

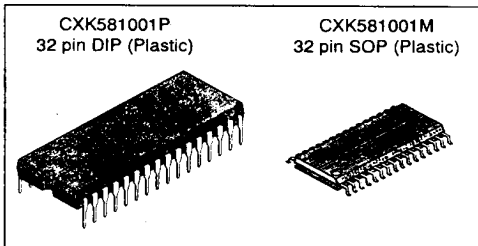
131,072-word × 8-bit High Speed CMOS Static RAM

Description

CXK581001P/M is a 1,048,576 bits high speed CMOS static RAMs organized as 131,072 words by 8-bit and operates from a single 5V supply. This IC is suitable for use in high speed and low power applications in which battery back up for nonvolatility is required.

Features

- Fast access time: (Access time)
CXK581001P/M-70L/70LL 70ns (Max.)
CXK581001P/M-85L/85LL 85ns (Max.)
- Low power operation :
CXK581001P/M Standby/Operation
-70L/85L : 10 μ W (Typ.)/237.5mW (Typ., Cycle=Min.)
-70LL/85LL : 3.5 μ W (Typ.)/237.5mW (Typ., Cycle=Min.)
- Single +5V supply : +5V $\pm$ 10%
- Fully static memory... 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.
- Low voltage data retention : 2.0V (Min.)
- CXK581001P 600mil 32 pin DIP package
- CXK581001M 525mil 32 pin SOP package



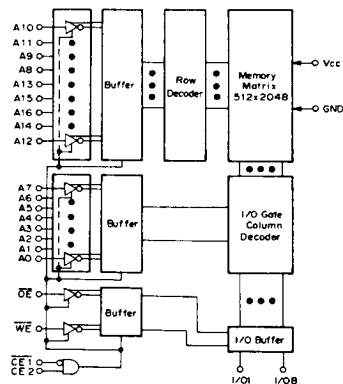
Function

131,072-word × 8-bit static RAM

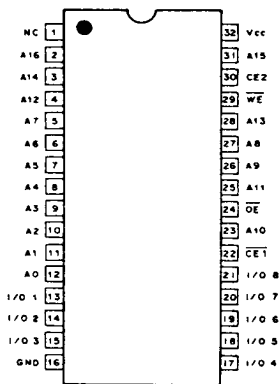
Structure

Silicon gate CMOS IC

Block diagram



Pin Configuration
(Top View)



Pin Description

Symbol	Description
A ₀ to A ₁₆	Address input
I/O ₁ to I/O ₈	Data input/output
CE ₁ , CE ₂	Chip enable 1, 2 input
WE	Write enable input
OE	Output enable input
V _{cc}	+5V power supply
GND	Ground
NC	No connection

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	CXK581001P	1.0
		CXK581001M	0.7
Operating temperature	T _{opr}	0 to +70	°C
Storage temperature	T _{stg}	− 55 to +150	°C
Soldering temperature • time	T _{solder}	260 • 10	°C • sec

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

$\overline{\text{CE1}}$	CE2	$\overline{\text{OE}}$	$\overline{\text{WE}}$	Mode	I/O1 to I/O8	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 _{CC}
L	H	L	H	Read	Data out	I _{CC}
L	H	X	L	Write	Data in	I _{CC}

X : "H" or "L"

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

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

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

Electrical Characteristics

• DC and operating characteristics

(Vcc=5V ± 10%, GND=0V, Ta=0 to +70 °C)

Item	Symbol	Test conditions	- 70L/85L			- 70LL/85LL			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
Average operating current	I _{CC}	Cycle=Min, Duty=100% I _{OUT} =0mA	—	47.5	80	—	47.5	80	mA
Standby current	I _{SB1}	CE2 ≤ 0.2V or CE1 ≥ V _{CC} - 0.2V CE2 ≥ V _{CC} - 0.2V	0 to 70 °C	—	—	100	—	—	20
			0 to 40 °C	—	—	20	—	—	4
			+25 °C	—	2	8	—	0.7	2
	I _{SB2}	CE1=V _{IH} or CE2=V _{IL}	—	1.2	3	—	1.2	3	mA
Output high voltage	V _{OH}	I _{OH} = - 1.0mA	2.4	—	—	2.4	—	—	V
Output low voltage	V _{OL}	I _{OL} =2.1mA	—	—	0.4	—	—	0.4	V

