

data sheet

HM 6116/6116 L 2K x 8 CMOS STATIC RAM

MAY 1986

Features

- MILITARY/INDUSTRIAL :
FAST ACCESS TIME : 120 ns
- ASYNCHRONOUS
- STAND BY CURRENT : 100 μ A max
- OPERATING SUPPLY CURRENT : 60 mA max
- BATTERY BACK UP OPERATION : 2V min - 50 μ A max
- EQUAL ACCESS AND CYCLE TIME
- NO CLOCK OR STROBES REQUIRED
- WIDE TEMPERATURE RANGE : - 55° C TO 125° C
- GATED INPUTS
- SINGLE 5V SUPPLY

Description

The HM 6116 is a 16384 bits static RAM organized as 2K x 8. It is manufactured using MHS high performance high reliability CMOS technology "scaled SAJI IV". This "State of the Art" technology features low stand by current and fast access time providing a cost effective solution to bipolar or NMOS device.

120 ns access time for military, industrial and commercial temperature range is available with a maximum power consumption of only 440 mW.

The circuit offers also two reduced power stand by mode. When the CS goes high, the circuit will automatically go to and remain in a stand by power mode. Thanks to the special input buffer "gated inputs", the circuits stays in stand by mode when the CS goes to an intermediate level (VIH).

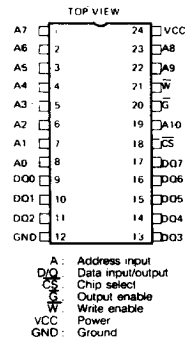
This capability provides significant system level power and cooling savings.

The low power version (L) offers a battery back up data retention capability where the device consumes only typically less than 5 μ W at 2 volts.

The military RAM (-8) are 100% screened using the test method MIL-STD-883C. Ideally suited to military temperature applications for the highest level of performance and reliability.

The HM 6116(L) is housed in either plastic ceramic 24 pin on 32 pin leadless chip carrier allowing maximum board packing density.

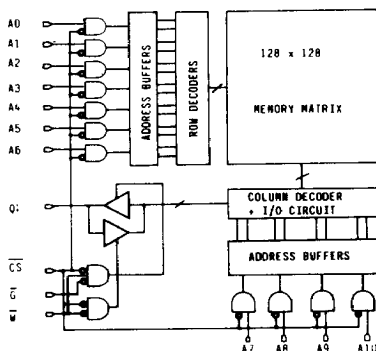
Pinout



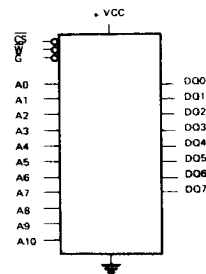
LCC 32 PINS BOTTOM VIEW



Functional Diagram



Logic Symbol



<p>• ABSOLUTE MAXIMUM RATINGS</p> <p>Supply voltage (VCC-GND) - 0.3 V* to + 7 V Input or output voltage applied : GND - 0.3 V* to : VCC + 0.3 V Storage temperature : - 65° C to + 150° C * - 1V pulse width 50 ns</p>	<p>• OPERATING RANGE</p> <p>Military - 2 Industrial - 9 Commercial - 5</p>	<p>Operating Voltage</p> <p>5V ± 10 % 5V ± 10 % 5V ± 10 %</p>	<p>Operating Temperature</p> <p>- 55° C to + 125° C - 40° C to + 85° C - 0° C to + 70° C</p>
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ELECTRICAL CHARACTERISTICS

DC PARAMETERS

Symbol	Parameter	6116 -5	6116L -5	6116 -2	6116L -2	6116 -9	6116L -9	Unit	Value
ICCSB (1)	Standby supply current	3	2	5	4.5	4.5	4.0	mA	max
ICCSB1 (2)	Standby supply current	2000	100	3000	1500	2000	500	µA	max
ICCOP (3)	Power supply current	70	60	85	80	80	70	mA	max
ICC (4)	Average operating supply current	70	60	85	80	80	70	mA	max
II/O (5)	Input/output/package current	± 2	± 2	± 10	± 5	± 5	± 2	µA	max
VIL (6)	Input low voltage	0.8	0.8	0.8	0.8	0.8	0.8	V	max
VIH (6)	Input high voltage	2.2	2.2	2.2	2.2	2.2	2.2	V	min
VOL (7)	Output low voltage	0.4	0.4	0.4	0.4	0.4	0.4	V	max
VOH (7)	Output high voltage	2.4	2.4	2.4	2.4	2.4	2.4	V	min
CI (8)	Input capacitance	8	8	8	8	8	8	PF	max
CO (8)	Input/output capacitance	10	10	10	10	10	10	PF	max

