

MAY 1986

PRELIMINARY

Features

- HIGH SPEED, FAST ACCESS TIME : 25/35/45 ns
- ASYNCHRONOUS
- STAND BY CURRENT : 10 mA
- OPERATING SUPPLY CURRENT : 70 mA
- MULTIPLEXED DATA INPUT AND OUTPUT
- NO CLOCKS OR STROBES REQUIRED
- WIDE TEMPERATURE RANGE : - 55° C TO 125° C
- TTL COMPATIBLE INPUTS AND OUTPUTS
- SINGLE 5V SUPPLY
- CAPABLE OF WITHSTANDING GREATER THAN 2000 V ELECTROSTATIC DISCHARGE

Description

The HM 65768/65769 is a 16384 bit static Random Access Memory organized as 4096 words by 4 bit using CMOS technology and operates from the single 5V supply.

The HM 65768/65769 uses MHS technology featuring a very fast access time.

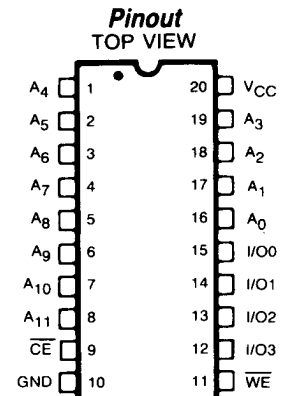
A 25 ns access time is available with a maximum power consumption of 385 mW.

Easy memory expansion is provided by an active low chip enable (\overline{CE}) and three state drivers.

The HM 65768 has an automatic power down feature, reducing the power consumption by 85 %

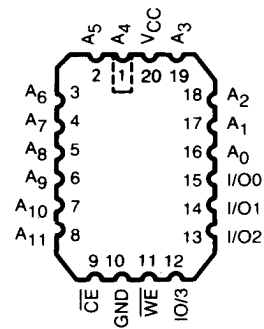
This product features fully static operation requiring no external clocks or timing strobes. The pinout is the Jedec 20 pin .300" width package allowing maximum board packing density.

The HM 65768/65769 military RAM is 100 % processed using the MIL 883C test methods. This makes an ideally product suited to military temperature application demanding the highest level of performance and reliability.

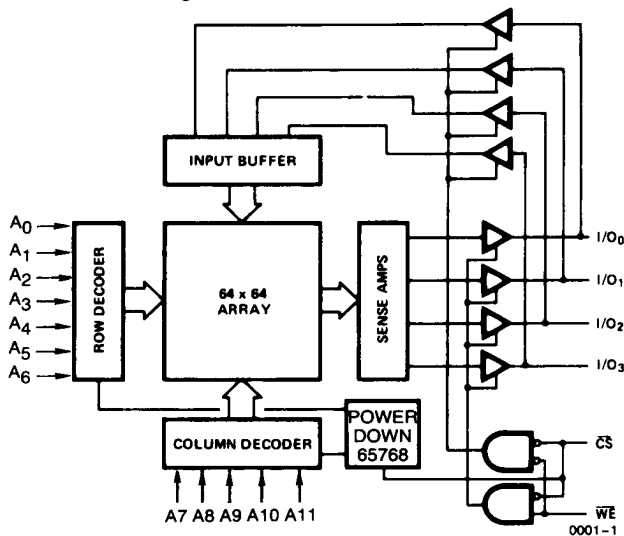


A-Address input
 I/O-Input/Output data
 \overline{CE} -Chip Enable
 WE-Write Enable
 VCC-Power
 GND-Ground

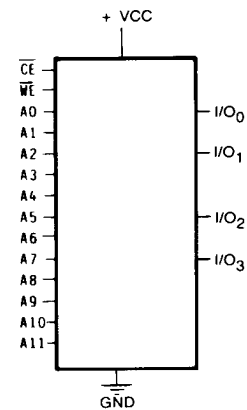
LCC 20 PINS TOP VIEW



Functional Diagram



Logic Symbol



129

ORIG

5622

005622

MHS

HM 65768

• ABSOLUTE MAXIMUM RATINGS	• OPERATING RANGE	Operating Voltage	Operating Temperature
Supply voltage (VCC-GND) — 0.5 V to + 7.0 V DC input voltage : - 3. to 7.0V DC output voltage in high Z state : - 0.5V to 7.0V Storage temperature : - 65° C to + 150° C Output current into outputs (low) : 20 mA	Military - 2 Commercial - 5	VCC ± 10 % VCC ± 10 %	- 55° C to + 125° C - 0° C to + 70° C

