
HM621100A Series

1048576-word × 1-bit High Speed CMOS Static RAM

HITACHI

Rev. 0.0
Dec. 1, 1995

Description

The Hitachi HM621100A is a high speed 1M Static RAM organized as 1048576-word × 1-bit. It realizes high speed access time (20/25/35 ns) and low power consumption, employing CMOS process technology and high speed circuit designing technology. It is most advantageous for the field where high speed and high density memory is required, such as the cache memory for main frame or 32-bit MPU. The HM621100A, packaged in a 400-mil plastic SOJ is available for high density mounting.

Features

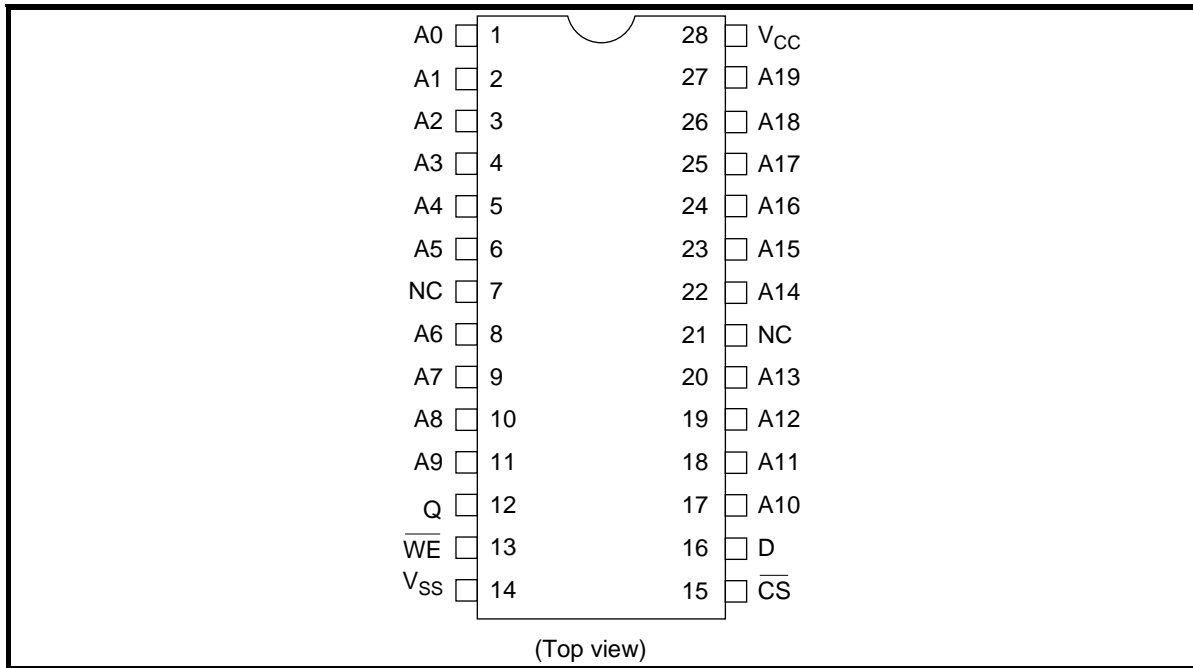
- Single 5 V supply and high density 28-pin package (DIP and SOJ)
- High speed
Access time: 20/25/35 ns (max)
- Low power dissipation
Active mode: 350 mW (typ)
Standby mode: 100 μW (typ)
- Completely static memory required
No clock or timing strobe required
- Equal access and cycle time
- Directly TTL compatible
All inputs and outputs

Ordering Information

Type No.	Access Time	Package
HM621100AP-20	20 ns	400-mil 28-pin plastic DIP (DP-28C)
HM621100AP-25	25 ns	
HM621100AP-35	35 ns	
HM621100ALP-20	20 ns	
HM621100ALP-25	25 ns	
HM621100ALP-35	35 ns	
HM621100AJP-20	20 ns	400-mil 28-pin plastic SOJ (CP-28D)
HM621100AJP-25	25 ns	
HM621100AJP-35	35 ns	
HM621100ALJP-20	20 ns	
HM621100ALJP-25	25 ns	
HM621100ALJP-35	35 ns	

HM621100A Series

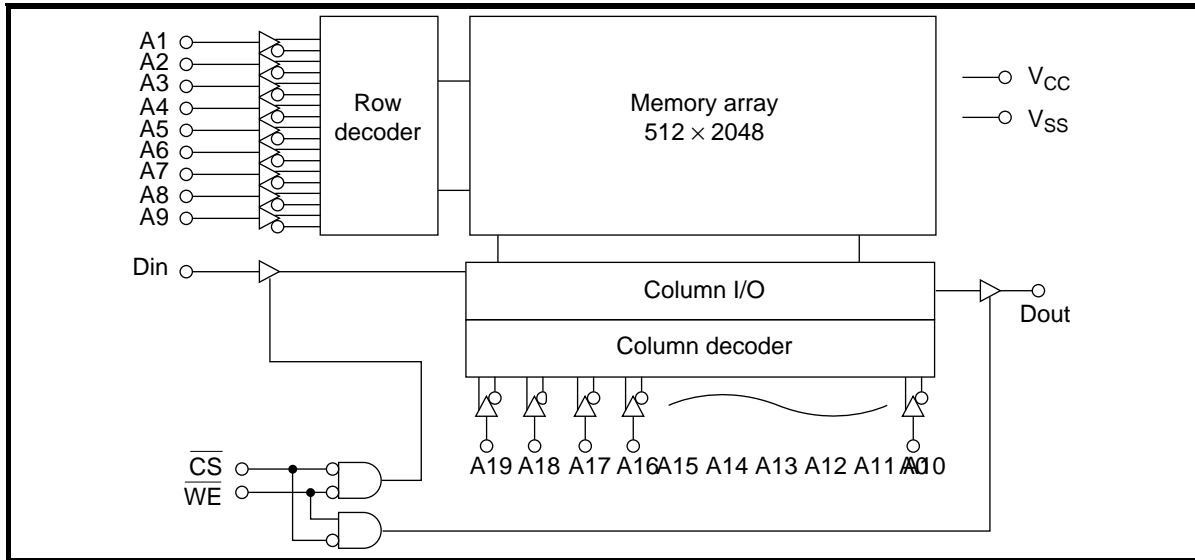
Pin Arrangement



Pin Description

Pin Name	Function
A0 – A19	Address
D	Input
Q	Output
CS	Chip select
WE	Write enable
V _{cc}	Power supply
V _{ss}	Ground

Block Diagram



HM621100A Series

Function Table

CS	WE	Mode	V _{CC} Current	Output 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

Note: X : H or L

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Voltage on any pin relative to V _{SS}	V _{in}	-0.5 ¹ to +7.0	V
Power dissipation	P _T	1.0	W
Operating temperature range	T _{opr}	0 to +70	°C
Storage temperature range	T _{stg}	-55 to +125	°C
Storage temperature range under bias	T _{bias}	-10 to +85	°C

Note: 1. V_{in} min = -2.0 V for pulse width ≤ 10 ns.

