

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

Description

The CXK5T81000ATM/AYM/AM is a high speed CMOS static RAM organized as 131072-words by 8-bits.

Special feature are low power consumption and high speed.

The CXK5T81000ATM/AYM/AM is a suitable RAM for portable equipment with battery back up.

Features

- Extended operating temperature range:
-25 to +85°C
- Wide supply voltage range operation: 2.7 to 3.6V
- Fast access time:

		(Access time)
3.0V operation	-10LLX	100ns (Max.)
	-12LLX	120ns (Max.)
3.3V operation	-10LLX	85ns (Max.)
	-12LLX	100ns (Max.)

- Low standby current: 28μA (Max.)
- Low data retention current: 24μA (Max.)
- Low voltage data retention: 2.0V (Min.)

Package line-up

CXK5T81000ATM/AYM

8mm × 20mm 32 pin TSOP package

CXK5T81000AM

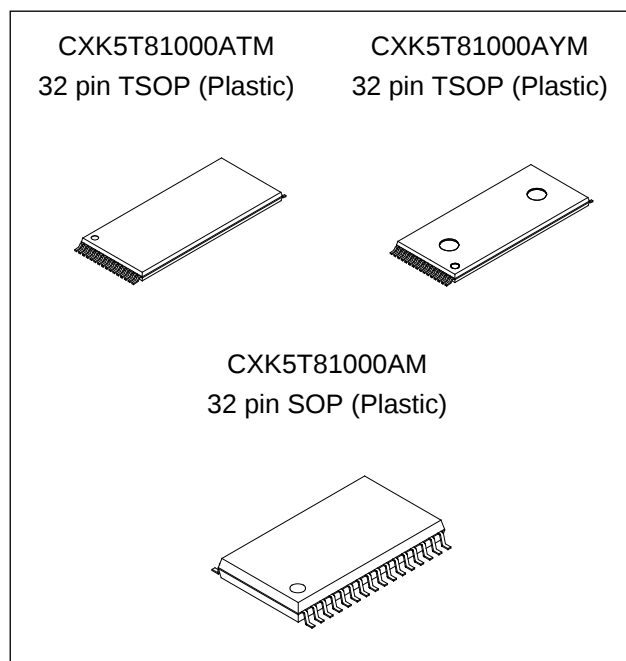
525mil 32 pin SOP package

Function

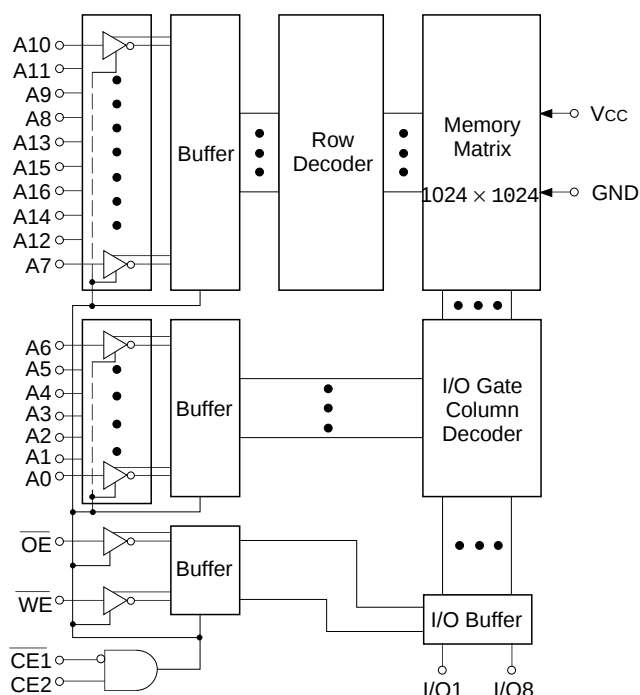
131072-word × 8-bit static RAM

Structure

Silicon gate CMOS IC

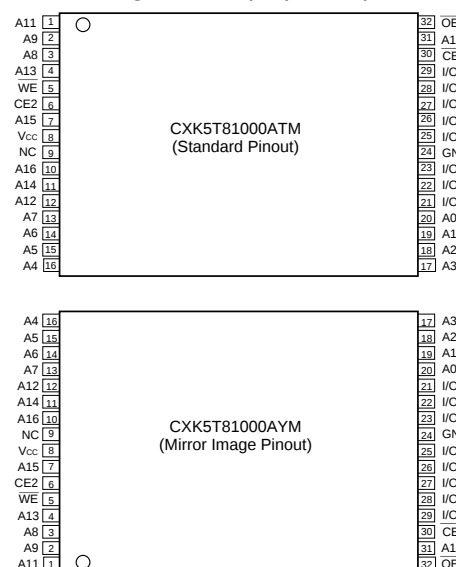


Block Diagram



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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
$\overline{\text{CE1}}$, $\overline{\text{CE2}}$	Chip enable 1, 2 input
$\overline{\text{WE}}$	Write enable input
$\overline{\text{OE}}$	Output enable input
V _{CC}	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 +4.6	V
Input voltage	V _{IN}	−0.5*1 to V _{CC} + 0.5	V
Input and output voltage	V _{I/O}	−0.5*1 to V _{CC} + 0.5	V
Allowable power dissipation	P _D	0.7	W
Operating temperature	T _{opr}	−25 to +85	°C
Storage temperature	T _{stg}	−55 to +150	°C
Soldering temperature · time	T _{solder}	235 · 10	°C · s

*1 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/O pin	V _{CC} Current
H	×	×	×	Not selected	High Z	I _{SB1} , I _{SB2}
×	L	×	×	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	×	L	Write	Data in	I _{CC1} , I _{CC2} , I _{CC3}

× : “H” or “L”

