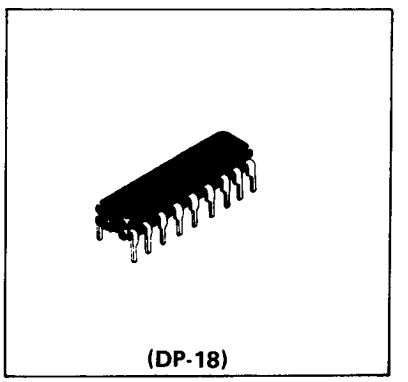
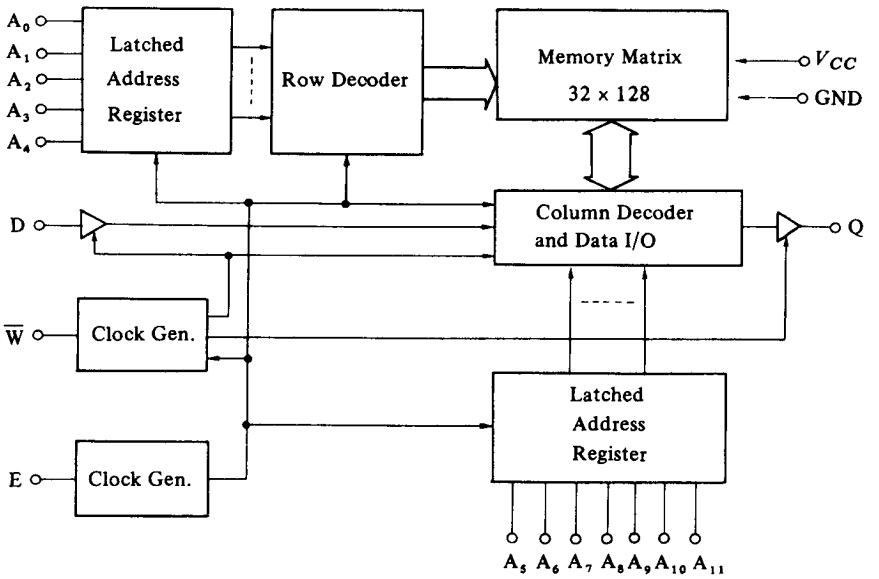
HM4315P

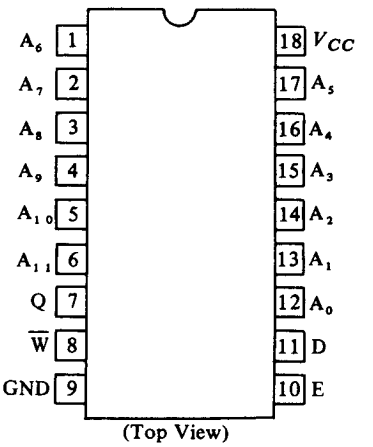
4096-word×1-bit Static Random Access Memory

- Low Power Standby . . . . . 10μW typ.
- Low Power Operation . . . . . 20mW typ.
- Data Retention 2.0V
- Fast Access Time . . . . . 450ns max.
- TTL/CMOS Compatible Input/Output
- On Chip Address Register
- Si Gate CMOS Technology





■ PIN ARRANGEMENT



(Top View)

■ **ABSOLUTE MAXIMUM RATINGS**

Item	Symbol	Value	Unit
Supply Voltage*	V_{CC}	−0.3 to +7.0	V
Terminal Voltage*	V_T	−0.3 to V_{CC}+0.3	V
Power Dissipation	P_T	1.0	W
Operating Temperature	T_{opr}	0 to +70	°C
Storage Temperature	T_{stg}	−55 to +125	°C

* with respect to GND

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

Item	Symbol	min.	typ.	max.	Unit
Supply Voltage	V_{CC}	4.5	5.0	5.5	V
	GND	0	0	0	V
Input Voltage	V_{IH}	2.4	—	V_{CC}+0.3	V
	V_{IL}	−0.3	—	0.8	V