Recommended DC Operating Conditions (T_a = 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 high (logic 1) voltage	V _{IH}	2.2	—	6.0	V
Input low (logic 0) voltage	V _{IL}	-0.5 ¹	—	0.8	V

Note: 1. V_{IL} min = -2.0 V for pulse width ≤ 10 ns.

HM621100A Series

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

HM621100A-20 HM621100A-
25/35

Parameter	Symbol	Min	Typ ^{*1}	Max	Min	Typ ^{*1}	Max	Unit	Test Conditions
Input leakage current	I _{Li}	—	—	2.0	—	—	2.0	μA	V _{CC} = max Vin = V _{SS} to V _{CC}
Output leakage current	I _{Lo}	—	—	2.0	—	—	2.0	μA	CS = V _{IH} V _{IO} = V _{SS} to V _{CC}
Operating power supply current	I _{CC}	—	—	150	—	—	120	mA	CS = V _{IL} , I _{IO} = 0 mA, min cycle
Standby power supply current	I _{SB}	—	—	60	—	—	40	mA	CS = V _{IH} , min cycle
Standby power supply current (1)	I _{SB1} ^{*2}	—	0.02	2.0	—	0.02	2.0	mA	CS ≥ V _{CC} - 0.2 V 0 V ≤ Vin ≤ 0.2 V or Vin ≥ V _{CC} - 0.2 V
	I _{SB1} ^{*3}	—	—	100	—	—	100	μA	
Output low voltage	V _{OL}	—	—	0.4	—	—	0.4	V	I _{OL} = 8 mA
Output high voltage	V _{OH}	2.4	—	—	2.4	—	—	V	I _{OH} = -4 mA

Notes: 1. Typical values are at V_{CC} = 5.0 V, Ta = +25°C and not guaranteed.

2. P and JP version

3. LP and LJP version

Capacitance (Ta = 25°C, f = 1 MHz)

Parameter	Symbol	Min	Max	Unit	Test Conditions
Input capacitance	Cin	—	5 ^{*2} 6 ^{*3}	pF	Vin = 0 V
Output capacitance	Cout	—	8	pF	Vout = 0 V

Notes: 1. This parameter is sampled and not 100% tested.

2. SOJ package

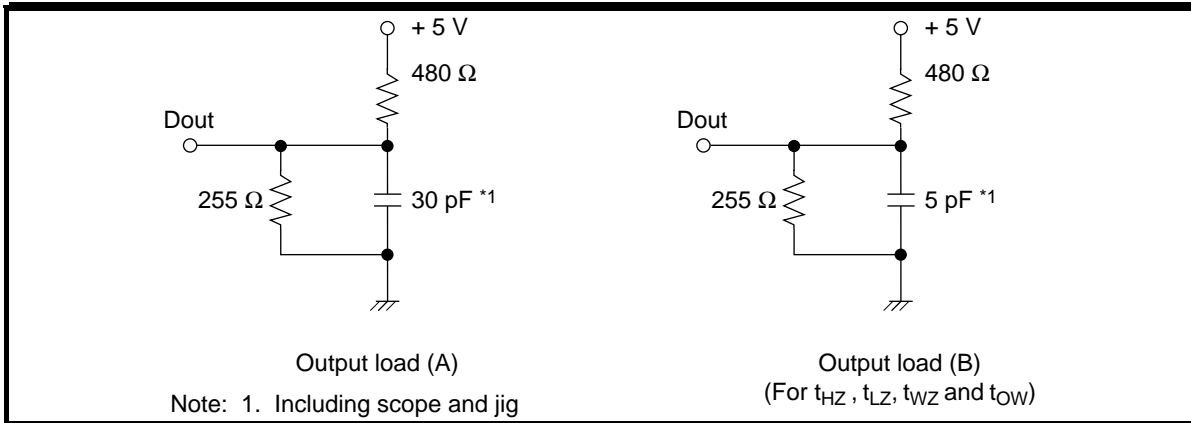
3. DIP package

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

Test Conditions

- _ Input pulse levels: 0 V to 3.0 V
- _ Input rise and fall time: 4 ns
- _ Input timing reference levels: 1.5 V
- _ Output timing reference levels: 1.5 V
- _ Output load: See figures