Electro Static Discharge Voltage > 2000V
(per MIL STD 883, Method 3015.2)

ELECTRICAL CHARACTERISTICS DC PARAMETERS

Symbol	Parameter	65768H-5 65768K-5	65768K-2	65768M-5	65768M-2	Unit	Value
ICCSB (1)	Stand by supply current	20	20	15	20	mA	max
ICCSB (2)	Stand by supply current	11	20	15	20	mA	max
ICCOP (3)	Average operating supply current	90	90	70	70	mA	max
IIX (4)	Input leakage current	± 10	± 10	± 10	± 10	µA	max
IOZ (4)	Output leakage current	± 50	± 50	± 50	± 50	µA	max
VIL (5)	Input low voltage	0.8	0.8	0.8	0.8	V	max
VIH (5)	Input high voltage	2.0	2.0	2.0	2.0	V	min
VOL (6)	Output low voltage	0.4	0.4	0.4	0.4	V	max
VOH (6)	Output high voltage	2.4	2.4	2.4	2.4	V	min
I OS (7)	Output short circuit current	- 350	- 350	- 350	- 350	mA	max
C IN (8)	Input capacitance	4	4	4	4	PF	max
C OUT (8)	Output capacitance	7	7	7	7	PF	max

Note 1 : $\overline{CE} \geq V_{IH}$

Note 2 : $\overline{CE} \geq V_{CC} - 0.3V$

Note 3 : VCC max, Iout = 0 mA

Note 4 : $GND \leq V_I \leq V_{CC}$, $GND \leq V_O \leq V_{CC}$ Output disabled

Note 5 : VIL min = - 3.0V, VIH max = VCC

Note 6 : VCC min, IOH = - 4 mA, IOL = 8.0 mA

Note 7 : VCC = max, Vout = GND, duration of the short circuit should not exceed 30 seconds.

Not more than 1 output should be shorted at one time

Note 8 : This parameter is sampled and not 100 % tested. TA = 25°C, F = 1 MHz, VCC = 5.0V



HM 65768

AC PARAMETERS

Conditions Input pulse levels GND to 3.0 V
 Input rise time 5 ns
 Input timing reference levels 1.5 V
 Output loading IOL/IOH + 30 pF
 (see fig. 1a and 1b)

Read cycle

Parameter	Description	65768H-5	65768K-5	65768K-2	65768M-5	65768M-2	Unit	Value
TAVAV	Read cycle time	25	35	35	45	45	ns	min
TAVQV	Address to data valid	25	35	35	45	45	ns	max
TAVQX	Data hold from address change	3	3	3	3	3	ns	min
TELQV	\overline{CE} low to data valid	25	35	35	45	45	ns	max
TELQX	\overline{CE} low to low Z (10)	5	5	5	5	5	ns	min
TEHQZ	\overline{CE} high to high Z (9, 10)	15	20	20	25	25	ns	max
TELIC	\overline{CE} low to power up	0	0	0	0	0	ns	min
TEHICCL	\overline{CE} high to power down	25	25	25	30	30	ns	max
TWHEL	Read command set up	0	0	0	0	0	ns	min
TEHWL	Read command hold	0	0	0	0	0	ns	min

Write cycle (11)

Parameter	Description	65768H-5	65768K-5	65768K-2	65768M-5	65768M-2	Unit	Value
TAVAV	Write cycle time	25	35	35	40	40	ns	min
TELWH	\overline{CE} low to write end	25	35	35	35	35	ns	min
TAVWH	Address set up to write end	20	30	30	35	35	ns	min
TWHAX	Address hold from write end	0	0	0	0	0	ns	min
TAVWL	Address set up to write start	0	0	0	0	0	ns	min
TWLWH	\overline{WE} pulse width	20	30	30	35	35	ns	min
TDVWH	Data set up to write end	15	15	15	15	15	ns	min
TWHDX	Data hold from write end	0	0	0	3	3	ns	min
TWLQZ	\overline{WE} Low to high Z (10)	10	15	15	20	20	ns	max
TWHQX	\overline{WE} high to low Z (9, 10)	6	6	6	6	6	ns	min

Note 9 : TEHQZ, TWLQZ are tested with CL = 5 pF as in figure 1b. Transition is measured \pm 500 mV from steady state voltage.

