

HM6287 Series

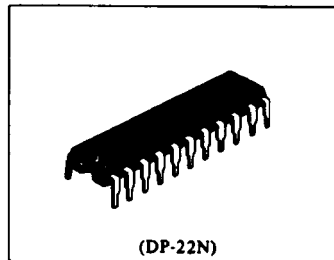
Maintenance Only

65536-word x 1-bit High Speed CMOS Static RAM

Refer to HM6287H Series

FEATURES

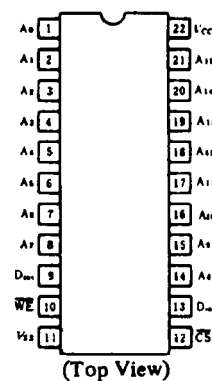
- High Speed: Fast Access Time 45/55/70ns (max.)
- Single 5V Supply and High Density 22 Pin Package
- Low Power Standby and Low Power Operation
Standby: 100μW (typ.)/10μW (typ.) (L-version)
Operation: 300mW (typ.)
- Completely Static Memory
No Clock or Timing Strobe Required
- Equal Access and Cycle Times
- Directly TTL Compatible: All Inputs and Output
- Capability of Battery Back Up Operation (L-version)



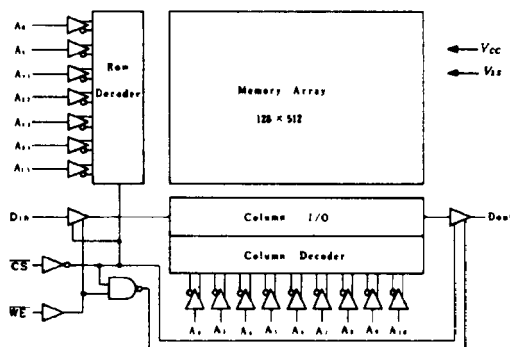
ORDERING INFORMATION

Type No.	Access Time	Package
HM6287P-45	45ns	300 mil 22 pin Plastic DIP
HM6287P-55	55ns	
HM6287P-70	70ns	
HM6287LP-45	45ns	300 mil 22 pin Plastic DIP
HM6287LP-55	55ns	
HM6287LP-70	70ns	

PIN ARRANGEMENT



BLOCK DIAGRAM



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■ TRUTH TABLE

CS	WE	Mode	V _{CC} Current	Dout Pin	Ref. Cycle
H	X	Not Selected	I _{SB} , I _{SB1}	High Z	-
L	H	Read	I _{CC}	Dout	Read Cycle
L	L	Write	I _{CC}	High Z	Write Cycle

■ ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Rating	Unit
Voltage on Any Pin Relative to V _{SS}	V _T	-0.5 ^{*1} to +7.0	V
Power Dissipation	P _T	1.0	W
Operating Temperature	T _{opr}	0 to +70	°C
Storage Temperature	T _{stg}	-55 to +125	°C
Temperature Under Bias	T _{bias}	-10 to +85	°C

Note) *1. -3.5V for pulse width ≤ 20ns

■ RECOMMENDED DC OPERATING CONDITIONS (T_a = 0 to +70°C)

Item	Symbol	min	typ	max	Unit
Supply Voltage	V _{CC}	4.5	5.0	5.5	V
	V _{SS}	0	0	0	V
Input Voltage	V _{IH}	2.2	-	6.0	V
	V _{IL}	-0.5 ^{*1}	-	0.8	V

Note) *1. -3.0V for pulse width ≤ 20ns

■ DC AND OPERATING CHARACTERISTICS (V_{CC} = 5V ± 10%, V_{SS} = 0V, T_a = 0 to +70°C)