HM621100A Series

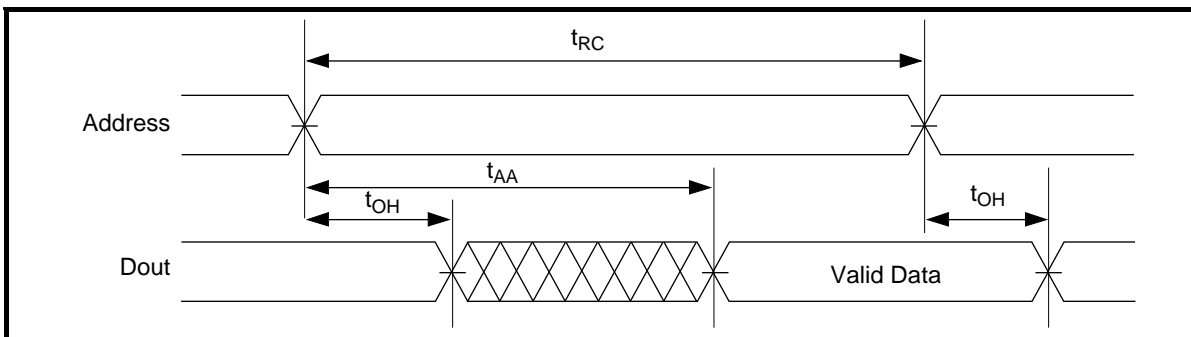


Read Cycle

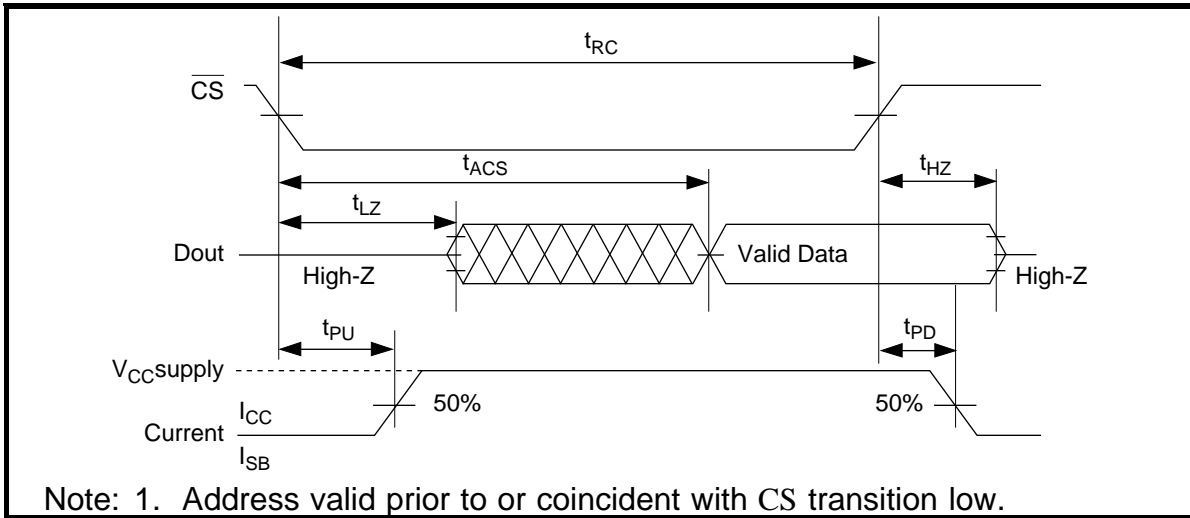
Parameter	Symbol	HM621100A-20		HM621100A-25		HM621100A-35		Unit
		Min	Max	Min	Max	Min	Max	
Read cycle time	t_{RC}	20	—	25	—	35	—	ns
Address access time	t_{AA}	—	20	—	25	—	35	ns
Chip select access time	t_{ACS}	—	20	—	25	—	35	ns
Chip selection to output in low-Z	t_{LZ}^{-1}	5	—	5	—	5	—	ns
Chip deselection to output in high-Z	t_{HZ}^{-1}	0	10	0	12	0	15	ns
Output hold from address change	t_{OH}	5	—	5	—	5	—	ns
Chip selection to power up time	t_{PU}	0	—	0	—	0	—	ns
Chip deselection to power down time	t_{PD}	—	12	—	15	—	25	ns

Note: 1. Transition is measured ± 200 mV from high impedance voltage with Load (B). This parameter is sampled and not 100% tested.

Read Timing Waveform (1) ($\overline{WE} = V_{IH}$, $\overline{CS} = V_{IL}$)



Read Timing Waveform (2)*1 ($\overline{WE} = V_{IH}$)



Write Cycle

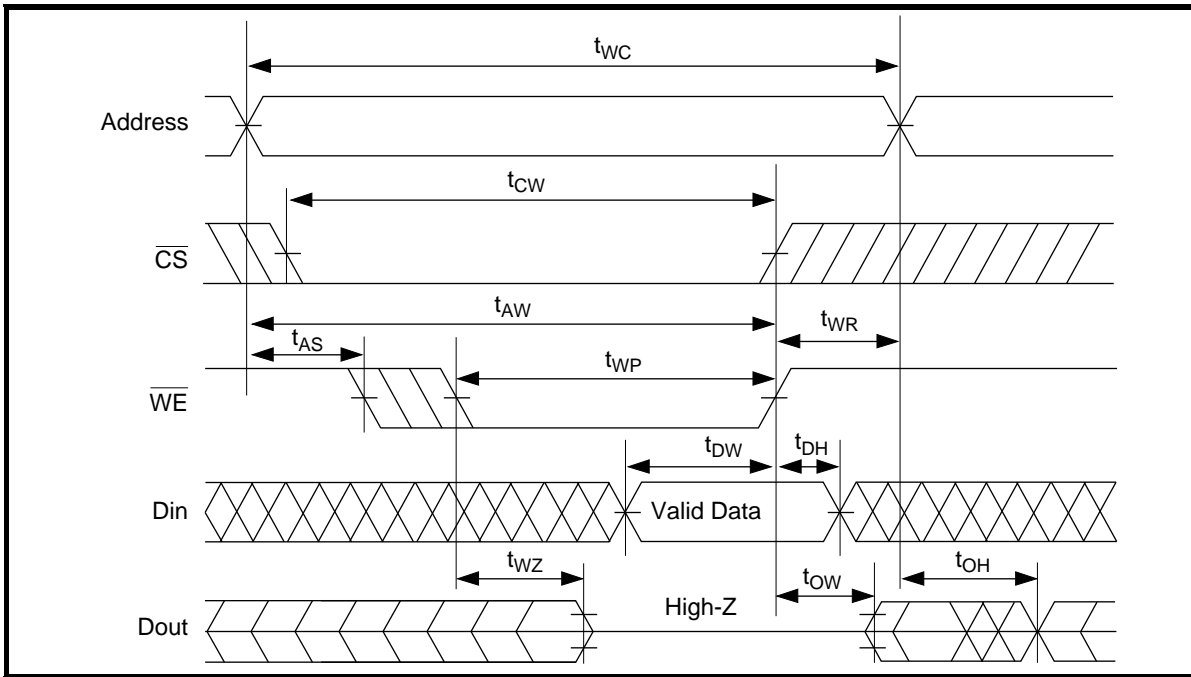
Parameter	Symbol	HM621100A-20		HM621100A-25		HM621100A-35		Unit
		Min	Max	Min	Max	Min	Max	
Write cycle time	t_{WC}	20	—	25	—	35	—	ns
Chip selection to end of write	t_{CW}	15	—	17	—	25	—	ns
Address valid to end of write	t_{AW}	16	—	20	—	30	—	ns
Address setup time	t_{AS}	0	—	0	—	0	—	ns
Write pulse width	t_{WP}^{*2}	15	—	17	—	25	—	ns
Write recovery time	t_{WR}^{*3}	0	—	0	—	0	—	ns
Write to output in high-Z	t_{WZ}^{*1}	0	12	0	15	0	15	ns
Data to write time overlap	t_{DW}	12	—	15	—	20	—	ns
Data hold from write time	t_{DH}	0	—	0	—	0	—	ns
Output active from end of write	t_{OW}^{*1}	0	—	0	—	0	—	ns
Output hold from address change	t_{OH}^{*4}	5	—	5	—	5	—	ns

Notes: 1. Transition is measured ± 200 mV from high impedance voltage with Load (B). This parameter is sampled and not 100% tested.

