

8 K x 9 HIGH SPEED CMOS SRAM

FEATURES

- **FAST ACCESS TIME**
COMMERCIAL : 25/35/45/55 ns (max)
- **LOW POWER CONSUMPTION**
ACTIVE : 850 mW (max)
STANDBY : 125 mW (max)
- **300 AND 330 MILS WIDTH PACKAGE**
- **TTL COMPATIBLE INPUTS AND OUTPUTS**
- **ASYNCHRONOUS**
- **CAPABLE OF WITHSTANDING GREATER THAN 2000 V ELECTROSTATIC DISCHARGE**
- **SINGLE 5 VOLT SUPPLY**

INTRODUCTION

The HM 65779 is a high speed CMOS static RAM organized as 8192 x 9 bits. It is manufactured using MHS's high performance CMOS technology. Access times as fast as 25 ns are available with maximum power consumption of only 660 mW. The HM 65779 features fully static operation requiring no external clocks or timing strobes. The automatic power-down feature reduces the power consumption by 68 % when the circuit is deselected. Easy memory expansion is provided by an active low chip select (CS1), an active high chip select (CS2), an active low output enable (OE) and three state drivers.

All inputs and outputs of the HM 65779 are TTL compatible and operate from a single 5 V supply thus simplifying system design.

The HM-65779 is 100 % processed following the test methods of MIL STD 883C and/or ESA/SCC 9000 making it ideally suitable for military/space applications that demand superior levels of performance and reliability.

The HM 65779 is cache memory application oriented. It can be used either as cache disk (RAM disk) or cache memory in the main frame.

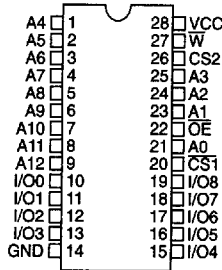
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INTERFACE

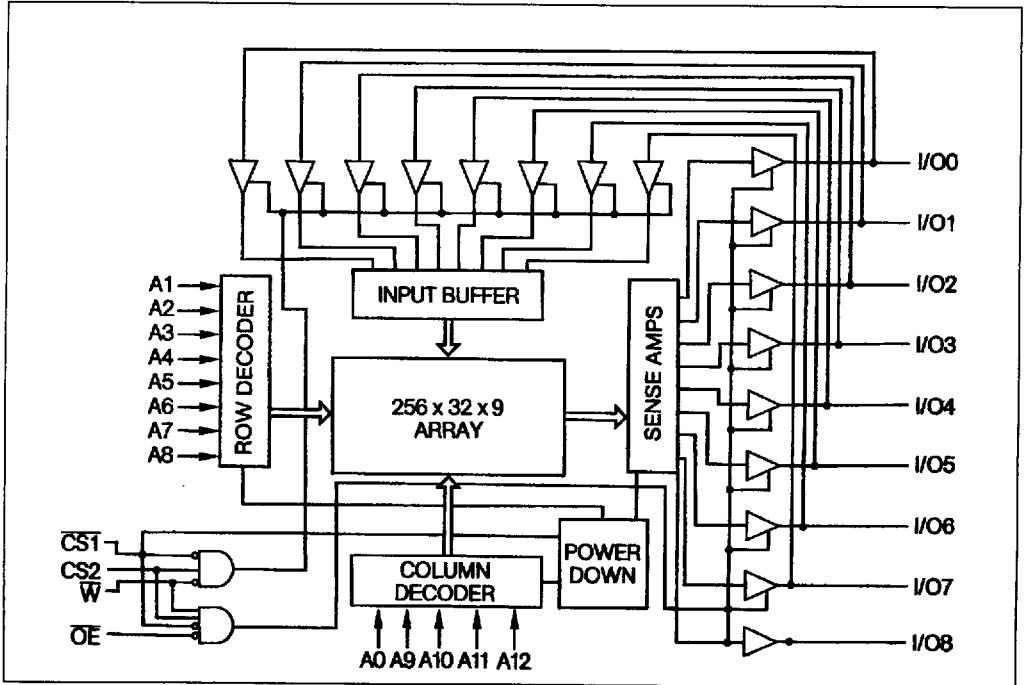
PIN CONFIGURATION

Plastic 300 mils, 28 pins, DIL.
 Ceramic 300 mils, 28 pins, DIL.
 SOIC 300/330 mils and SOJ 300 mils, 28 pins