Note 10 : At any given temperature and voltage condition, TQZ is less than TQX for all devices.

These parameters are sampled and not 100 % tested.

Note 11 : Data input set up and hold timing should be referenced to the using edge of the signal that terminates the write.



HM 65769

AC PARAMETERS

Conditions Input pulse levels GND to 3.0 V
 Input rise time 5 ns
 Input timing reference levels 1.5 V
 Output loading IOL/IOH + 30 pF
 (see fig. 1a and 1b)

Read cycle

Parameter	Description	65769H-5	65769K-5	65769K-2	65769M-5	65769M-2	Unit	Value
TAVAV	Read cycle time	25	35	35	45	45	ns	min
TAVQV	Address to data valid	25	35	35	45	45	ns	max
TAVQX	Data hold from address change	3	3	3	3	3	ns	min
TELQV	\overline{CE} low to data valid	15	25	25	25	25	ns	max
TELQX	\overline{CE} low to low Z (10)	5	5	5	5	5	ns	min
TEHQZ	\overline{CE} high to high Z (9, 10)	15	20	20	25	25	ns	max
TWHEL	Read command set up	0	0	0	0	0	ns	min
TEHWL	Read command hold	0	0	0	0	0	ns	min

Write cycle (11)

Parameter	Description	65769H-5	65769K-5	65769K-2	65769M-5	65769M-2	Unit	Value
TAVAV	Write cycle time	25	35	35	40	40	ns	min
TELWH	\overline{CE} low to write end	25	35	35	35	35	ns	min
TAVWH	Address set up to write end	20	30	30	35	35	ns	min
TWHAX	Address hold from write end	0	0	0	0	0	ns	min
TAVWL	Address set up to write start	0	0	0	0	0	ns	min
TWLWH	\overline{WE} pulse width	20	30	30	35	35	ns	min
TDVWH	Data set up to write end	15	15	15	15	15	ns	min
TWHDX	Data hold from write end	0	0	0	3	3	ns	min
TWLQZ	\overline{WE} Low to high Z (10)	10	15	15	20	20	ns	max
TWHQX	\overline{WE} high to low Z (9, 10)	6	6	6	6	6	ns	min

Note 9 : TEHQZ, TWLQZ are tested with CL = 5 pF as in figure 1b. Transition is measured \pm 500 mV from steady state voltage.

Note 10 : At any given temperature and voltage condition, TQZ is less than TQX for all devices.

These parameters are sampled and not 100 % tested.

Note 11 : Data input set up and hold timing should be referenced to the using edge of the signal that terminates the write.



HM 65769

<p>• ABSOLUTE MAXIMUM RATINGS</p> <p>Supply voltage (VCC-GND) — 0.5 V to + 7.0 V DC input voltage : - 3. to 7.0V DC output voltage in high Z state : - 0.5V to 7.0V Storage temperature : - 65° C to + 150° C Output current into outputs (low) : 20 mA</p>	<p>• OPERATING RANGE</p> <p style="text-align: center;">Military - 2 Commercial - 5</p>	<p>Operating Voltage</p> <p style="text-align: center;">VCC ± 10 % VCC ± 10 %</p>	<p>Operating Temperature</p> <p style="text-align: center;">- 55° C to + 125° C - 0° C to + 70° C</p>
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Electro Static Discharge Voltage > 2000V
(per MIL STD 883, Method 3015.2)

• ELECTRICAL CHARACTERISTICS

DC PARAMETERS

Symbol	Parameter	HM 65769H-5 HM 65769K-5 HM 65769K-2	65769M-5	65769M-2	Unit	Value
ICCOP (1)	Average operating supply currennt	90	70	70	mA	max
IIX (2)	Input leakage current	± 10	± 10	± 10	μA	max
IOZ (3)	Output leakage current	± 50	± 50	± 50	μA	max
VIL (3)	Input low voltage	0.8	0.8	0.8	V	max
VIH (3)	Input high voltage	2.0	2.0	2.0	V	min
VOL (4)	Output low voltage	0.4	0.4	0.4	V	max
VOH (4)	Output high voltage	2.4	2.4	2.4	V	min
I OS (5)	Output short clrcuit current	± 350	± 350	± 350	mA	max
C IN (6)	Input capacitance	4	4	4	pF	max
C OUT (6)	Output capacitance	7	7	7	pF	max