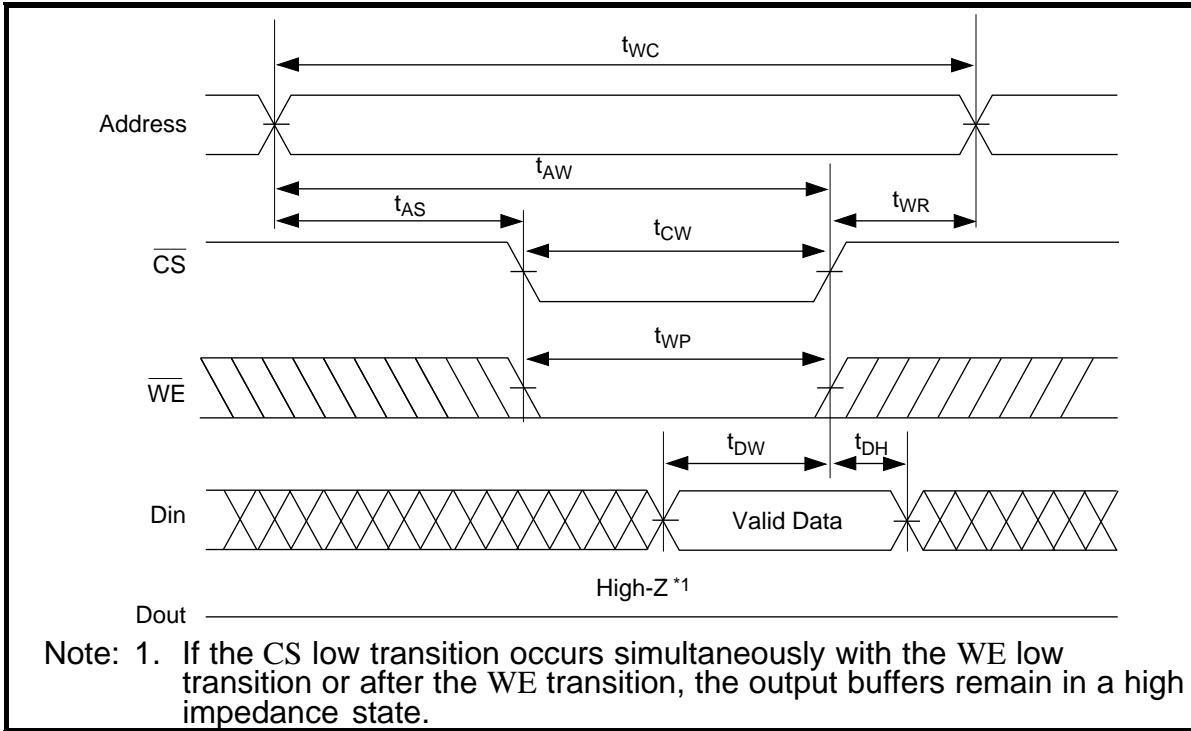
2. A write occurs during the overlap of a low CS and a low WE.
3. t_{WR} is measured from the earlier of CS or WE going high to the end of write cycle.
4. D_{out} is the same phase of write data of this write cycle, if t_{WR} is long enough.

HM621100A Series

Write Timing Waveform (1) (\overline{WE} Controlled)



Write Timing Waveform (2) (\overline{CS} Controlled)



Low V_{CC} Data Retention Characteristics ($T_a = 0$ to $+70^\circ\text{C}$)

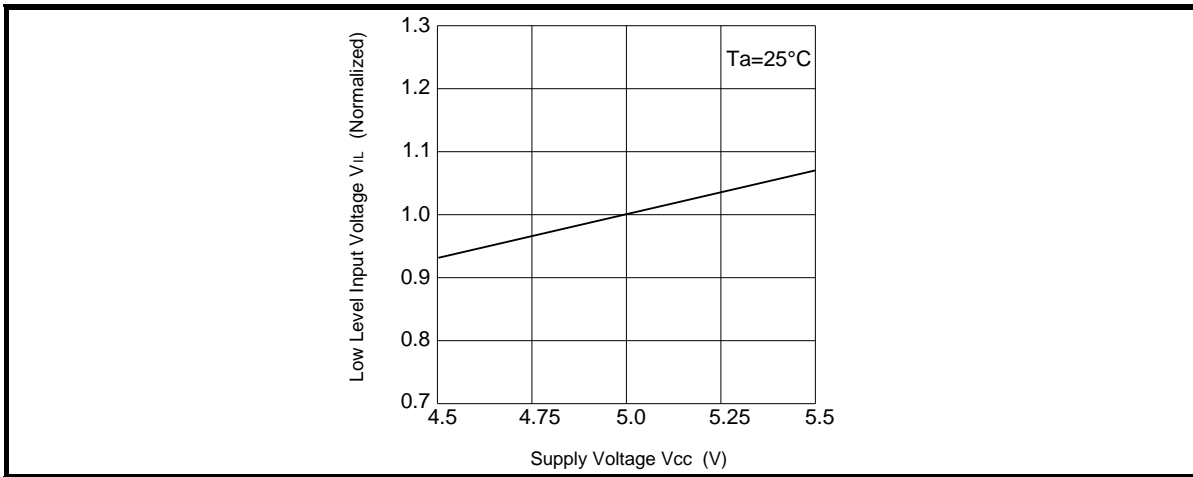
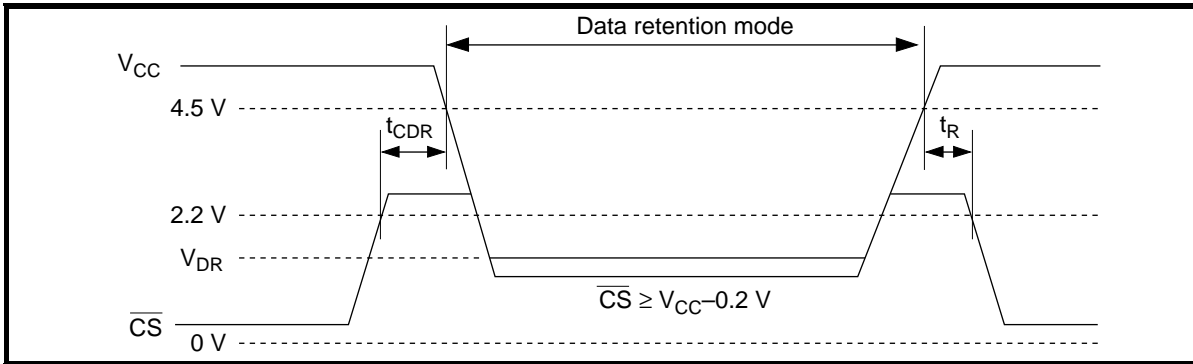
This characteristics is guaranteed only for L-version.