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

Item	Symbol	Test Condition	min.	typ.	max.	Unit
Input Leakage Current	I_{LI}	V_{IN}=0~V_{CC}	−1.0	—	1.0	μA
Output Leakage Current	I_{LO}	E=V_{IL}, V_{out}=0~V_{CC}	−1.0	—	1.0	μA
Operating Power Supply Current	I_{CC1}	E=V_{CC}, V_{IN}=V_{CC} or 0V, Output Open	—	—	1.0	mA
	I_{CC2}	E=2.4V, V_{IN}=2.4V, Output Open	—	2.5	5.0	mA
Average Power Supply Current	I_{CC3}	V_{IH}≧V_{CC} −0.2V, f=1MHz, duty 50%	—	4	10	mA
	I_{CC4}	V_{IH}=2.4V, f=1MHz, duty 50%	—	6	15	mA
Standby Power Supply Current	I_{CCL}	E≦0.2V	—	2	100	μA
Output Voltage	V_{OL}	I_{OL}=2.0mA	—	—	0.4	V
	V_{OH}	I_{OH}=−1.0mA	2.4	—	—	V

■ CAPACITANCE (Ta=25°C, f=1MHz)

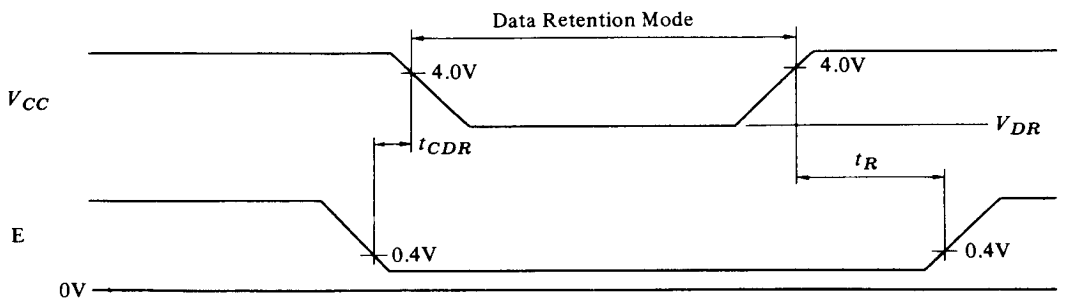
Item	Symbol	Test Condition	min.	typ.	max.	Unit
Input Capacitance	C_{in}	V_{in}=0V	—	3	5	pF
Output Capacitance	$C_{I/O}$	$V_{I/O}$=0V	—	7	10	pF

■ LOW V_{CC} DATA RETENTION CHARACTERISTICS (T_a = 0 to +70°C)

Item	Symbol	Test Condition	min.	typ.	max.	Unit
V_{CC} for Data Retention	V_{DR}	E≦0.2V	2.0	—	—	V
Data Retention Power Supply Current	I_{CCDR}	E≦0.2V, V_{DR}=2.0V	—	0.5	50	μA
Chip Deselect to Data Retention Time	t_{CDR}		0	—	—	ns
Operation Recovery Time	t_R		t_C*	—	—	ns

* t_C = Cycle Time

■ LOW V_{CC} DATA RETENTION TIMING



NOTE: All inputs shall be kept below V_{CC}+0.3V under any operating conditions.

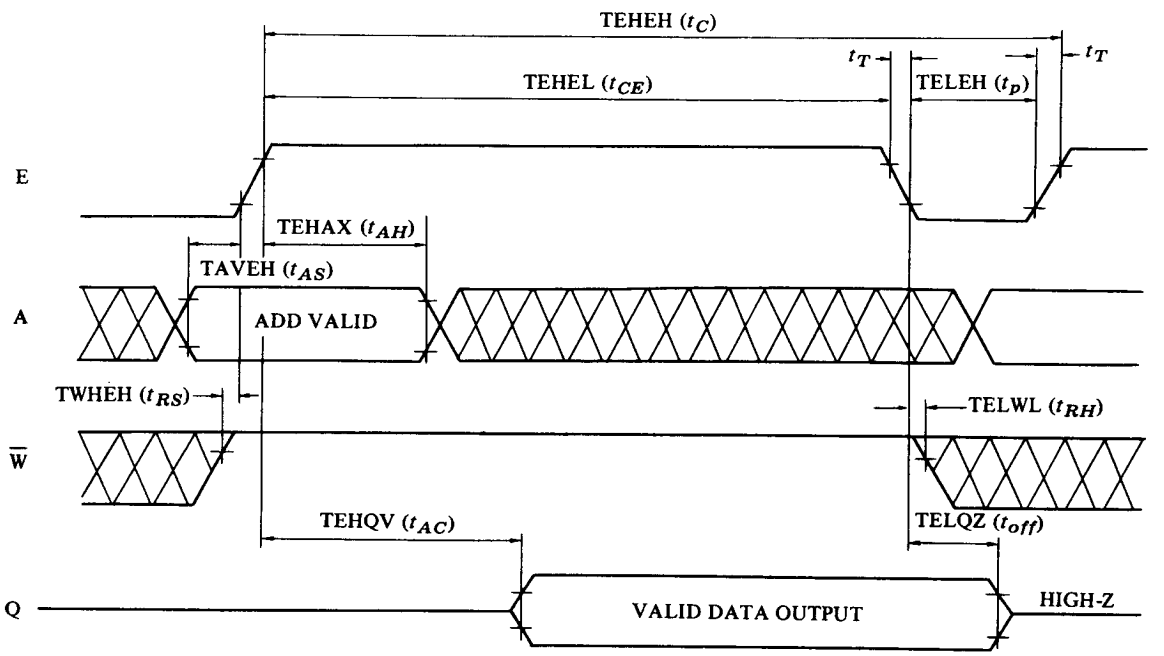
■ AC CHARACTERISTICS (V_{CC}=5V±10%, Ta=0 to +70℃)

