

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

Description

CXK581100TM/YM is a general purpose high speed CMOS static RAM organized as 131,072 words by 8 bits. It is suitable for portable and battery back-up systems by adopting TSOP packages correspond to 2.7 to 5.5V power supply operation and low power consumption.

Features

- Wide supply voltage range operation: 2.7 to 5.5V
- Thin small-outline packages of EIAJ standard:
CXK581100TM:
8mm × 20mm 32 pin TSOP
CXK581100YM:
8mm × 20mm 32 pin TSOP (Mirror image pinout)
- Low power consumption operation:
Standby / DC operation
3V operation; 3 μW (Typ.) / 1.2mW (Typ.)
5V operation; 10 μW (Typ.) / 35mW (Typ.)
- Fast access time: (Access time)
3V operation; 240ns (Max.)
5V operation; 120ns (Max.)
- Low voltage data retention: 2.0V (Min.)

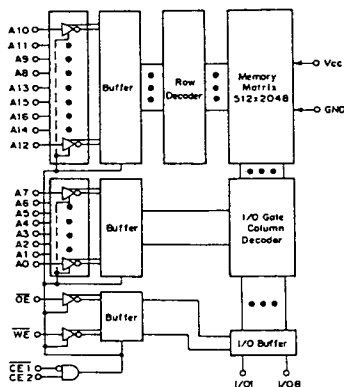
Function

131072-word × 8-bit static RAM

Structure

Silicon gate CMOS IC

Block Diagram



CXK581100TM
32 pin TSOP (Plastic)



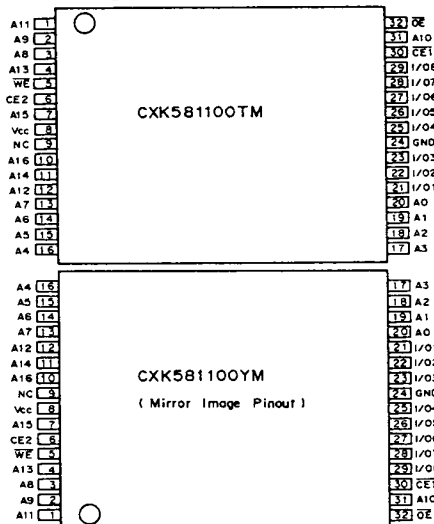
CXK581100YM
32 pin TSOP (Plastic)



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	2.7 to 5.5V power supply
GND	Ground
NC	No connection

Pin Configuration (Top View)



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Absolute Maximum Ratings

(Ta=25°C, GND=0V)

Item	Symbol	Rating	Unit
Supply voltage	V _{CC}	-0.5 * to +7.0	V
Input voltage	V _{IN}	-0.5 * to V _{CC} +0.5	V
Input and output voltage	V _{I/O}	-0.5 * to V _{CC} +0.5	V
Allowable power dissipation	P _D	0.7	W
Operating temperature	T _{opr}	0 to +70	°C
Storage temperature	T _{stg}	-55 to +150	°C
Soldering temperature * time	T _{solder}	235 * 10	°C * sec

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

CE1	CE2	OE	WE	Mode	I/O pin	V _{CC} Current
H	X	X	X	Not selected	High Z	I _{SB1} , I _{SB2}
X	L	X	X	Not selected	High Z	I _{SB1} , I _{SB2}
L	H	H	H	Output disable	High Z	I _{CC1} , I _{CC2} , I _{CC3}
L	H	L	H	Read	Data out	I _{CC1} , I _{CC2} , I _{CC3}
L	H	X	L	Write	Data in	I _{CC1} , I _{CC2} , I _{CC3}

X : "H" or "L"

DC Recommended Operating Conditions

(Ta=0 to +70°C, GND=0V)

Item	Symbol	V _{CC} =5V ± 10%			V _{CC} =2.7 to 5.5V			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
Supply voltage	V _{CC}	4.5	—	5.5	2.7	—	5.5	V
Input high voltage	V _{IH}	2.2	—	V _{CC} +0.3	2.2	—	V _{CC} +0.3	V
Input low voltage	V _{IL}	-0.3 *	—	0.8	-0.3 *	—	0.4	V

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

Electrical Characteristics

• DC characteristics

(GND=0V, Ta=0 to +70 °C)