Parameter	Symbol	Min	Typ	Max	Unit	Test Conditions
V_{CC} for data retention	V_{DR}	2.0	—	—	V	$CS \geq V_{CC} - 0.2 \text{ V}$, $V_{in} \geq V_{CC} - 0.2 \text{ V}$ or $0 \text{ V} \leq V_{in} \leq 0.2 \text{ V}$
Data retention current	I_{CCDR}	—	2	50^{*1}	μA	
Chip deselect to data retention time	t_{CDR}	0	—	—	ns	
Operation recovery time	t_R	5	—	—	ms	

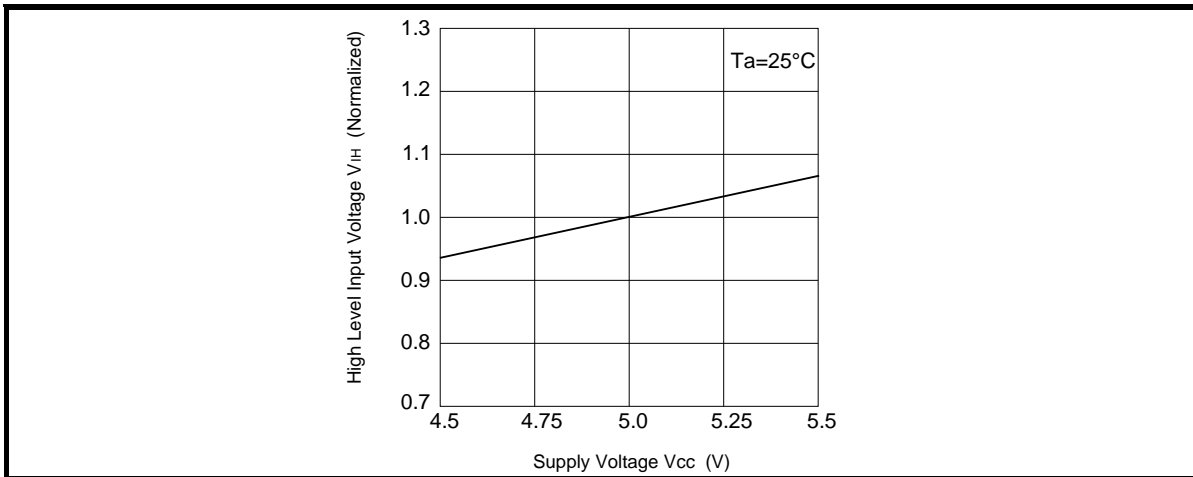
Note: 1. $V_{CC} = 3.0 \text{ V}$

