

## Advance Information

### Description

The MC-434000 is a high-density 4M static RAM module with four 128K x 8-bit SRAMs and one decoder circuit. The module is compatible with the future 4M monolithic SRAM—with TTL-compatible inputs and outputs and fully asynchronous circuitry that requires no clocks or refreshing and provides equal access and cycle times for ease of use.

The MC-434000 operates from a +5-volt power supply and is available in a standard 600-mil, 32-pin ceramic DIP or a JEDEC-type 32-pin plastic (FR-4) DIP.

### Features

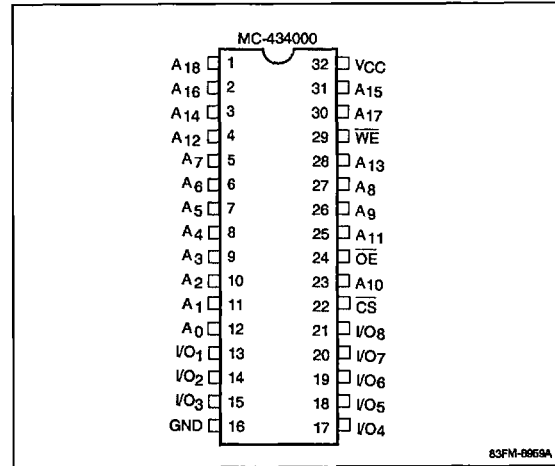
- 524,288-word by 8-bit organization
- Single +5-volt power supply
- Fully static operation—no clocks or refreshing
- TTL-compatible inputs and outputs
- Common I/O using three-state outputs
- One  $\overline{CS}$  pin and one  $\overline{OE}$  pin for easy application
- 32-pin ceramic and plastic (FR-4) DIP packaging

### Pin Identification

Symbol	Function
$A_0 - A_{18}$	Address inputs
$I/O_1 - I/O_8$	Data inputs/outputs
$\overline{CS}$	Chip select
$\overline{OE}$	Output enable
$\overline{WE}$	Write enable
GND	Ground
$V_{CC}$	+5-volt power supply

### Pin Configuration

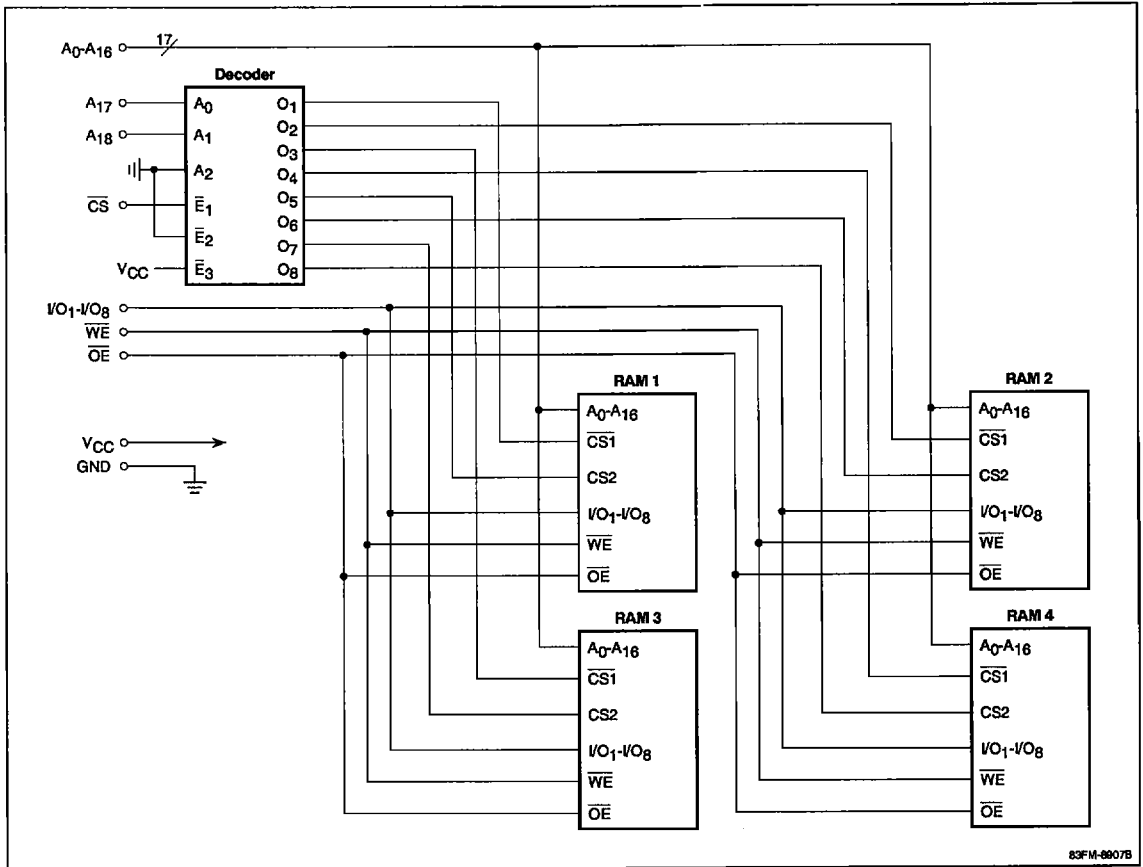
#### 32-Pin Ceramic or Plastic (FR-4) DIP