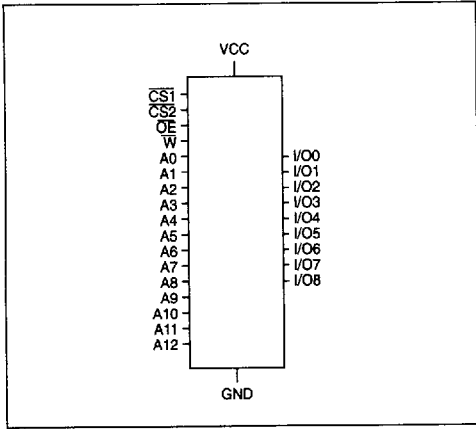


Pinout DIL, SOIC, SOJ 28 pins (top view)

BLOCK DIAGRAM



LOGIC SYMBOL



PIN NAMES

A0-A13 : Address inputs	$\overline{CS1}$: Chip-select 1
I/O0-I/O8 : Inputs/Outputs	CS2 : Chip Select 2
VCC : Power	\overline{OE} : Output Enable
GND : Ground	\overline{W} : Write enable

TRUTH TABLE

$\overline{CS1}$	CS2	\overline{OE}	\overline{W}	DATA-IN	DATA-OUT	MODE
H	X	X	X	Z	Z	Deselect (power down)
L	H	L	H	Z	Valid	Read
L	H	X	L	Valid	Z	Write
L	H	H	H	Z	Z	Output disable
X	L	X	X	Z	Z	Deselect

L = low - H = high - X = H or L - Z = high impedance.

ELECTRICAL CHARACTERISTICS

ABSOLUTE MAXIMUM RATINGS

Supply voltage to GND potential : - 0.5 V to + 7.0 V
 DC input voltage : - 3.0 V to + 7.0 V
 DC output voltage in high Z state : - 0.5 V to + 7.0 V
 Storage temperature : - 65°C to + 150°C

Output current into outputs (low) : 20 mA
 Electro Static Discharge voltage > 2000 V (MIL STD 883C method 3015.2)

OPERATING RANGE

		OPERATING VOLTAGE	OPERATING TEMPERATURE
Commercial	(- 5)	5 V ± 10 %	0°C to + 70°C
Military	(- 2)	5 V ± 10 %	- 55°C to + 125°C

RECOMMENDED DC OPERATING CONDITIONS

PARAMETER	DESCRIPTION	MINIMUM	TYPICAL	MAXIMUM	UNIT
Vcc	Supply Voltage	4.5	5.0	5.5	V
Gnd	Ground	0.0	0.0	0.0	V
VIL	Input low voltage	- 3.0	0.0	0.8	V
VIH	Input high voltage	2.2	-	VCC	V

CAPACITANCE

PARAMETER	DESCRIPTION	MINIMUM	TYPICAL	MAXIMUM	UNIT
Cin (1)	Input capacitance	-	-	5	pF
Cout (1)	Output capacitance	-	-	7	pF

Note : 1. TA = 25°C, f = 1 MHz, Vcc = 5.0 V, these parameters are not 100 % tested.

7

DC PARAMETERS

PARAMETER	DESCRIPTION	MINIMUM	TYPICAL	MAXIMUM	UNIT
IIX (2)	Input leakage current	- 10.0	-	10.0	μA
IOZ (3)	Output leakage current	- 10.0	-	10.0	μA
IOS (3)	Output short circuit current	-	-	- 300.0	mA
VOL (4)	Output low voltage	-	-	0.4	V
VOH (5)	Output high voltage	2.4	-	-	V

- Notes :
2. $Gnd < V_{in} < V_{cc}$, $Gnd < V_{out} < V_{cc}$ output disabled.
 3. $V_{cc} = \text{max}$, $V_{out} = Gnd$, duration of the short circuit should not exceed 30 seconds. Not more than 1 output should be shorted at one time.
 4. $V_{cc} \text{ min}$, $I_{OL} = 8.0 \text{ mA}$.
 5. $V_{cc} \text{ min}$, $I_{OH} = -4.0 \text{ mA}$.

