

**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
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- CXK581000AP
 

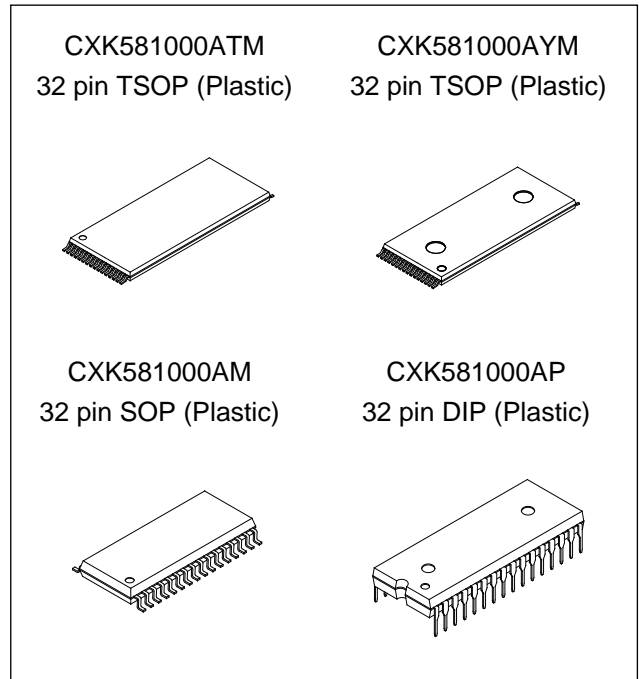
	600mil 32 pin DIP package
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**Functions**

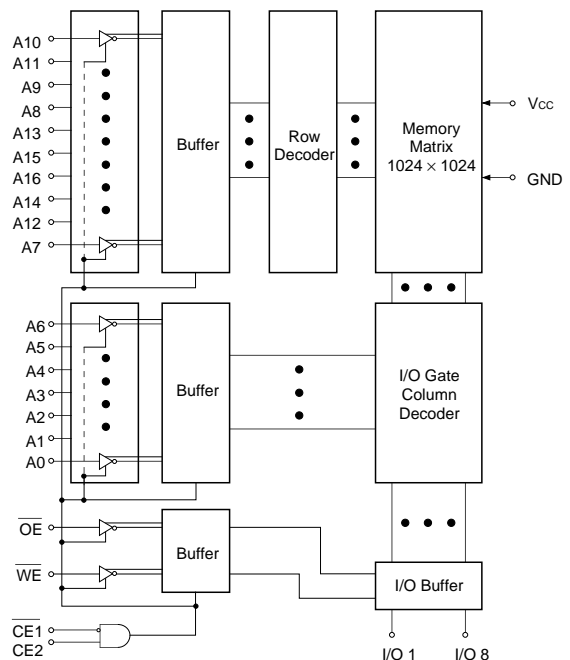
131072-word × 8-bit static RAM

**Structure**

Silicon gate CMOS IC

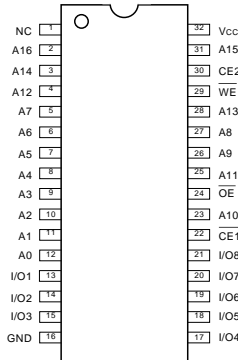
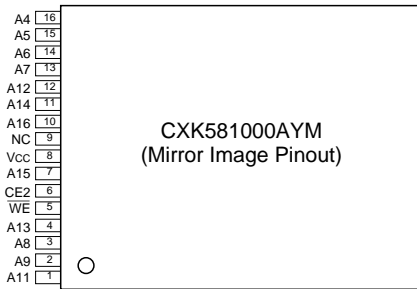
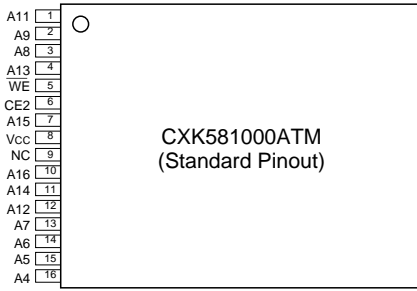


**Block Diagram**



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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
CE1, CE2	Chip enable 1, 2 input
WE	Write enable input
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 <sub>IN</sub>	-0.5* to Vcc +0.5		
Input and output voltage	V <sub>I/O</sub>	-0.5* to Vcc +0.5		
Allowable power dissipation	P <sub>D</sub>	CXK581000AP	1.0	W
		CXK581000ATM/AYM/AM	0.7	
Operating temperature	T <sub>opr</sub>	0 to +70	°C	
Storage temperature	T <sub>stg</sub>	-55 to +150		
Soldering temperature	T <sub>solder</sub>	CXK581000AP	260 • 10	°C • s
		CXK581000ATM/AYM/AM	235 • 10	

\* V<sub>IN</sub>, V<sub>I/O</sub> = -3.0V Min. for pulse width less than 50ns.