DC Recommended Operating Conditions

(Ta = -25 to +85°C, GND = 0V)

Item	Symbol	V _{CC} = 2.7 to 3.6V			V _{CC} = 3.3V ± 0.3V			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
Supply voltage	V _{CC}	2.7	3.3	3.6	3.0	3.3	3.6	V
Input high voltage	V _{IH}	2.4	—	V _{CC} + 0.3	2.2	—	V _{CC} + 0.3	
Input low voltage	V _{IL}	-0.3 ^{*1}	—	0.4	-0.3 ^{*1}	—	0.6	

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

Electrical Characteristics

• DC Characteristics

(V_{CC} = 2.7 to 3.6V, GND = 0V, Ta = -25 to +85°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}	$\overline{\text{CE1}} = V_{IH}$ or $\text{CE2} = V_{IL}$ or $\overline{\text{OE}} = V_{IH}$ or $\overline{\text{WE}} = V_{IL}$ V _{IO} = GND to V _{CC}		-1	—	+1	μA
Operating power supply current	I _{CC1}	$\overline{\text{CE1}} = V_{IL}$, $\text{CE2} = V_{IH}$ V _{IN} = V _{IH} or V _{IL} I _{OUT} = 0mA		—	1	3	mA
Average operating current	I _{CC2}	Min. cycle duty = 100% I _{OUT} = 0mA	10LLX	—	25 ^{*2}	35 ^{*3}	mA
			12LLX	—	25	35	
	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		—	5	10	mA
Standby current	I _{SB1}	CE2 ≤ 0.2V or { CE1 ≥ V _{CC} - 0.2V CE2 ≥ V _{CC} - 0.2V	-25 to +85°C	—	—	28	μA
			-25 to +70°C	—	—	14	
			+25°C	—	0.48	—	
	I _{SB2}	$\overline{\text{CE1}} = V_{IH}$ or $\text{CE2} = V_{IL}$		—	0.12	1.4	mA
Output high voltage	V _{OH}	I _{OH} = -2.0mA		2.4	—	—	V
Output low voltage	V _{OL}	I _{OL} = 2.0mA		—	—	0.4	V

*1 V_{CC} = 3.3V, Ta = 25°C*2 I_{CC2} = 30mA for 3.3V operation (V_{CC} = 3.3V ± 0.3V)*3 I_{CC2} = 40mA for 3.3V operation (V_{CC} = 3.3V ± 0.3V)

I/O capacitance (Ta = 25°C, f = 1MHz)

Item	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Input capacitance	C _{IN}	V _{IN} = 0V	—	—	8	pF
I/O capacitance	C _{I/O}	V _{I/O} = 0V	—	—	10	pF

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

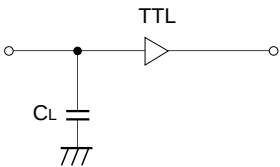
AC Characteristics

• AC test conditions (Ta = -25 to +85°C)