CONSUMPTION FOR COMMERCIAL (- 5) SPECIFICATION

SYMBOL	PARAMETER	65779 H-5	65779 K-5	65779 M-5	65779 N-5	UNIT	VALUE
ICCSB (6)	Standby supply current	20	20	20	20	mA	max
ICCOP (7)	Dynamic operating current	120	120	120	120	mA	max

CONSUMPTION FOR MILITARY (- 2) SPECIFICATION

SYMBOL	PARAMETER	65779 K-2	65779 M-2	65779 N-2	UNIT	VALUE
ICCSB (6)	Standby supply current	30	30	30	mA	max
ICCOP (7)	Dynamic operating current	140	140	140	mA	max

- Notes :
6. $CS1 \geq V_{IH}$, $CS2 \leq V_{IL}$, a pull-up resistor to V_{cc} on the CS input is required to keep the device deselected during V_{cc} power-up otherwise ICCSB will exceed values above.
 7. $V_{cc} \text{ max}$, Output current = 0 mA, $f = \text{max}$, $V_{in} = V_{cc}$ or Gnd.

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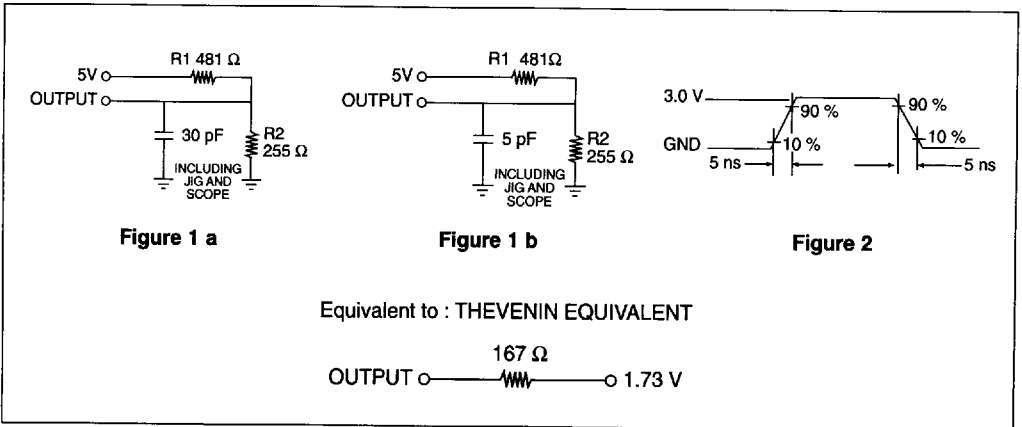
AC PARAMETERS

AC CONDITIONS :

Input pulse levels : Gnd to 3.0 V
 Input rise : 5 ns

Input timing reference levels : 1.5 V
 Output loading IOL/IOH (see figure 1 a and 1 b) : + 30 pF

AC TEST LOADS AND WAVEFORMS



WRITE CYCLE : COMMERCIAL (- 5) SPECIFICATION

SYMBOL	PARAMETER	65779 H-5	65779 K-5	65779 M-5	65779 N-5	UNIT	VALUE
TAVAV	Write cycle time	25	35	45	50	ns	min
TAVWL	Address set-up time	0	0	0	0	ns	min
TAVWH	Address valid to end of write	20	30	40	50	ns	min
TDVWH	Data set-up time	15	20	25	30	ns	min
TEL1WH	CS1 low to write end	20	30	40	50	ns	min
TEH2WH	CS2 high to write end	20	30	40	50	ns	min
TWLQZ (9)	Write low to high Z	13	15	20	25	ns	max
TWLWH	Write pulse width	20	25	30	35	ns	min
TWHAX	Address hold from end of write	5	5	5	5	ns	min
TWHDX	Data hold time	0	0	0	0	ns	min
TWHQX (8, 9)	Write high to low Z	3	3	3	3	ns	min