### Ordering Information

Catalog Part Number	Access Time (max)	Package
MC-434000D-85	85 ns	32-pin ceramic DIP
D-10	100 ns	
MC-434000E-85	85 ns	32-pin plastic (FR-4) DIP
E-10	100 ns	

Block Diagram



## Absolute Maximum Ratings

Supply voltage, $V_{CC}$ (Note 1)	-0.5 to +7.0 V
Input voltage, $V_{IN}$ (Note 1)	-0.5 to $V_{CC} + 0.5$ V
Output voltage, $V_{IO}$ (Note 1)	-0.5 to $V_{CC} + 0.5$ V
Operating temperature, $T_{OPR}$	0 to +70°C
Storage temperature, $T_{STG}$	-55 to +125°C
Power dissipation, $P_D$	1.0 W

Exposure to Absolute Maximum Ratings for extended periods may affect device reliability; exceeding the ratings could cause permanent damage. The device should be operated within the limits specified under DC and AC Characteristics.

### Note:

(1) - 3.0 V minimum (pulse width = 30 ns).

## Capacitance

$T_A = +25^\circ\text{C}$ ;  $f = 1$  MHz;  $V_{IN}$  and  $V_{OUT} = 0$  V

Parameter	Symbol	Max	Unit	Pins
Input capacitance	$C_{IN}$	45	pF	$A_0 - A_{16}$ , $\overline{WE}$ , $\overline{OE}$ , $\overline{CS}$
Input/output capacitance	$C_{IO}$	50	pF	$I/O_1 - I/O_8$

Note: Capacitance is sampled and not 100% tested.

## DC Characteristics

$T_A = 0$  to +70°C;  $V_{CC} = +5.0$  V  $\pm$  10%

Parameter	Symbol	Min	Typ	Max	Unit	Test Conditions
Input leakage current	$I_{LI}$			2	$\mu\text{A}$	$V_{IN} = 0$ V to $V_{CC}$
I/O leakage current	$I_{LO}$			2	$\mu\text{A}$	$V_{IO} = 0$ V to $V_{CC}$ ; $\overline{CS} = V_{IH}$ or $\overline{OE} = V_{IH}$ or $\overline{WE} = V_{IL}$
Operating supply current	$I_{CCA1}$		48	89	mA	$\overline{CS} = V_{IL}$ ; $t_{RC} = t_{RC}(\text{min})$ ; $I_{IO} = 0$ mA
	$I_{CCA2}$		19	46	mA	$\overline{CS} = V_{IL}$ ; $I_{IO} = 0$ mA
	$I_{CCA3}$			36	mA	$\overline{CS} \leq 0.2$ V; $t_{RC}$ or $t_{WC} = 1$ MHz; $V_{IN} \leq 0.2$ V or $V_{IN} \geq V_{CC} - 0.2$ V
Standby supply current	$I_{SB}$		4	12	mA	$\overline{CS} = V_{IH}$ (Note 1)
	$I_{SB1}$		8	400	$\mu\text{A}$	$\overline{CS} \geq V_{CC} - 0.2$ V (Note 2)
Output voltage, low	$V_{OL}$			0.4	V	$I_{OL} = 2.1$ mA
Output voltage, high	$V_{OH}$	2.4			V	$I_{OH} = -1.0$ mA

## Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit
Supply voltage	$V_{CC}$	4.5	5.0	5.5	V
Input voltage, low	$V_{IL}$	-0.3		0.8	V
Input voltage, high	$V_{IH}$	2.2		$V_{CC} + 0.5$	V
Ambient temperature	$T_A$	0		70	°C

Note: - 3.0 V minimum (pulse width = 30 ns).