Note 1 : VCC max, Iout = 0 mA

Note 2 : GND ≤ VIN ≤ VCC, GND ≤ VO ≤ VCC Output disabled

Note 3 : VIL min = - 3.0 V, VIH max = VCC

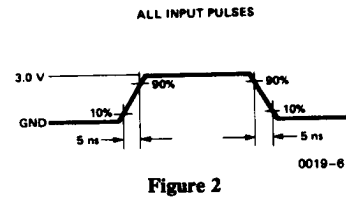
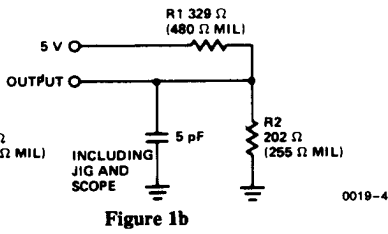
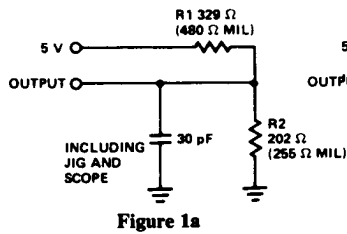
Note 4 : IOH = - 4 mA, IOL = 8.0 mA, VCC min

Note 5 : VCC = 5.5 V, Vout = GND, Duration of the short circuit should not exceed 30 seconds
Not more than one output should be shorted at one time.

Note 6 : This parameter is sampled and not 100 % tested. TA = 25°C. F = 1 MHz, VCC = 5.0V

