MHS
MATRA M H S

T-46-23-08

September 1990

DATA SHEET

HM 65768

4 K x 4
HIGH SPEED CMOS SRAM

4

FEATURES

- FAST ACCESS TIME
  MILITARY : 25*/35/45/55 ns (max)
  COMMERCIAL : 20/25/35/45/55 ns (max)
- LOW POWER CONSUMPTION
  ACTIVE : 200 mW (typ)
  STANDBY : 35 mW (typ)
- WIDE TEMPERATURE RANGE :
  – 55°C TO + 125°C
- 300 MILS WIDTH PACKAGE
- TTL COMPATIBLE INPUTS AND OUTPUTS
- ASYNCHRONOUS
- CAPABLE OF WITHSTANDING GREATER THAN 2000 V ELECTROSTATIC DISCHARGE
- SINGLE 5 VOLT SUPPLY

DESCRIPTION

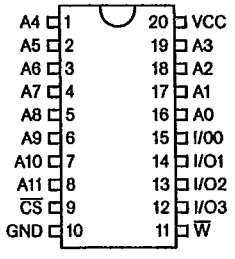
The HM 65768 is a high speed CMOS static RAM organized as 4096 x 4 bits. It is manufactured using MHS's high performance CMOS technology.
Access times as fast as 20 ns are available with maximum power consumption of only 385 mW.
The HM 65768 features fully static operation requiring no external clocks or timing strobes. The automatic power-down feature reduces the power consumption by 77 % when the circuit is deselected.

Each memory expansion is provided by an active low chip select (CS) and three state drivers.
All inputs and outputs of the HM 65768 are TTL compatible and operate from single 5 V supply thus simplifying system design.
The HM 65768 is processed following the test methods of MIL STD 883C.

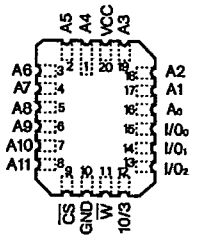
PACKAGES

Plastic 300 mils, 20 pins, DIL.
Ceramic 300 mils, 20 pins, DIL.
Tape and Reel Service
SOIC 300 mils, 20 pins, DIL.
SOJ 300 mils, 20 pins
LCC 20 pins.

Pinout DIL 20 pins (top view)

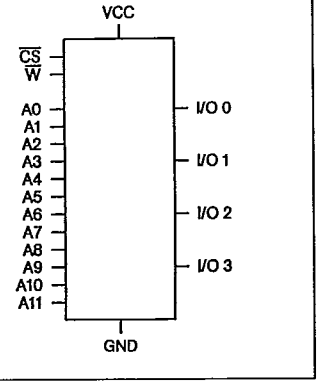


Pinout LCC 20 pins (top view)



