HM62256 Series — Maintenance only

32768-word × 8-bit High Speed CMOS Static RAM

Features

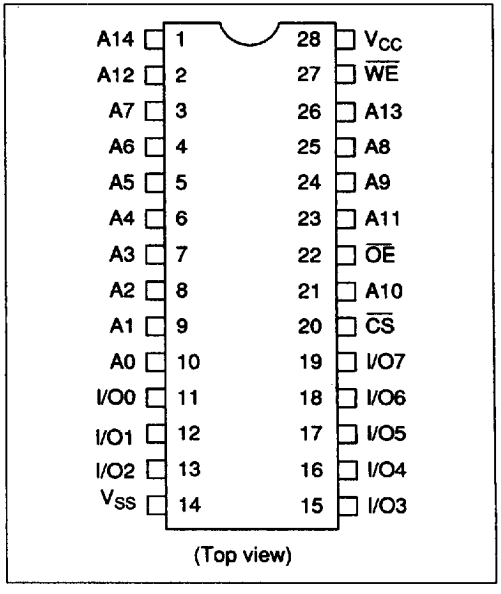
- High speed: Fast access time 85/100/120/150 ns (max)
- Low power standby and low power operation
  - — Standby: 200 µW (typ)/ 10 µW (typ) (L-/L-SL-version)
  - — Operation: 40 mW (typ) (f = 1 MHz)
- Single 5 V supply
- Completely static RAM: No clock or timing strobe required
- Equal access and cycle time
- Common data input and output, three-state output
- Directly TTL compatible—all inputs and outputs
- Battery back up operation capability (L-/L-SL-version)

Ordering Information

Type No.	Access time	Package
HM62256P-8	85 ns	600-mil 28-pin plastic DIP (DP-28)
HM62256P-10	100 ns	
HM62256P-12	120 ns	
HM62256P-15	150 ns	
HM62256LP-8	85 ns	
HM62256LP-10	100 ns	
HM62256LP-12	120 ns	
HM62256LP-15	150 ns	
HM62256LP-10SL	100 ns	
HM62256LP-12SL	120 ns	
HM62256LP-15SL	150 ns	

Type No.	Access time	Package
HM62256FP-8T	85 ns	28-pin plastic SOP (FP-28DA)
HM62256FP-10T	100 ns	
HM62256FP-12T	120 ns	
HM62256FP-15T	150 ns	
HM62256LFP-8T	85 ns	
HM62256LFP-10T	100 ns	
HM62256LFP-12T	120 ns	
HM62256LFP-15T	150 ns	
HM62256LFP-10SLT	100 ns	
HM62256LFP-12SLT	120 ns	
HM62256LFP-15SLT	150 ns	

Pin Arrangement



(Top view)

Note: This device is not available for new application.

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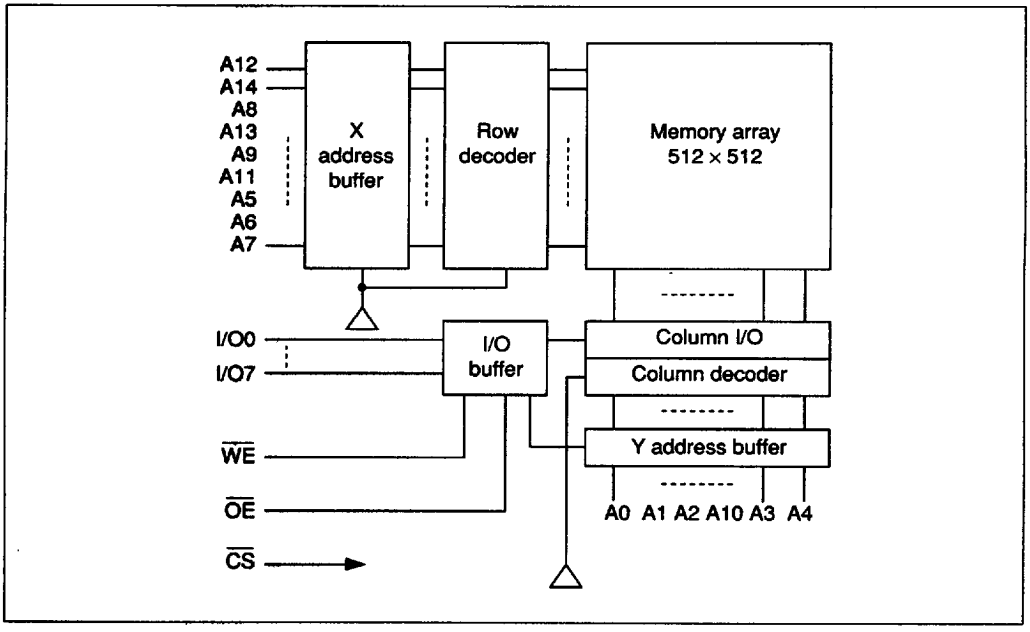
Block Diagram