Truth Table

CE1	CE2	OE	WE	Mode	I/O pin	Vcc Current
H	x	x	x	Not selected	High Z	ISB1, ISB2
x	L	x	x	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	x	L	Write	Data in	Icc1, Icc2, Icc3

x: "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 <sub>IH</sub>	2.2	—	Vcc +0.3	
Input low voltage	V <sub>IL</sub>	-0.3*	—	0.8	

\* V<sub>IL</sub> = -3.0V Min. for pulse width less than 50ns.

**Electrical Characteristics**

**• DC Characteristics**

(V<sub>CC</sub> = 5V ±10%, GND = 0V, T<sub>a</sub> = 0 to +70°C)

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

\*1 V<sub>CC</sub> = 5V, T<sub>a</sub> = 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 <sub>IN</sub>	V <sub>IN</sub> = 0V	—	—	7	pF
I/O capacitance	C <sub>I/O</sub>	V <sub>I/O</sub> = 0V	—	—	8	

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

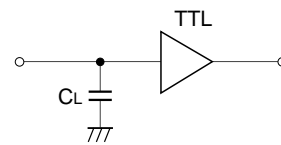
**AC Characteristics**

• **AC test conditions** (V<sub>CC</sub> = 5V±10%, Ta = 0 to +70°C)

Item	Conditions	
Input pulse high level	V <sub>IH</sub> = 2.2V	
Input pulse low level	V <sub>IL</sub> = 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 <sub>L</sub> * = 30pF, 1TTL
	-70LL/70SL	C <sub>L</sub> * = 100pF, 1TTL
	-10LL/10SL	

\* C<sub>L</sub> 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.

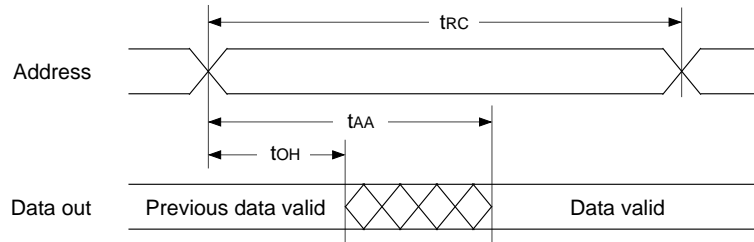
• Write cycle

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	

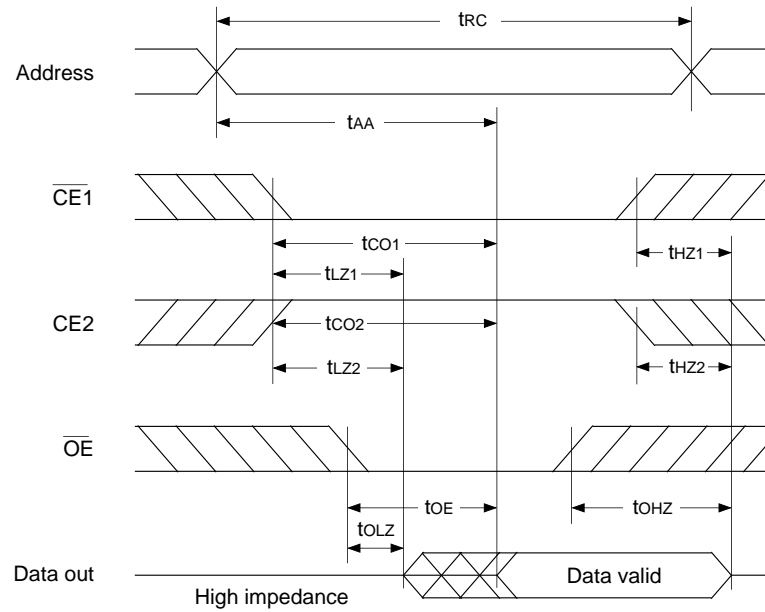
\*  $t_{WHZ}$  is defined as the time required for outputs to turn to high impedance state and is not referred to as output voltage level.