## Truth Table

Function	$\overline{CS}$	$\overline{OE}$	$\overline{WE}$	I/O	$I_{CC}$
Not selected	H	X	X	High-Z	Standby
Selected	L	H	H	High-Z	Active
Read	L	L	H	$D_{OUT}$	Active
Write	L	X	L	$D_{IN}$	Active

X = don't care.

### AC Characteristics

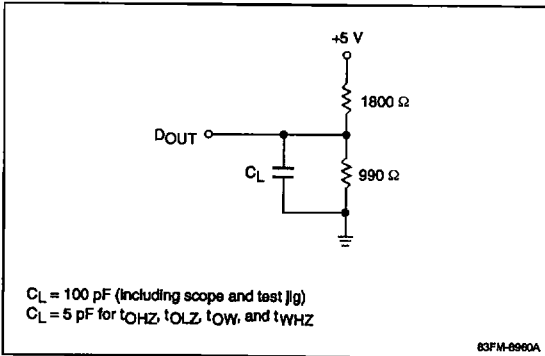
$T_A = 0 \text{ to } +70^\circ\text{C}$ ;  $V_{CC} = +5.0 \text{ V} \pm 10\%$

Parameter	Symbol	MC-434000-85		MC-434000-10		Unit
		Min	Max	Min	Max	
<b>Read Operation</b>						
Read cycle time	$t_{RC}$	85		100		ns
Address access time	$t_{AA}$		85		100	ns
CS access time	$t_{CO}$		85		100	ns
Output enable to output valid	$t_{OE}$		35		45	ns
Output hold from address change	$t_{OH}$	10		10		ns
CS to output in low-Z	$t_{LZ}$	10		10		ns
Output enable to output in low-Z	$t_{OLZ}$	5		5		ns
CS to output in high-Z	$t_{HZ}$		25		30	ns
Output enable to output in high-Z	$t_{OHZ}$		20		30	ns
<b>Write Operation</b>						
Write cycle time	$t_{WC}$	85		100		ns
CS to end of write	$t_{CW}$	75		90		ns
Address valid to end of write	$t_{AW}$	75		90		ns
Address setup time	$t_{AS}$	0		0		ns
Write pulse width	$t_{WP}$	65		75		ns
Write recovery time	$t_{WR}$	5		5		ns
Data valid to end of write	$t_{DW}$	35		40		ns
Data hold time	$t_{DH}$	0		0		ns
Write enable to output in high-Z	$t_{WHZ}$		30		35	ns
Output active from end of write	$t_{OW}$	5		5		ns

#### Notes:

- (1) Input pulse levels = 0.8 to 2.2 V; input rise and fall times = 5 ns; timing reference levels = 1.5 V.
- (2) See figure 1 for output load.