Truth Table

$\overline{CS}$	$\overline{OE}$	$\overline{WE}$	Mode	V_{CC} current	I/O pin	Reference cycle
H	x	x	Not selected	I_{SB}, I_{SB1}	High Z	—
L	L	H	Read	I_{CC}	Dout	Read cycle No. 1–3
L	H	L	Write	I_{CC}	Din	Write cycle No. 1
L	L	L	Write	I_{CC}	Din	Write cycle No. 2

Note: x means H or L

Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Voltage on any pin relative to V_{SS}	V_T	−0.5* 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: −3.0 V min for pulse width ≤ 50 ns

Recommended DC Operating Conditions (Ta = 0 to +70°C)

Parameter	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*	—	0.8	V

Note: −3.0 V min for pulse width ≤ 50 ns

DC Characteristics (V_{CC} = 5 V ± 10%, V_{SS} = 0 V, Ta = 0 to +70°C)

Parameter		Symbol	Min	Typ *1	Max	Unit	Test condition
Input leakage current		$\|I_{LI}\|$	—	—	2	µA	V_{IN} = V_{SS} to V_{CC}
Output leakage current		$\|I_{LO}\|$	—	—	2	µA	$\overline{CS}$ = V_{IH} or $\overline{OE}$ = V_{IH} or $\overline{WE}$ = V_{IL} $V_{I/O}$ = V_{SS} to V_{CC}
Operating power supply current		I_{CC}	—	8	15	mA	$\overline{CS}$ = V_{IL}, $I_{I/O}$ = 0 mA
Average operating power supply current	HM62256-8	I_{CC1}	—	50	70	mA	Min. cycle, duty = 100%, $\overline{CS}$ = V_{IL}, $I_{I/O}$ = 0 mA
	HM62256-10		—	40	70	mA	
	HM62256-12		—	35	70	mA	
	HM62256-15		—	33	70	mA	
		I_{CC2}	—	8	15	mA	$\overline{CS}$ = V_{IL}, VIH = V_{CC}, V_{IL} = 0V, $I_{I/O}$ = 0 mA f = 1 MHz

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DC Characteristics (V_{CC} = 5 V ± 10%, V_{SS} = 0 V, Ta = 0 to +70°C) (cont)

Parameter	Symbol	Min	Typ *1	Max	Unit	Test condition
Standby power supply current	I_{SB}	—	0.5	3	mA	$\overline{CS}$ = V_{IH}
	I_{SB1}	—	0.04	2	mA	$\overline{CS} \geq V_{CC} - 0.2V$, $0V \leq V_{IN}$
		—	2*2	100*2	µA	
		—	2*3	50*3		
Output voltage	V_{OL}	—	—	0.4	V	I_{OL} = 2.1 mA
	V_{OH}	2.4	—	—	V	I_{OH} = −1.0 mA

Notes: 1. Typical values are at V_{CC} = 5.0 V, Ta = 25°C and specified loading.
2. These characterisitcs are guaranteed only for L-version.
3. These characterisitcs are guaranteed only for L-SL version.

Capacitance (Ta = 25°C, f= 1 MHz)

Parameter	Symbol	Typ	Max	Unit	Test Condition
Input capacitance	C_{IN}	—	6	pF	V_{IN} = 0 V
Input/output capacitance	$C_{I/O}$	—	8	pF	$V_{I/O}$ = 0 V

Note: These parameters are sampled and not 100% tested.

AC Characteristics (V_{CC} = 5 V ± 10%, Ta = 0 to +70°C unless otherwise noted)

