Min.	Max.	
V_{OH}	Output HIGH Voltage	V_{CC} = Min., I_{OH} = –4.0 mA	2.4		2.4		2.4		V
V_{OL}	Output LOW Voltage	V_{CC} = Min., I_{OL} = 8.0 mA		0.4		0.4		0.4	V
V_{IH}	Input HIGH Voltage		2.2	V_{CC}	2.2	V_{CC}	2.2	V_{CC}	V
V_{IL}	Input LOW Voltage		–0.5	0.8	–0.5	0.8	–0.5	0.8	V
I_{IX}	Input Load Current	GND ≤ V_I ≤ V_{CC}	–20	+20	–20	+20	–20	+20	µA
I_{OZ}	Output Leakage Current	GND ≤ V_O ≤ V_{CC}, Output Disabled	–20	+20	–20	+20	–20	+20	µA
I_{CC}	V_{CC} Operating Supply Current	V_{CC} = Max., I_{OUT} = 0 mA, $\overline{CS}_N$ ≤ V_{IL}		1120		960		720	mA
I_{SB1}	Automatic $\overline{CS}$ Power-Down Current[1]	V_{CC} = Max., $\overline{CS}_N$ ≥ V_{IH}, Min. Duty Cycle = 100%		320		320		320	mA
I_{SB2}	Automatic $\overline{CS}$ Power-Down Current[1]	V_{CC} = Max., $\overline{CS}_N$ ≥ V_{CC} – 0.2V, V_{IN} ≥ V_{CC} – 0.2V or V_{IN} ≤ 0.2V		160		160		160	mA

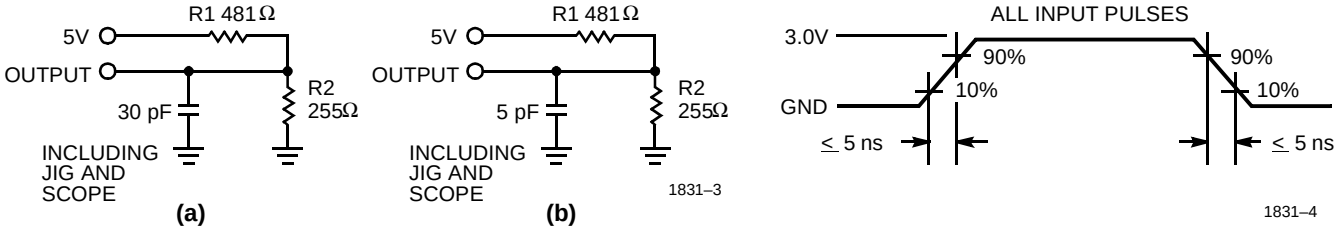
Capacitance[2]

Parameter	Description	Test Conditions	Max.	Unit
C_{INA}	Input Capacitance (A_0–A_{15}, $\overline{WE}$, $\overline{OE}$)	T_A = 25°C, f = 1 MHz, V_{CC} = 5.0V	80	pF
C_{INB}	Input Capacitance ($\overline{CS}$)		15	pF
C_{OUT}	Output Capacitance		20	pF

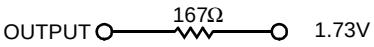
Notes:

1. A pull-up resistor to V_{CC} on the $\overline{CS}$ input is required to keep the device deselected during V_{CC} power-up, otherwise I_{SB} will exceed values given.
2. Tested on a sample basis.

AC Test Loads and Waveforms



Equivalent to: THÉVENIN EQUIVALENT



Switching Characteristics Over the Operating Range[3]

