

131072-word × 8-bit High Speed CMOS Static RAM

Description

The CXK581000ATM/AYM/AM/AP is a high speed CMOS static RAM organized as 131072-words by 8 bits.

A polysilicon TFT cell technology realized extremely low stand-by current and higher data retention stability.

Special feature are low power consumption, high speed and broad package line-up.

The CXK581000ATM/AYM/AM/AP ia a suitable RAM for portable equipment with battery back up.

Features

- Fast access time:

CXK581000ATM/AYM/AM/AP	(Access time)
-55LL/55SL	55ns (Max.)
-70LL/70SL	70ns (Max.)
-10LL/10SL	100ns (Max.)
- Low standby current:

CXK581000ATM/AYM/AM/AP	
-55LL/70LL/10LL	20µA (Max.)
-55SL/70SL/10SL	12µA (Max.)
- Low data retention current

CXK581000ATM/AYM/AM/AP	
-55LL/70LL/10LL	12µA (Max.)
-55SL/70SL/10SL	4µA (Max.)
- Single +5V supply: +5V ±10%
- Low voltage data retention: 2.0V (Min.)
- Broad package line-up
- CXK581000ATM/AYM

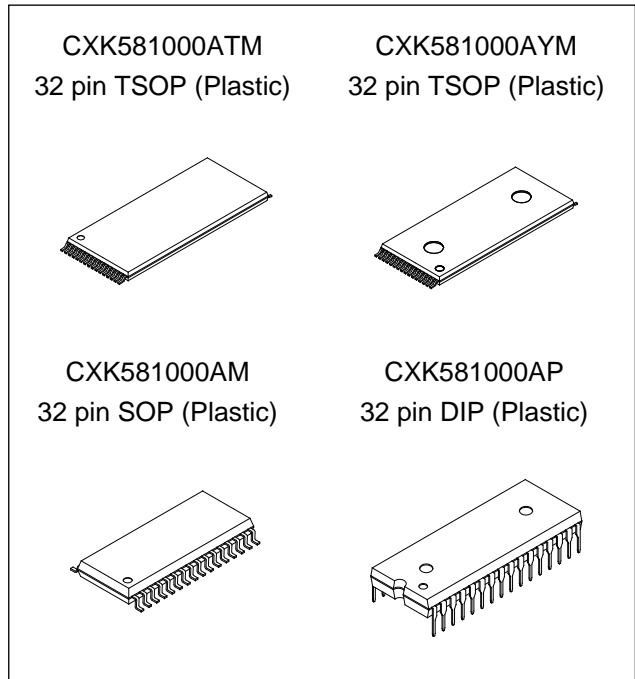
	8mm × 20mm 32 pin TSOP package
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- CXK581000AM 525mil 32 pin SOP package
- CXK581000AP 600mil 32 pin DIP package

Functions

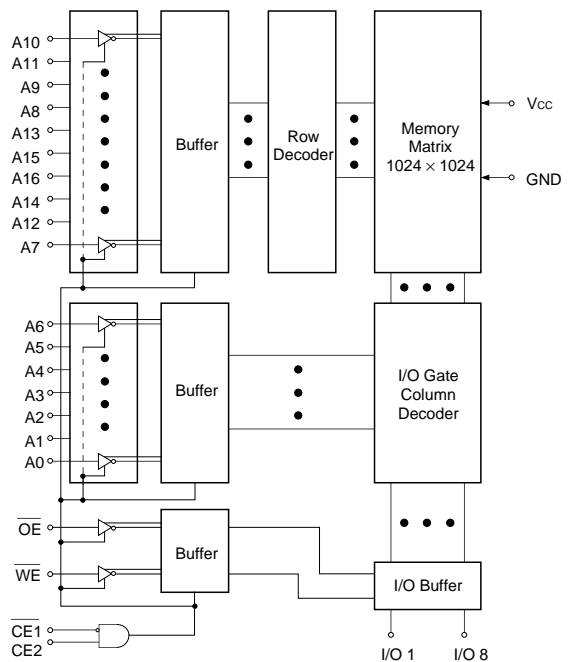
131072-word × 8-bit static RAM

Structure

Silicon gate CMOS IC

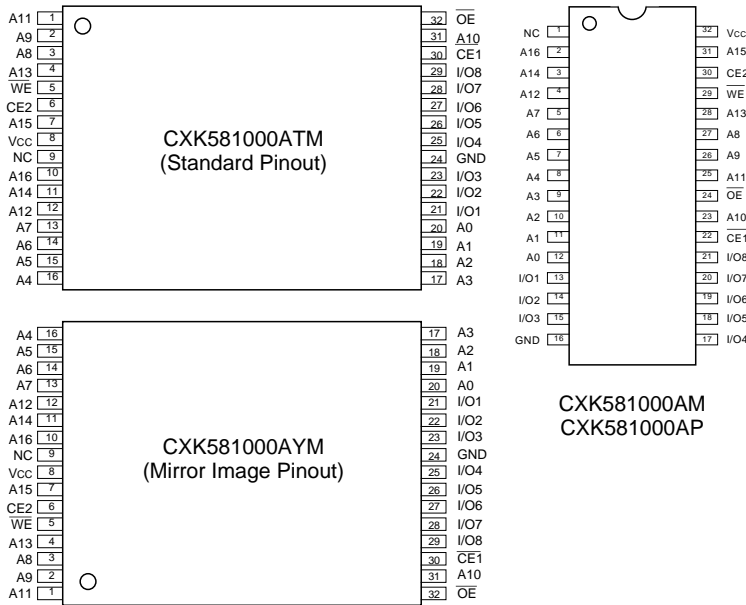


Block Diagram



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Pin Configuration (Top View)