Item	Symbol	Test Conditions	min	typ ^{*1}	max	Unit
Input Leakage Current	I _{LI}	V _{CC} = 5.5V, V _{in} = V _{SS} to V _{CC}	-	-	2.0	μA
Output Leakage Current	I _{LO}	CS = V _{IH} , V _{out} = V _{SS} to V _{CC}	-	-	2.0	μA
Operating Power Supply Current	I _{CC}	CS = V _{IL} , I _{out} = 0mA, min. cycle	-	60	100	mA
Standby Power Supply Current	I _{SB}	CS = V _{IH} , min. cycle	-	10	30	mA
	I _{SB1}	CS ≥ V _{CC} - 0.2V, 0V ≤ V _{in} ≤ 0.2V or V _{CC} - 0.2V ≤ V _{in}	-	0.02	2.0	mA
Output Voltage	V _{OL}	I _{OL} = 8mA	-	-	0.4	V
	V _{OH}	I _{OH} = -4.0mA	2.4	-	-	V

Notes) *1. Typical limits are at V_{CC} = 5.0V, T_a = 25°C and specified loading.

*2. This characteristics is guaranteed only for L-version.

■ CAPACITANCE (f = 1MHz, T_a = 25°C)

Item	Symbol	Test Conditions	min	typ	max	Unit
Input Capacitance	C _{in}	V _{in} = 0V	-	-	5	pF
Output Capacitance	C _{out}	V _{out} = 0V	-	-	7.5	pF

Note) This parameter is sampled and not 100% tested.



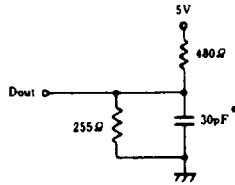
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■ AC CHARACTERISTICS ($V_{CC} = 5V \pm 10\%$, $T_a = 0$ to $+70^\circ\text{C}$, unless otherwise noted)

● AC TEST CONDITIONS

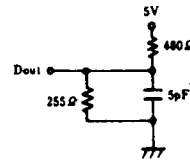
- Input Pulse Levels: V_{SS} to 3.0V
- Input Rise and Fall Times: 5ns
- Input and Output Timing Reference Levels: 1.5V
- Output Load: See Figure

Output Load A



* Including scope & jig capacitance

Output Load B

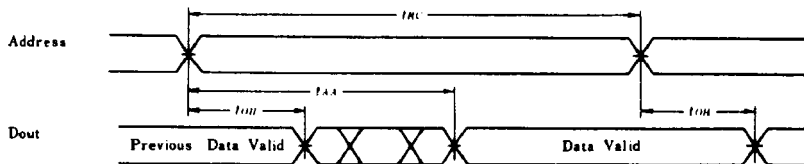


* Including scope & jig capacitance

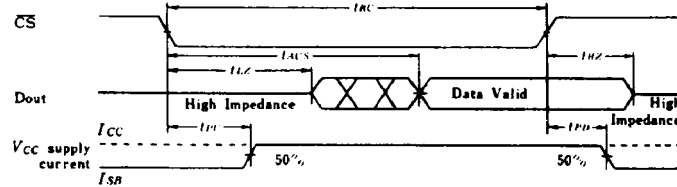
● READ CYCLE

Item	Symbol	HM6287-45		HM6287-55		HM6287-70		Unit	Notes
		min	max	min	max	min	max		
Read Cycle Time	t_{RC}	45	—	55	—	70	—	ns	1
Address Access Time	t_{AA}	—	45	—	55	—	70	ns	
Chip Select Access Time	t_{ACS}	—	45	—	55	—	70	ns	
Output Hold from Address Change	t_{OH}	5	—	5	—	5	—	ns	
Chip Selection to Output in Low Z	t_{LZ}	5	—	5	—	5	—	ns	2, 3, 7
Chip Deselection to Output in High Z	t_{HZ}	0	30	0	30	0	30	ns	2, 3, 7
Chip Selection to Power Up Time	t_{PU}	0	—	0	—	0	—	ns	7
Chip Deselection to Power Down Time	t_{PD}	—	40	—	40	—	40	ns	7

● Timing Waveform of Read Cycle No. 1⁽⁴⁾⁽⁵⁾



● Timing Waveform of Read Cycle No. 2⁽⁴⁾⁽⁶⁾



- Notes:
1. All Read Cycle timings are referenced from last valid address to the first transitioning address.
 2. At any given temperature and voltage condition, t_{HZ} max. is less than t_{LZ} min. both for a given device and from device to device.
 3. Transition is measured ± 500 mV from steady state voltage with specified loading in Load B.
 4. \overline{WE} is high for READ Cycle.
 5. Device is continuously selected, while $\overline{CS} = V_{IL}$.
 6. Address valid prior to or coincident with \overline{CS} transition low.
 7. This parameter is sampled and not 100% tested.