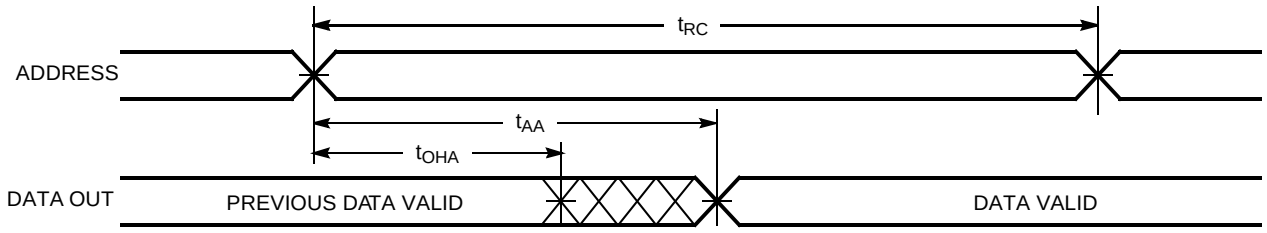
Parameter	Description	1831–15		1831–20		1831–25		1831–30		1831–35		1831–45		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
READ CYCLE														
t_{RC}	Read Cycle Time	15		20		25		30		35		45		ns
t_{AA}	Address to Data Valid		15		20		25		30		35		45	ns
t_{OHA}	Data Hold from Address Change	3		3		3		3		3		3		ns
t_{ACS}	$\overline{CS}$ LOW to Data Valid		15		20		25		30		35		45	ns
t_{DOE}	$\overline{OE}$ LOW to Data Valid		8		10		15		20		20		30	ns
t_{LZOE}	$\overline{OE}$ LOW to Low Z	0		0		0		0		0		0		ns
t_{HZOE}	$\overline{OE}$ LOW to High Z		8		10		15		15		20		20	ns
t_{LZCS}	$\overline{CS}$ LOW to Low Z[4]	0		0		3		3		3		3		ns
t_{HZCS}	$\overline{CS}$ HIGH to High Z[4, 5]		6		8		13		15		20		20	ns
WRITE CYCLE[6]														
t_{WC}	Write Cycle Time	15		20		25		30		35		45		ns
t_{SCS}	$\overline{CS}$ LOW to Write End	10		15		20		25		30		40		ns
t_{AW}	Address Set-Up to Write End	10		15		20		25		30		40		ns
t_{HA}	Address Hold from Write End	2		2		2		2		2		2		ns
t_{SA}	Address Set-Up to Write Start	2		2		2		2		2		2		ns
t_{PWE}	$\overline{WE}$ Pulse Width	10		15		20		25		25		30		ns
t_{SD}	Data Set-Up to Write End	8		12		15		15		20		20		ns
t_{HD}	Data Hold from Write End	2		2		2		2		2		2		ns
t_{LZWE}	$\overline{WE}$ HIGH to Low Z	3		3		3		3		3		3		ns
t_{HZWE}	$\overline{WE}$ LOW to High Z[5]	0	7	0	10	0	13	0	15	0	20	0	20	ns

Note:

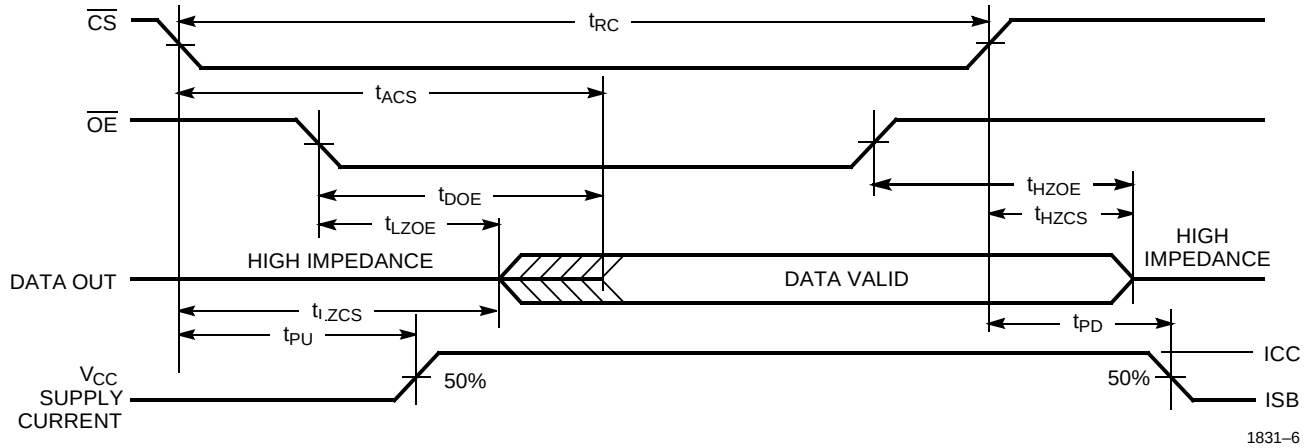
3. Test conditions assume signal transition times of 5 ns or less, timing reference levels of 1.5V, input pulse levels of 0 to 3.0V, and output loading of the specified I_{OL}/I_{OH} and 30-pF load capacitance.
4. At any given temperature and voltage condition, t_{HZCS} is less than t_{LZCS} for any given device. These parameters are guaranteed by design and not 100% tested.
5. t_{HZCS} and t_{HZWE} are specified with C_L = 5 pF as in part (b) of AC Test Loads and Waveforms. Transition is measured ±500 mV from steady-state voltage.
6. The internal write time of the memory is defined by the overlap of $\overline{CS}$ LOW and $\overline{WE}$ LOW. Both signals must be LOW to initiate a write and either signal can terminate a write by going HIGH. The data input set-up and hold timing should be referenced to the rising edge of the signal that terminates the write.