Pin Description

Symbol	Description
A0 to A16	Address input
I/O1 to I/O8	Data input output
$\overline{CE}1, \overline{CE}2$	Chip enable 1, 2 input
\overline{WE}	Write enable input
\overline{OE}	Output enable input
Vcc	Power supply
GND	Ground
NC	No connection

Absolute Maximum Ratings

(Ta = 25°C, GND = 0V)

Item	Symbol	Rating	Unit	
Supply voltage	Vcc	-0.5 to +7.0	V	
Input voltage	V _{IN}	-0.5* to Vcc +0.5		
Input and output voltage	V _{I/O}	-0.5* to Vcc +0.5		
Allowable power dissipation	P _D	CXK581000AP	1.0	W
		CXK581000ATM/AYM/AM	0.7	
Operating temperature	T _{opr}	0 to +70	°C	
Storage temperature	T _{stg}	-55 to +150		
Soldering temperature	T _{solder}	CXK581000AP	260 • 10	°C • s
		CXK581000ATM/AYM/AM	235 • 10	

* V_{IN}, V_{I/O} = -3.0V Min. for pulse width less than 50ns.

Truth Table

$\overline{CE}1$	CE2	\overline{OE}	\overline{WE}	Mode	I/O pin	Vcc Current
H	×	×	×	Not selected	High Z	ISB1, ISB2
×	L	×	×	Not selected	High Z	ISB1, ISB2
L	H	H	H	Output disable	High Z	Icc1, Icc2, Icc3
L	H	L	H	Read	Data out	Icc1, Icc2, Icc3
L	H	×	L	Write	Data in	Icc1, Icc2, Icc3

×: "H" or "L"

DC Recommended Operating Conditions

(Ta = 0 to +70°C, GND = 0V)

Item	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	Vcc	4.5	5.0	5.5	V
Input high voltage	V _{IH}	2.2	—	Vcc +0.3	
Input low voltage	V _{IL}	-0.3*	—	0.8	

* V_{IL} = -3.0V Min. for pulse width less than 50ns.

Electrical Characteristics

• DC Characteristics

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

Item	Symbol	Test conditions		Min.	Typ.*1	Max.	Unit	
Input leakage current	I _{LI}	V _{IN} = GND to V _{CC}		-1	—	1	μA	
Output leakage current	I _{LO}	$\overline{CE1} = V_{IH}$ or $CE2 = V_{IL}$ or $\overline{OE} = V_{IH}$ or $\overline{WE} = V_{IL}$, V _{I/O} = GND to V _{CC}		-1	—	1		
Operating power supply current	I _{CC1}	$\overline{CE1} = V_{IL}$, CE2 = V _{IH} V _{IN} = V _{IH} or V _{IL} I _{OUT} = 0mA		—	7	15	mA	
Average operating current	I _{CC2}	Min. cycle Duty = 100% I _{OUT} = 0mA	55LL/55SL	—	45	90		
			70LL/70SL	—	40	70		
			10LL/10SL	—	35	60		
	I _{CC3}	Cycle time 1μs duty = 100% I _{OUT} = 0mA CE1 ≤ 0.2V CE2 ≥ V _{CC} - 0.2V V _{IL} ≤ 0.2V V _{IH} ≥ V _{CC} - 0.2V		—	10	20		
Standby current	I _{SB1}	CE2 ≤ 0.2V or $\begin{cases} \overline{CE1} \geq V_{CC} - 0.2V \\ CE2 \geq V_{CC} - 0.2V \end{cases}$	LL*2	0 to +70°C	—	—	20	μA
				0 to +40°C	—	—	4	
				+25°C	—	0.7	2	
			SL*3	0 to +70°C	—	—	12	
				0 to +40°C	—	—	2.4	
	+25°C	—		0.3	1			
I _{SB2}	$\overline{CE1} = V_{IH}$ or CE2 = V _{IL}		—	0.6	3	mA		
Output high voltage	V _{OH}	I _{OH} = -1.0mA		2.4	—	—	V	
Output low voltage	V _{OL}	I _{OL} = 2.1mA		—	—	0.4		

*1 V_{CC} = 5V, Ta = 25°C

*2 For -55LL/70LL/10LL

*3 For -55SL/70SL/10SL

I/O Capacitance

(Ta = 25°C, f = 1MHz)

Item	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Input capacitance	C _{IN}	V _{IN} = 0V	—	—	7	pF
I/O capacitance	C _{I/O}	V _{I/O} = 0V	—	—	8	

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

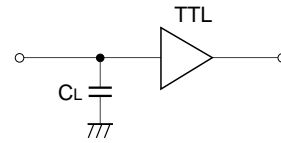
AC Characteristics

• **AC test conditions** (V_{CC} = 5V±10%, Ta = 0 to +70°C)

Item	Conditions	
Input pulse high level	V _{IH} = 2.2V	
Input pulse low level	V _{IL} = 0.8V	
input rise time	tr = 5ns	
input fall time	tf = 5ns	
Input and output reference level	1.5V	
Output load conditions	-55LL/55SL	C _L * = 30pF, 1TTL
	-70LL/70SL	C _L * = 100pF, 1TTL
	-10LL/10SL	

* C_L includes scope and jig capacitances.