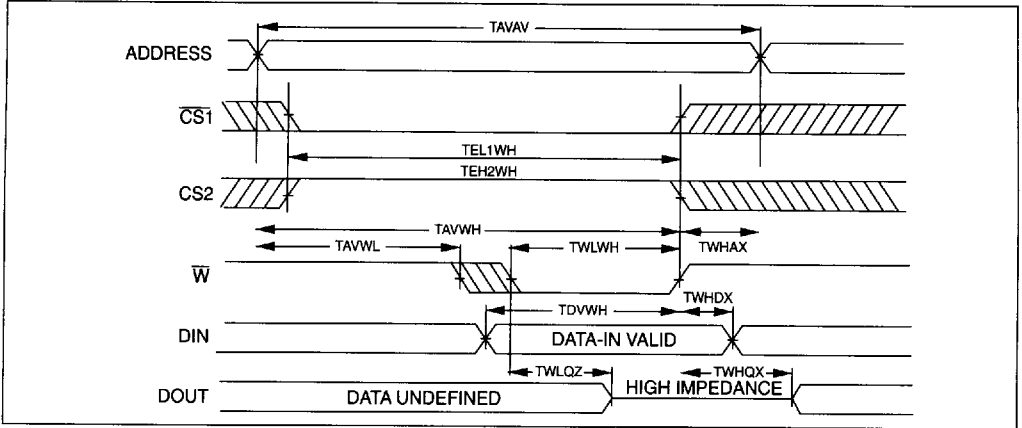
WRITE CYCLE : MILITARY (- 2) SPECIFICATION

SYMBOL	PARAMETER	65779 K-2	65779 M-2	65779 N-2	UNIT	VALUE
TAVAV	Write cycle time	35	45	50	ns	min
TAVWL	Address set-up time	0	0	0	ns	min
TAVWH	Address valid to end of write	30	40	50	ns	min
TDVWH	Data set-up time	20	25	30	ns	min
TEL1WH	CS1 low to write end	30	40	50	ns	min
TEH2WH	CS2 high to write end	30	40	50	ns	min
TWLQZ (9)	Write low to high Z	15	20	25	ns	max
TWLWH	Write pulse width	25	30	35	ns	min
TWHAX	Address hold to end of write	5	5	5	ns	min
TWHDX	Data hold time	0	0	0	ns	min
TWHQX (8, 9)	Write high to low Z	3	3	3	ns	min

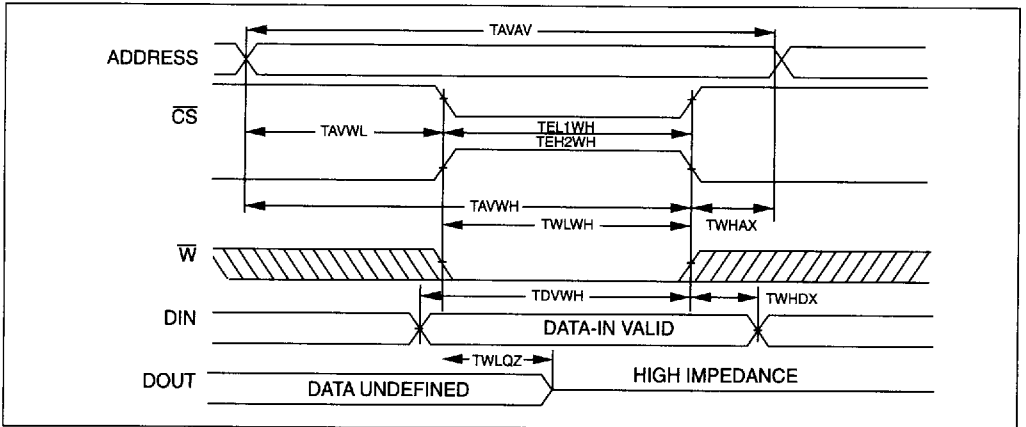
Notes : 8. The data input set-up and hold timing should be referenced to the rising edge of the signal that terminates the write.

9. At any given temperature and voltage condition, TWHQX is less than TWLQZ for all devices. These parameters are sampled and not 100 % tested.

WRITE CYCLE 1 \overline{W} CONTROLLED (note 10)



WRITE CYCLE 2 $\overline{CS1}$ CONTROLLED (note 10)



Note : 10. The internal write of the memory is defined by the overlap of \overline{CS} LOW and \overline{W} LOW. Both signals must be LOW to initiate a write and either signal can terminate a write by going HIGH. The data input setup and hold timing should be referenced to the rising edge of the signal that terminates the write.
Data-out is HIGH impedance if $\overline{OE} = V_{IH}$.