HM621100A Series

Low V_{CC} Data Retention Timing Waveform

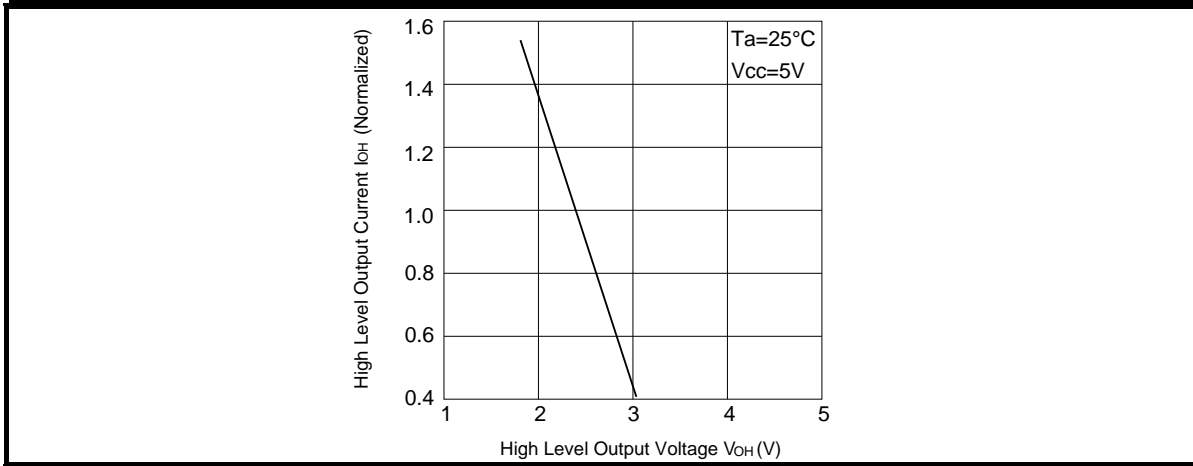


Low Level Input Voltage vs. Supply Voltage

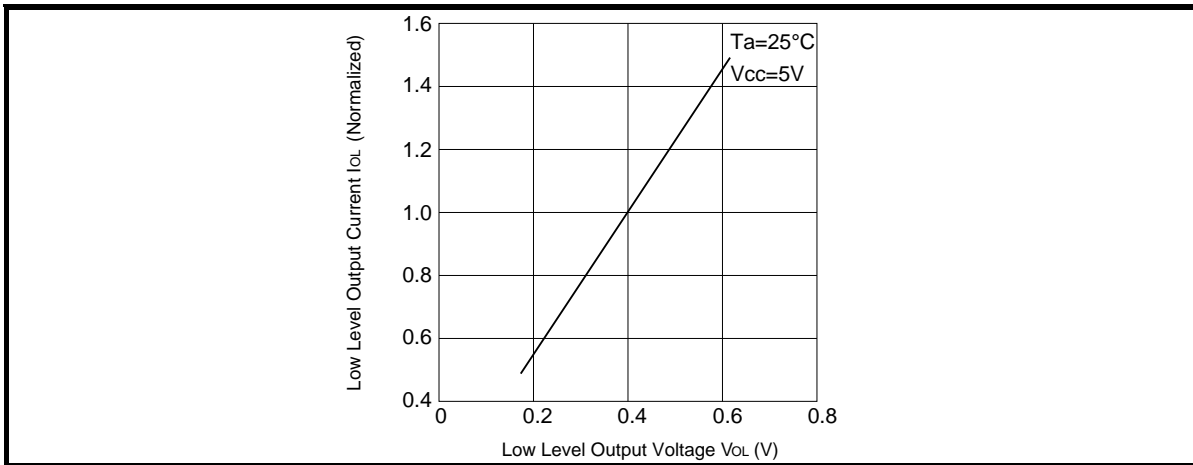


High Level Input Voltage vs. Supply Voltage

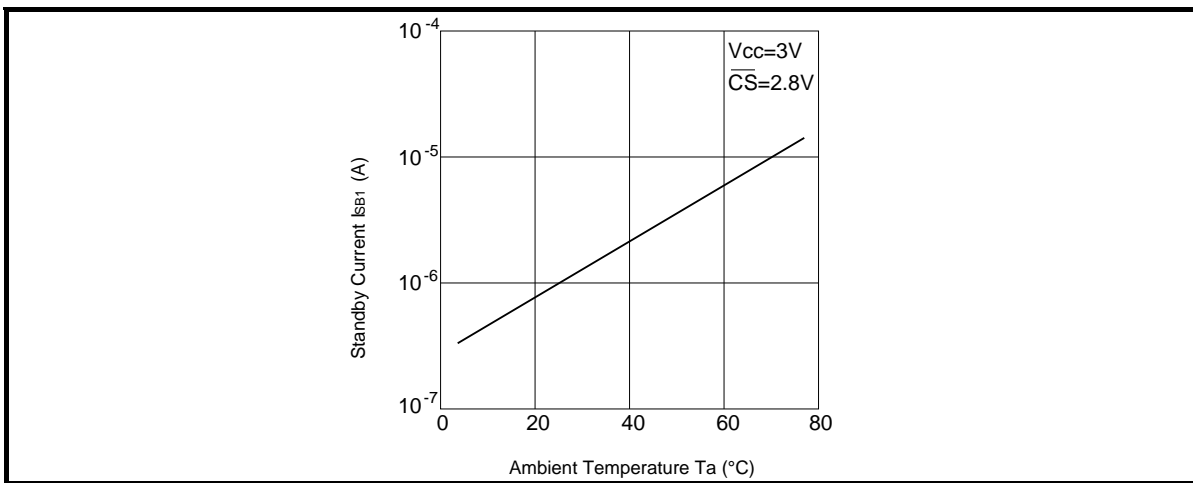
HM621100A Series



High Level Output Current vs. High Level Output Voltage

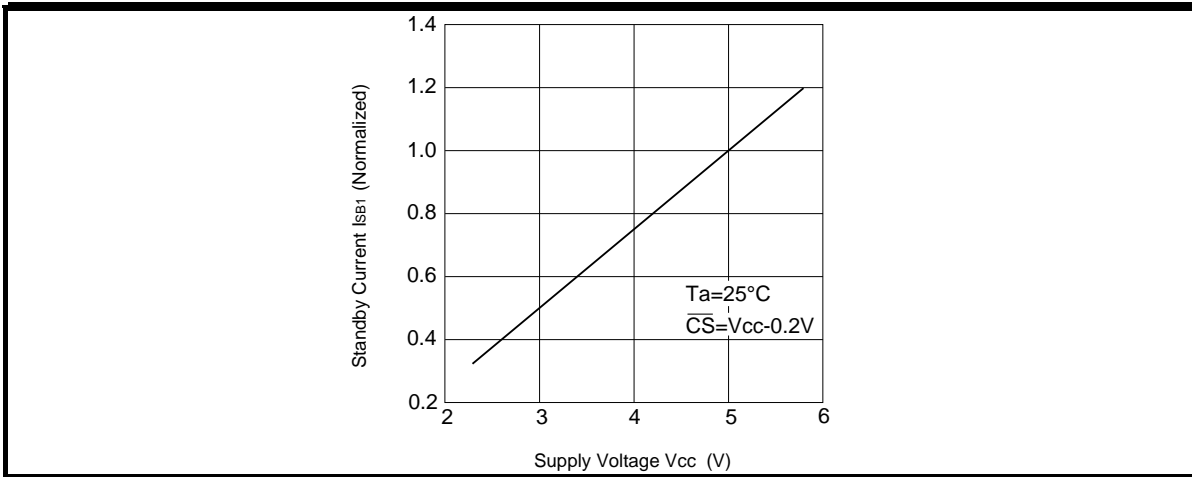