- AC TEST CONDITIONS

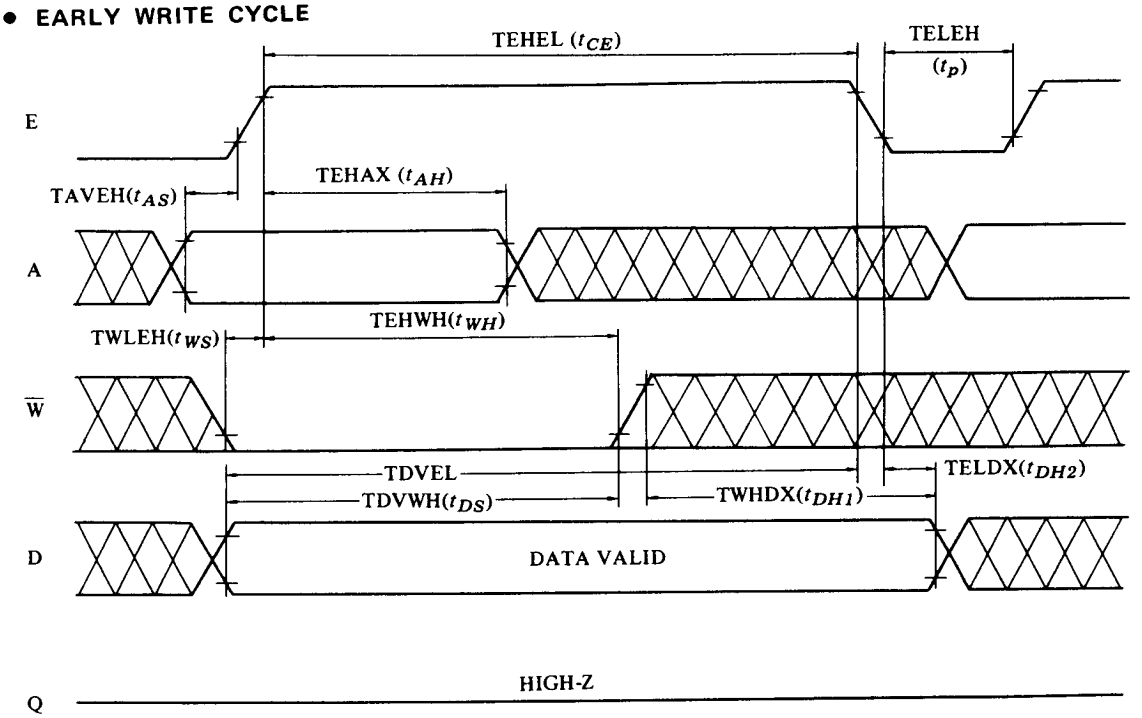
Input High Level 2.4V
Input Low Level 0.8V
Input Rise and Fall Times 20ns
Timing Measurement Levels 2.4V, 0.8V
Reference Level ..... V_{OH}=2.0V, V_{OL}=0.8V
Output Load ..... 1TTL+C_L=100pF