Timing Waveform

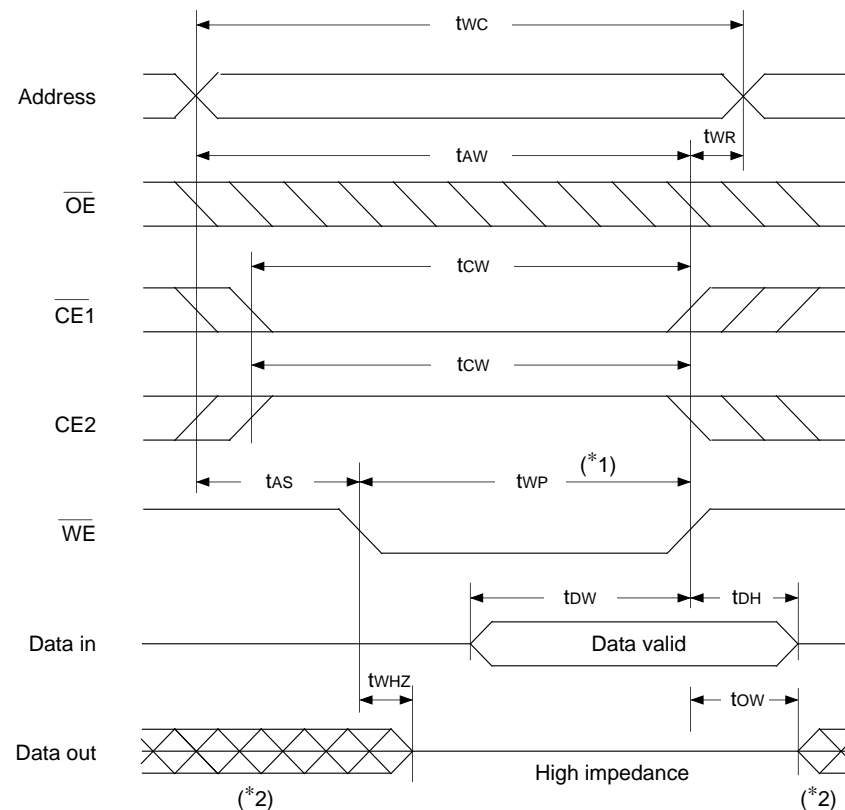
- Read cycle (1) :  $\overline{CE1} = \overline{OE} = V_{IL}$ ,  $CE2 = V_{IH}$ ,  $\overline{WE} = V_{IH}$



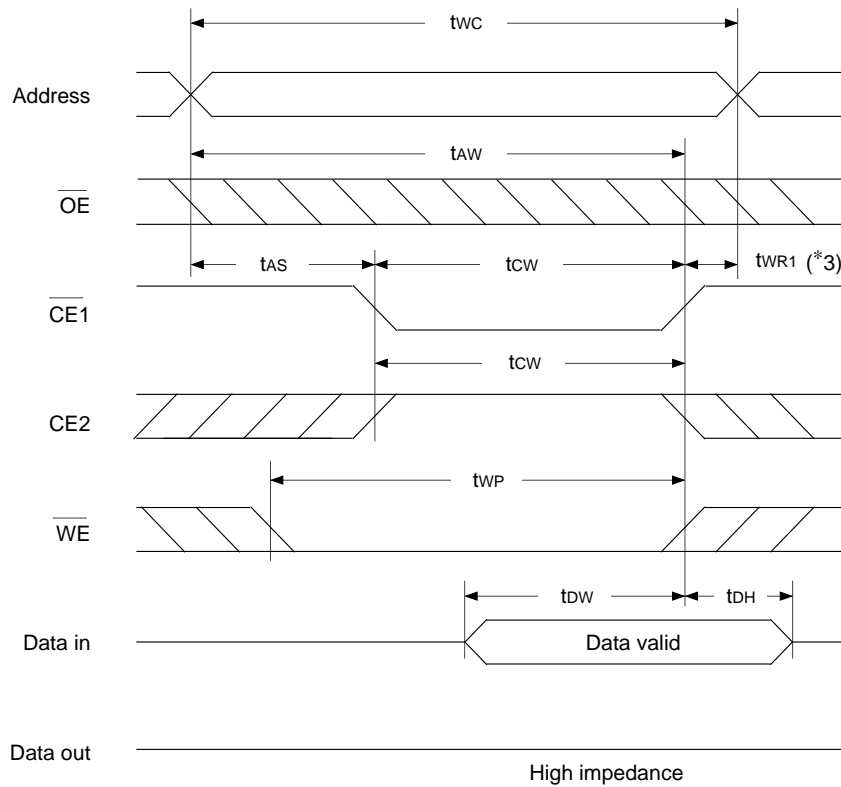
- Read cycle (2) :  $\overline{WE} = V_{IH}$