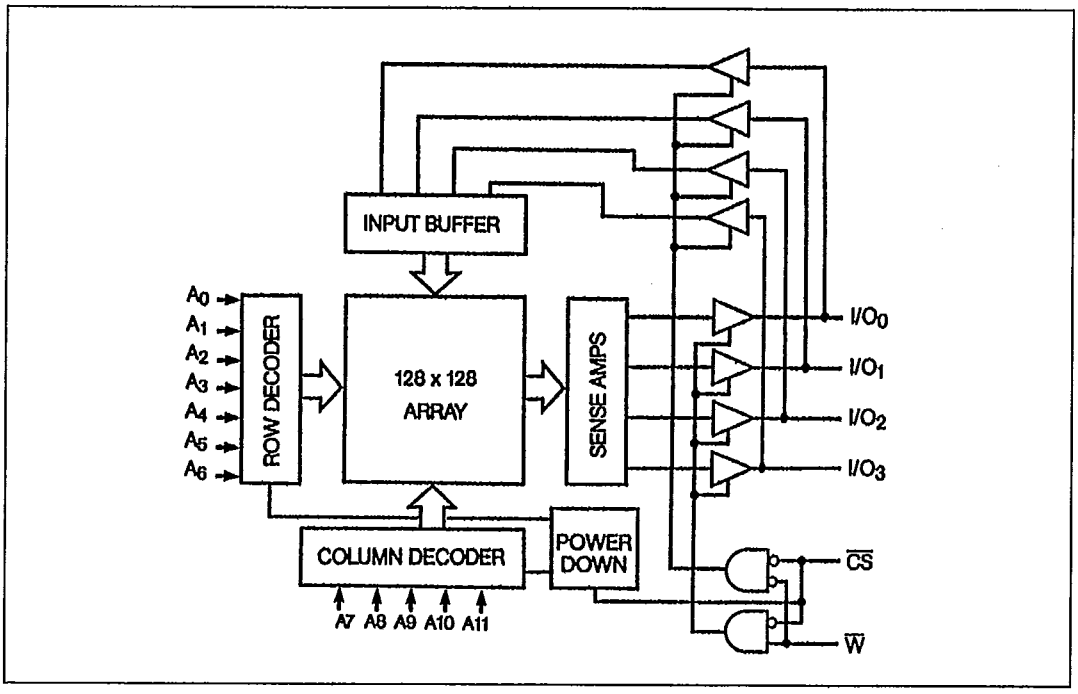
* preliminary specification

LOGIC SYMBOL



4

BLOCK DIAGRAM



PIN NAMES

A0-A11	: Address inputs	$\overline{CS}$	: Chip Select
I/O0-I/O3	: Input/Output	$\overline{W}$	: Write enable
Vcc	: Power		
Gnd	: Ground		

TRUTH TABLE

$\overline{CS}$	$\overline{W}$	DATA-IN	DATA-OUT	MODE
H	X	Z	Z	Deselect
L	H	Z	Valid	Read
L	L	Valid	Z	Write

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

OPERATING RANGE

		OPERATING VOLTAGE	OPERATING TEMPERATURE
Military	(– 2)	5 V ± 10 %	– 55°C to + 125°C
Commercial	(– 5)	5 V ± 10 %	0°C to + 70°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	2.0	–	5.5	V

4

CAPACITANCE

PARAMETER		DESCRIPTION	MINIMUM	TYPICAL	MAXIMUM	UNIT
Cin	(1)	Input capacitance	–	–	4	pF
Cout	(1)	Output capacitance	–	–	7	pF

L = low, H = high, X = H or L, Z = high impedance

AC TEST LOADS WAVEFORMS

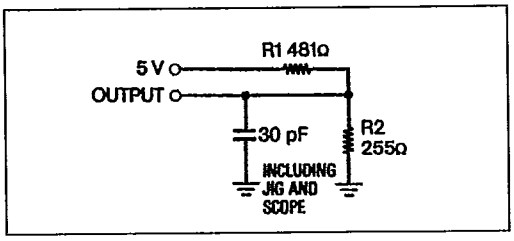


Fig. 1a.

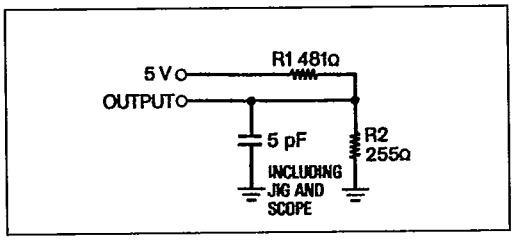
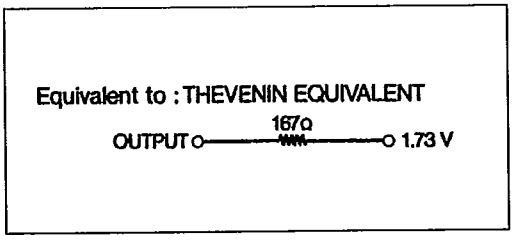


Fig. 1b.



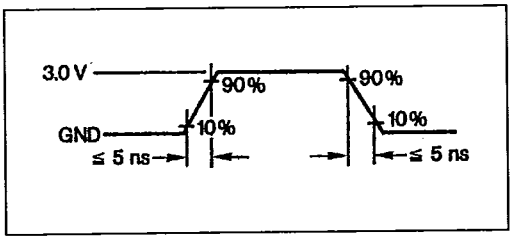


Fig. 2.

T-46-23-08

ELECTRICAL CHARACTERISTICS DC PARAMETER

PARAMETER		DESCRIPTION	MINIMUM	TYPICAL	MAXIMUM	UNIT
IIX	(2)	Input leakage current	−10.0	–	10.0	µA
IOZ	(3)	Output leakage current	−50.0	–	50.0	µA
IOS	(3)	Output short circuit current	–	–	−350.0	mA
VOL	(4)	Output low voltage	–	–	0.4	V
VOH	(5)	Output high voltage	2.4	–	–	V

Note : 1. TA = 25°C - f = 1 MHz - Vcc = 5.0 V.