Item	Symbol	min.	max.	Unit
Read or Write Cycle Time	TEHEH (t_C)	640	—	ns
Random Access Time	TEHQV (t_{AC})	—	450	ns
Chip Enable Pulse Width	TEHEL (t_{CE})	450	—	ns
Chip Enable Precharge Time	TELEH (t_P)	150	—	ns
Address Hold Time	TEHAX (t_{AH})	200	—	ns
Address Setup Time	TAVEH (t_{AS})	20	—	ns
Output Buffer Turn-off Delay	TELQZ (t_{off})	0	100	ns
Write Enable Setup Time	TEHWL(t_{WS})	−20	—	ns
Data Input Hold Time	TWHDX(t_{DH1})	60	—	ns
Data Input Hold Time referenced to E	TELDX (t_{DH2})	40	—	ns
Write Enable Pulse Width	TWLWH(t_{WW})	120	—	ns
Chip Enable to Write Enable Delay*	TEHWL(t_{CWD})	350	—	ns
$\overline{W}$ to E Precharge Lead Time	TWLEL(t_{WPL})	150	—	ns
Data Input Setup Time	TDVWH, TDVEL(t_{DS})	100	—	ns
Write Enable Hold Time	TEHWH(t_{WH})	300	—	ns
Read Setup Time	TWHEH(t_{RS})	0	—	ns
Read Hold Time	TELWL(t_{RH})	0	—	ns
Chip Enable Rise/Fall Time	TT (t_T)	—	300	ns

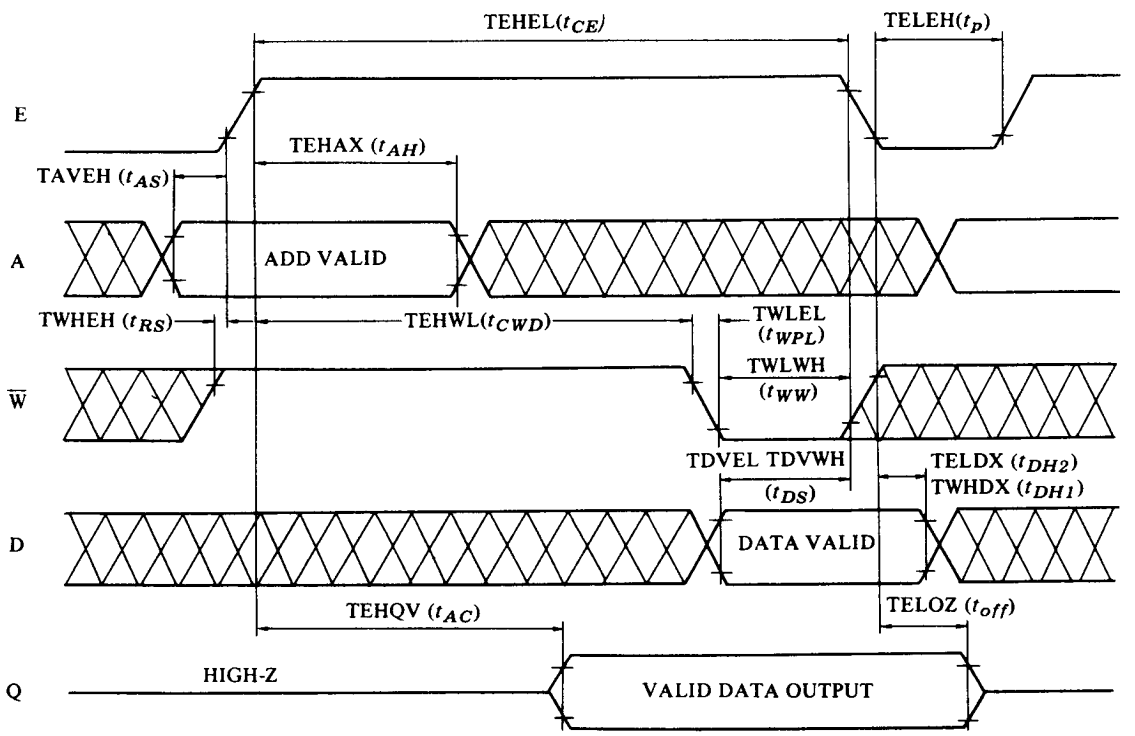
- READ CYCLE



- **EARLY WRITE CYCLE**



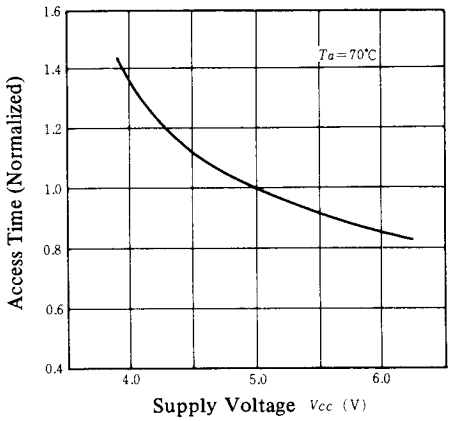
- **READ MODIFY WRITE CYCLE AND READ WRITE CYCLE**