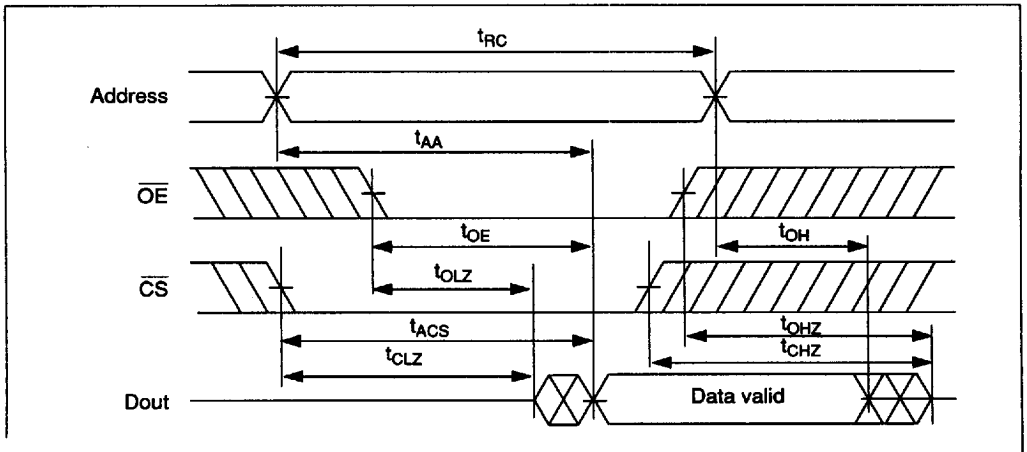
AC Test Conditions:

- Input pulse levels: 0.8 V to 2.4 V
- Input and output timing reference levels: 1.5 V
- Input rise and fall times: 5 ns
- Output load: 1TTL gate and C_L = 100 pF (including scope and jig)

Read Cycle

		HM62256-8		HM62256-10		HM62256-12		HM62256-15		
Parameter	**Symbol**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Unit**
Read cycle time	t_{RC}	85	—	100	—	120	—	150	—	ns
Address access time	t_{AA}	—	85	—	100	—	120	—	150	ns
Chip select access time	t_{ACS}	—	85	—	100	—	120	—	150	ns
Output enable to output valid	t_{OE}	—	45	—	50	—	60	—	70	ns
Output hold from address change	t_{OH}	5	—	10	—	10	—	10	—	ns
Chip selection to output in low Z	t_{CLZ}	10	—	10	—	10	—	10	—	ns
Output enable to output in low Z	t_{OLZ}	5	—	5	—	5	—	5	—	ns
Chip deselection to output in high Z	t_{CHZ}	0	30	0	35	0	40	0	50	ns
Output disable to output in high Z	t_{OHZ}	0	30	0	35	0	40	0	50	ns

Read Timing Waveform (1)



Note: $\overline{WE}$ is high during the read cycle.

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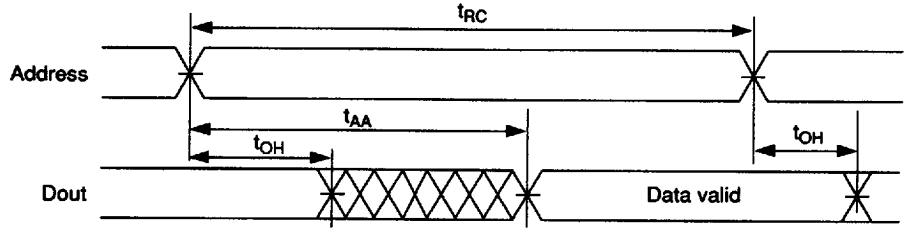
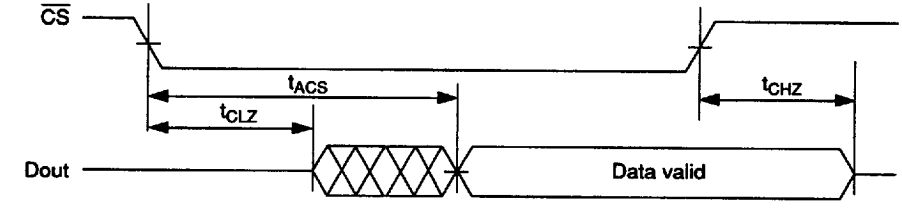
Read Timing Waveform (2)



Notes: 1. $\overline{WE}$ is high during the read cycle.
2. Device is continuously selected, $\overline{CS}$ = V_{IL}.
3. $\overline{OE}$ = V_{IL}.

Read Timing Waveform (3)