Switching Waveforms

Read Cycle No. 1 [7, 8]



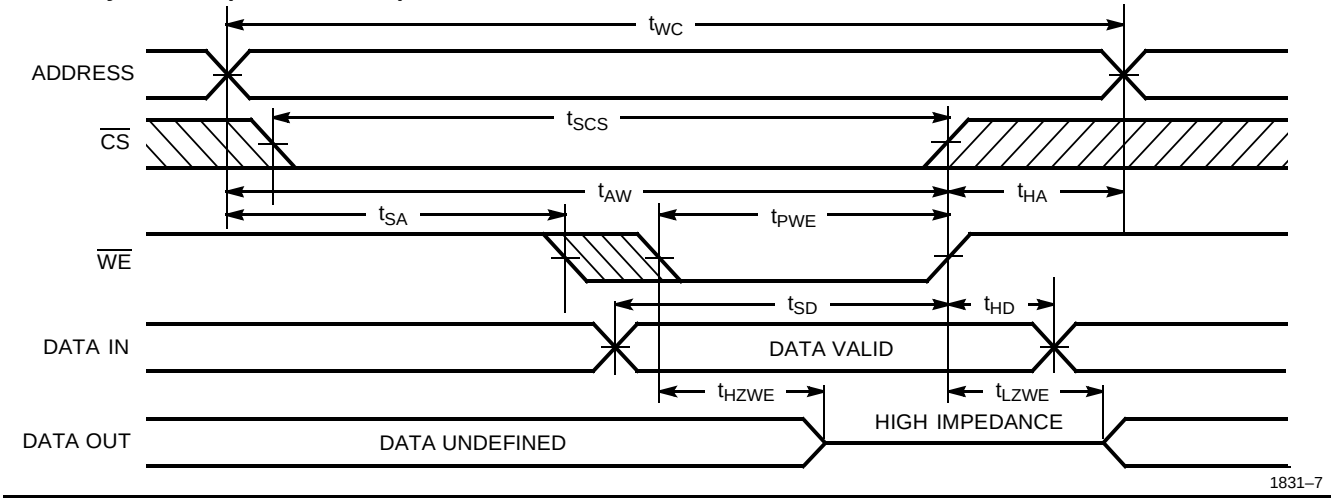
Read Cycle No . 2[7, 9]



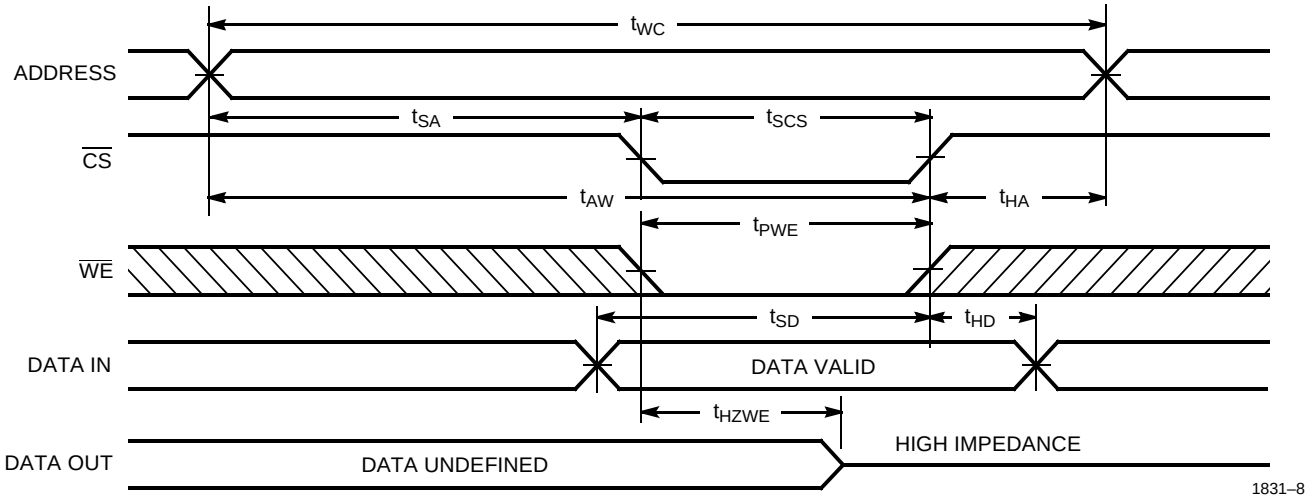
Notes:
7. $\overline{WE}$ is HIGH for read cycle.
8. Device is continuously selected, $\overline{CS} = V_{IL}$ and $\overline{OE} = V_{IL}$.
9. Address valid prior to or coincident with $\overline{CS}$ transition LOW.