Note 1 : \overline{CS} = VIH, li/io = 0; input gating

Note 2 : \overline{CS} = VCC-0.3V; li/io = 0

Note 3 : ICCOP with a duty cycle = 100%; VI = VCC or GND ; li/io = 0; F = 1MHz, typical derating = 5 mA/MHz

Note 4 : \overline{CS} = VIL, li/io = 0; addresses and data inputs level = VCC or GND

Note 5 : VCC = 5V; VIN = GND to VCC

Note 6 : VIH max = VCC + 0.3V; VIL min = - 0.3V or - 1V pulse width 50 ns

Note 7 : IOL = 3.2 mA; IOH = -1 mA

Note 8 : This parameter is sampled and not 100 % tested TA = 25°C, f = 1MHz

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AC PARAMETERS

- AC test conditions :
- VCC = 5V ± 10 %
 - Input pulse levels : 0V to 3.0V
 - Input and output timing
 - Reference levels : 1.5V
 - Output load : 1 TTL gate and CL = 100 pf (including scope and jig)
 - Input rise and fall times : 10 ns

Write cycle

Symbol	Parameter	6116 -5	6116L -5	6116 -2	6116L -2	6116 -9	6116L -9	Unit	Value
TAVAV	Write cycle time	120	120	120	120	120	120	ns	min
TELWH	Chip selection to end of write	70	70	70	70	70	70	ns	min
TAVWH	Address valid to end of write	105	105	105	105	105	105	ns	min
TAVWL	Address set up time	20	20	20	20	20	20	ns	min
TWLWH	Write pulse width	70	70	70	70	70	70	ns	min
TWHAV	Write recovery time	5	5	5	5	5	5	ns	min
TGHOZ	Output enable to output in high Z	40	40	40	40	40	40	ns	max
TWLOZ	Write low to output in high Z	50	50	50	50	50	50	ns	max
TDVWH	Input data valid to write high	35	35	35	35	35	35	ns	min
TWHDX	Data hold from write time	5	5	5	5	5	5	ns	min
TWHQX	Output active from end of write	5	5	5	5	5	5	ns	min

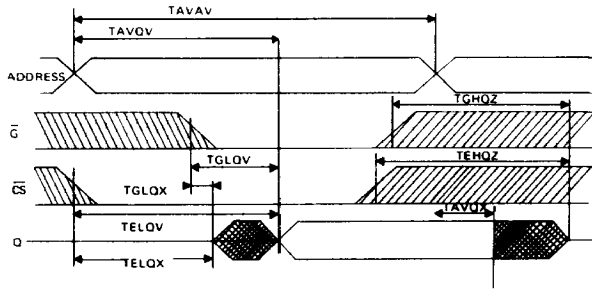
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Read cycle

Symbol	Parameter	6116 -5	6116L -5	6116 -2	6116L -2	6116 -9	6116L -9	Unit	Value
TAVAV	Read cycle time	120	120	120	120	120	120	ns	min
TAVQV	Address access time	120	120	120	120	120	120	ns	max
TELQV	Chip select access time	120	120	120	120	120	120	ns	max
TELQX	Chip select low to active output	10	10	10	10	10	10	ns	min
TGLQV	Output enable to output valid time	80	80	80	80	80	80	ns	max
TGLQX	Output enable to output in low Z time	10	10	10	10	10	10	ns	min
TEHQZ	Chip select disable time	40	40	40	40	40	40	ns	max
TGHOZ	Output enable to output in high Z time	40	40	40	40	40	40	ns	max
TAVQX	Output holdtime from address change	10	10	10	10	10	10	ns	min