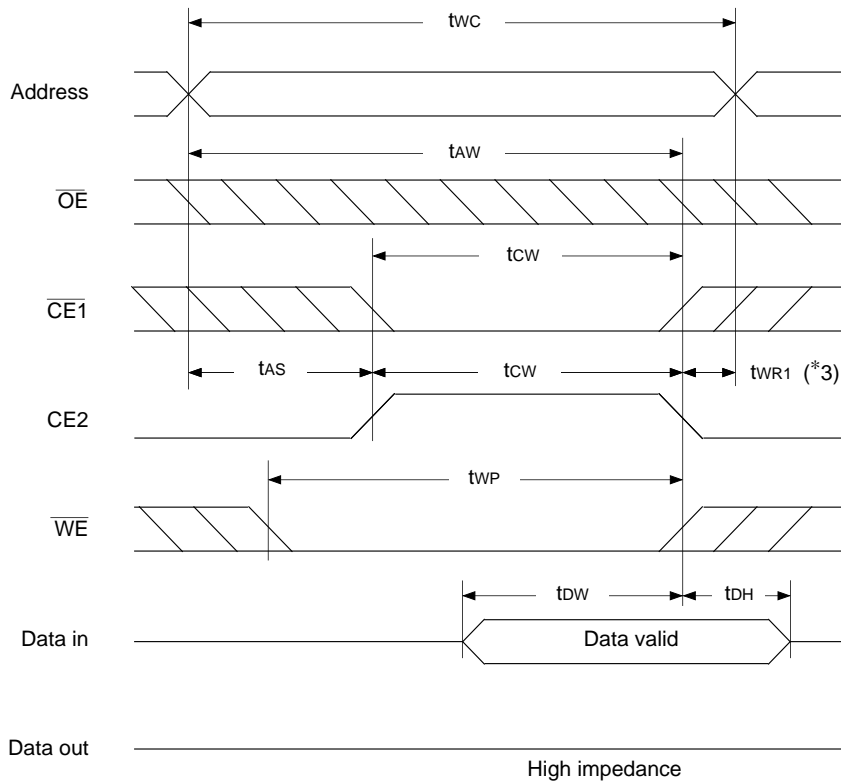
- Write cycle (1) :  $\overline{WE}$  control



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



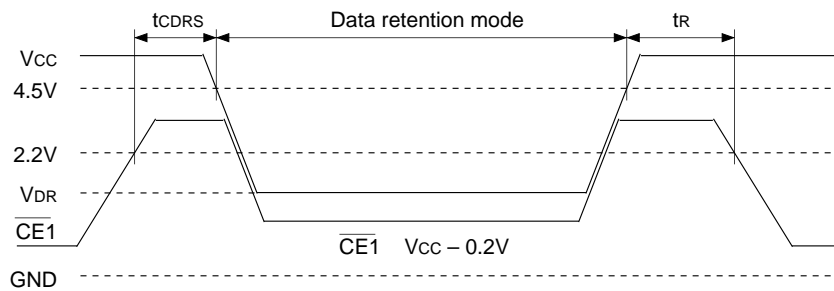
• Write cycle (3) : CE2 control



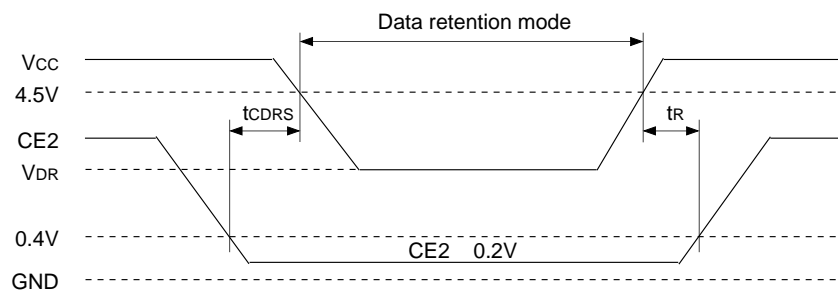
- \*1 Write is executed when both  $\overline{\text{CE1}}$  and  $\overline{\text{WE}}$  are at low and CE2 is at high simultaneously.
- \*2 Do not apply the data input voltage of the opposite phase to the output while the I/O pin is in output condition.
- \*3  $t_{WR1}$  is tested from either the rising 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 <sup>*2</sup>	0 to $+70^\circ\text{C}$	—	12	$\mu\text{A}$
				0 to $+40^\circ\text{C}$	—	2.4	
				$+25^\circ\text{C}$	—	0.4	
	$I_{CCDR2}$	$V_{CC} = 2.0V$ to $5.5V^{*1}$	SL <sup>*3</sup>	0 to $+70^\circ\text{C}$	—	4	
				0 to $+40^\circ\text{C}$	—	0.8	
				$+25^\circ\text{C}$	—	0.15	
			LL <sup>*2</sup>	—	0.7	20	
			SL <sup>*3</sup>	—	0.3	12	
Data retention setup time	$t_{CDRS}$	Chip disable to data retention mode	0	—	—	ns	
Recovery time	$t_R$		5	—	—	ms	