Item		Conditions	
		V _{CC} = 2.7 to 3.6V	V _{CC} = 3.3V ± 0.3V
Input pulse high level		V _{IH} = 2.4V	V _{IH} = 2.2V
Input pulse low level		V _{IL} = 0.4V	V _{IL} = 0.6V
Input rise time		t _r = 5ns	t _r = 5ns
Input fall time		t _f = 5ns	t _f = 5ns
Input and output reference level		1.4V	1.4V
Output load conditions	-10LLX	C _L *1 = 100pF, 1TTL	C _L *1 = 30pF, 1TTL
	-12LLX	C _L *1 = 100pF, 1TTL	C _L *1 = 100pF, 1TTL

*1 C_L includes scope and jig capacitances.

• Test circuit



• Read cycle ($\overline{WE}$ = "H")

Item	Symbol	V _{CC} = 2.7 to 3.6V				V _{CC} = 3.3V ± 0.3V				Unit
		-10LLX		-12LLX		-10LLX		-12LLX		
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
Read cycle time	t _{RC}	100	—	120	—	85	—	100	—	ns
Address access time	t _{AA}	—	100	—	120	—	85	—	100	ns
Chip enable access time ($\overline{CE1}$)	t _{CO1}	—	100	—	120	—	85	—	100	ns
Chip enable access time (CE2)	t _{CO2}	—	100	—	120	—	85	—	100	ns
Output enable to output valid	t _{OE}	—	50	—	60	—	40	—	50	ns
Output hold from address change	t _{OH}	10	—	10	—	10	—	10	—	ns
Chip enable to output in low Z ($\overline{CE1}$, CE2)	t _{LZ1} t _{LZ2}	10	—	10	—	10	—	10	—	ns
Output enable to output in low Z ($\overline{OE}$)	t _{OLZ}	5	—	5	—	5	—	5	—	ns
Chip disable to output in high Z ($\overline{CE1}$, CE2)	t _{HZ1} *1 t _{HZ2} *1	—	40	—	40	—	35	—	40	ns
Output disable to output in high Z ($\overline{OE}$)	t _{OHZ} *1	—	35	—	35	—	30	—	35	ns

*1 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.

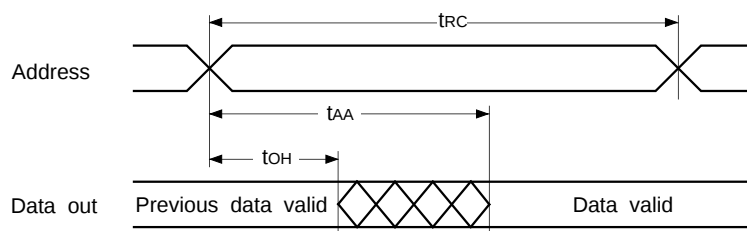
• Write cycle

Item	Symbol	V _{CC} = 2.7 to 3.6V				V _{CC} = 3.3V ± 0.3V				Unit
		-10LLX		-12LLX		-10LLX		-12LLX		
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
Write cycle time	t _{WC}	100	—	120	—	85	—	100	—	ns
Address valid to end of write	t _{AW}	80	—	100	—	70	—	80	—	ns
Chip enable to end of write	t _{CW}	80	—	100	—	70	—	80	—	ns
Data to write time overlap	t _{DW}	40	—	50	—	35	—	40	—	ns
Data hold from write time	t _{DH}	0	—	0	—	0	—	0	—	ns
Write pulse width	t _{WP}	70	—	70	—	60	—	70	—	ns
Address setup time	t _{AS}	0	—	0	—	0	—	0	—	ns
Write recovery time ($\overline{WE}$)	t _{WR}	0	—	0	—	0	—	0	—	ns
Write recovery time ($\overline{CE1}$, CE2)	t _{WR1}	0	—	0	—	0	—	0	—	ns
Output active from end of write	t _{OW}	5	—	5	—	5	—	5	—	ns
Write to output in high Z	t _{WHZ} *2	—	40	—	40	—	35	—	40	ns