**Figure 1. Output Load**

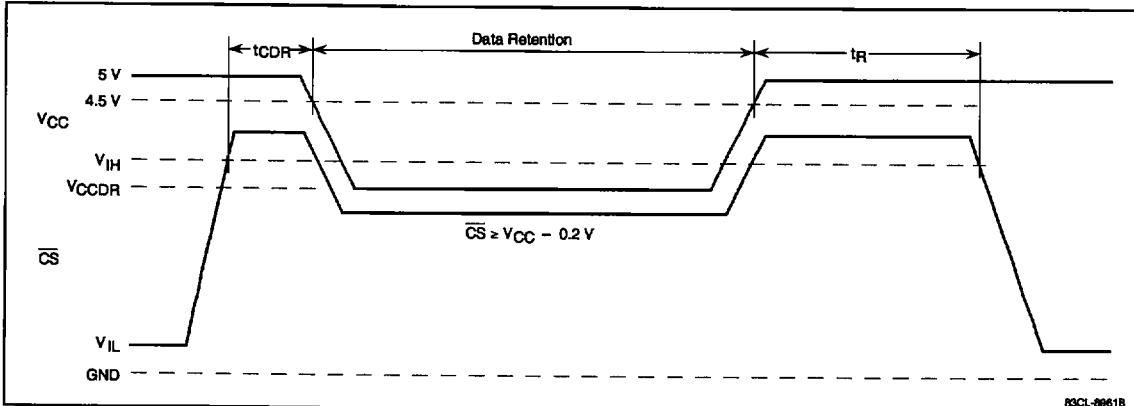


### Low- $V_{CC}$ Data Retention Characteristics

$T_A = 0 \text{ to } +70^\circ\text{C}$

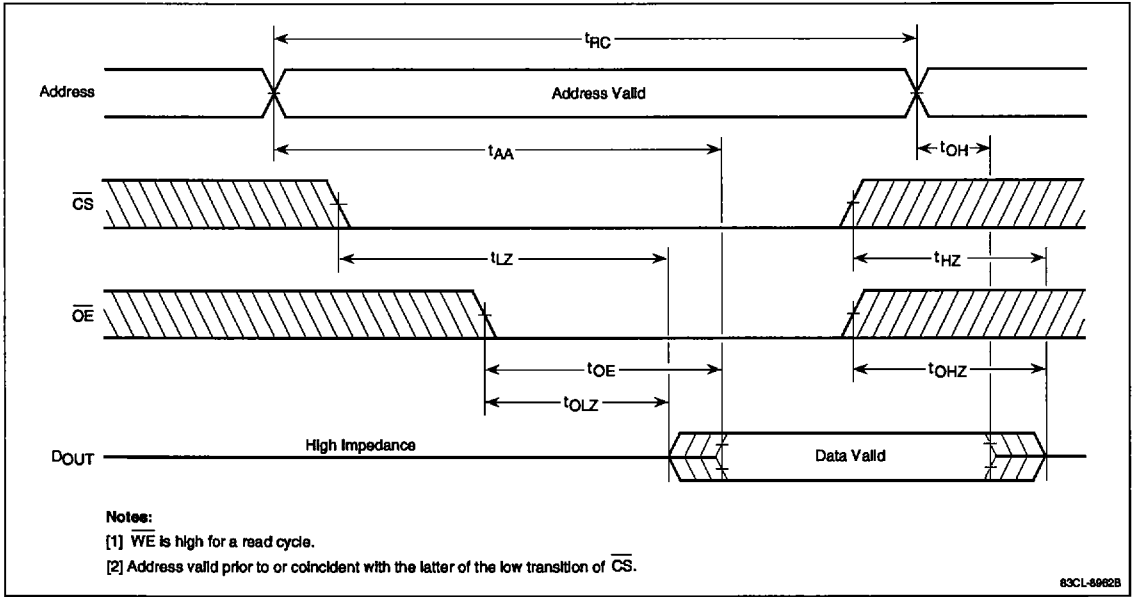
Parameter	Symbol	Min	Typ	Max	Unit	Test Conditions
Data retention supply voltage	$V_{CCDR}$	2		5.5	V	$\overline{CS} \geq V_{CC} - 0.2 \text{ V}$
Data retention supply current	$I_{CCDR}$		4	200	$\mu\text{A}$	$V_{CC} = 3.0 \text{ V}$ ; $\overline{CS} \geq V_{CC} - 0.2 \text{ V}$
Chip deselection to data retention	$t_{CDR}$	0			ns	
Operation recovery time	$t_R$	5			ms	