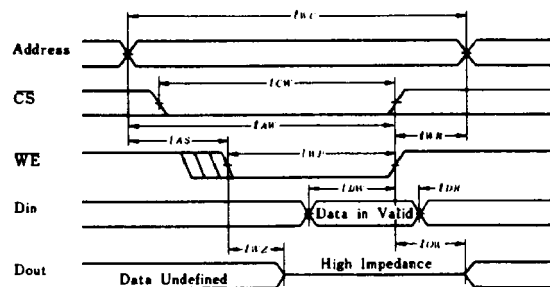
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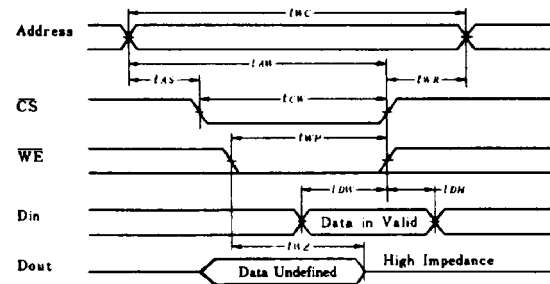
• WRITE CYCLE

Item	Symbol	HM6287-45		HM6287-55		HM6287-70		Unit	Notes
		min	max	min	max	min	max		
Write Cycle Time	t_{WC}	45	—	55	—	70	—	ns	2
Chip Selection to End of Write	t_{CW}	40	—	50	—	55	—	ns	
Address Valid to End of Write	t_{AW}	40	—	50	—	55	—	ns	
Address Setup Time	t_{AS}	0	—	0	—	0	—	ns	
Write Pulse Width	t_{WP}	25	—	35	—	40	—	ns	
Write Recovery Time	t_{WR}	0	—	0	—	0	—	ns	
Data Valid to End of Write	t_{DW}	25	—	25	—	30	—	ns	
Data Hold Time	t_{DH}	0	—	0	—	0	—	ns	
Write Enabled to Output in High Z	t_{WZ}	0	25	0	25	0	30	ns	3, 4
Output Active from End of Write	t_{OW}	0	—	0	—	0	—	ns	3, 4

• Timing Waveform of Write Cycle No. 1 (\overline{WE} Controlled)



• Timing Waveform of Write Cycle No. 1 (\overline{CS} Controlled)



- Notes)
1. If \overline{CS} goes high Simultaneously with \overline{WE} high, the output remains in a high impedance state.
 2. All Write Cycle timings are referenced from the last valid address to the first transitioning address.
 3. Transition is measured $\pm 500mV$ from steady state voltage with specified loading in Load B.
 4. This parameter is sampled and not 100% tested.



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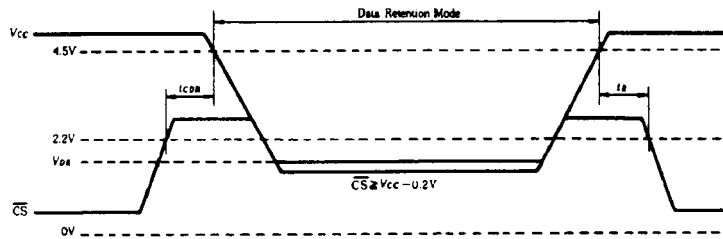
■ **LOW V_{CC} DATA RETENTION CHARACTERISTICS** ($T_a = 0$ to $+70^\circ\text{C}$)

This characteristics is guaranteed only for L-version.