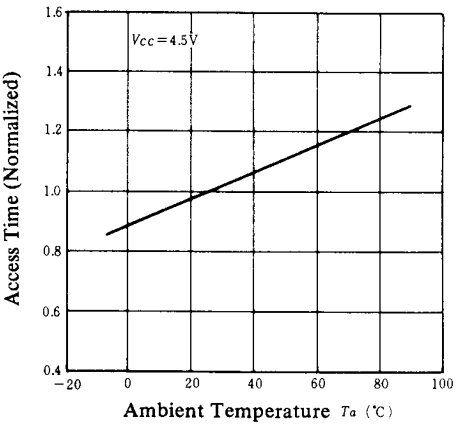
*For R-M-W Cycle (VALID DATA OUTPUT) $t_{CWD} \geqq 350$ ns, $t_{CE} \geqq 550$ ns
For R-W Cycle (INVALID DATA OUTPUT) 20 ns$< t_{CWD} <$ 350 ns, $t_{CE} \geqq 450$ ns

Notes: V_{CC} = 5.0V, Ta = 25°C

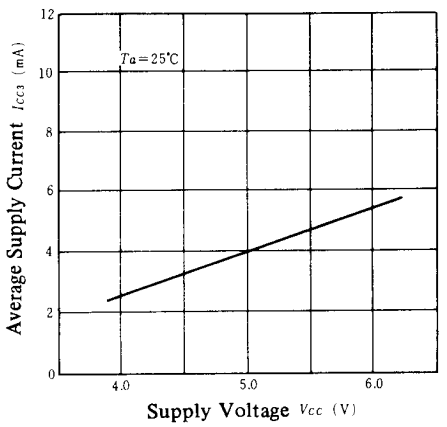
ACCESS TIME vs. SUPPLY VOLTAGE



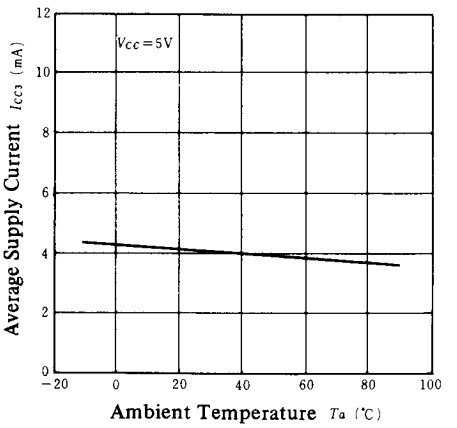
ACCESS TIME vs. AMBIENT TEMPERATURE



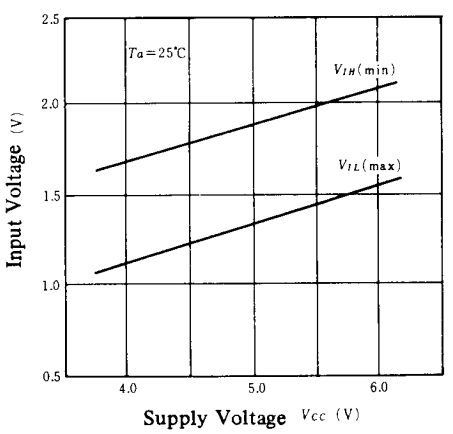
AVERAGE SUPPLY CURRENT vs. SUPPLY VOLTAGE



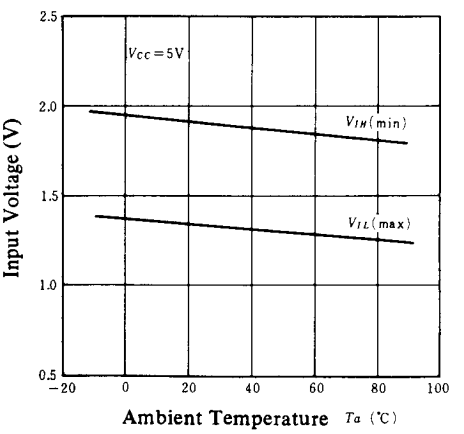
AVERAGE SUPPLY CURRENT vs. AMBIENT TEMPERATURE



INPUT VOLTAGE vs. SUPPLY VOLTAGE



INPUT VOLTAGE vs. AMBIENT TEMPERATURE



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