**Figure 2.  $\overline{CS}$ -Controlled Data Retention Timing**



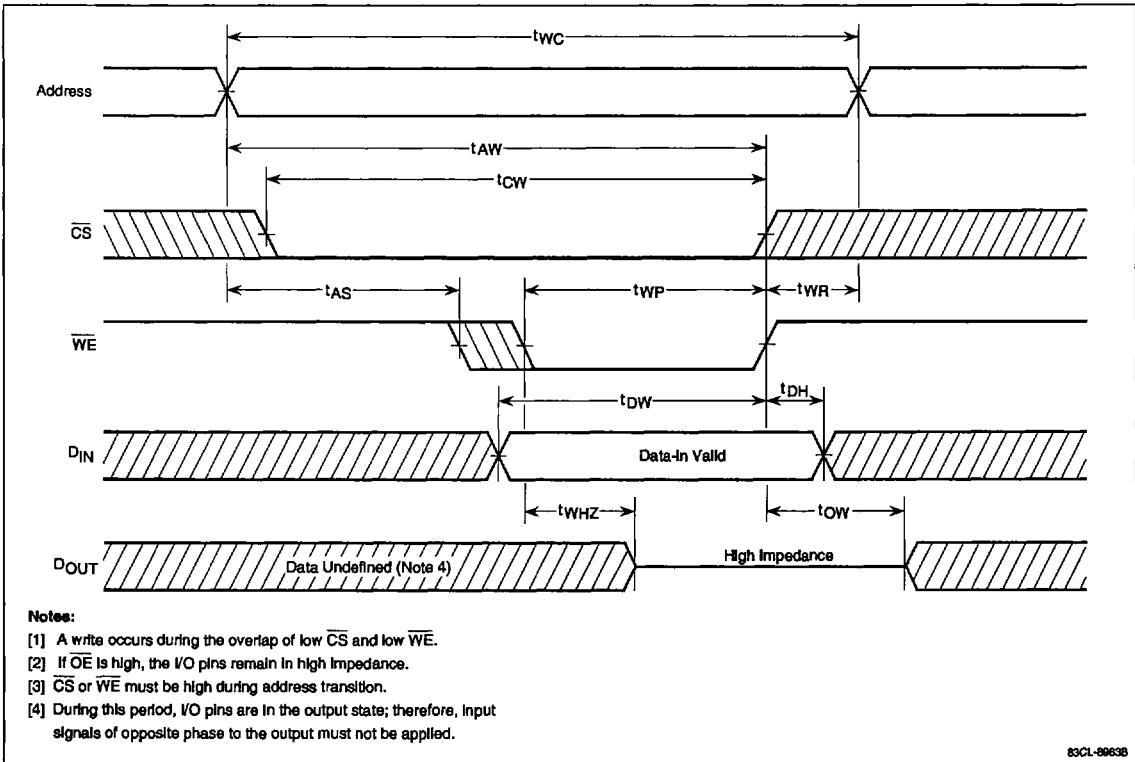
Timing Waveforms

**Read Cycle**



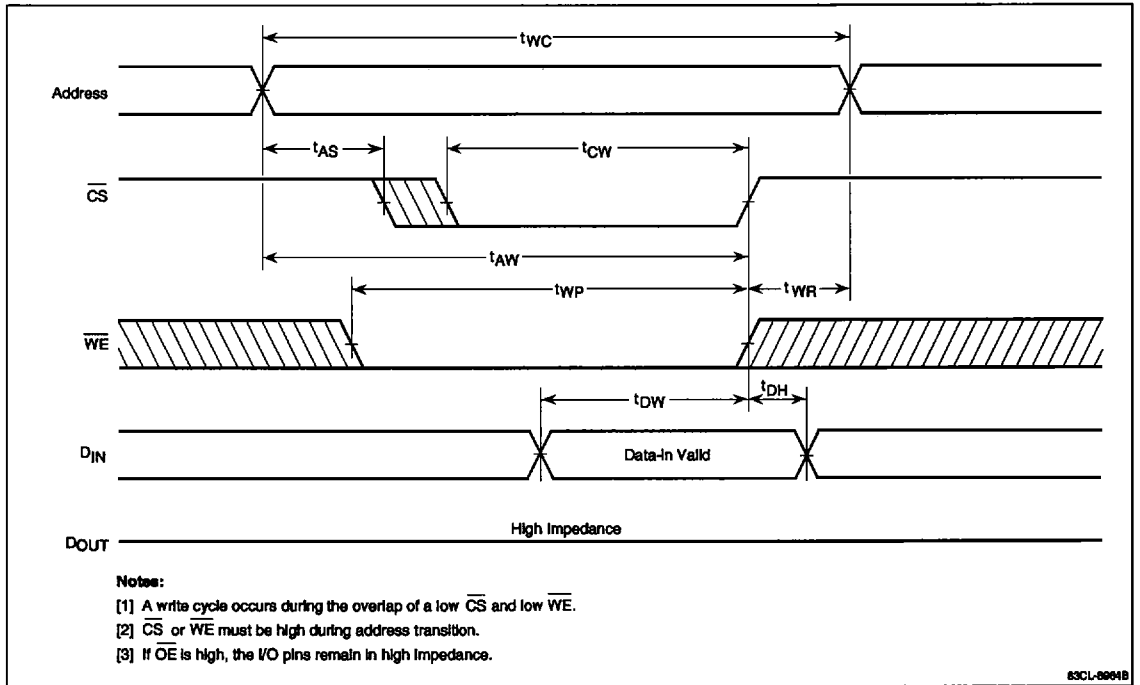
### Timing Waveforms (cont)