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READ CYCLE : COMMERCIAL (- 5) SPECIFICATION

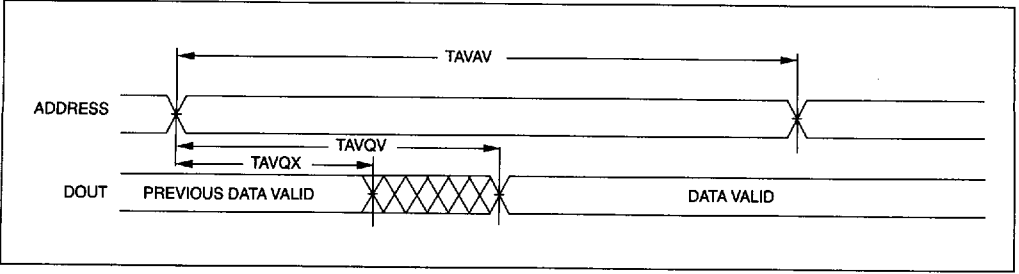
SYMBOL	PARAMETER	65779 H-5	65779 K-5	65779 M-5	65779 N-5	UNIT	VALUE
TAVAV	READ cycle time	25	35	45	55	ns	min
TAVQV	Address access time	25	35	45	55	ns	max
TAVQX	Address valid to low Z	3	3	3	3	ns	min
TEL1QV	Chip-select 1 access time	25	35	45	55	ns	max
TEH2QV	Chip-select 2 access time	15	15	20	25	ns	max
TEL1QX	$\overline{CS1}$ low to low Z	5	5	5	5	ns	min
TEH2QX	CS2 high to high Z	5	5	5	5	ns	min
TEH1QZ (10)	$\overline{CS1}$ high to high Z	20	20	25	25	ns	max
TEL2QZ (10)	CS2 high to high Z	20	20	25	25	ns	max
TEL1IC	$\overline{CS1}$ low to power up	0	0	0	0	ns	min
TEH1ICCL	$\overline{CS1}$ high to power down	20	20	25	25	ns	max
TGLQV	Output enable access time	15	15	20	25	ns	max
TGLQX	\overline{OE} low to low Z	3	3	3	3	ns	min
TGHQZ	\overline{OE} high to high Z	20	20	25	30	ns	max

READ CYCLE : MILITARY (- 2) SPECIFICATION

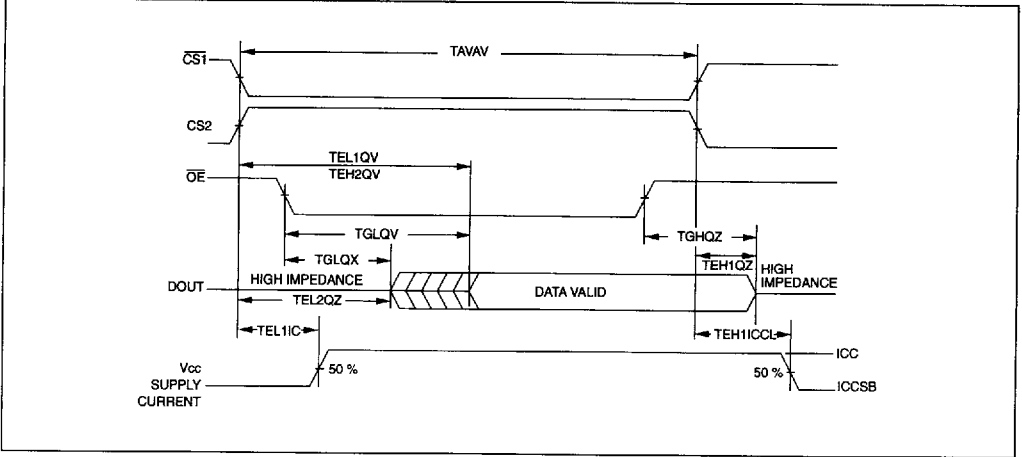
SYMBOL	PARAMETER	65779 K-2	65779 M-2	65779 N-2	UNIT	VALUE
TAVAV	READ cycle time	35	45	55	ns	min
TAVQV	Address access time	35	45	55	ns	max
TAVQX	Address valid to low Z	3	3	3	ns	min
TEL1QV	Chip-select 1 access time	35	45	55	ns	max
TEH2QV	Chip-select 2 access time	20	20	25	ns	max
TEL1QX	$\overline{CS1}$ low to low Z	5	5	5	ns	min
TEH2QX	CS2 high to low Z	5	5	5	ns	min
TEH1QZ (10)	$\overline{CS1}$ high to high Z	20	25	25	ns	max
TEL2QZ (10)	CS2 high to high Z	20	25	25	ns	max
TEL1IC	$\overline{CS1}$ low to power up	0	0	0	ns	min
TEH1ICCL	$\overline{CS1}$ high to power down	20	25	25	ns	max
TGLQV	Output enable access time	20	20	25	ns	max
TGLQX	\overline{OE} low to low Z	3	3	3	ns	min
TGHQZ	\overline{OE} high to high Z	20	25	30	ns	max