* Vcc=5V, Ta=25 °C

I/O capacitance

(Ta=25 °C, f=1MHz)

Item	Symbol	Test conditions	Min.	Max.	Unit
Input capacitance	C _{IN}	V _{IN} =0V	—	6	pF
I/O capacitance	C _{I/O}	V _{I/O} =0V	—	8	pF

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

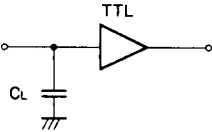
AC characteristics

• AC test conditions

(Vcc=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	C _L * =100pF, 1TTL

* C_L includes scope and jig capacitances.



• Read cycle ($\overline{WE}$ ="H")

Item	Symbol	– 70L/70LL		– 85L/85LL		Unit
		Min.	Max.	Min.	Max.	
Read cycle time	t_{RC}	70	—	85	—	ns
Address access time	t_{AA}	—	70	—	85	ns
Chip enable access time ($\overline{CE1}$)	t_{CO1}	—	70	—	85	ns
Chip enable access time (CE2)	t_{CO2}	—	70	—	85	ns
Output enable to output valid	t_{OE}	—	40	—	45	ns
Output hold from address change	t_{OH}	10	—	10	—	ns
Chip enable to output in low Z ($\overline{CE1}$, CE2)	t_{LZ1} , t_{LZ2}	10	—	10	—	ns
Output enable to output in low Z ($\overline{OE}$)	t_{OLZ}	5	—	5	—	ns
Chip disable to output in high Z ($\overline{CE1}$, CE2)	t_{HZ1} , t_{HZ2} *	—	25	—	25	ns
Chip disable to output in high Z ($\overline{OE}$)	t_{OHZ} *	—	25	—	25	ns

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

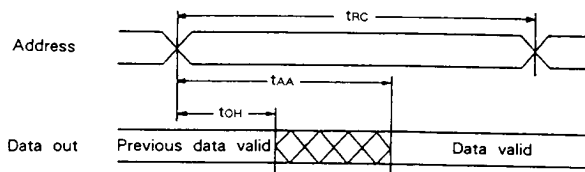
• Write cycle

Item	Symbol	– 70L/70LL		– 85L/85LL		Unit
		Min.	Max.	Min.	Max.	
Write cycle time	t_{WC}	70	—	85	—	ns
Address valid to end of write	t_{AW}	60	—	75	—	ns
Chip enable to end of write	t_{CW}	60	—	75	—	ns
Data to write time overlap	t_{DW}	25	—	30	—	ns
Data hold from write time	t_{DH}	0	—	0	—	ns
Write pulse width	t_{WP}	50	—	60	—	ns
Address set up time	t_{AS}	0	—	0	—	ns
Write recovery time ($\overline{WE}$, $\overline{CE1}$)	t_{WR}	5	—	5	—	ns
Write recovery time (CE2)	t_{WR1}	10	—	10	—	ns
Output active from end of write	t_{OW}	5	—	5	—	ns
Write to output in high Z	t_{WHZ} *	—	25	—	30	ns

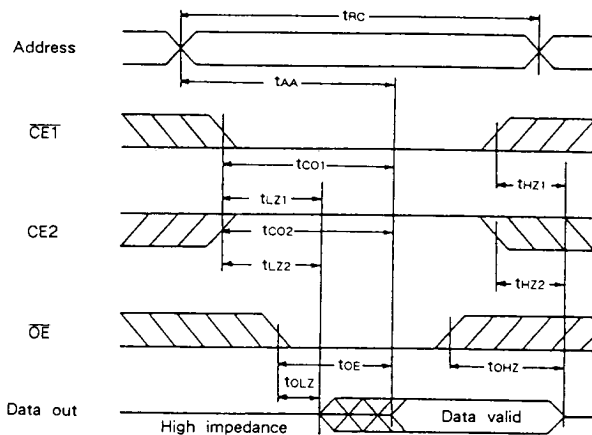
* t_{WHZ} is defined as the time at which the outputs become the high impedance state and are not referred to output voltage levels.