Item	Symbol	Test conditions		Vcc=3V ± 10%			Vcc=5V ± 10%			Unit
				Min.	Typ. *	Max.	Min.	Typ. *	Max.	
Input leakage current	I _{LI}	V _{IN} =GND to V _{CC}		-1	—	1	-1	—	1	μA
Output leakage current	I _{LO}	CE1=V _{IH} or CE2=V _{IL} or OE=V _{IH} or WE=V _{IL} V _{I/O} =GND to V _{CC}		-1	—	1	-1	—	1	μA
Operating power supply current	I _{CC1}	CE1=V _{IL} , CE2=V _{IH} V _{IN} =V _{IH} or V _{IL} I _{OUT} =0mA		—	0.4	0.8	—	7	15	mA
Average operating current	I _{CC2}	Min. cycle Duty=100% I _{OUT} =0mA	Write cycle	—	10	15	—	35	60	mA
			Read cycle	—	10	15	—	25	40	
	I _{CC3}	Cycle time 1 μs Duty=100% I _{OUT} =0mA CE1 ≤ 0.2V, CE2 ≥ V _{CC} -0.2V V _{IL} ≤ 0.2V, V _{IH} ≥ V _{CC} -0.2V	Write cycle	—	5	10	—	10	20	mA
			Read cycle	—	2.5	5	—	5	10	
Standby current	I _{SB1}	CE2 ≤ 0.2V or CE1 ≥ V _{CC} -0.2V CE2 ≥ V _{CC} -0.2V	0 to +70 °C	—	—	60	—	—	100	μA
			0 to +40 °C	—	—	12	—	—	20	
			+25 °C	—	1.2	5	—	2	8	
	I _{SB2}	CE1=V _{IH} or CE2=V _{IL}		—	0.06	0.3	—	0.6	3	mA
Output high voltage	V _{OH}	I _{OH} =-1.0mA		2.2	—	—	2.4	—	—	V
Output low voltage	V _{OL}	I _{OL} =2.1mA		—	—	0.4	—	—	0.4	V

* Ta=25 °C

I/O Capacitance

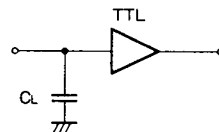
(Ta=25 °C, f=1MHz)

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	pF

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

AC Characteristics**● AC test conditions**(V_{CC}=2.7 to 5.5V, T_a=0 to +70 °C)

Item	Conditions	
	V _{CC} =3V	V _{CC} =5V
Input pulse high level	V _{IH} =2.2V	V _{IH} =2.2V
Input pulse low level	V _{IL} =0.4V	V _{IL} =0.8V
Input rise time	t _r =5ns	t _r =5ns
Input fall time	t _f =5ns	t _f =5ns
Input and output reference level	1.5V	1.5V
Output load conditions	C _L * =100pF, 1TTL	C _L * =100pF, 1TTL

* C_L includes scope and jig capacitances.

• Read cycle ($\overline{WE}$ ="H")

Item	Symbol	Vcc=3V $\pm$ 10%		Vcc=5V $\pm$ 10%		Unit
		Min.	Max.	Min.	Max.	
Read cycle time	t _{RC}	240	—	120	—	ns
Address access time	t _{AA}	—	240	—	120	ns
Chip enable access time ($\overline{CE1}$)	t _{CO1}	—	240	—	120	ns
Chip enable access time (CE2)	t _{CO2}	—	240	—	120	ns
Output enable to output valid	t _{OE}	—	120	—	60	ns
Output hold from address change	t _{OH}	30	—	15	—	ns
Chip enable to output in low Z ($\overline{CE1}$, CE2)	t _{LZ1} , t _{LZ2}	20	—	10	—	ns
Output enable to output in low Z ($\overline{OE}$)	t _{OLZ}	10	—	5	—	ns
Chip disable to output in high Z ($\overline{CE1}$, CE2)	t _{HZ1} *, t _{HZ2} *	—	80	—	40	ns
Output disable to output in high Z ($\overline{OE}$)	t _{OHZ} *	—	80	—	40	ns

* 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.