#### $\overline{WE}$ -Controlled Write Cycle



Timing Waveforms (cont)

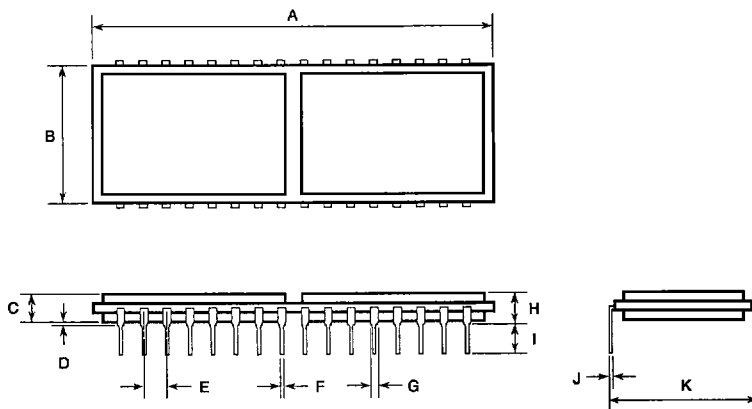
***CS-Controlled Write Cycle***



## Package Drawings

### 32-Pin Ceramic DIP

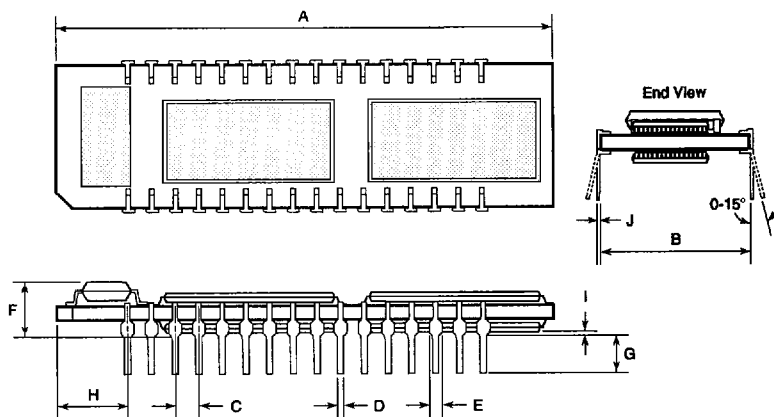
Item	Millimeters	Inches
A	43.053 ± .127	1.7 ± 0.01
B	14.99 ± .254	.59 ± 0.10
C	9.78 max	.385 max
D	0.254 ± .127	.010 ± .005
E	2.54 [TP]	.100 [TP]
F	0.508 ± .127	.02 ± .005
G	1.27 ± .381	.05 ± .015
H	10.287 max	.405 max
I	3.81 ± .635	.15 ± .025
J	0.254 ± .076	.01 ± .003
K	15.37 ± .381	.605 ± .015



83FM-8066B (9/92)

### 32-Pin Plastic (FR-4) DIP

Item	Millimeters	Inches
A	53.47 ± 0.13	2.105 ± .005
B	15.24	.600
C	2.54 [TP]	.100 [TP]
D	0.47 ± 0.12	.019 ± .005
E	1.02	.040
F	5.84 max	.230 max
G	2.54 min	.100 min
H	7.62	.300
I	0.38 min	.015 min
J	0.28 ± 0.08	.011 ± .003



83FM-8066B (9/92)