Timing Waveform

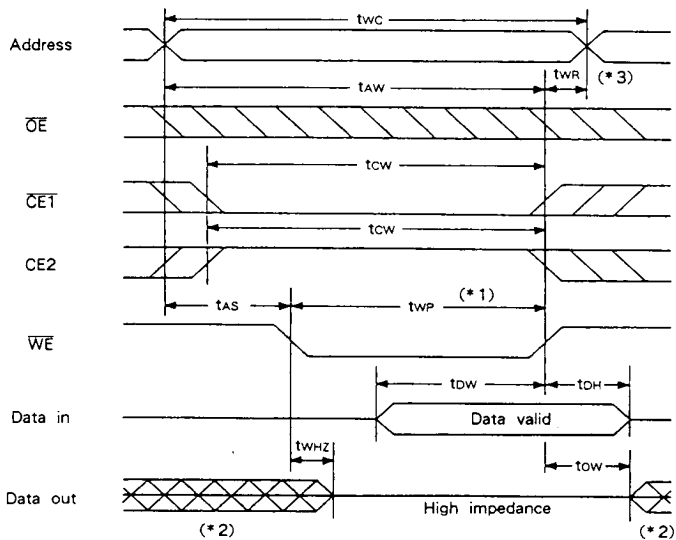
- Read cycle (1): $\overline{CE1}=\overline{OE}=V_{IL}$, $CE2=V_{IH}$, $\overline{WE}=V_{IH}$



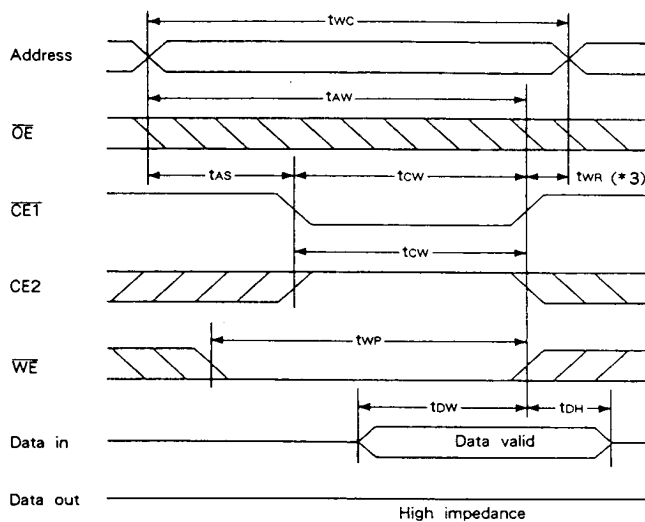
- Read cycle (2): $\overline{WE}=V_{IH}$



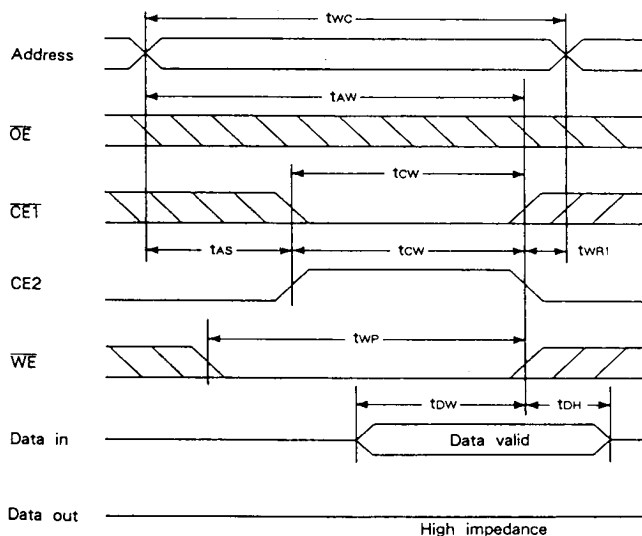
- Write cycle (1): $\overline{WE}$ control



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



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



* 1. Write is executed when both $\overline{CE1}$ and $\overline{WE}$ are at low and $\overline{CE2}$ 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_{WR} is tested from the rising edge of $\overline{WE}$ or $\overline{CE1}$, whichever comes earlier, until the end of the write cycle.