Switching Waveforms (continued)

Write Cycle No. 1 ($\overline{WE}$ Controlled)[6]



Write Cycle No. 2 ($\overline{CS}$ Controlled)[6, 10]



Note:
10. If $\overline{CS}$ goes HIGH simultaneously with $\overline{WE}$ HIGH, the output remains in a high-impedance state.

Truth Table

$\overline{CS}_N$	WE	OE	Inputs/Outputs	Mode
H	X	X	High Z	Deselect/Power-Down
L	H	L	Data Out	Read
L	L	X	Data In	Write
L	H	H	High Z	Deselect

Ordering Information

Speed	Ordering Code	Package Name	Package Type	Operating Range
15	CYM1831PM–15C	PM01	64-Pin Plastic SIMM Module	Commercial
	CYM1831PN–15C	PN01	64-Pin Plastic Angled SIMM Module	
	CYM1831PY–15C	PM01	64-Pin Gold SIMM Module	
	CYM1831PZ–15C	PZ01	64-Pin Plastic ZIP Module	
20	CYM1831PM–20C	PM01	64-Pin Plastic SIMM Module	Commercial
	CYM1831PN–20C	PN01	64-Pin Plastic Angled SIMM Module	
	CYM1831PY–20C	PM01	64-Pin Gold SIMM Module	
	CYM1831PZ–20C	PZ01	64-Pin Plastic ZIP Module	
25	CYM1831PM–25C	PM01	64-Pin Plastic SIMM Module	Commercial
	CYM1831PN–25C	PN01	64-Pin Plastic Angled SIMM Module	
	CYM1831PY–25C	PM01	64-Pin Gold SIMM Module	
	CYM1831PZ–25C	PZ01	64-Pin Plastic ZIP Module	
35	CYM1831PM–35C	PM01	64-Pin Plastic SIMM Module	Commercial
	CYM1831PN–35C	PN01	64-Pin Plastic Angled SIMM Module	
	CYM1831PY–35C	PM01	64-Pin Gold SIMM Module	
	CYM1831PZ–35C	PZ01	64-Pin Plastic ZIP Module	
45	CYM1831PM–45C	PM01	64-Pin Plastic SIMM Module	Commercial
	CYM1831PN–45C	PN01	64-Pin Plastic Angled SIMM Module	
	CYM1831PY–45C	PM01	64-Pin Gold SIMM Module	
	CYM1831PZ–45C	PZ01	64-Pin Plastic ZIP Module	