**Note)**

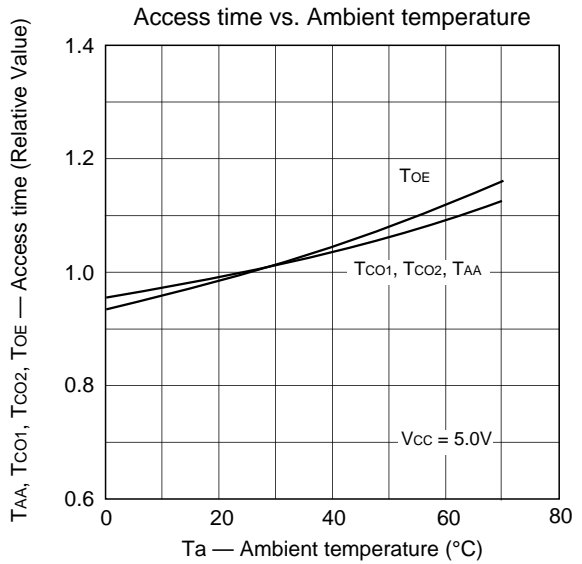
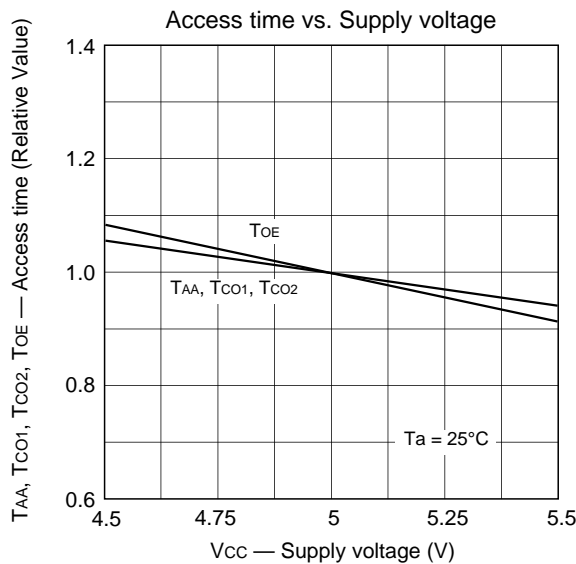
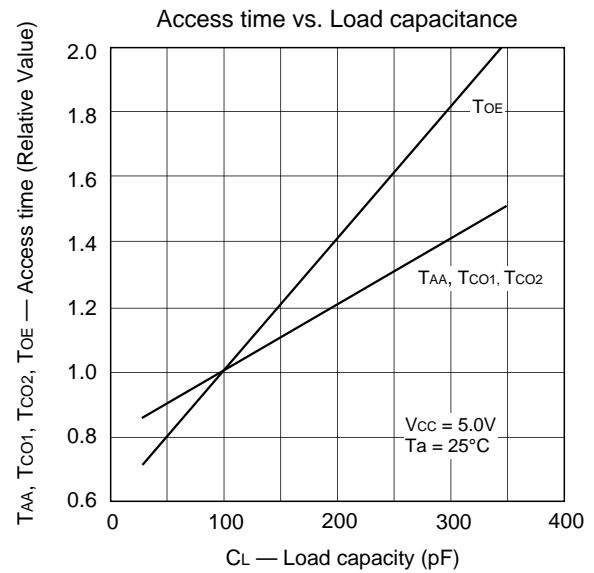
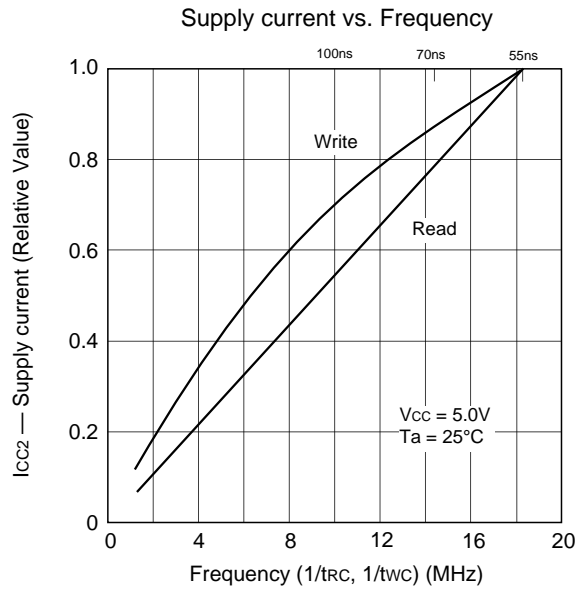
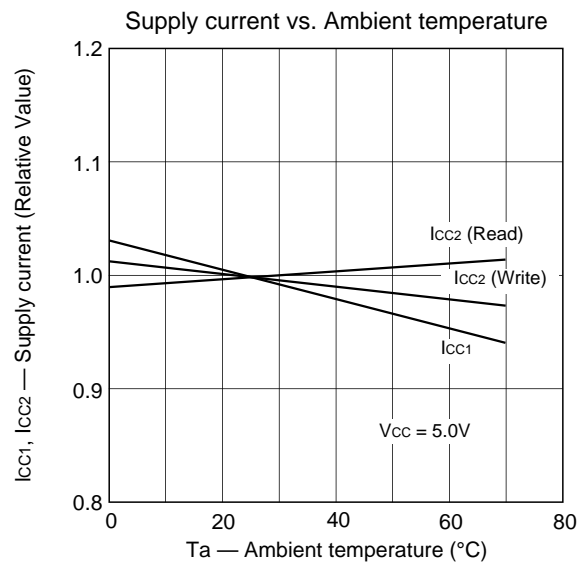