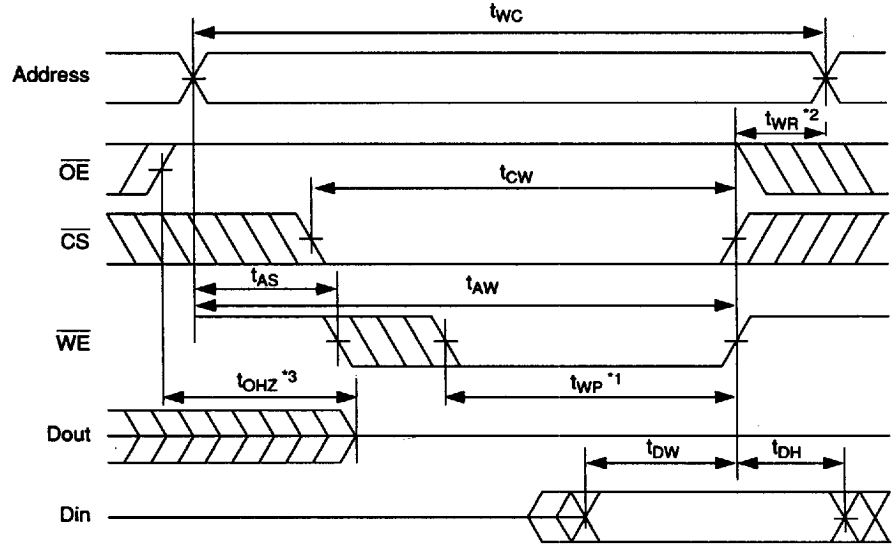


Notes: 1. $\overline{WE}$ is high during the read cycle.
2. Address valid prior to or coincident with $\overline{CS}$ transition low.
3. $\overline{OE}$ = V_{IL}.

Write Cycle

		HM62256-8		HM62256-10		HM62256-12		HM62256-15		
Parameter	**Symbol**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Unit**
Write cycle time	t_{WC}	85	—	100	—	120	—	150	—	ns
Chip selection to end of write	t_{CW}	75	—	80	—	85	—	100	—	ns
Address valid to end of write	t_{AW}	75	—	80	—	85	—	100	—	ns
Address set up time	t_{AS}	0	—	0	—	0	—	0	—	ns
Write pulse width	t_{WP}	60	—	60	—	70	—	90	—	ns
Write recovery time	t_{WR}	10	—	0	—	0	—	0	—	ns
Write to output in high Z	t_{WHZ}	0	30	0	35	0	40	0	50	ns
Data to write time overlap	t_{DW}	40	—	40	—	50	—	60	—	ns
Data hold from write time	t_{DH}	0	—	0	—	0	—	0	—	ns
Output disable to output in high Z	t_{OHZ}	0	30	0	35	0	40	0	50	ns
Output active from end of write	t_{OW}	5	—	5	—	5	—	5	—	ns

Write Timing Waveform (1) ($\overline{OE}$ Clock)



Notes: 1. A write occurs during the overlap (t_{WP}) of a low $\overline{CS}$ and a low $\overline{WE}$.
2. t_{WR} is measured from the earlier of $\overline{CS}$ or $\overline{WE}$ going high to the end of write cycle.
3. During this period, I/O pins are in the output state. Out of phase input signals must not be applied.

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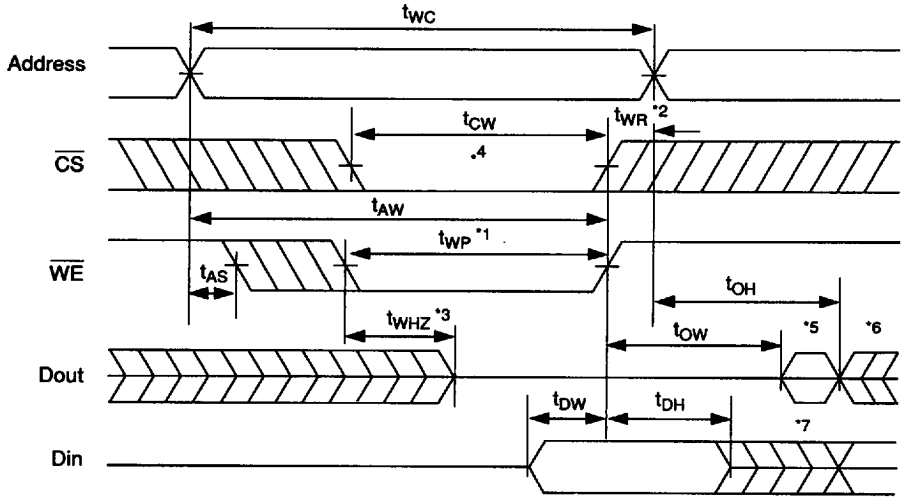
Write Timing Waveform (2) ($\overline{OE}$ Fixed Low)



Notes: 1. A write occurs during the overlap (t_{WP}) of a low $\overline{CS}$ and a low $\overline{WE}$.
2. t_{WR} is measured from the earlier of $\overline{CS}$ or $\overline{WE}$ going high to the end of write cycle.
3. During this period, I/O pins are in the output state. The input signals out of phase must not be applied.
4. If the $\overline{CS}$ low transistion occurs simultaneously with the $\overline{WE}$ low transition or after the $\overline{WE}$ low transition, outputs remain in a high impedance state.
5. Dout is in the same phase of written data of this write cycle.
6. Dout is the read data of next address.
7. If $\overline{CS}$ is low during this period, I/O pins are in the output state. Out of phase input signals must not be appplied to I/O pins.