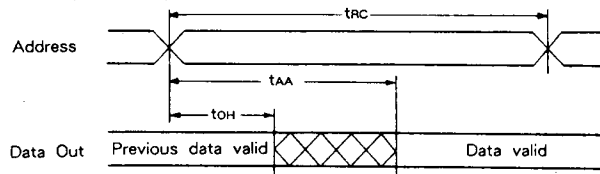
• Write cycle

Item	Symbol	Vcc=3V $\pm$ 10%		Vcc=5V $\pm$ 10%		Unit
		Min.	Max.	Min.	Max.	
Write cycle time	t _{WC}	240	—	120	—	ns
Address valid to end of write	t _{AW}	170	—	85	—	ns
Chip enable to end of write	t _{CW}	170	—	85	—	ns
Data to write time overlap	t _{DW}	100	—	50	—	ns
Data hold from write time	t _{DH}	0	—	0	—	ns
Write pulse width	t _{WP}	160	—	80	—	ns
Address setup time	t _{AS}	0	—	0	—	ns
Write recovery time ($\overline{WE}$)	t _{WR}	0	—	0	—	ns
Write recovery time ($\overline{CE1}$, CE2)	t _{WR1}	0	—	0	—	ns
Output active from end of write	t _{OW}	20	—	10	—	ns
Write to output in high Z	t _{WHZ} *	—	60	—	30	ns

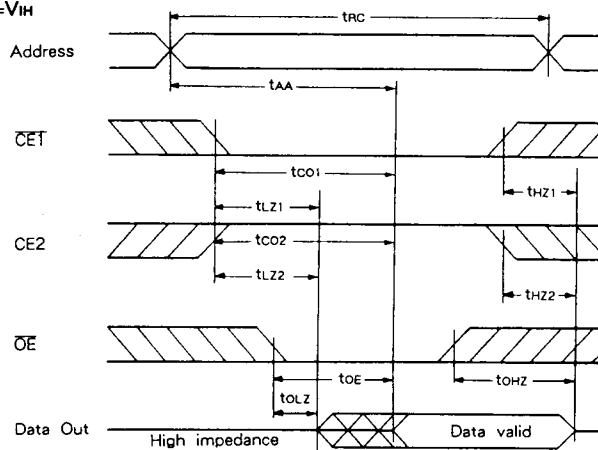
* t_{WHZ} is defined as the time required for outputs to turn to high impedance state and is not referred to as output voltage level.

Timing Waveform

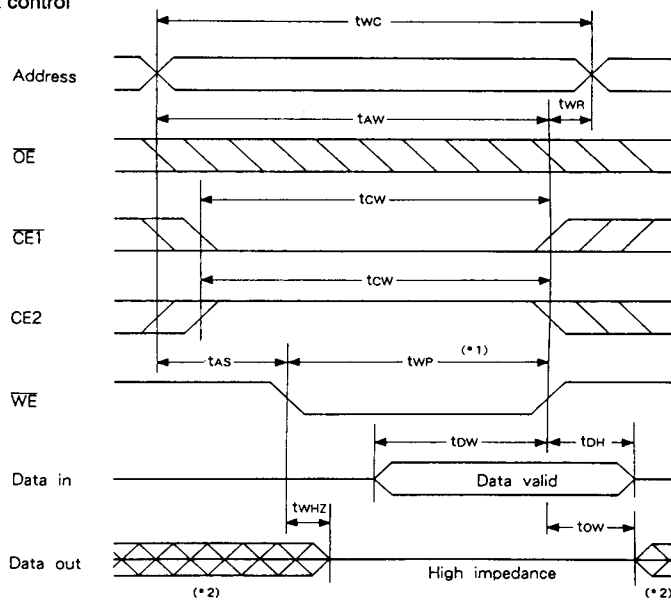
- Read cycle (1) : $\overline{CE1}=\overline{OE}=V_{IL}$, $CE2=V_{IH}$, $\overline{WE}=V_{IH}$



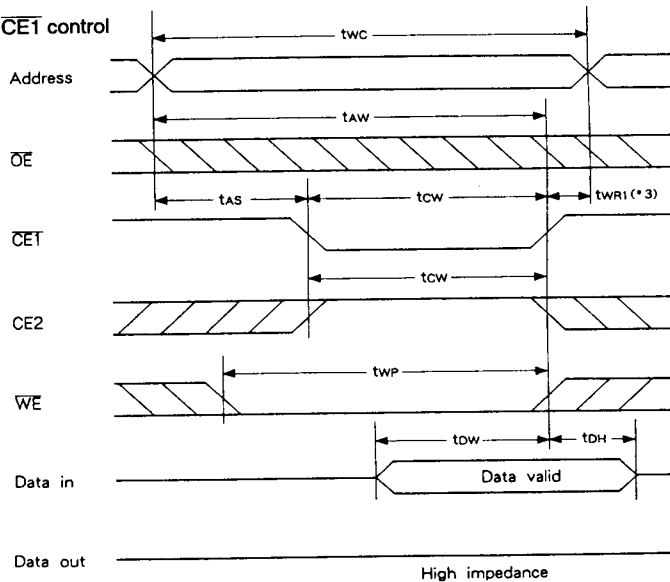
- Read cycle (2) : $\overline{WE}=V_{IH}$