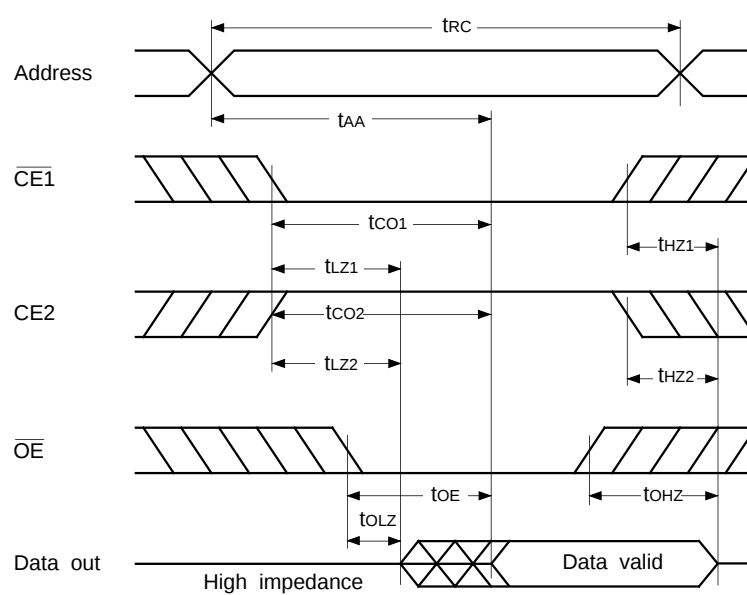
*2 t_{WHZ} is defined as the time required for outputs to turn to high impedance state and is not referred to as output voltage level.

Timing Waveform

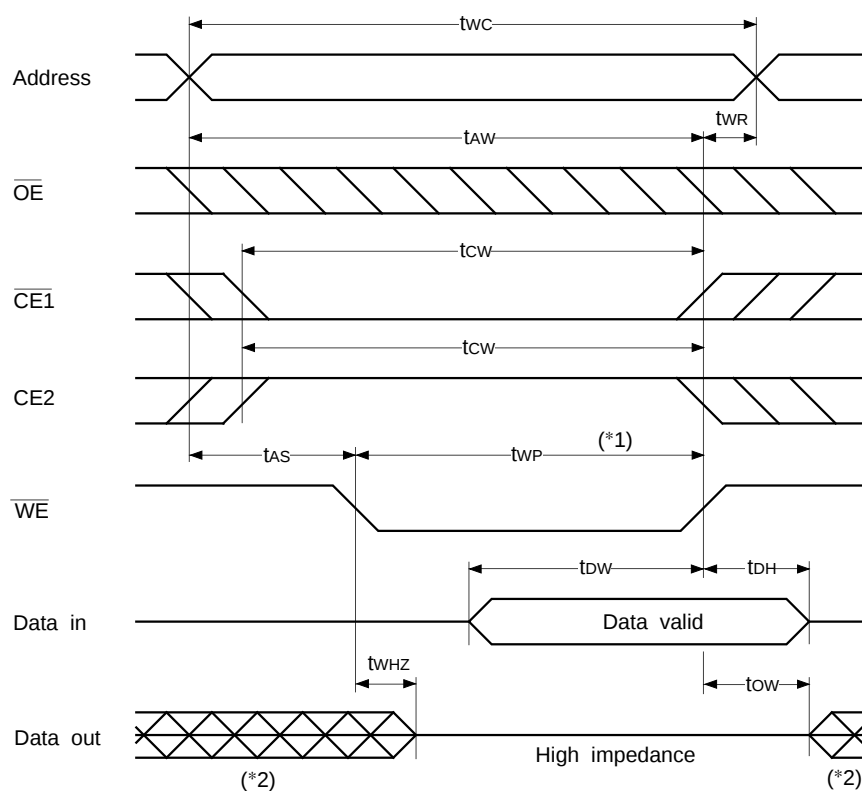
- Read cycle (1) : $\overline{\text{CE1}} = \overline{\text{OE}} = V_{\text{IL}}$, $\text{CE2} = V_{\text{IH}}$, $\overline{\text{WE}} = V_{\text{IH}}$