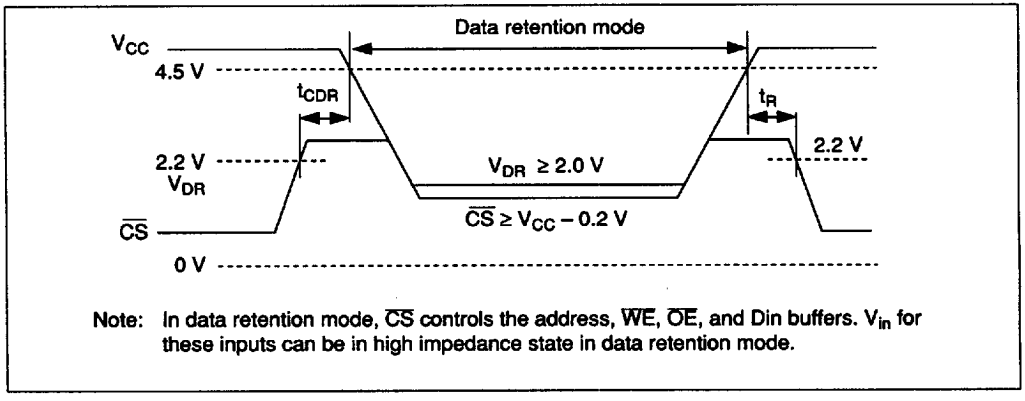
Low V_{CC} Data Retention Characteristics (Ta = 0 to +70°C)

These characteristics are guaranteed only for L- and L-SL version.

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
V_{CC} for data retention	V_{DR}	$\overline{CS} \geq V_{CC} - 0.2$ V	2.0	—	—	V
Data retention current	I_{CCDR}	V_{CC} = 3.0 V, $\overline{CS} \geq 2.8$ V 0 V ≤ V_{IN}	—	—	50 *2	µA
			—	—	10 *3	
Chip deselect to data retention time	t_{CDR}	See retention waveform	0	—	—	ns
Operation recovery time	t_R	See retention waveform	t_{RC} *1	—	—	ns

Notes: 1. t_{RC} = read cycle time
2. These characteristics are guaranteed only for L-version, V_{IL} = –0.3 V min, 20 µA max. at Ta = 0 to 40°C.
3. These characteristics are guaranteed only for L-SL version, V_{IL} = –0.3 V min, 3 µA max. at Ta = 0 to 40°C.

Low V_{CC} Data Retention Waveform



Note: In data retention mode, $\overline{CS}$ controls the address, $\overline{WE}$, $\overline{OE}$, and Din buffers. V_{in} for these inputs can be in high impedance state in data retention mode.

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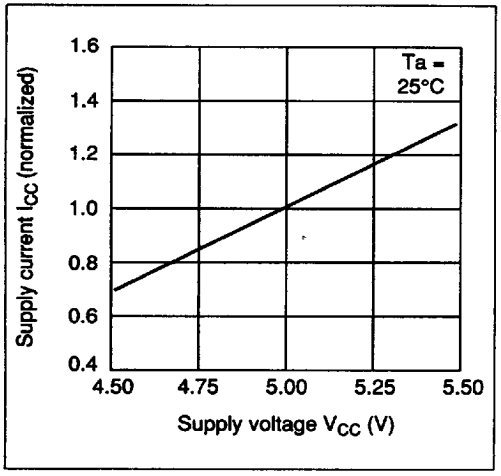
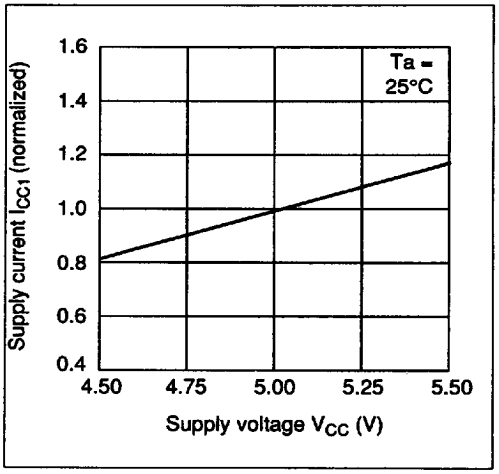
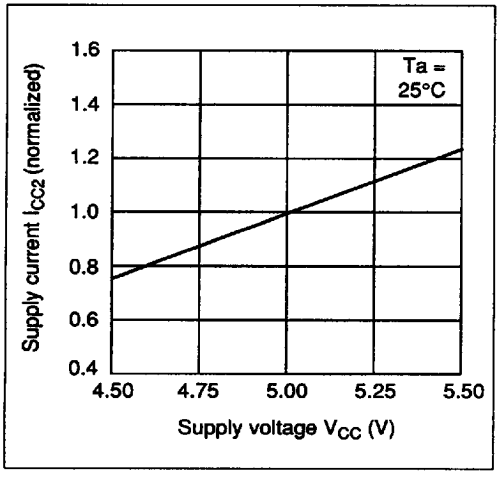
Characteristic Curves