Notes : 2. Gnd < Vin < Vcc, Gnd < Vout < Vcc Output disabled.
3. 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.
4. Vcc min, IOL = 8.0 mA .

Consumption for Commercial specification :

SYMBOL		PARAMETER	65768 F-5*	65768 H-5	65768 K-5	65768 M-5	65768 N-5	UNIT	VALUE
ICCSB	(6)	Standby supply current	30	15	15	15	30	mA	max
ICCSB1	(7)	Standby supply current	30	11	11	11	30	mA	max
ICCOP	(8)	Dynamic operating current	70	70	70	70	90	mA	max

Consumption for Commercial specification :

SYMBOL		PARAMETER	65768 F-5*	65768 H-5	65768 K-5	65768 M-5	65768 N-5	UNIT	VALUE
ICCSB	(6)	Standby supply current	30	15	15	15	30	mA	max
ICCSB1	(7)	Standby supply current	30	11	11	11	30	mA	max
ICCOP	(8)	Dynamic operating current	70	70	70	70	90	mA	max

Notes : 5. $\underline{Vcc}$ min, IOH = - 4.0 mA.
6. $\overline{CS} \geq$ VIH, a pull-up resistor to Vcc on the $\overline{CS}$ input is required to keep the device deselected during Vcc power-up otherwise ICCSB will exceed values above.
7. CS ≥ Vcc - 300 mV.
8. Vcc max, Output current = 0 mA, f = max, Vin = Vcc or Gnd.

T-46-23-08

ELECTRICAL CHARACTERISTICS 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 1a and 1b*) : +30 pF

WRITE CYCLE : Commercial specification

SYMBOL	PARAMETER	65768 F-5*	65768 H-5	65768 K-5	65768 M/N-5	UNIT	VALUE
TAVAV	Write Cycle time	20	25	35	40	ns	min
TAVWL	Address set-up time	0	0	0	0	ns	min
TAVWH	Address valid to end of write	15	20	30	35	ns	min
TDVWH	Data set-up time	10	15	15	15	ns	min
TELWH	$\overline{CS}$ low to write end	15	25	35	35	ns	min
TWLQZ (9)	Write low to high Z	10	10	15	20	ns	max
TWLWH	Write pulse width	15	20	30	35	ns	min
TWHAX	Address hold from end of write	0	0	0	0	ns	min
TWHDX	Data hold time	0	0	3	3	ns	min
TWHQX (9)	Write high to low Z	3	6	6	6	ns	min
TEHAX	Address hold from end $\overline{CS}$	3	3	3	3	ns	min

WRITE CYCLE : Military specification

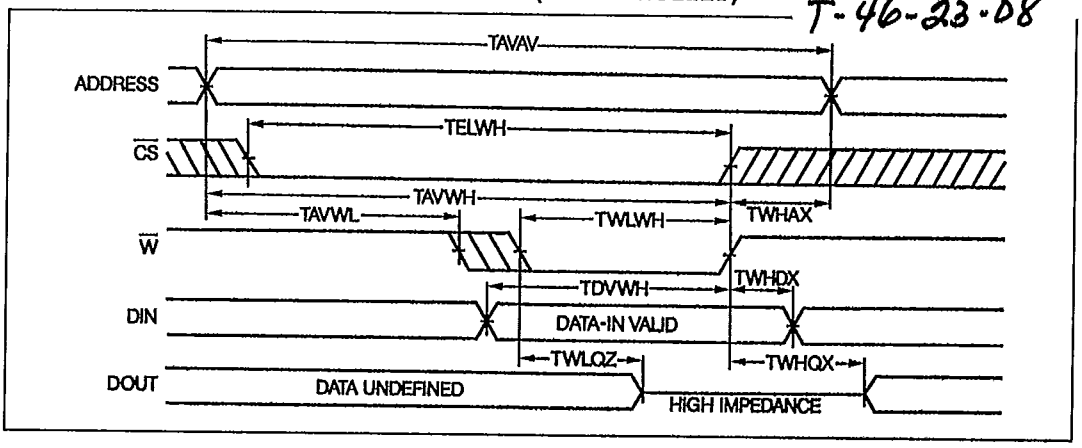
SYMBOL	PARAMETER	65768 H-2*	65768 K-2	65768 M-2	65768 N-2	UNIT	VALUE
TAVAV	Write Cycle time	25	35	40	40	ns	min
TAVWL	Address set-up time	0	0	0	0	ns	min
TAVWH	Address valid to end of write	20	30	35	35	ns	min
TDVWH	Data set-up time	15	15	15	15	ns	min
TELWH	$\overline{CS}$ low to write end	25	35	35	35	ns	min
TWLQZ (9)	Write low to high Z	10	15	20	20	ns	max
TWLWH	Write pulse width	20	30	35	35	ns	min
TWHAX	Address hold from end of write	2	2	2	2	ns	min
TWHDX	Data hold time	0	0	3	3	ns	min
TWHQX (9)	Write high to low Z	3	6	6	6	ns	min
TEHAX	Address hold from end $\overline{CS}$	3	3	3	3	ns	min