Parameter	Symbol	Test Condition	min.	typ.	max.	Unit
V_{CC} for Data Retention	V_{DR}	$CS \geq V_{CC} - 0.2V$	2.0	-	-	V
Data Retention Current	I_{CCDR}	$V_{in} \geq V_{CC} - 0.2V$ or $0V \leq V_{in} \leq 0.2V$	-	1	50^{*2}	μA
Chip Deselect to Data Retention Time	t_{CDR}	See retention waveform	0	-	-	ns
Operation Recovery Time	t_R		t_{RC}^{*1}	-	-	ns

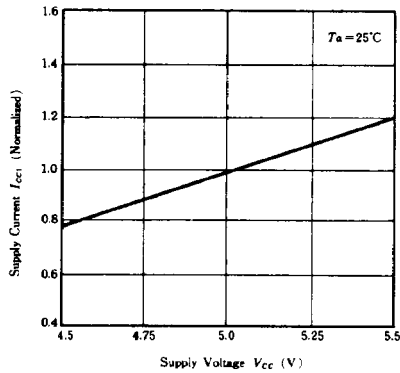
Note) *1. t_{RC} = Read Cycle Time
 *2. $V_{CC} = 3.0V$

● **LOW V_{CC} DATA RETENTION WAVEFORM**

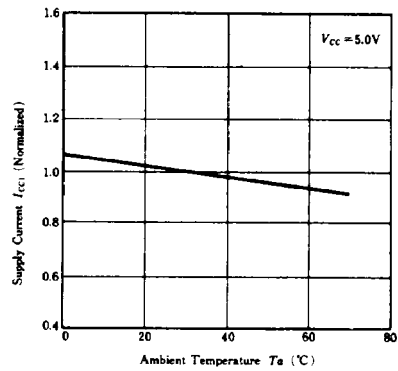


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SUPPLY CURRENT vs. SUPPLY VOLTAGE

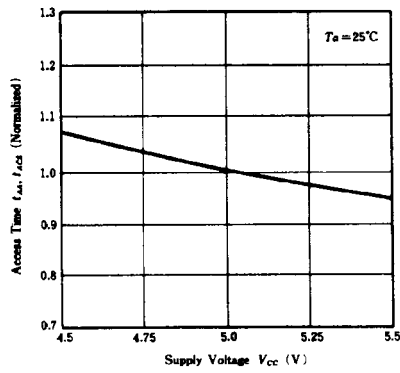


SUPPLY CURRENT vs. AMBIENT TEMPERATURE

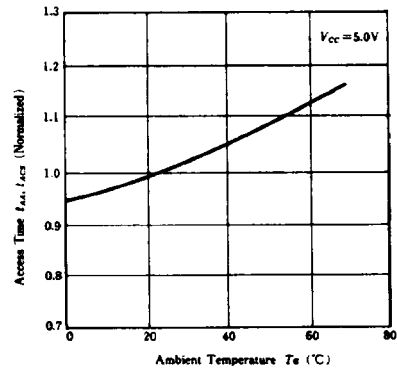


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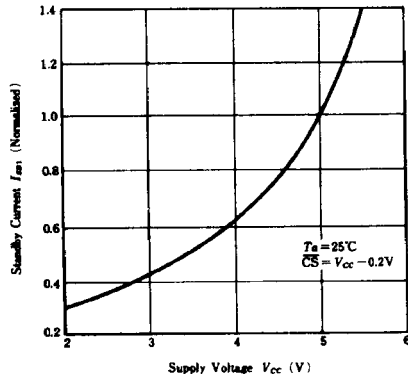
ACCESS TIME vs. SUPPLY VOLTAGE