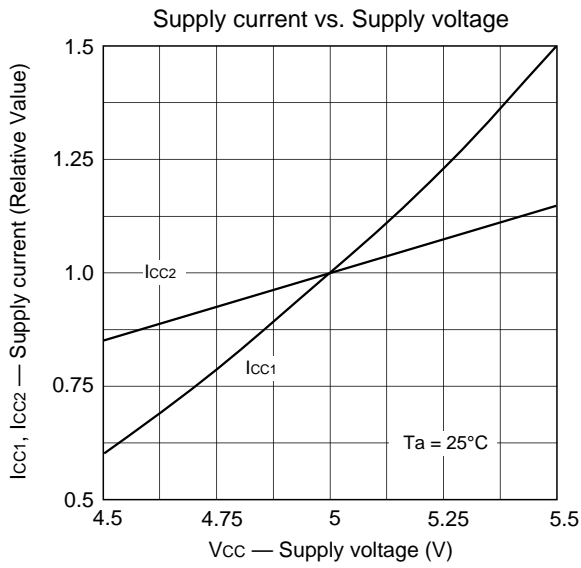
\*1  $\overline{CE1} \geq V_{CC} - 0.2V$ ,  $CE2 \geq V_{CC} - 0.2V$  [ $\overline{CE1}$  Control] or  $CE2 \leq 0.2V$  [CE2 Control]