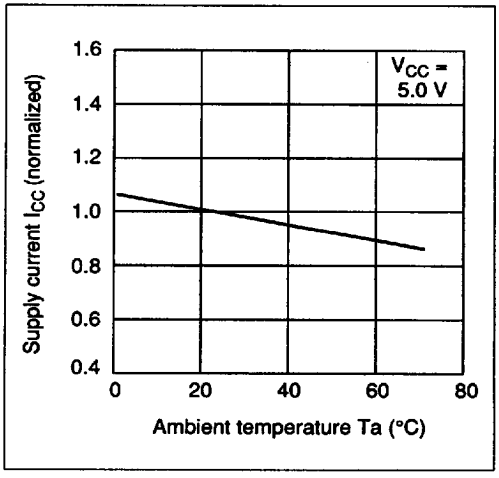
Supply Current vs. Supply Voltage (1)



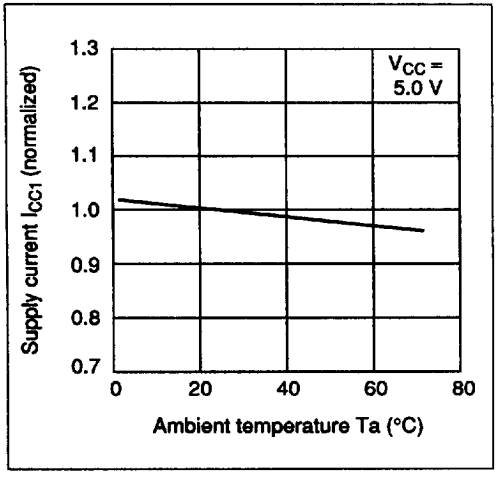
Supply Current vs. Supply Voltage (2)



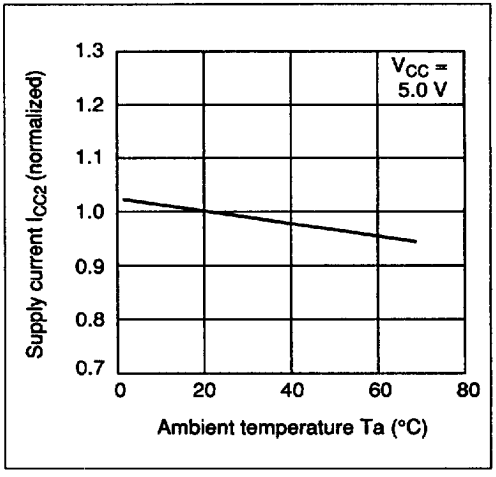
Supply Current vs. Supply Voltage (3)



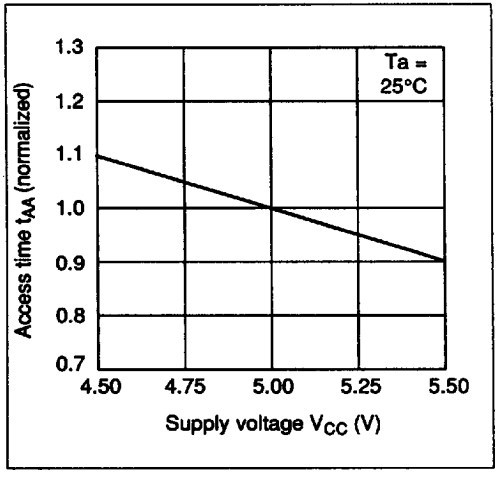
Supply Current vs. Ambient Temperature (1)



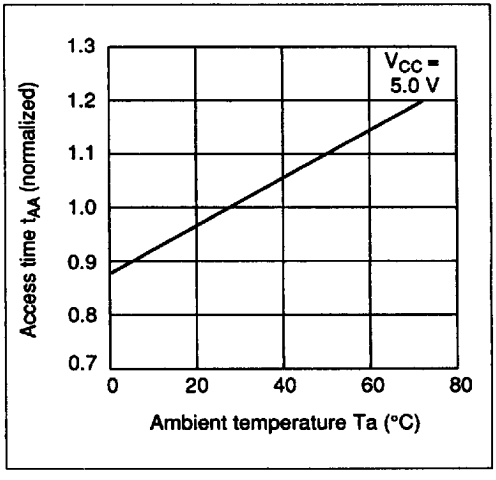
Supply Current vs. Ambient Temperature (2)