• **Test circuit**



• Read cycle ($\overline{WE} = "H"$)

Item	Symbol	-55LL/55SL		-70LL/70SL		-10LL/10SL		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Read cycle time	t_{RC}	55	—	70	—	100	—	ns
Address access time	t_{AA}	—	55	—	70	—	100	
Chip enable access time ($\overline{CE1}$)	t_{CO1}	—	55	—	70	—	100	
Chip enable access time (CE2)	t_{CO2}	—	55	—	70	—	100	
Output enable to output valid	t_{OE}	—	30	—	40	—	50	
Output hold from address change	t_{OH}	15	—	15	—	15	—	
Chip enable to output in low Z ($\overline{CE1}$, CE2)	t_{LZ1} , t_{LZ2}	10	—	10	—	10	—	
Output enable to output in low Z (\overline{OE})	t_{OLZ}	5	—	5	—	5	—	
Chip disable to output in high Z ($\overline{CE1}$, CE2)	t_{HZ1} , t_{HZ2}^*	—	25	—	25	—	35	
Output disable to output in high Z (\overline{OE})	t_{OHZ}^*	—	25	—	25	—	35	

* t_{HZ1} , t_{HZ2} and t_{OHZ} are defined as the time required for outputs to turn to high impedance state and are not referred to as output voltage levels.

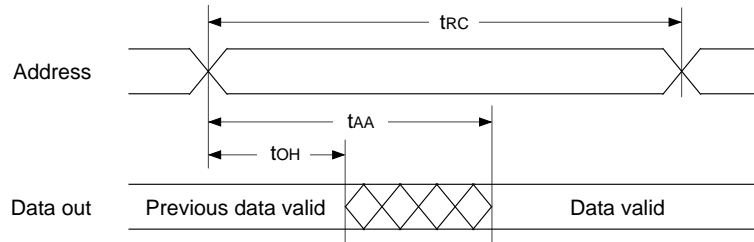
• Write cycle

Item	Symbol	-55LL/55SL		-70LL/70SL		-10LL/10SL		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Write cycle time	t_{WC}	55	—	70	—	100	—	ns
Address valid to end of write	t_{AW}	50	—	60	—	70	—	
Chip enable to end of write	t_{CW}	50	—	60	—	70	—	
Data to write time overlap	t_{DW}	25	—	30	—	40	—	
Data hold from write time	t_{DH}	0	—	0	—	0	—	
Write pulse width	t_{WP}	40	—	50	—	70	—	
Address setup time	t_{AS}	0	—	0	—	0	—	
Write recovery time (\overline{WE})	t_{WR}	0	—	0	—	0	—	
Write recovery time ($\overline{CE1}$, CE2)	t_{WR1}	0	—	0	—	0	—	
Output active from end of write	t_{OW}	10	—	10	—	10	—	
Write to output in high Z	t_{WHZ}^*	—	25	—	25	—	30	

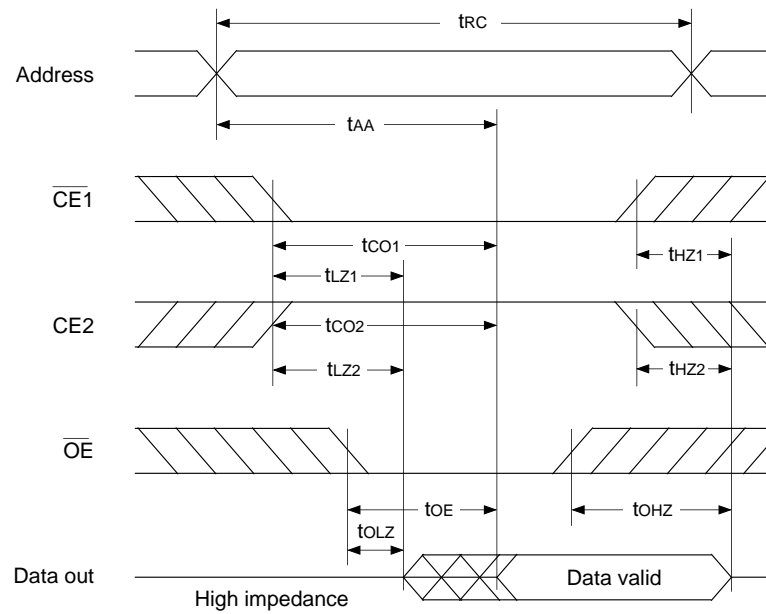
* t_{WHZ} is defined as the time required for outputs to turn to high impedance state and is not referred to as output voltage level.