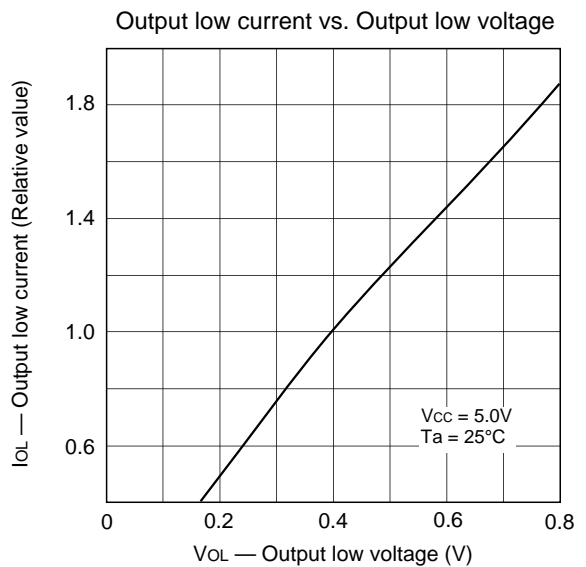
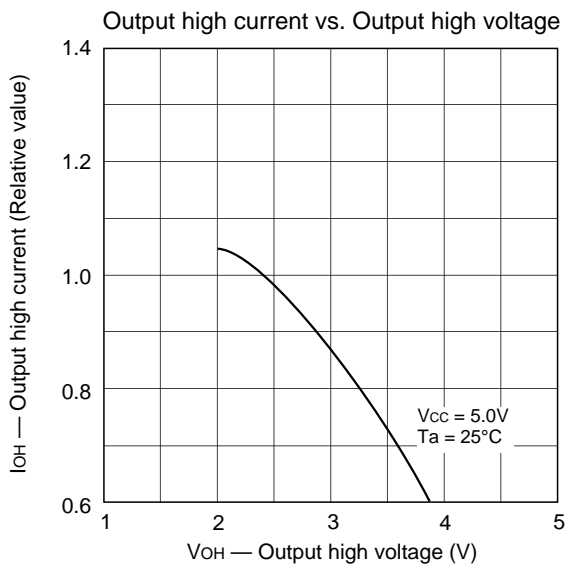
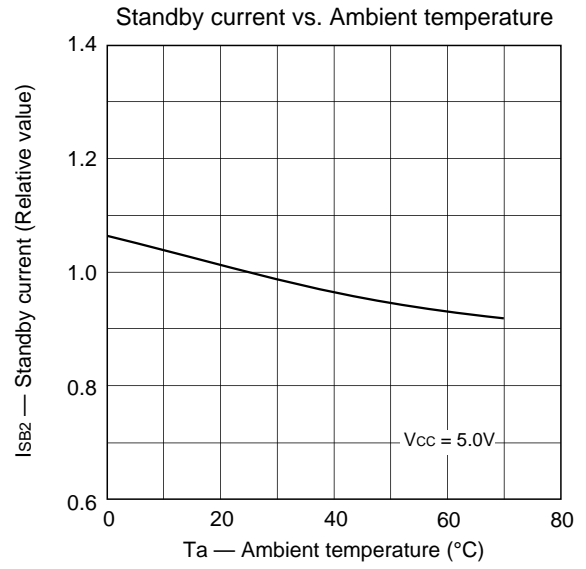
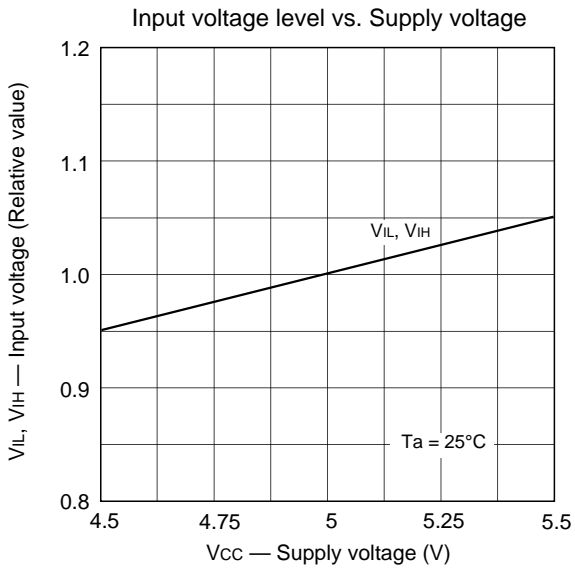
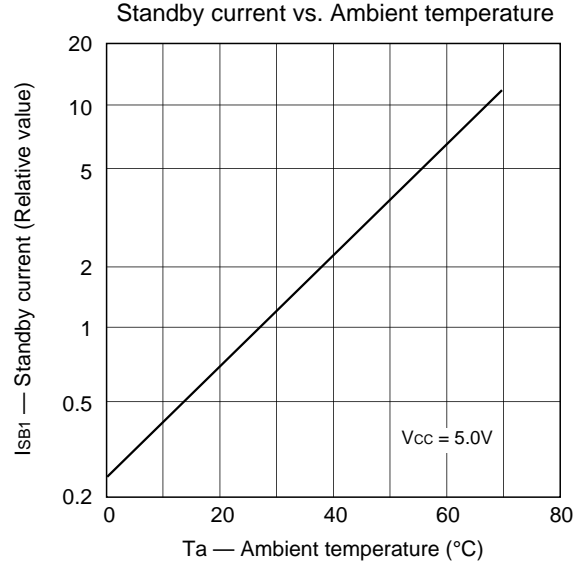
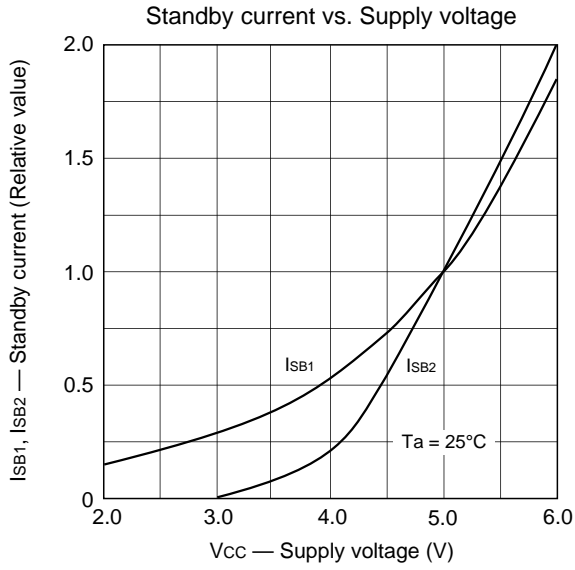
\*2 For -55LL/70LL/10LL