Data Retention Characteristics

(Ta=0 to 70 °C)

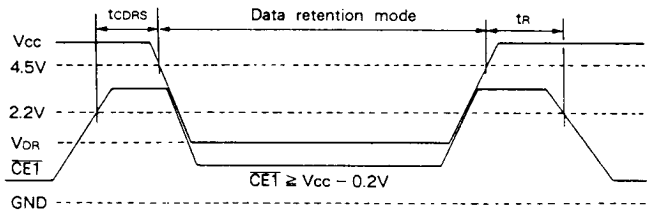
Item	Symbol	Test conditions		- 70L/85L			- 70LL/85LL			Unit
				Min.	Typ.	Max.	Min.	Typ.	Max.	
Data retention voltage	V _{DR}	* 1		2.0	—	5.5	2.0	—	5.5	V
Data retention current	I _{CCDR1}	V _{CC} =0.3V * 1	0 to 70 °C	—	—	50	—	—	12	μA
			0 to 40 °C	—	—	10	—	—	2.4	
			+25 °C	—	1	4	—	0.4	1.2	
	I _{CCDR2}	V _{CC} =2.0 to 5.5V * 1		—	2	100	—	0.7	20	μA
Data retention setup time	t _{CDRS}	Chip disable to data retention mode		0	—	—	0	—	—	ns
Recovery time	t _R			t _{RC} * 2	—	—	t _{RC} * 2	—	—	ns