Supply Current vs. Ambient Temperature (3)



Access Time vs. Supply Voltage



Access Time vs. Ambient Temperature

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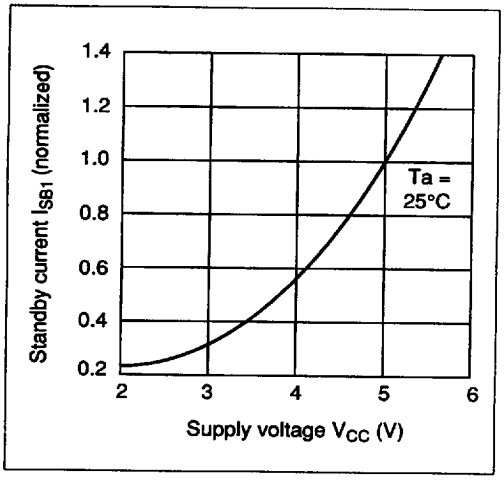
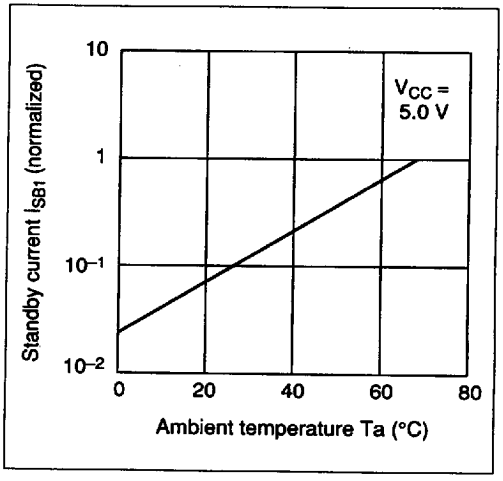
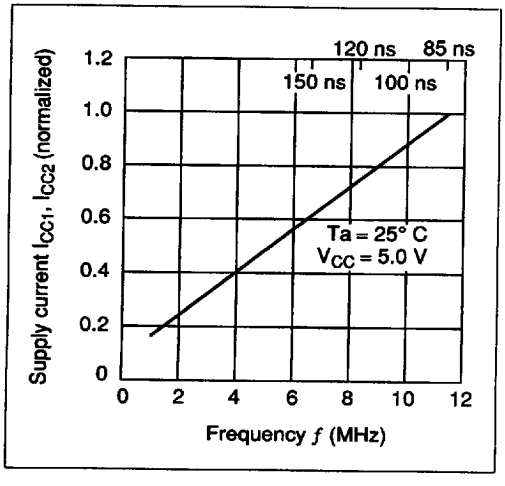