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



Example of Representative Characteristics

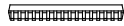
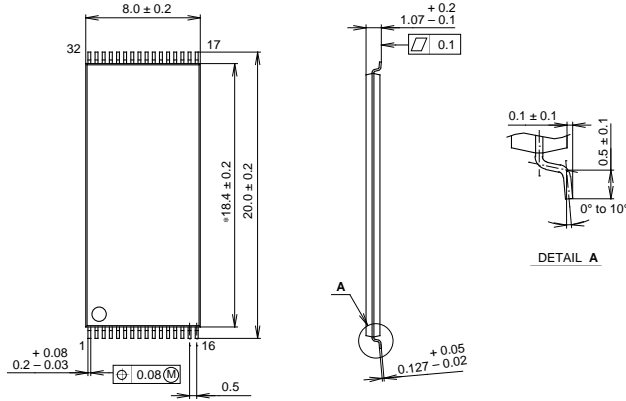




Package Outline Unit: mm

CXK581000ATM

32PIN TSOP (I) (PLASTIC)



NOTE: Dimension "\*" does not include mold protrusion.

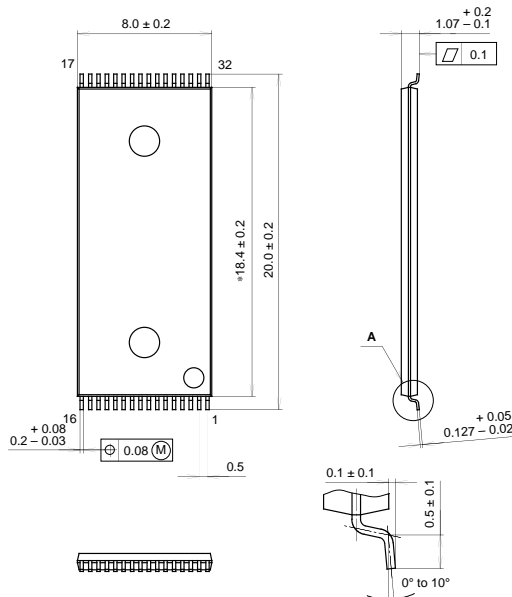
PACKAGE STRUCTURE

SONY CODE	TSOP (I) -32P-L01
EIAJ CODE	TSOP (I) 032-P-0820-A
JEDEC CODE	

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

CXK581000AYM

32PIN TSOP (PLASTIC)



NOTE: Dimension "\*" does not include mold protrusion.

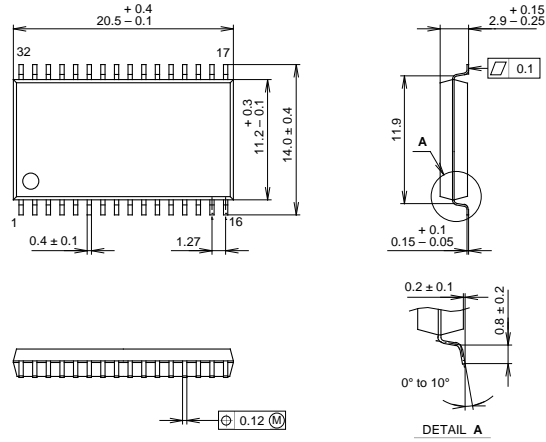
PACKAGE STRUCTURE

SONY CODE	TSOP-32P-L01R
EIAJ CODE	TSOP032-P-0820-B
JEDEC CODE	

PACKAGE MATERIAL	EPOXY RESIN
LEAD TREATMENT	SOLDER PLATING
LEAD MATERIAL	42 ALLOY
PACKAGE WEIGHT	0.3g

CXK581000AM

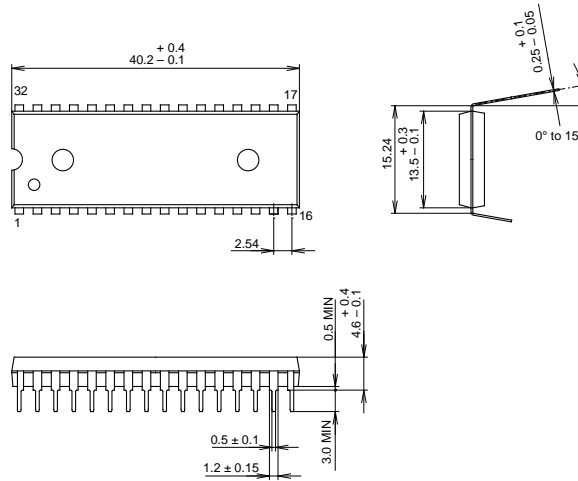
32PIN SOP (PLASTIC) 525mil



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