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

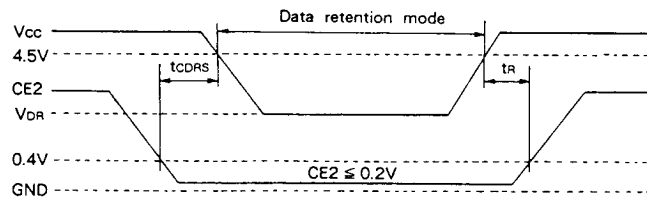
* 2. t_{RC} : Read cycle time

Data retention waveform

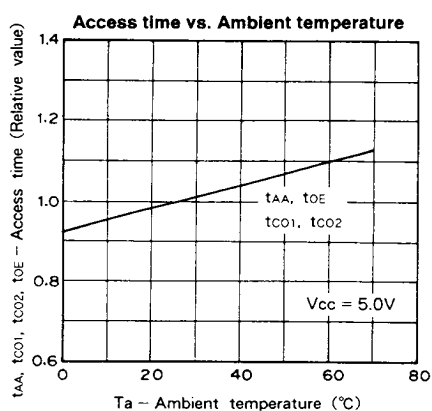
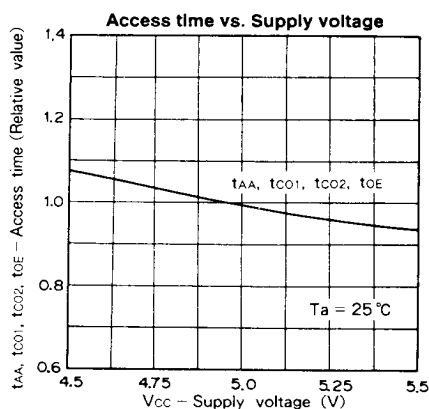
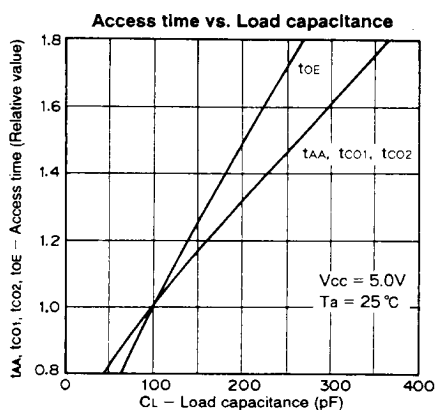
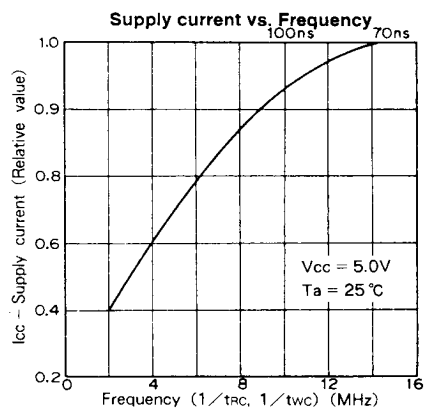
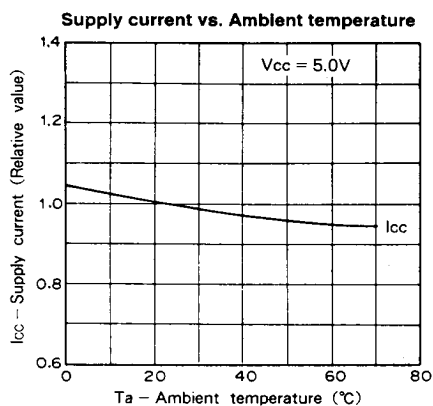
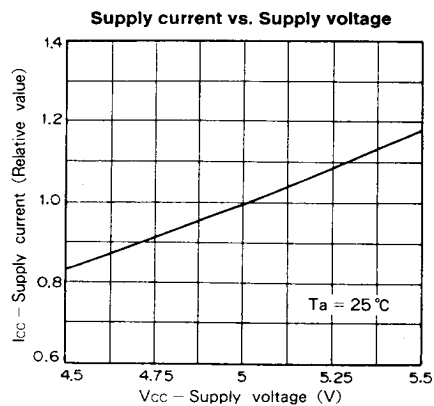
- Low supply voltage data retention waveform (1) ($\overline{CE1}$ control)



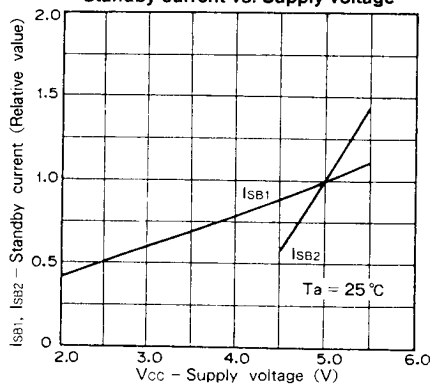
- Low supply voltage data retention waveform (2) ($CE2$ control)



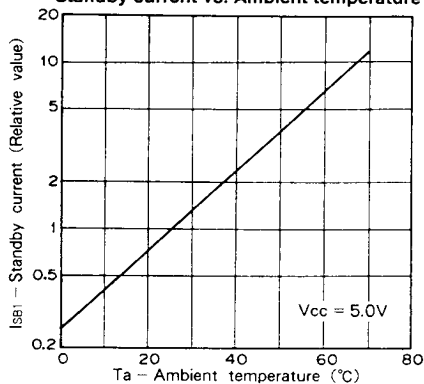
Example of Representative Characteristics