Note : 9. The data input set-up and hold timing should be referenced to the rising edge of the signal that terminates the write.

4

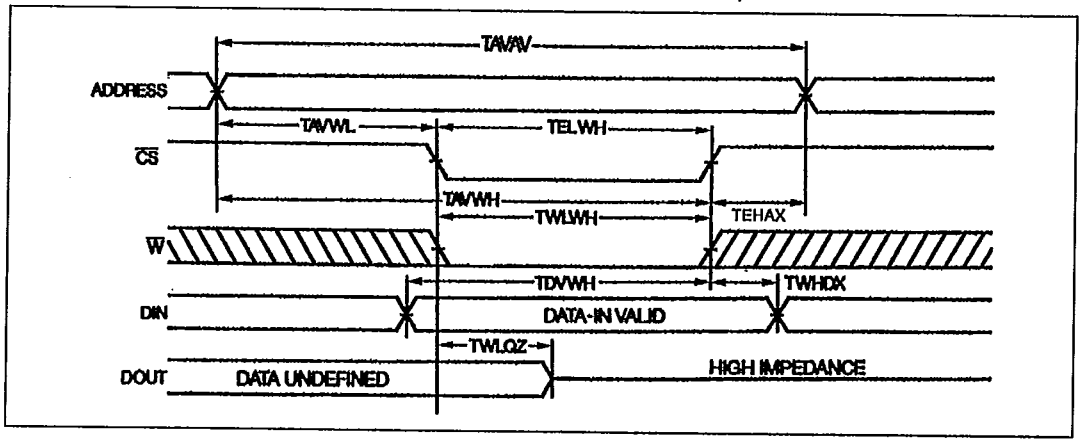
T-46-23-08

WRITE CYCLE 1 ($\overline{W}$ CONTROLLED)



4

WRITE CYCLE 2 ($\overline{CS}$ CONTROLLED)



READ CYCLE : Commercial specification

SYMBOL	PARAMETER	65768 F-5	65768 H-5	65768 K-5	65768 M-5	65768 N-5	UNIT	VALUE
TAVAV	READ cycle time	20	25	35	45	55	ns	min
TAVQV	Address access time	20	25	35	45	55	ns	max
TAVQX	Address valid to low Z	2	3	3	3	3	ns	min
TELQV	Chip-select access time	20	25	35	45	55	ns	max
TELQX	$\overline{CS}$ low to low Z	3	5	5	5	5	ns	min
TEHQZ	$\overline{CS}$ high to high Z	15	15	20	25	25	ns	max
TELIC	$\overline{CS}$ low to power up	0	0	0	0	0	ns	min
TEHICL	$\overline{CS}$ high to power down	25	25	25	30	30	ns	max

READ CYCLE : Military specification

SYMBOL	PARAMETER	65768 H-2*	65768 K-2	65768 M-2	65768 N-2	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	2	3	3	3	ns	min
TELQV	Chip-select access time	25	35	45	55	ns	max
TELQX	$\overline{CS}$ low to low Z	5	5	5	5	ns	min
TEHQZ	$\overline{CS}$ high to high Z	15	20	25	25	ns	max
TELIC	$\overline{CS}$ low to power up	0	0	0	0	ns	min
TEHICL	$\overline{CS}$ high to power down	5	25	30	30	ns	max