READ CYCLE

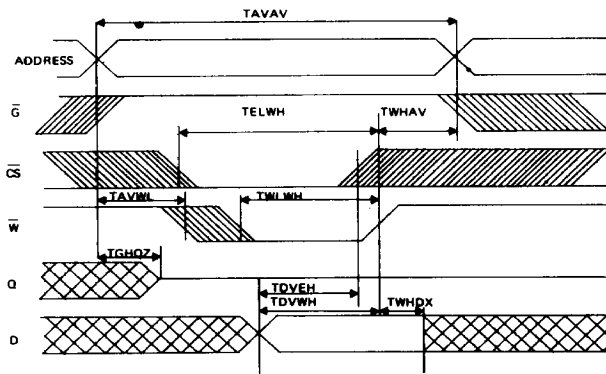


TRUTH TABLE :

\bar{CS}	\bar{G}	\bar{W}	D	Q	POWER SUPPLY CURRENT	MODE
H	X	X	Z	Z	ICCSB	$\bar{CS} = V_{IH}$ DESELECT
H	X	X	Z	Z	ICCSB1	$\bar{CS} > V_{CC} - 0.3$ DESELECT
L	L	H	Z	VALID	ICC	READ
L	L	L	VALID	Z	ICC	WRITE
L	L	L	VALID	Z	ICC	WRITE
L	L	H	Z	Z	ICC	DESELECT

NOTE: \bar{G} IS HIGH FOR A READ CYCLE

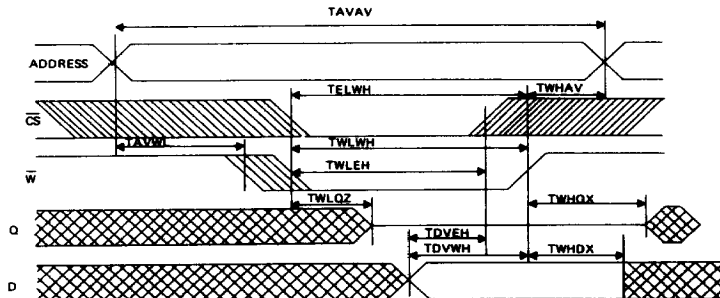
WRITE CYCLE TIME 1



This write cycle time is recommended for continuous writing.

$\bar{G} = V_{IH}$ during this write cycle.

WRITE CYCLE TIME 2



NOTE: \bar{G} IS LOW THROUGHOUT WRITE CYCLE.

This write cycle time may be used for write and read in the same cycle (write followed by read).

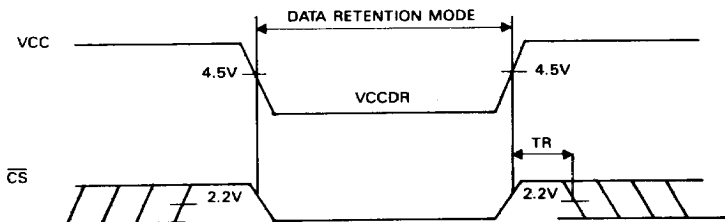
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Data retention Characteristics

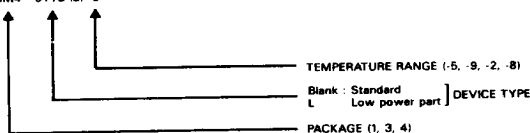
PARAMETER	SYMBOL	TEST CONDITIONS	6116L -5		6116L -9		6116L -2		UNIT
			min	max	min	max	min	max	
VCC for data retention	VCCDR	$\overline{CS} = VCC$ $VIN = OV$ or VCC	2	—	2	—	2	—	V
Data retention current	ICCDR	$VCC = 2.0V$ $\overline{CS} = VCC$ $VIN = OV$ or VCC	—	30	—	200	—	600	μA
Operating recovery time	TR		TAVAV		TAVAV		TAVAV		