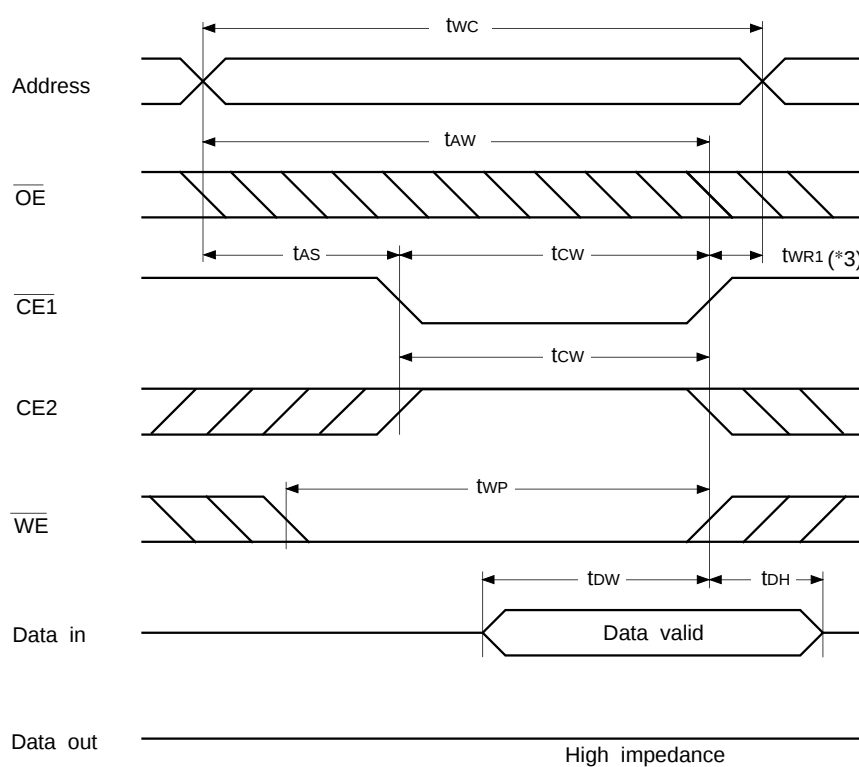
- Read cycle (2) : $\overline{\text{WE}} = V_{\text{IH}}$



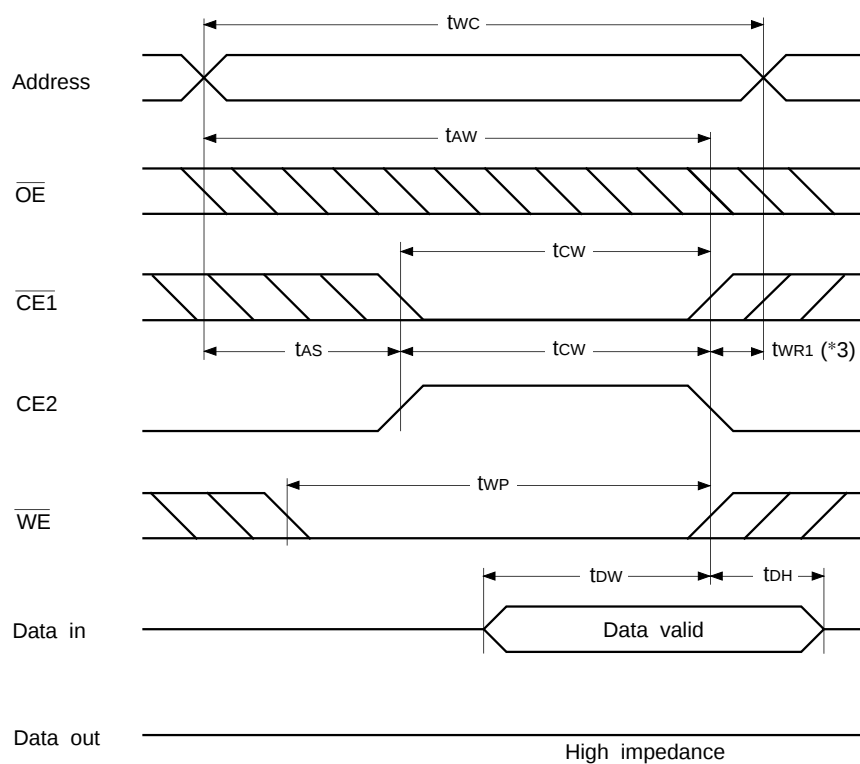
• Write cycle (1) : $\overline{\text{WE}}$ control