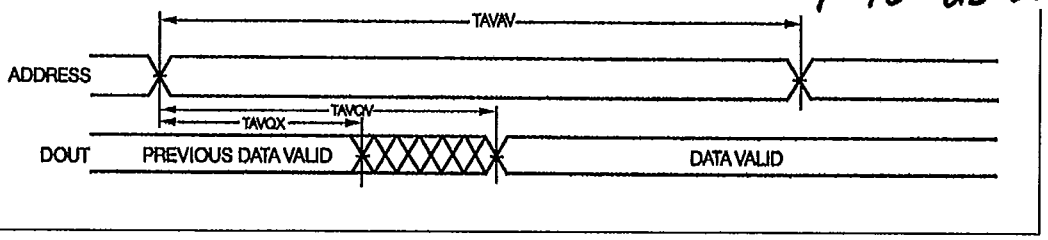
* Preliminary specification.

4

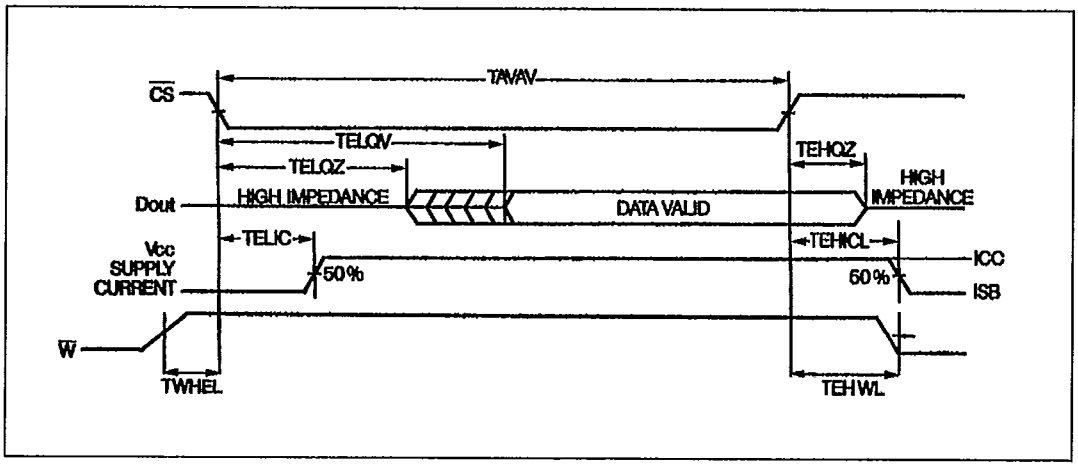
MATRA M H S

T-46-23-08

READ CYCLE nb 1



READ CYCLE nb 2



4

T-46-23-08

ORDERING INFORMATION

Package	Device type	Grade	Level
HM1	65768A	H	–5 : R

- Package: 0 - Chip form; 1 - Ceramic 20 pins; 3 - Plastic 20 pins; 4 - LCC 20 pins; T - SOIC 20 pins; U - SOJ 20 pins
- Device type: 4 k x 4 high speed static RAM
- Grade: F = 20 ns; H = 25 ns; K = 35 ns; M = 45 ns; N = 55 ns
- Level: –5 : Commercial; –2 : Military; –8 : Military with B.I. (B.I. = Burn-In)
- R : Tape and Reel Service

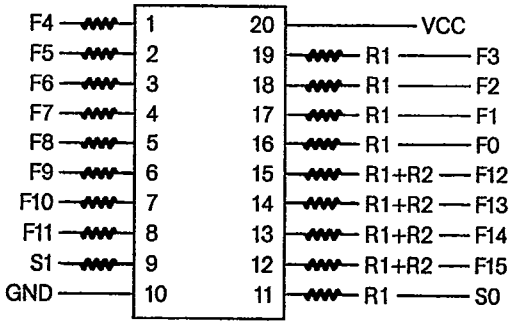
4

PACKAGE OUTLINE

For the packaging information, refer to chapter 10.

Package reference : Plastic DIL, 300 mils, 20 pins
SOIC DIL, 300 mils, 20 pins
Ceramic, 300 mils, 20 pins
LCC rectangular, 20 pins

BURN-IN SCHEMATICS



R1 = 300 Ω per row
R2 = 2 KΩ per driver
FO = 25 KHz ± 20 %
Fn = 1/2 F n-1

S0, S1 : programmable signals for write / read cycles