Timing Waveform

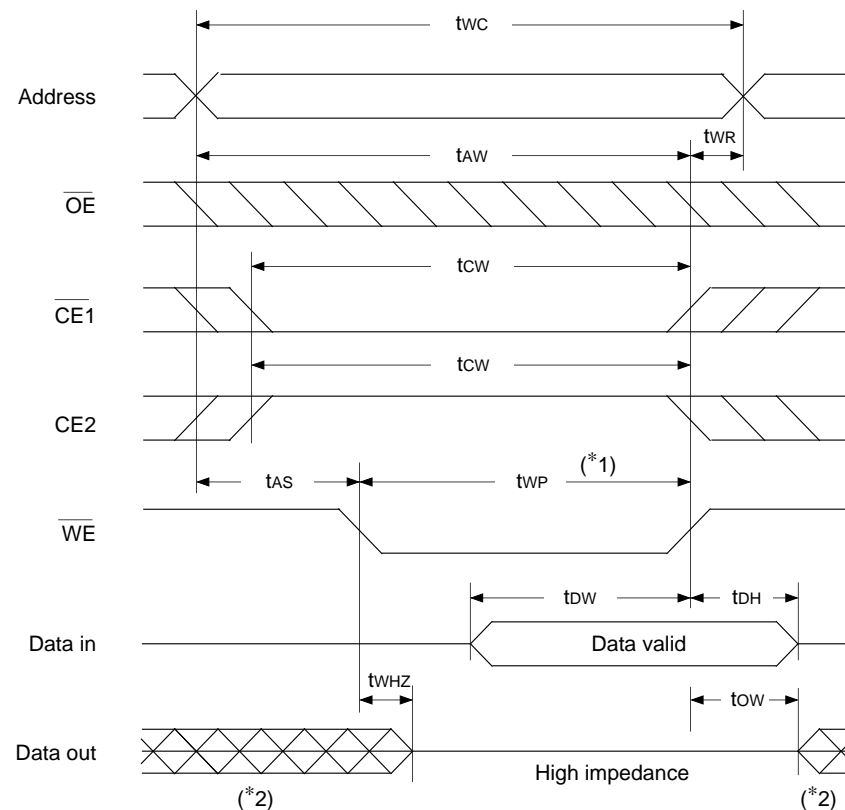
- **Read cycle (1) :** $\overline{CE1} = \overline{OE} = V_{IL}$, $CE2 = V_{IH}$, $\overline{WE} = V_{IH}$



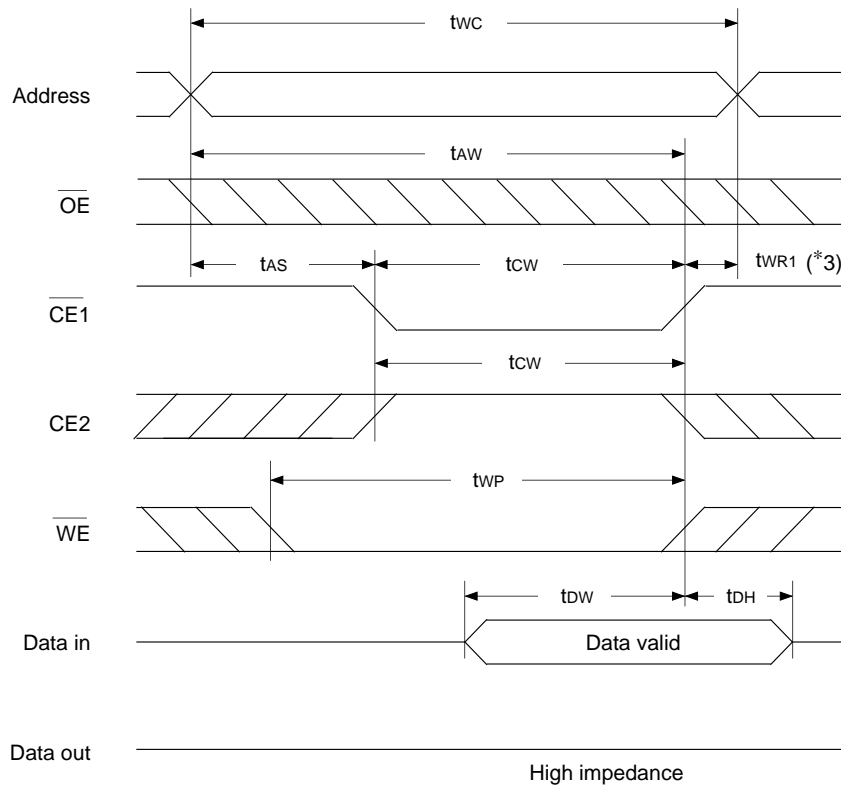
- **Read cycle (2) :** $\overline{WE} = V_{IH}$