Low Level Output Current vs. Low Level Output Voltage

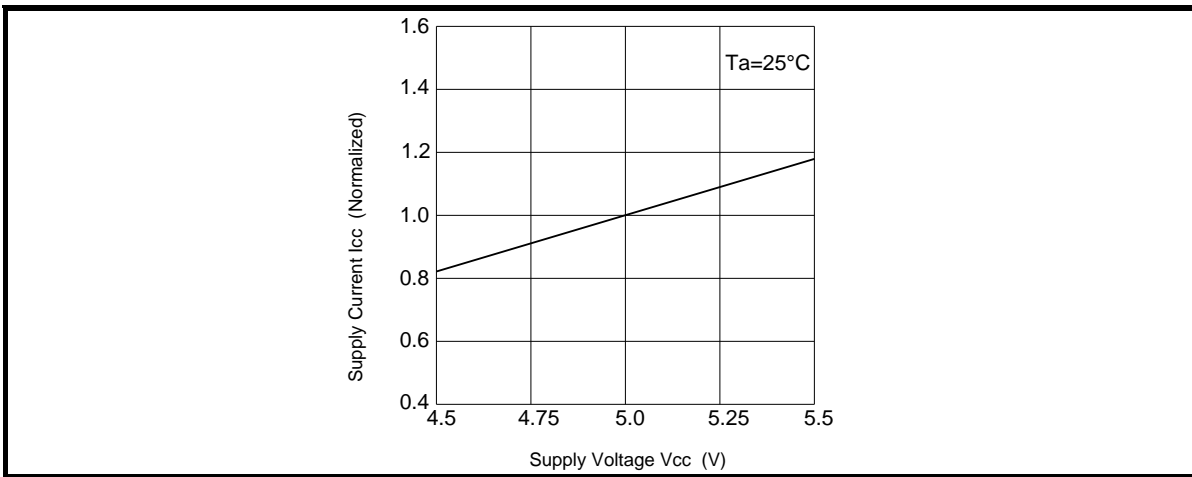


Standby Current vs. Ambient Temperature

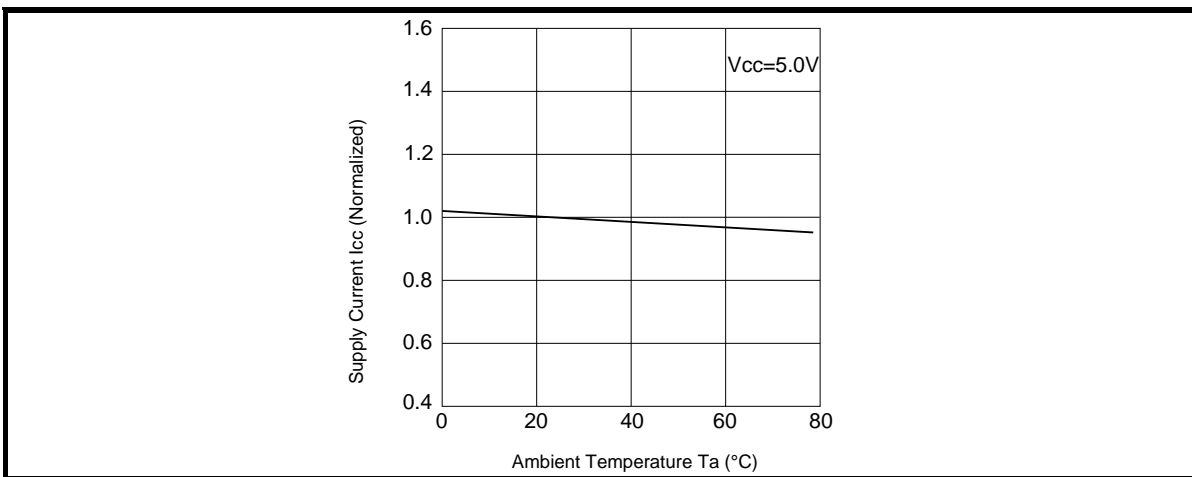
HM621100A Series



Standby Current vs. Supply Voltage

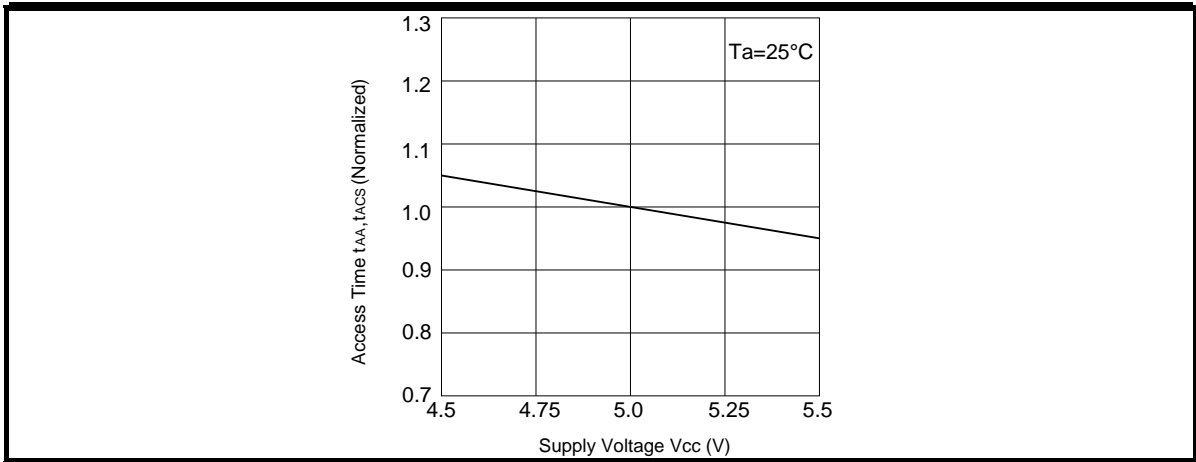


Supply Current vs. Supply Voltage

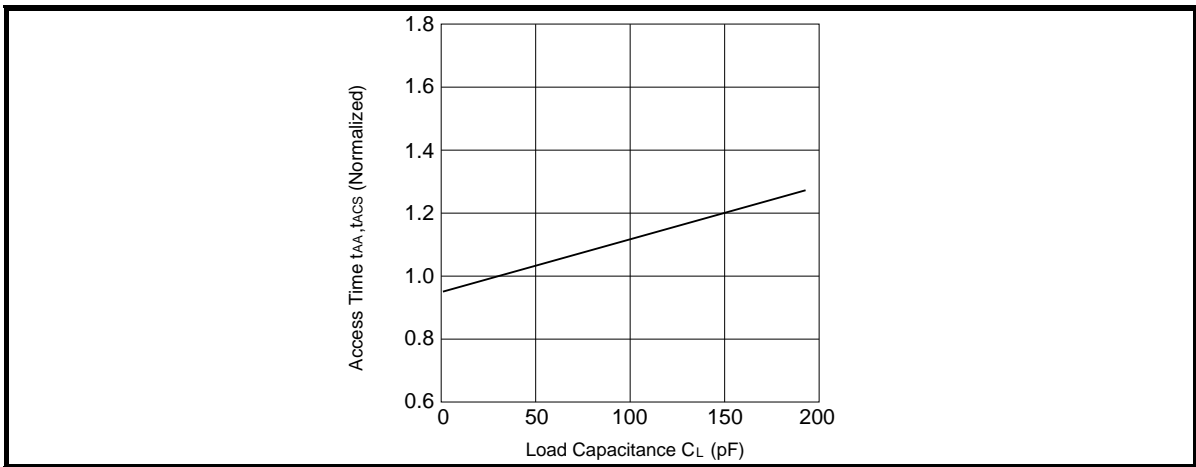


Supply Current vs. Ambient Temperature

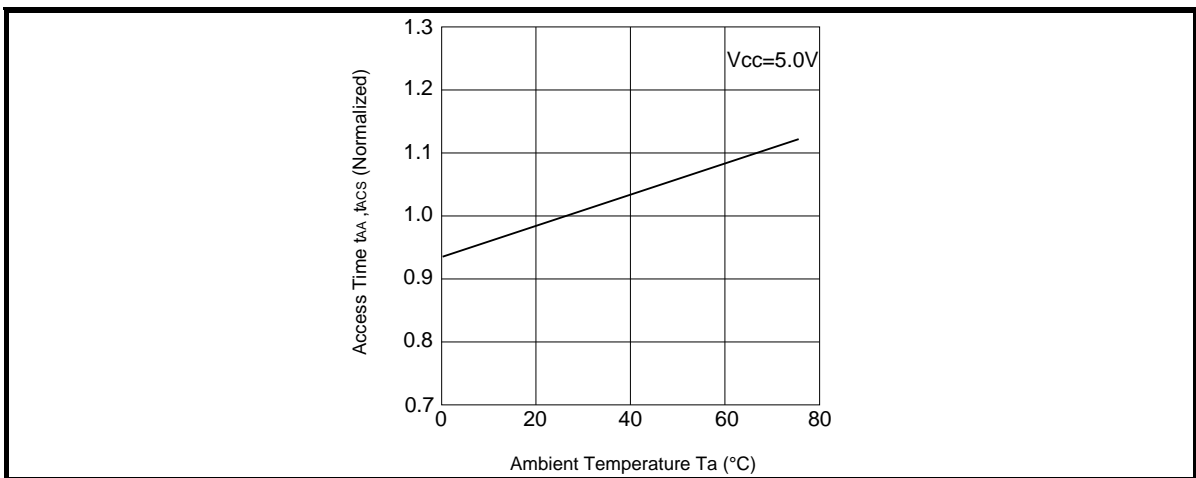
HM621100A Series