TAVAV = read cycle time

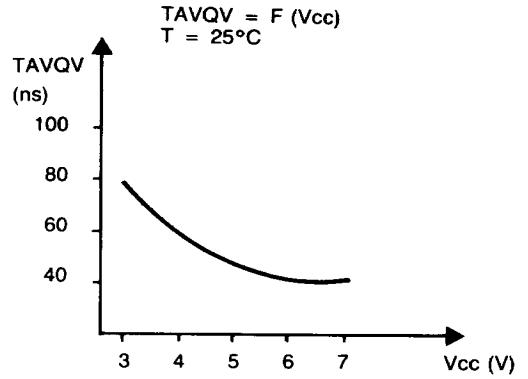
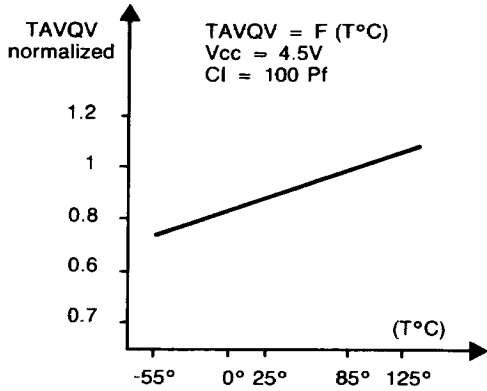


Ordering Information

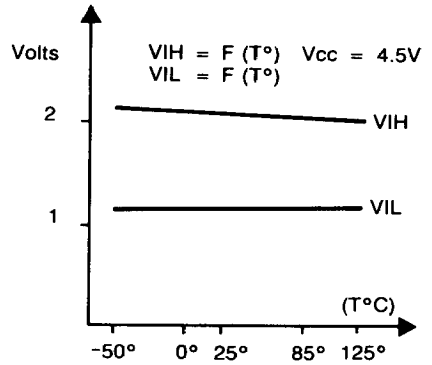
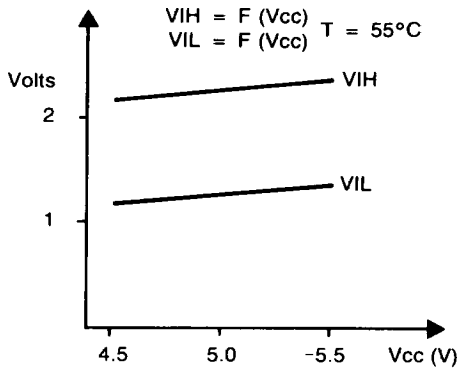
DEVICE TYPE	PACKAGE	TEMPERATURE RANGE
HM1 - 6116 (L) -5	CERAMIC DIL	0° C to + 70° C
HM1 - 6116 (L) -9	CERAMIC DIL	-40° C to + 85° C
HM1 - 6116 (L) -2	CERAMIC DIL	-55° C to + 125° C
HM1 - 6116 (L) -8	CERAMIC DIL	-55° C to + 125° C
HM3 - 6116 (L) -5	PLASTIC DIL	0° C to + 70° C
HM3 - 6116 (L) -9	PLASTIC DIL	-40° C to + 85° C
HM4 - 6116 (L) -5	LCC 32 PINS	0° C to + 70° C
HM4 - 6116 (L) -9	LCC 32 PINS	-40° C to + 85° C
HM4 - 6116 (L) -2	LCC 32 PINS	-55° C to + 125° C
HM4 - 6116 (L) -8	LCC 32 PINS	-55° C to + 125° C



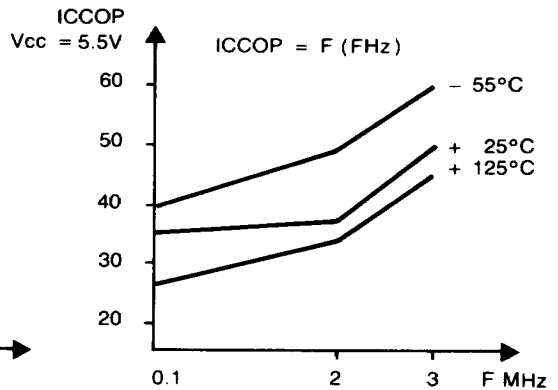
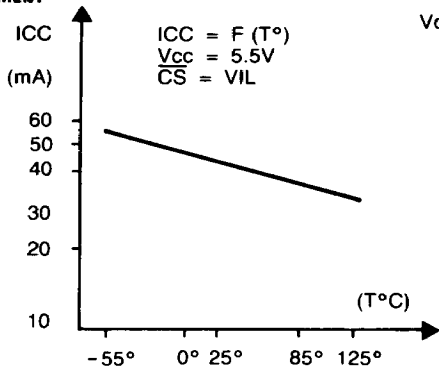
READ CYCLE TIME



INPUT VOLTAGE



POWER SUPPLY CURRENT



2



STANDBY AND DATA RETENTION CURRENT