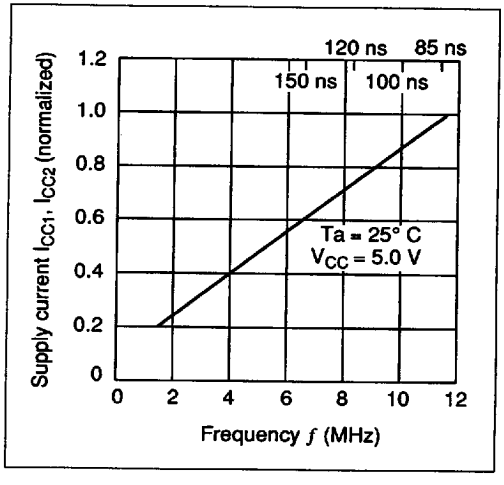
Standby Current vs. Supply Voltage



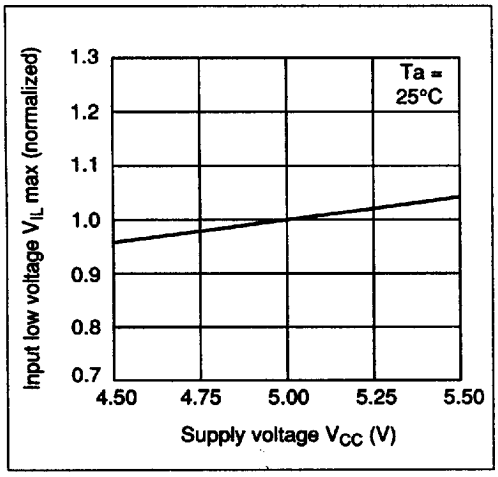
Standby Current vs. Ambient Temperature



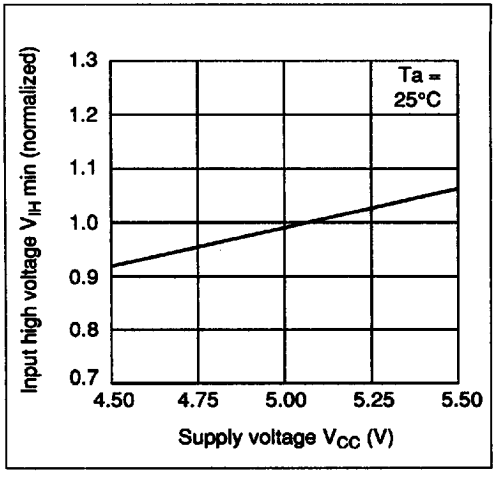
Supply Current vs. Frequency (Read)



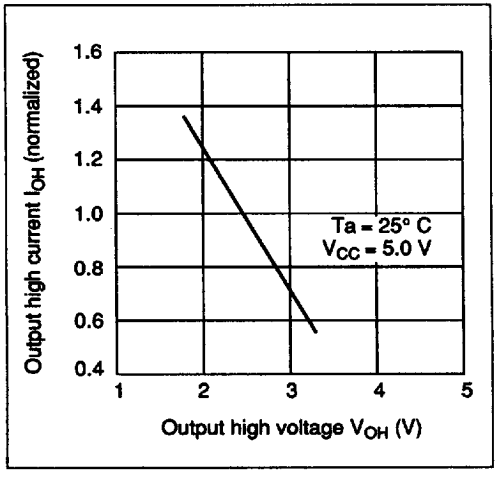
Supply Current vs. Frequency (Write)



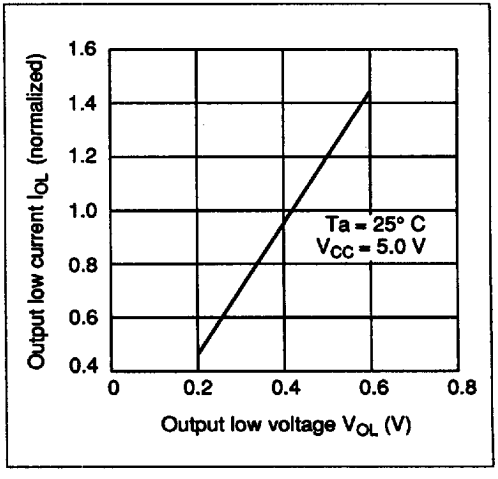
Input Low Voltage vs. Supply Voltage



Input High Voltage vs. Supply Voltage



Output Current vs. Output Voltage (High)



Output Current vs. Output Voltage (Low)

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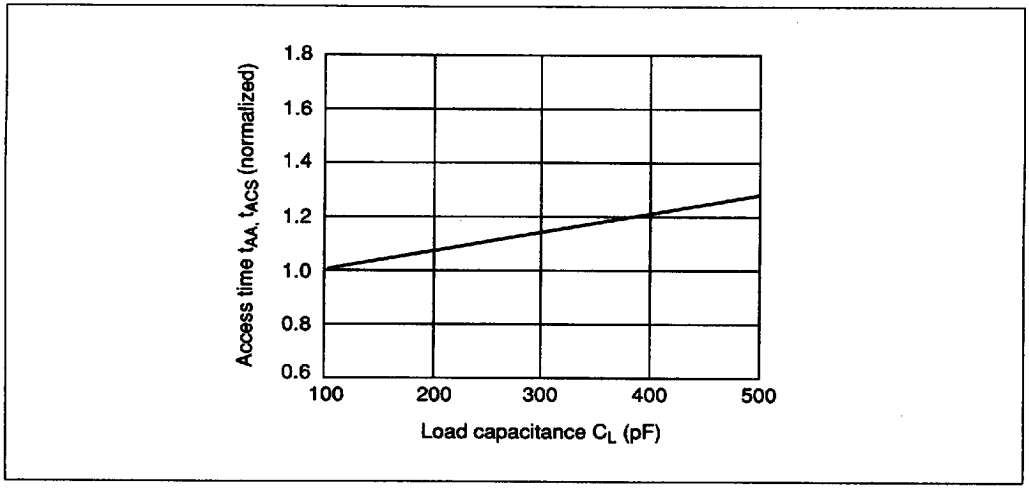

Access Time vs. Load Capacitance