Note : 10. TEHQZ and TWLQZ are specified with $C1 = 5$ pF. Transition is measured ± 500 mV from steady state voltage.

READ CYCLE nb 1 (notes 12, 13)



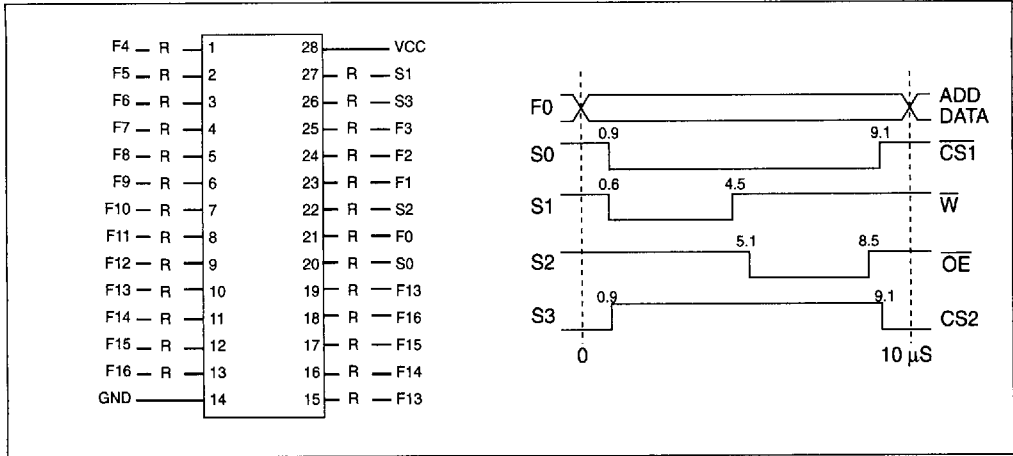
READ CYCLE nb 2 (note 12,14)



- Notes : 12. \bar{W} is high for read cycle.
 13. Device is continuously selected, $\overline{CS_1}/\overline{OE} = V_{IL}$, $CS_2 = V_{IH}$.
 14. Address valide prior to or coincident with $\overline{CS_1}$ transition low.

7

BURN-IN SCHEMATICS



VCC = + 5 V (-0, + 0.5)
 R = 1 KΩ per pin
 F0 = 91.6 KHz ± 20 %
 Fn = 1/2 Fn - 1
 S0 to S3 = Programmable signal for read/write cycles.

ORDERING INFORMATION

HM	Package	Device type	Grade	Level
<u>HM</u>	<u>3</u>	<u>65779</u>	<u>H</u>	<u>-5 : R</u>
		8 K x 9 high speed static RAM		
		1 - Ceramic 28 pins, 300 mils. 3 - Plastic 28 pins, 300 mils. T - SO 300 mils, 28 pins. TP - SO 330 mils, 28 pins. U - SOJ 300 mils, 28 pins.	H = 25 ns K = 35 ns M = 45 ns N = 55 ns	- 2 : Military - 5 : Commercial - 6 : 100% 25°C Probe /883 : MIL STD 883 Class B or S DB : Dice Military program R : Tape & Reel option RD : Tape & Reel / Dry pack option D : Dry pack option

7