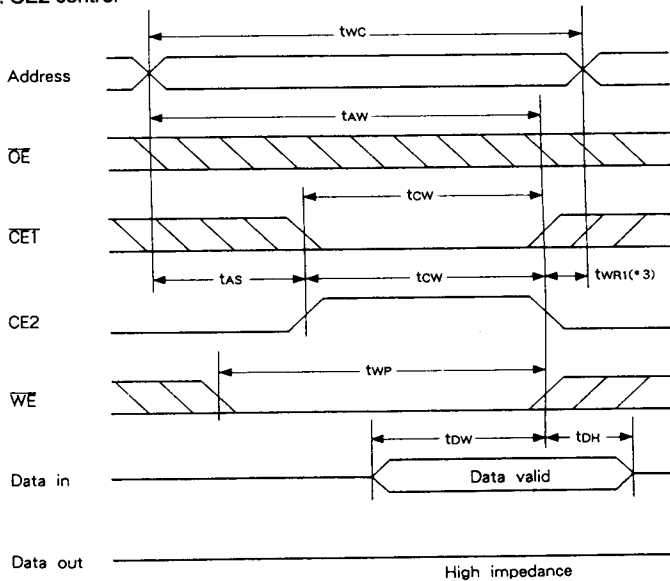
- Write cycle (1) : $\overline{WE}$ control



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



● Write cycle (3) : $\overline{\text{CE2}}$ control



- * 1. Write is executed when both $\overline{\text{CE1}}$ and $\overline{\text{WE}}$ are at low and $\overline{\text{CE2}}$ is at high simultaneously.
- * 2. Do not apply the data input voltage of the opposite phase to the output while 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 $\overline{\text{CE2}}$, whichever comes earlier, until the end of the write cycle.

Data Retention Characteristics

(Ta=0 to +70 °C)

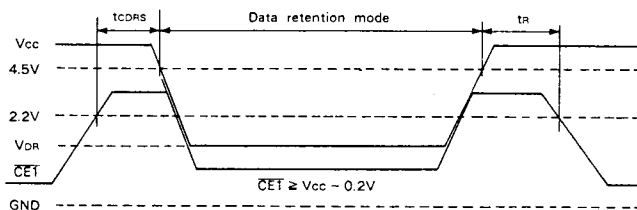
Item	Symbol	Test conditions		Min.	Typ.	Max.	Unit
Data retention voltage	V _{DR}	* 1		2.0	—	5.5	V
Data retention current	I _{CCDR1}	V _{CC} =3.0V * 1	0 to +70 °C	—	—	50	μA
			0 to +40 °C	—	—	10	
			+25 °C	—	1	4	
	I _{CCDR2}	V _{CC} =2.0 to 5.5V * 1		—	2	100	μA
Data retention setup time	t _{CDRS}	Chip disable to data retention mode		0	—	—	ns
Recovery time	t _R			t _{RC} * 2	—	—	ns

* 1. $\overline{\text{CE1}} \geq V_{CC}-0.2\text{V}$, $\text{CE2} \geq V_{CC}-0.2\text{V}$ ($\overline{\text{CE1}}$ control) or $\text{CE2} \leq 0.2\text{V}$ (CE2 control)