Access Time vs. Supply Voltage

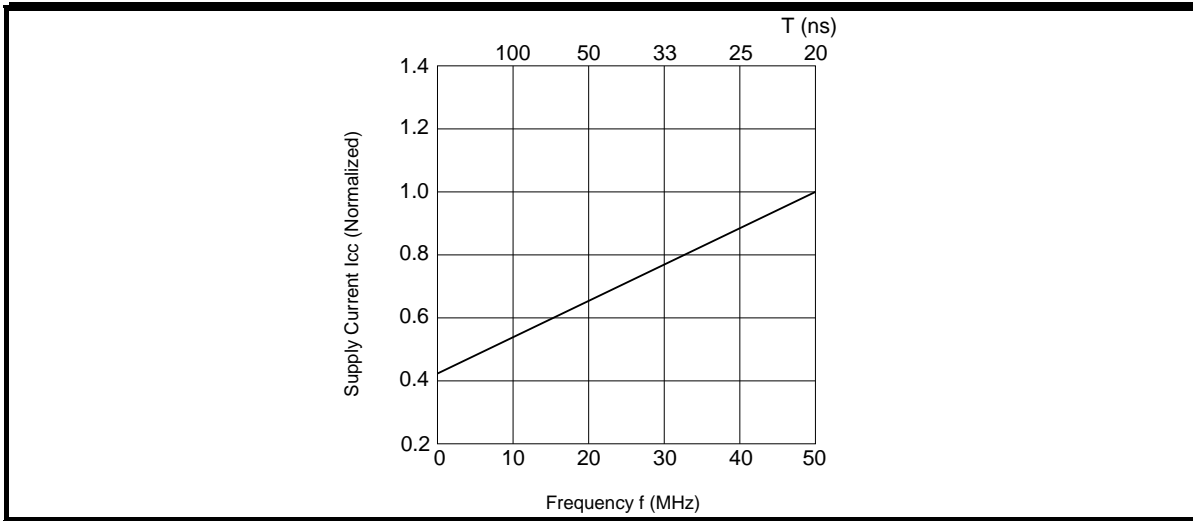


Access Time vs. Load Capacitance



Access Time vs. Ambient Temperature

HM621100A Series



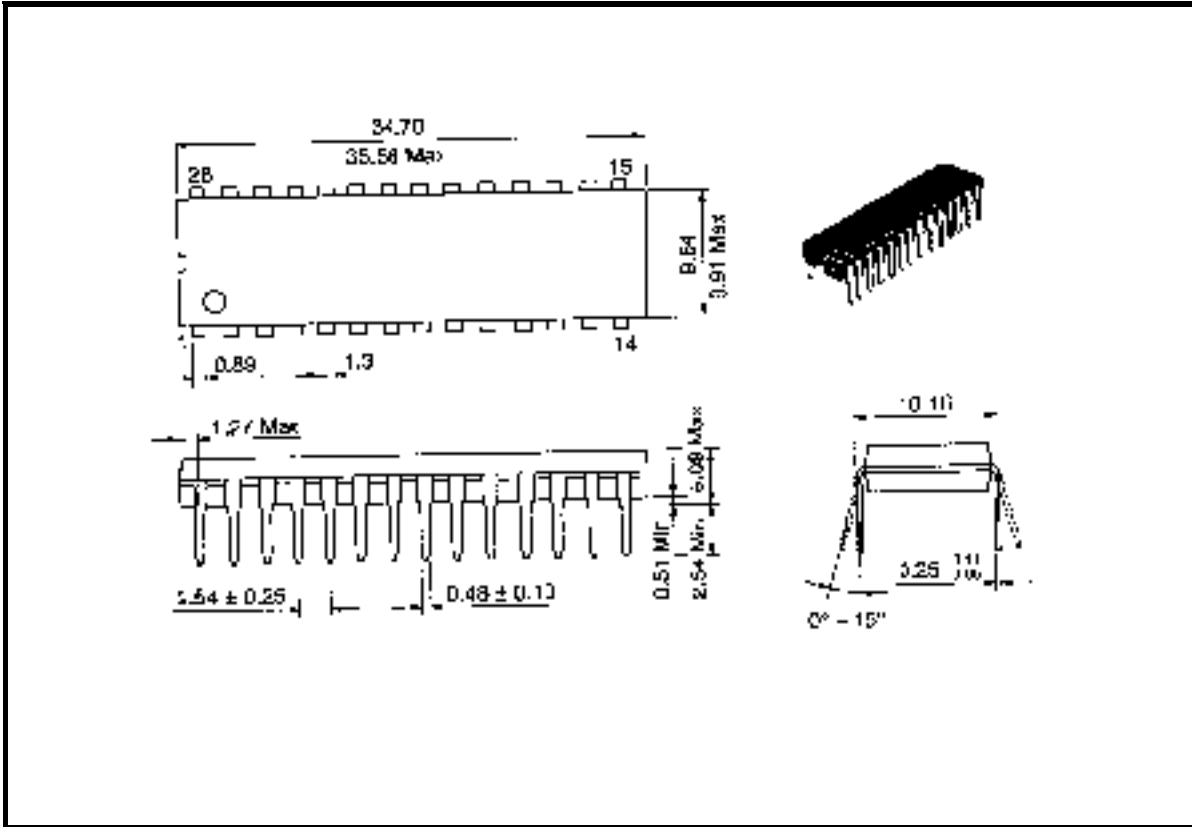
Supply Current vs. Frequency

HM621100A Series

Package Dimensions

HM621100AP/ALP Series (DP-28C)

Unit: mm



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HM621100AJP/ALJP Series (CP-28D)

Unit: mm