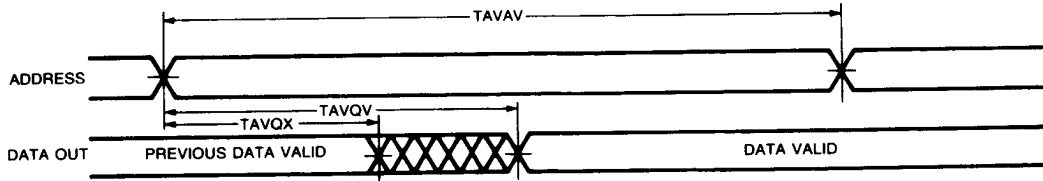


AC TEST LOADS AND WAVEFORMS

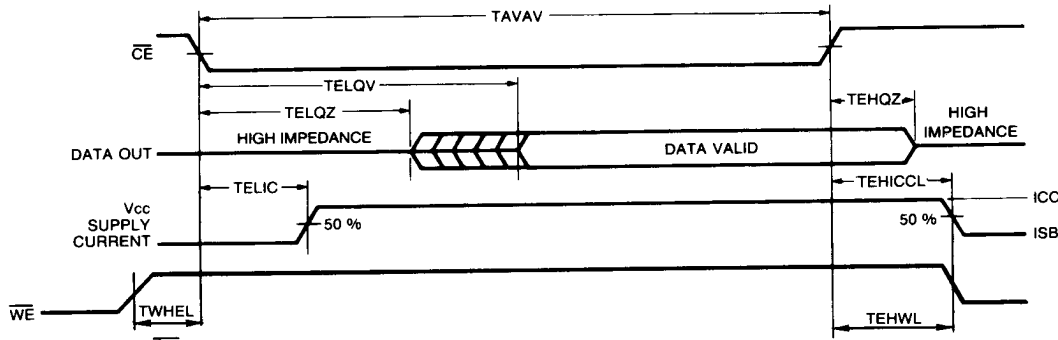


SWITCHING WAVEFORMS

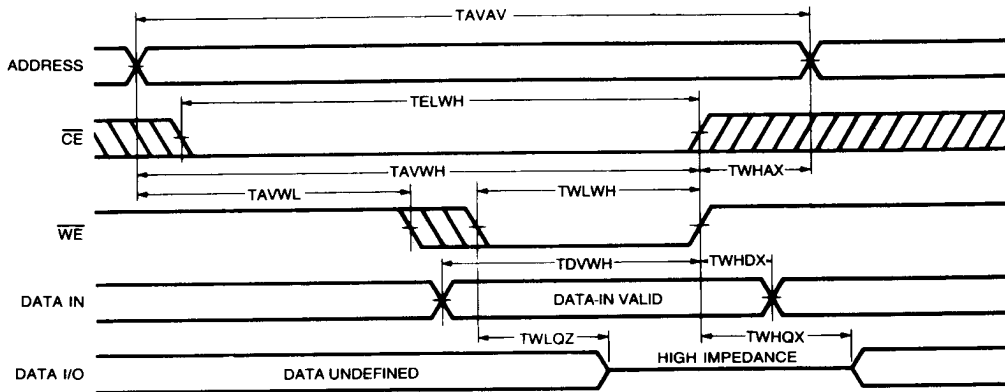
READ CYCLE No. 1 (Notes 12, 13)



READ CYCLE No. 2 (Notes 12, 14)



WRITE CYCLE No. 1 (\overline{WE} Controlled)

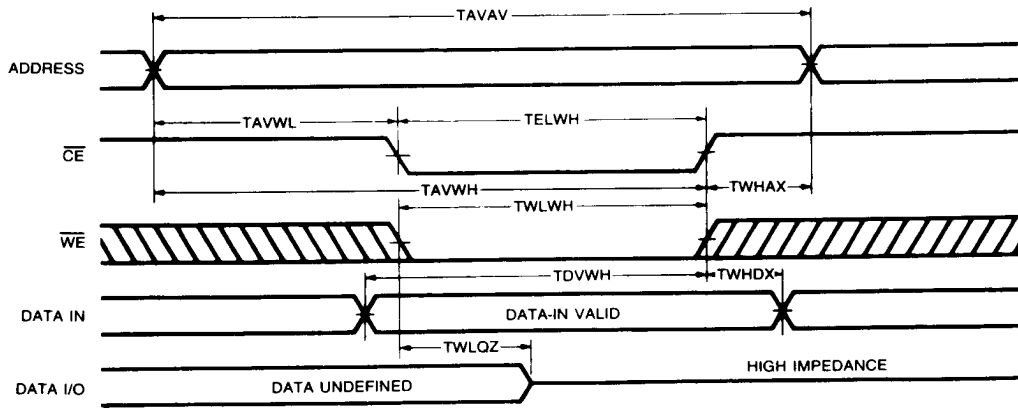


- Note 12 : \overline{WE} is high for read cycle
- Note 13 : Device is continuously selected, $\overline{CE} = V_{IL}$
- Note 14 : Address valid prior to or coincident with \overline{CE} transition low.