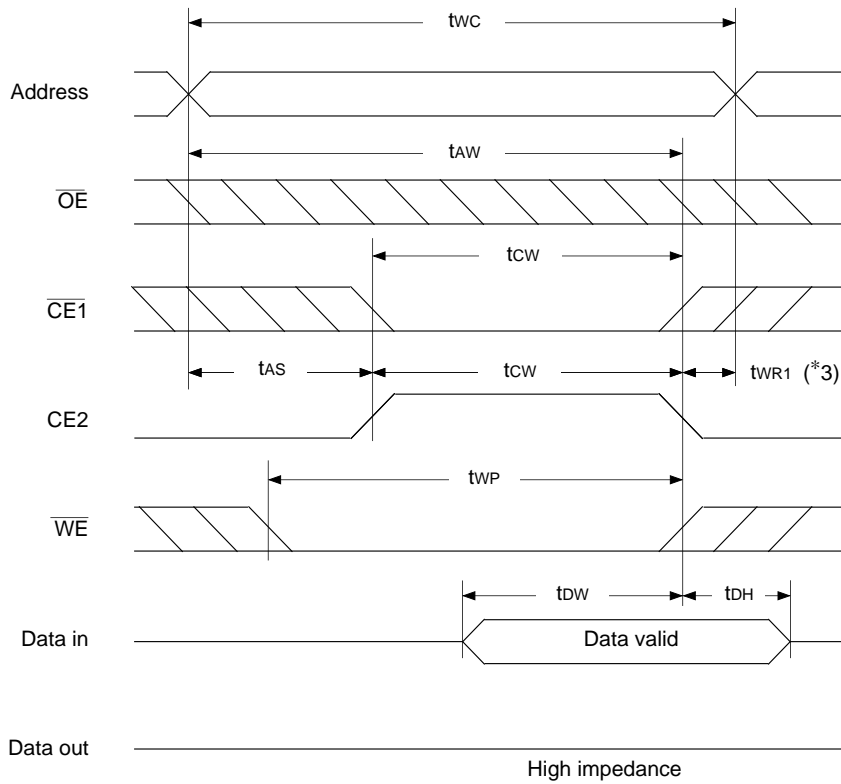
- **Write cycle (1) :** \overline{WE} control



• Write cycle (2) : $\overline{\text{CE1}}$ control



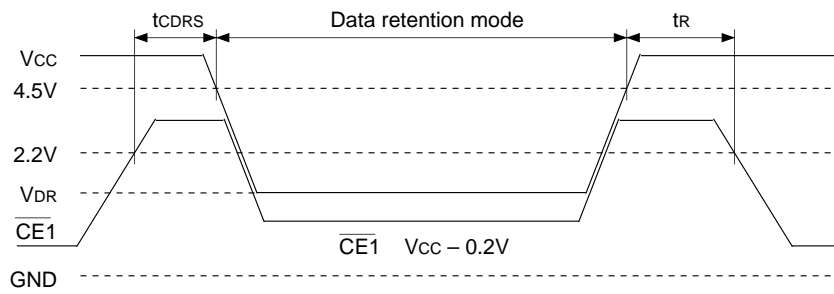
• Write cycle (3) : CE2 control



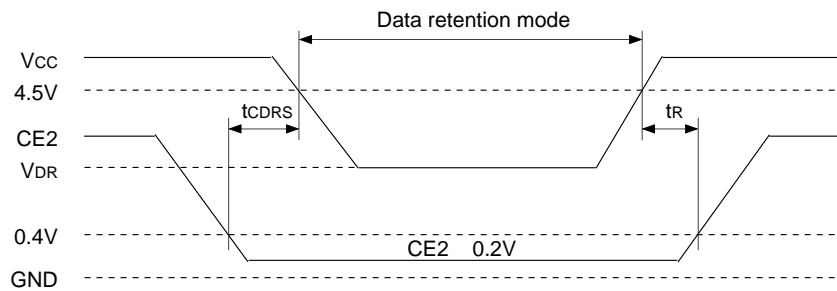
- *1 Write is executed when both $\overline{\text{CE1}}$ and $\overline{\text{WE}}$ are at low and CE2 is at high simultaneously.
- *2 Do not apply the data input voltage of the opposite phase to the output while the I/O pin is in output condition.
- *3 t_{WR1} is tested from either the rising edge of $\overline{\text{CE1}}$ or the falling edge of CE2, whichever comes earlier, until the end of the write cycle.