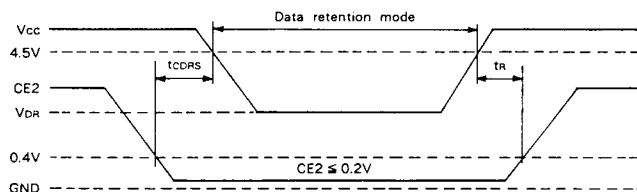
* 2. t_{RC} : Read cycle time

Data Retention Waveform

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

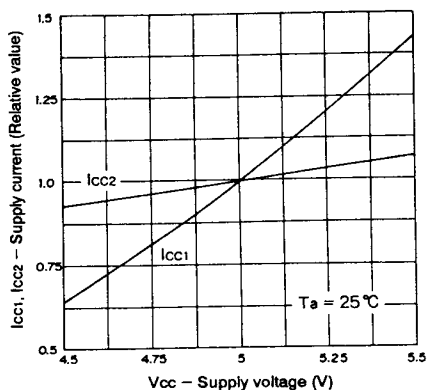


- Low supply voltage data retention waveform (2) : CE2 control

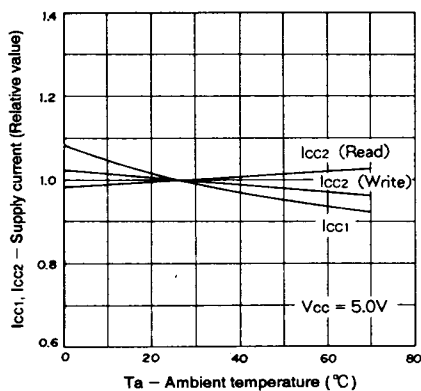


Example of Representative Characteristics

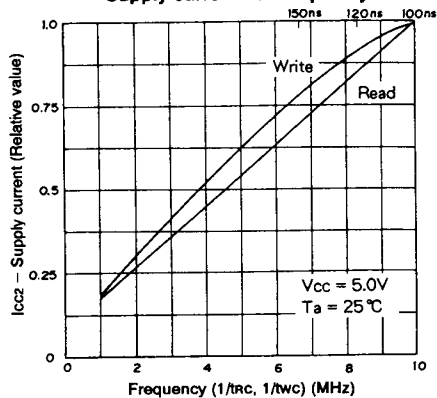
Supply current vs. Supply voltage



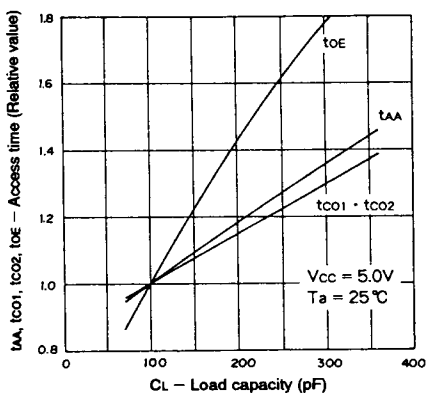
Supply current vs. Ambient temperature



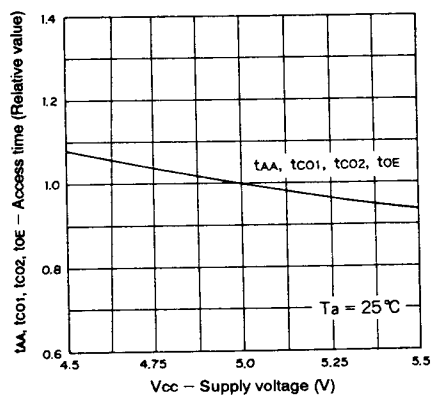
Supply current vs. Frequency



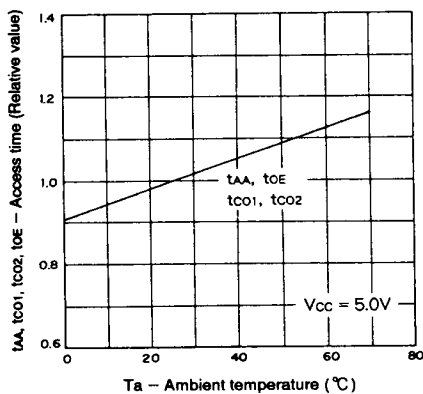
Access time vs. Load capacity



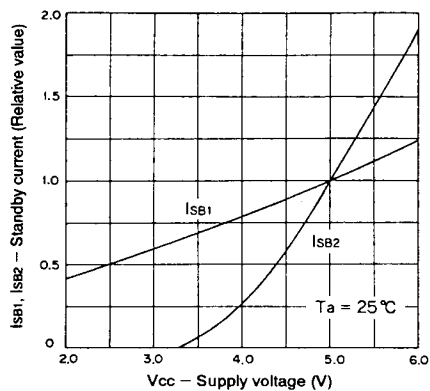
Access time vs. Supply voltage



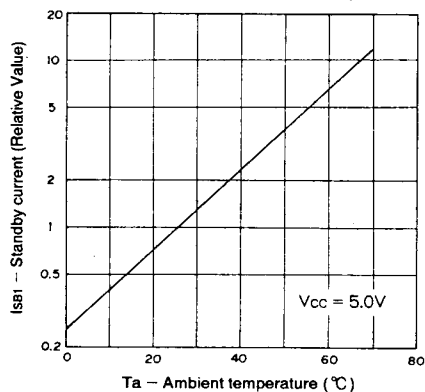
Access time vs. Ambient temperature



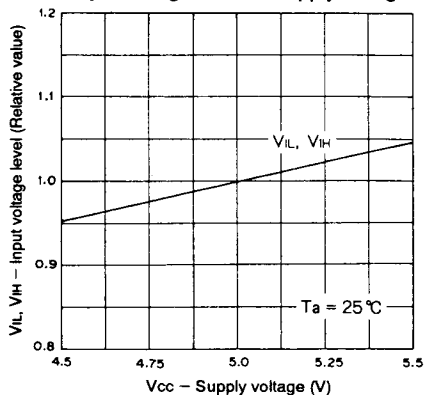