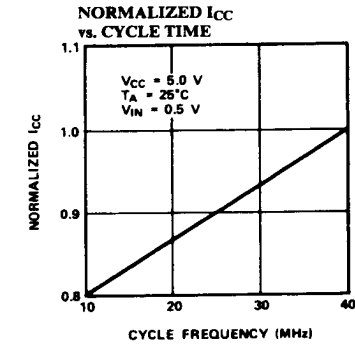
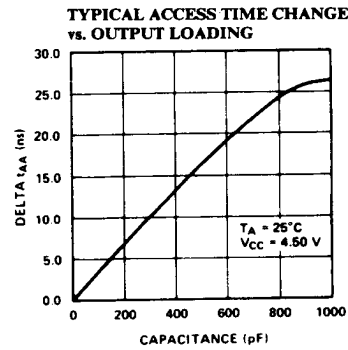
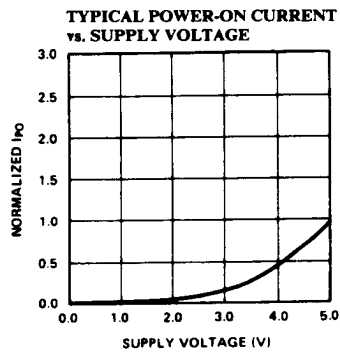
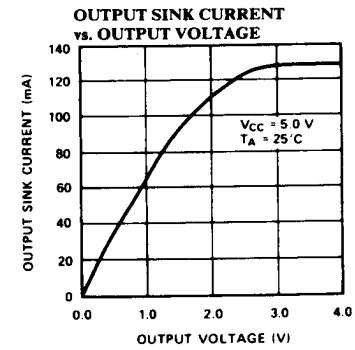
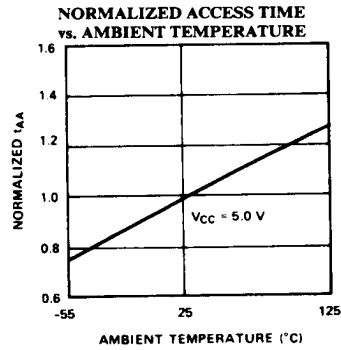
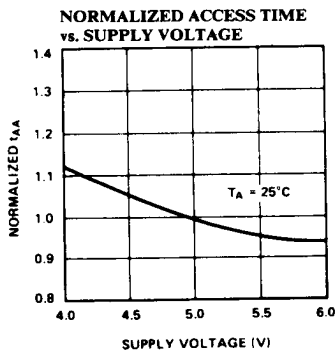
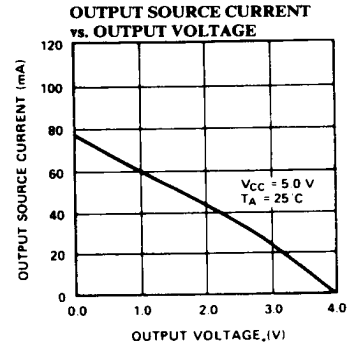
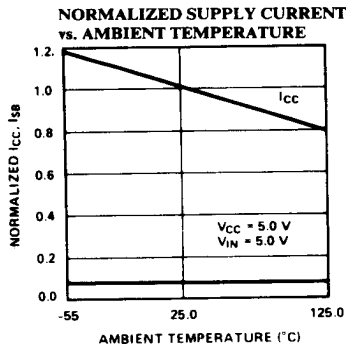
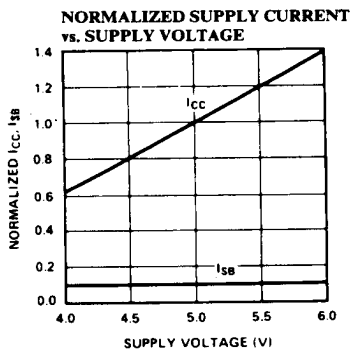
HM 65768/HM 65769

WRITE CYCLE No. 2 (\overline{CE} Controlled)



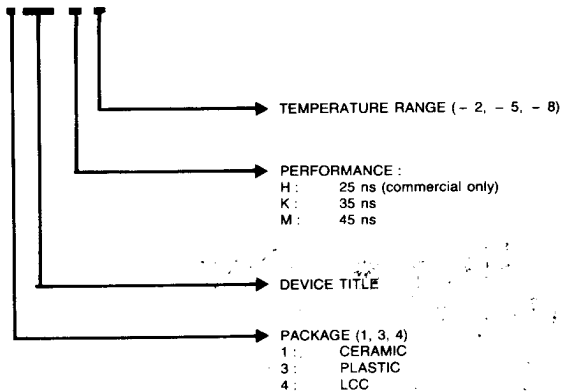
Note: If \overline{CE} goes high simultaneously with \overline{WE} high, the output remains in a high impedance state.

TYPICAL DC AND AC CHARACTERISTICS



Ordering information

DEVICE TYPE	PACKAGE	TEMPERATURE RANGE
HM1-65768 () -5/HM 65769 ()	CERAMIC DIL	0°C to + 70°C
HM1-65768 () -2/HM 65769 ()	CERAMIC DIL	- 55°C to + 125°C
HM3-65768 () -5/HM 65769 ()	PLASTIC DIL	0°C to + 70°C
HM1-65768 () -8/HM 65769 ()	CERAMIC DIL	- 55°C to + 125°C
HM4-65768 () -5/HM 65769 ()	LCC 20 PIN	0°C to + 70°C
HM4-65768 () -2/HM 65769 ()	LCC 20 PIN	- 55°C to + 125°C
HM4-65768 () -8/HM 65769 ()	LCC 20 PIN	- 55°C to 125°C



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