Data Retention Waveform

- Low supply voltage data retention waveform (1) : $\overline{CE1}$ control



- Low supply voltage data retention waveform (2) : CE2 control



Data Retention Characteristics

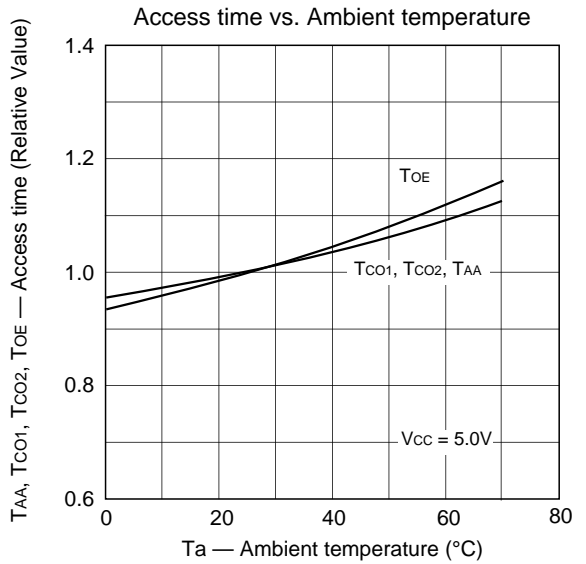
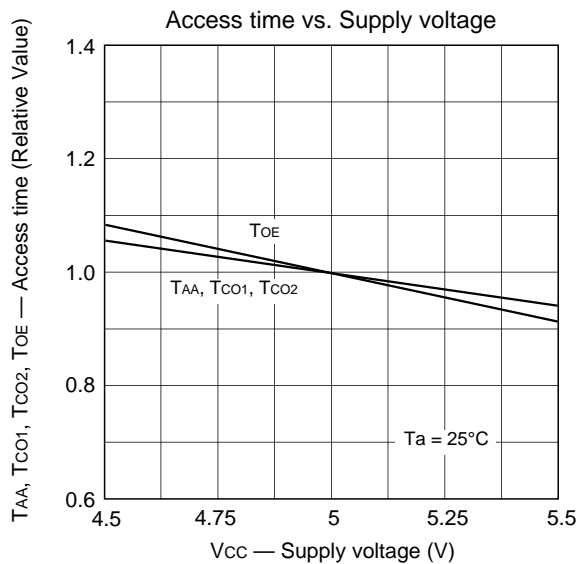
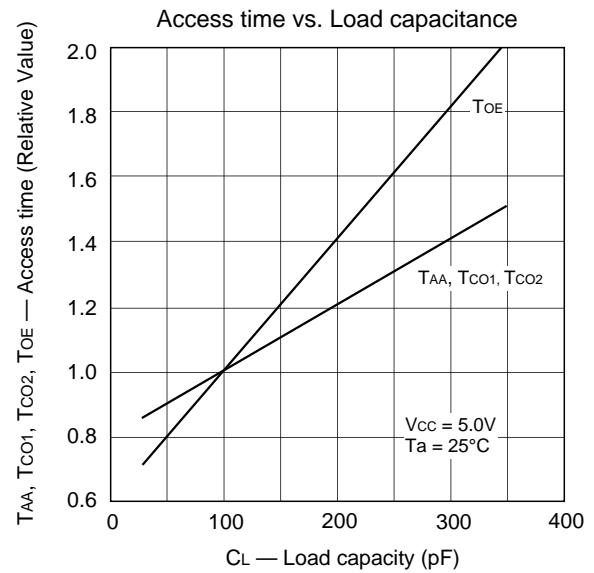
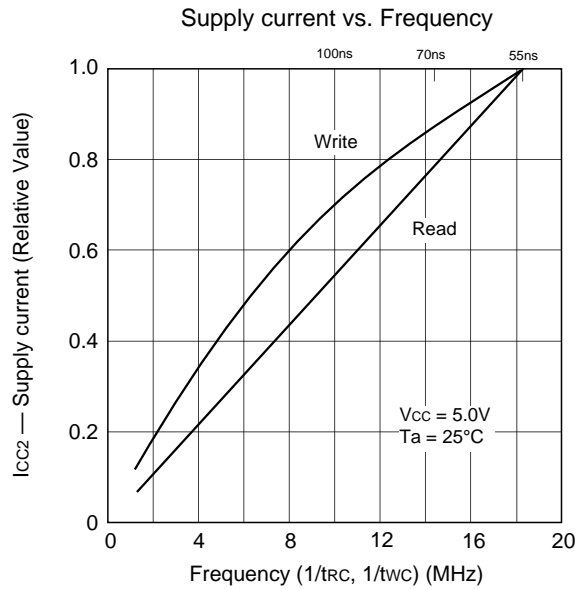
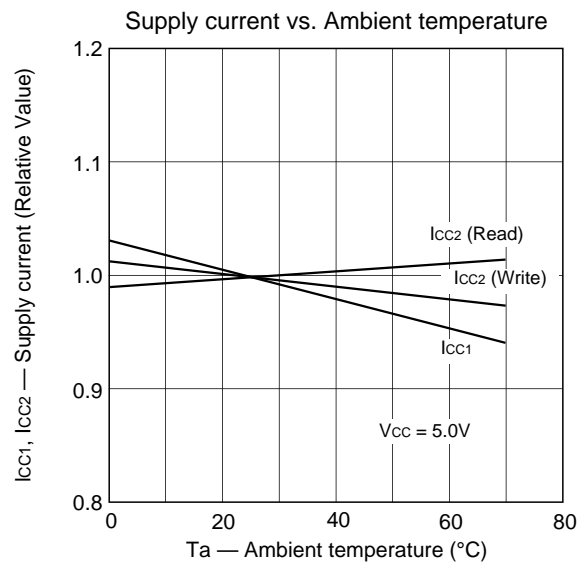
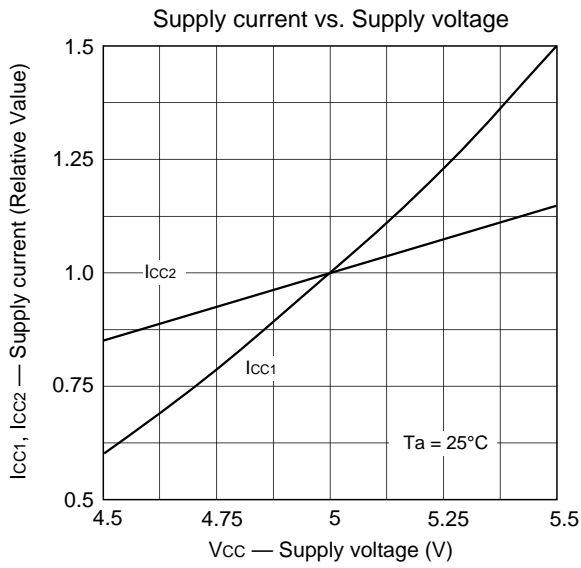
($T_a = 0$ to $+70^\circ\text{C}$)