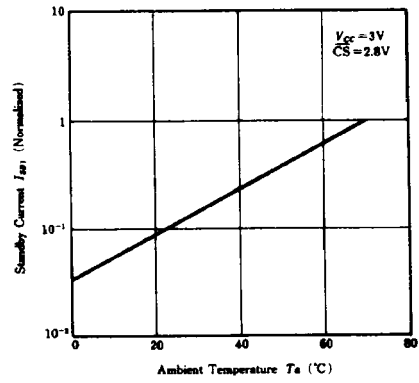
ACCESS TIME vs. AMBIENT TEMPERATURE



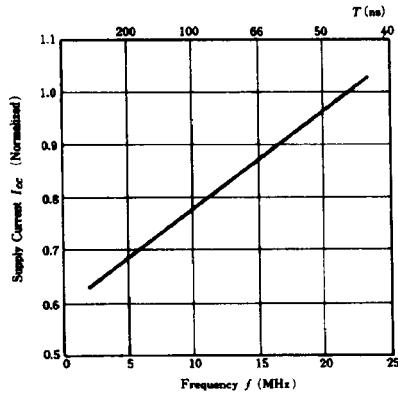
STANDBY CURRENT vs. SUPPLY VOLTAGE



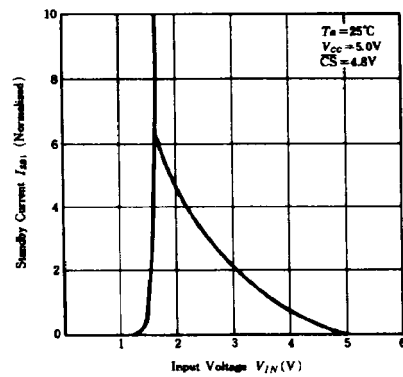
STANDBY CURRENT vs. AMBIENT TEMPERATURE



SUPPLY CURRENT vs. FREQUENCY

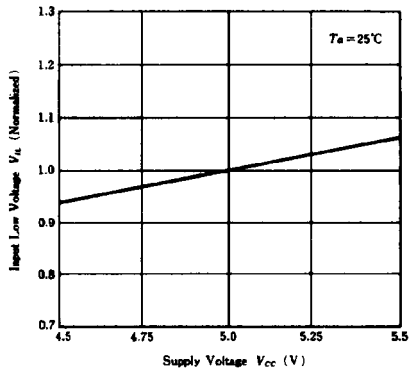


STANDBY CURRENT vs. INPUT VOLTAGE

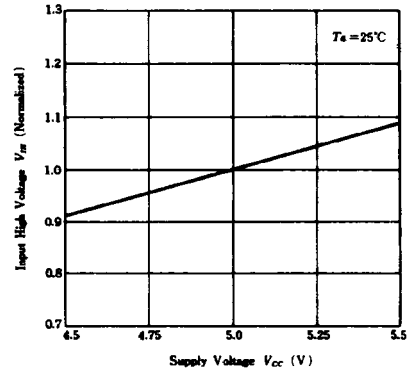


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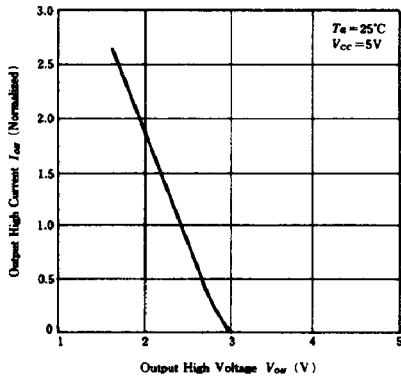
INPUT LOW VOLTAGE vs. SUPPLY VOLTAGE



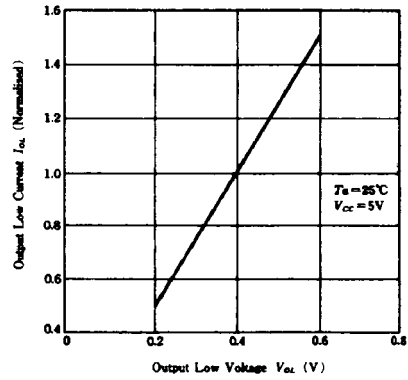
INPUT HIGH VOLTAGE vs. SUPPLY VOLTAGE



OUTPUT HIGH CURRENT vs. OUTPUT HIGH VOLTAGE



OUTPUT LOW CURRENT vs. OUTPUT LOW VOLTAGE



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