Standby current vs. Supply voltage



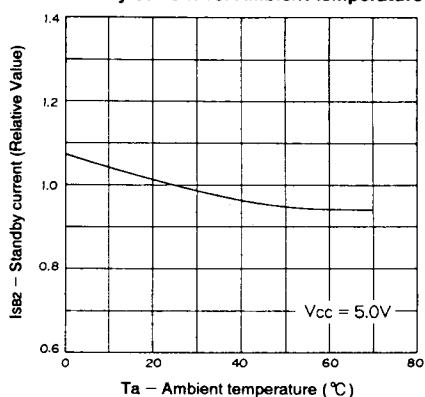
Standby current vs. Ambient temperature



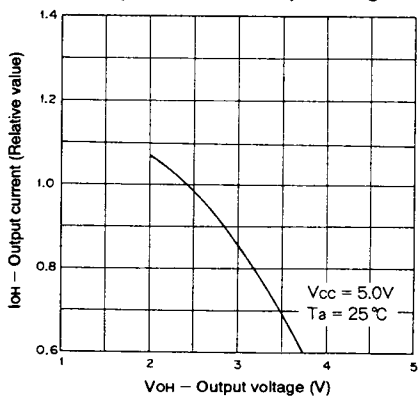
Input voltage level vs. Supply voltage



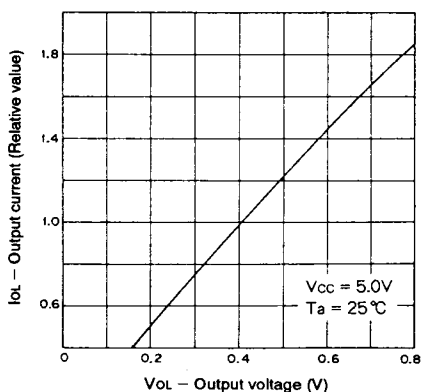
Standby current vs. Ambient temperature



Output current vs. Output voltage



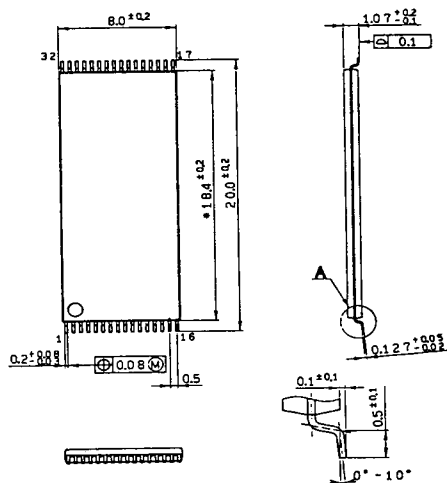
Output current vs. Output voltage



Package Outline Unit : mm

CXK581100TM

32pin TSOP (Plastic)



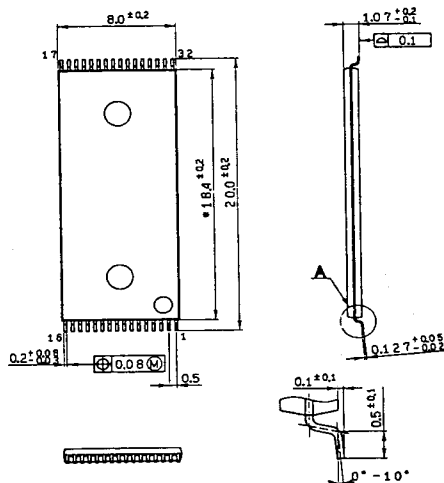
Detailed diagram of A(20/1)

Note) Dimensions marked with *
does not include resin residue.

SONY NAME	TSOP-32P-L01
EIAJ NAME	TSOP032-P-0820-A
JEDEC CODE	

CXK581100YM

32pin TSOP (Plastic)



Detailed diagram of A(20/1)

Note) Dimensions marked with *
does not include resin residue.

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