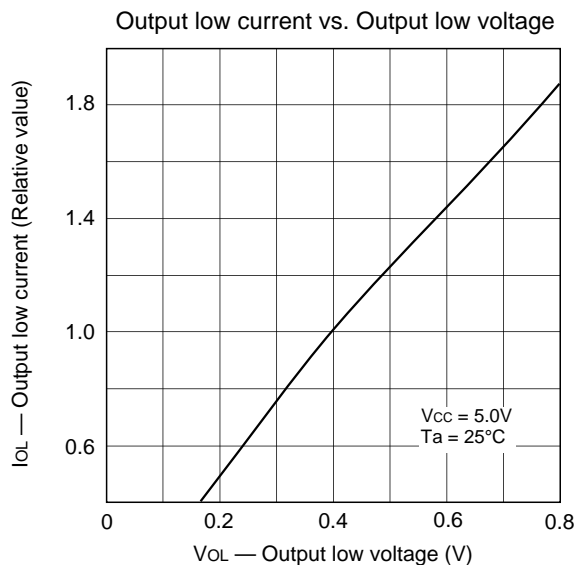
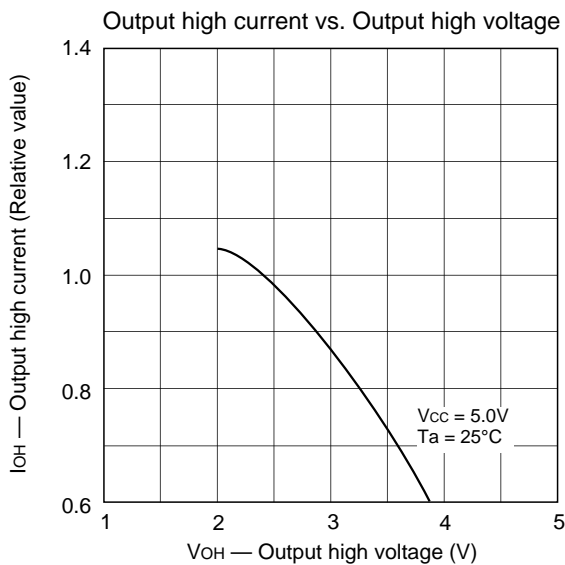
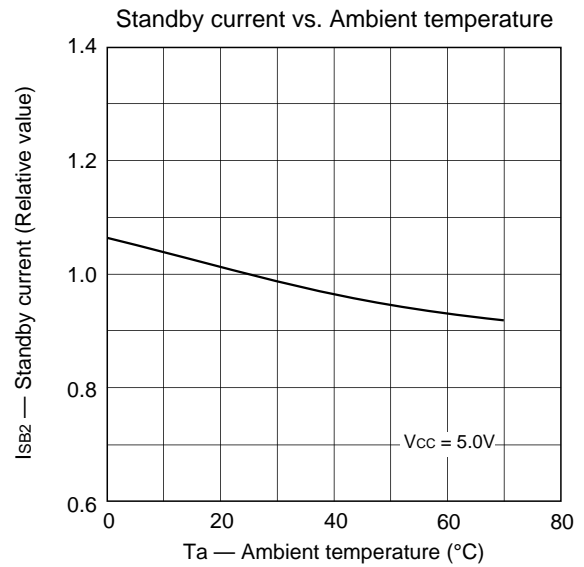
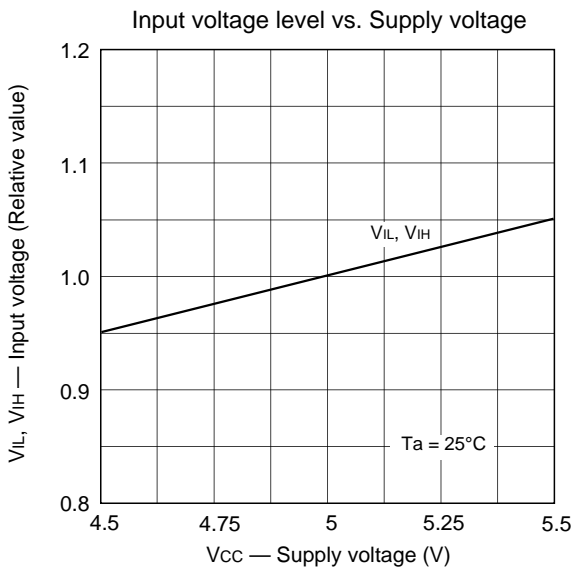
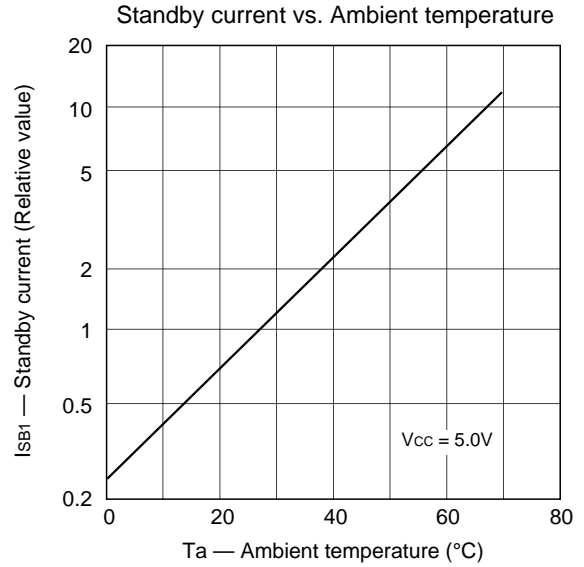
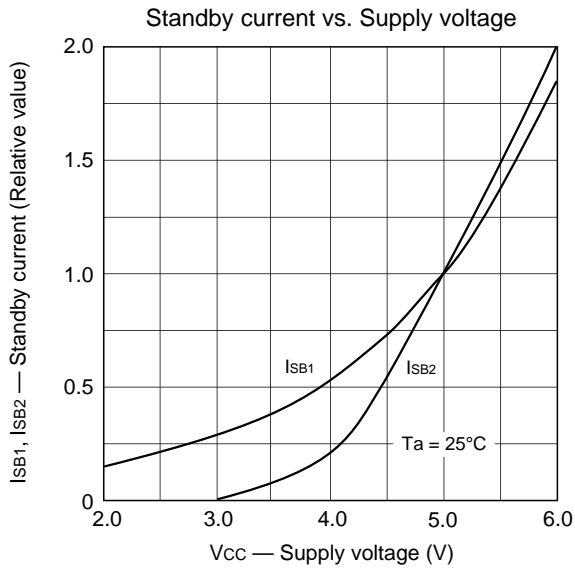
Item	Symbol	Test conditions	Min.	Typ.	Max.	Unit	
Data retention voltage	V_{DR}	*1	2.0	—	5.5	V	
Data retention current	I_{CCDR1}	$V_{CC} = 3.0V^{*1}$	LL ^{*2}	0 to $+70^\circ\text{C}$	—	—	12
				0 to $+40^\circ\text{C}$	—	—	2.4
				$+25^\circ\text{C}$	—	0.4	1.2
			SL ^{*3}	0 to $+70^\circ\text{C}$	—	—	4
				0 to $+40^\circ\text{C}$	—	—	0.8
				$+25^\circ\text{C}$	—	0.15	0.3
I_{CCDR2}	$V_{CC} = 2.0V$ to $5.5V^{*1}$	LL ^{*2}	—	0.7	20	μA	
		SL ^{*3}	—	0.3	12		
Data retention setup time	t_{CDRS}	Chip disable to data retention mode	0	—	—	ns	
Recovery time	t_R		5	—	—	ms	