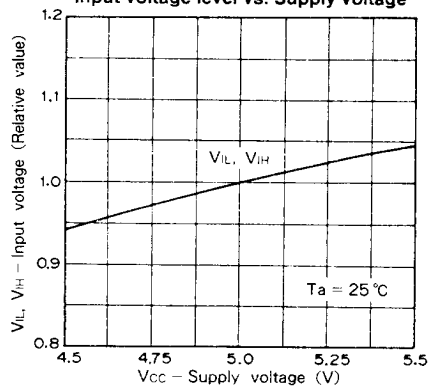
Standby current vs. Supply voltage



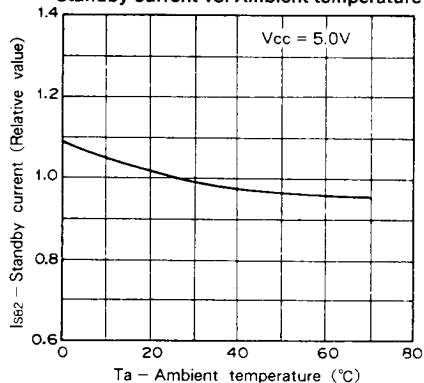
Standby current vs. Ambient temperature



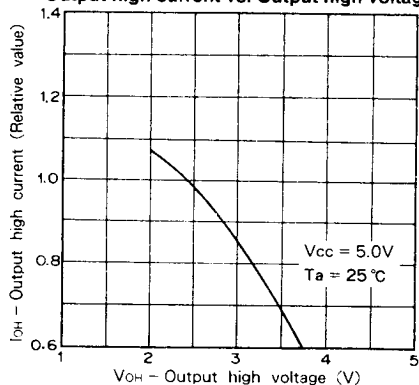
Input voltage level vs. Supply voltage



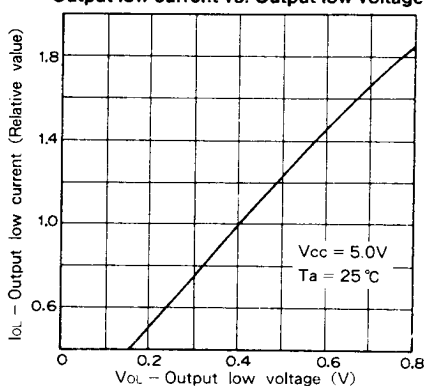
Standby current vs. Ambient temperature



Output high current vs. Output high voltage

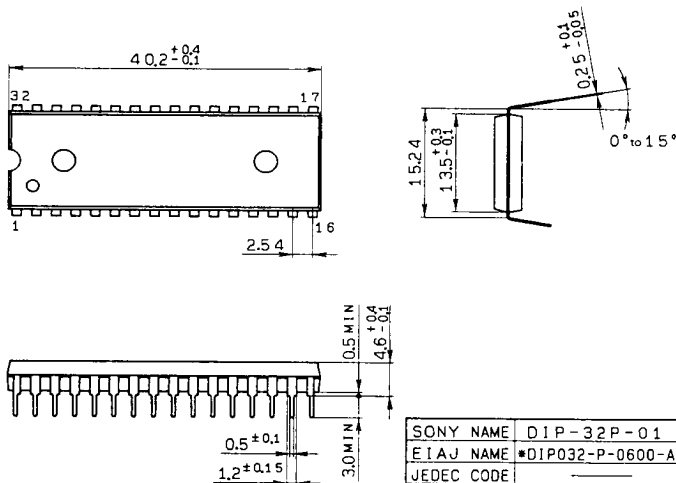


Output low current vs. Output low voltage

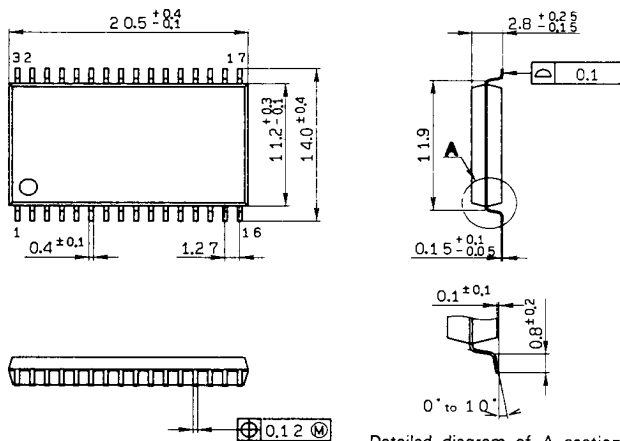


Package Outline Unit : mm

CXK581001P 32 pin DIP (Plastic) 600mil 4.5g



CXK581001M 32 pin SOP (Plastic) 525mil 1.2g



Detailed diagram of A section