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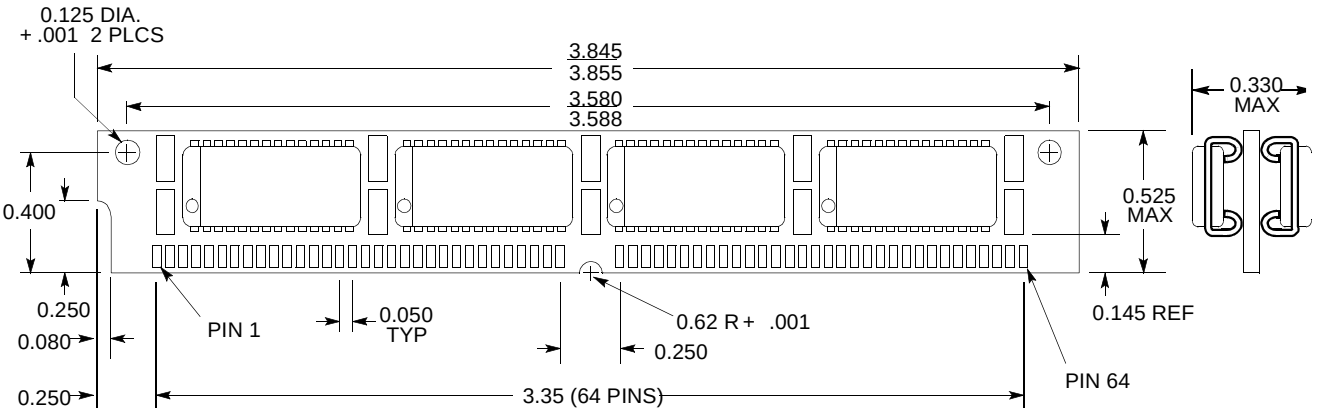
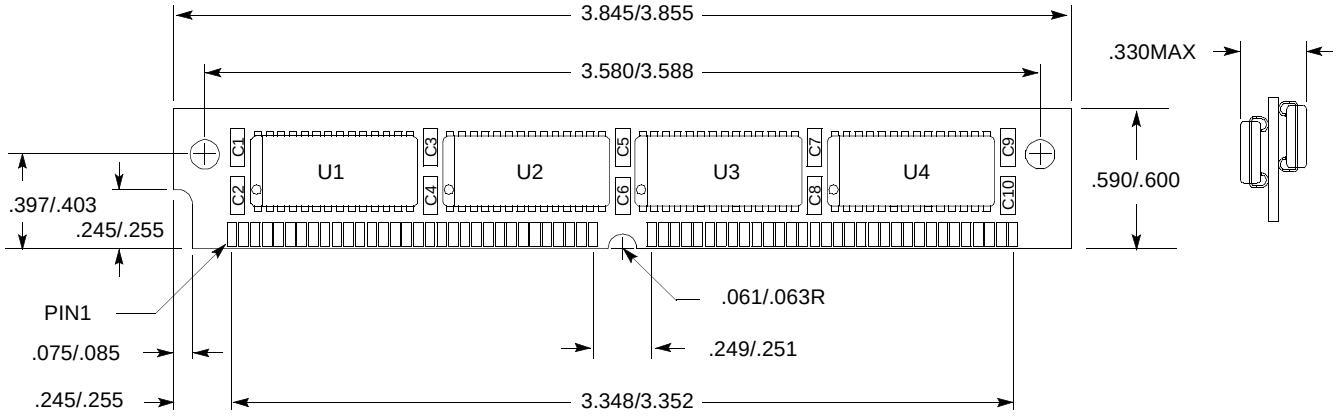
Package Diagrams

64-Pin Plastic SIMM Module PM01

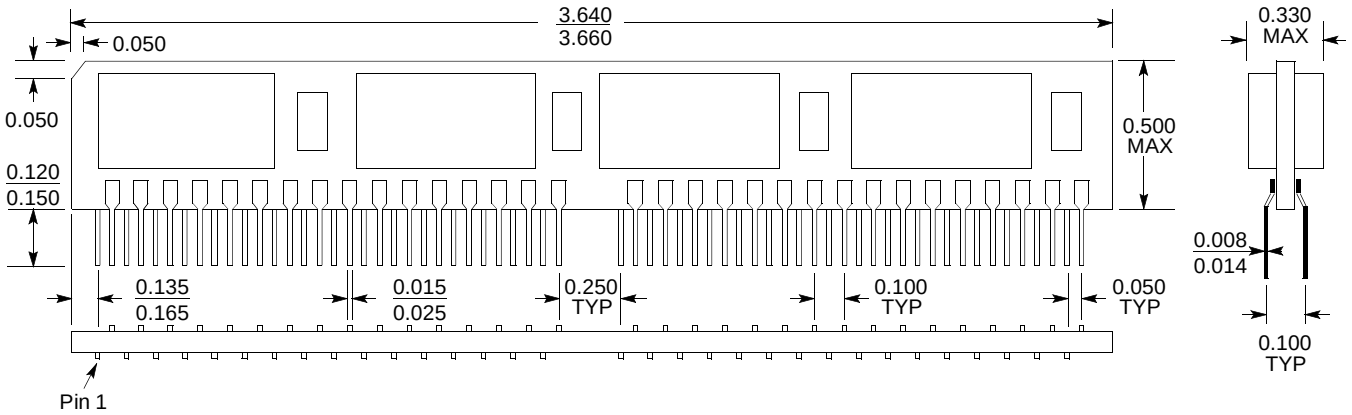


64-Pin Plastic Angled SIMM Module PN01



64-Pin Plastic ZIP Module PZ01

Bottom View



DIMENSIONS IN INCHES

MIN.
MAX.