Note)

- *1 $\overline{CE1} \geq V_{CC} - 0.2V$, $CE2 \geq V_{CC} - 0.2V$ [$\overline{CE1}$ Control] or $CE2 \leq 0.2V$ [CE2 Control]
- *2 For -55LL/70LL/10LL
- *3 For -55SL/70SL/10SL

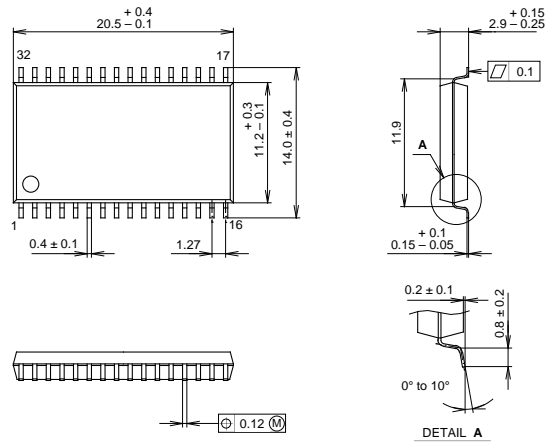
Example of Representative Characteristics





CXK581000AM

32PIN SOP (PLASTIC) 525mil



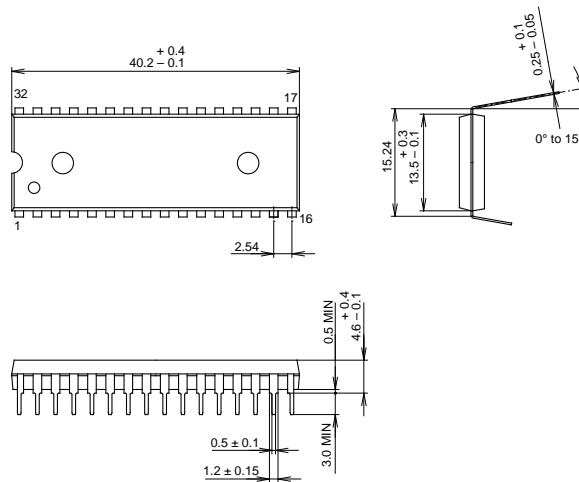
PACKAGE STRUCTURE

SONY CODE	SOP-32P-L02
EIAJ CODE	*SOP032-P-0525-A
JEDEC CODE	_____

PACKAGE MATERIAL	EPOXY / PHENOL RESIN
LEAD TREATMENT	SOLDER PLATING
LEAD MATERIAL	42 ALLOY
PACKAGE WEIGHT	_____

CXK581000AP

32PIN DIP (PLASTIC) 600mil



PACKAGE STRUCTURE

SONY CODE	DIP-32P-01
EIAJ CODE	*DIP32-P-0600-A
JEDEC CODE	_____

PACKAGE MATERIAL	EPOXY / PHENOL RESIN
LEAD TREATMENT	SOLDER PLATING
LEAD MATERIAL	42 ALLOY
PACKAGE WEIGHT	4.5g