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



• Write cycle (3) : CE2 control



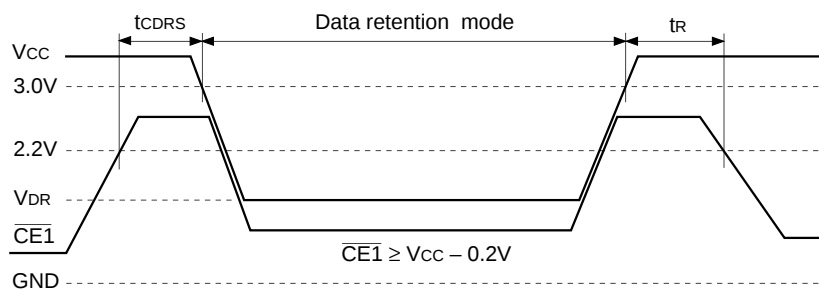
*1 Write is executed when both $\overline{CE1}$ and $\overline{WE}$ are at low and CE2 is at high simultaneously.

*2 Do not apply the data input voltage of the opposite phase to the output while I/O pin is in output condition.

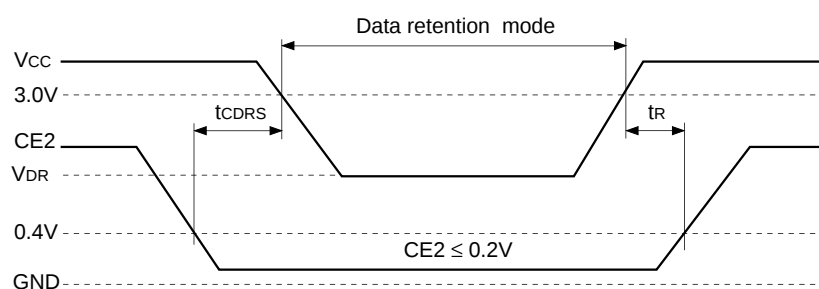
*3 t_{WR1} is tested from either the rising edge of $\overline{CE1}$ or the falling edge of CE2, whichever comes earlier, until the end of the write cycle.

Data retention waveform

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



• Low supply voltage data retention waveform (2) (CE2 control)



Data Retention Characteristics

($T_a = -25$ to $+85^\circ\text{C}$)

Item	Symbol	Test conditions		Min.	Typ.	Max.	Unit
Data retention voltage	V_{DR}	*1		2.0	—	3.6	V
Data retention current	I_{CCDR1}	$V_{CC} = 3.0V^{*1}$	-25 to $+85^\circ\text{C}$	—	—	24	μA
			-25 to $+70^\circ\text{C}$	—	—	12	
			$+25^\circ\text{C}$	—	0.4	—	
	I_{CCDR2}	$V_{CC} = 2.0$ to $3.6V^{*1}$		—	0.48^{*2}	28	μA
Data retention setup time	t_{CDRS}	Chip disable to data retention mode		0	—	—	ns
Recovery time	t_r			5	—	—	ns

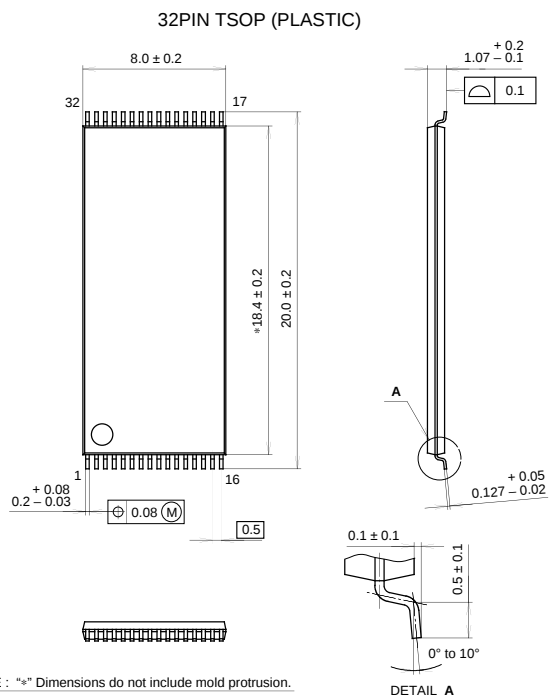
*1 $\overline{\text{CE1}} \geq V_{CC} - 0.2V$, $\text{CE2} \geq V_{CC} - 0.2V$ ($\overline{\text{CE1}}$ control) or $\text{CE2} \leq 0.2V$ (CE2 control)

*2 $V_{CC} = 3.3V$, $T_a = 25^\circ\text{C}$

Package Outline

Unit: mm

CXK5T81000ATM

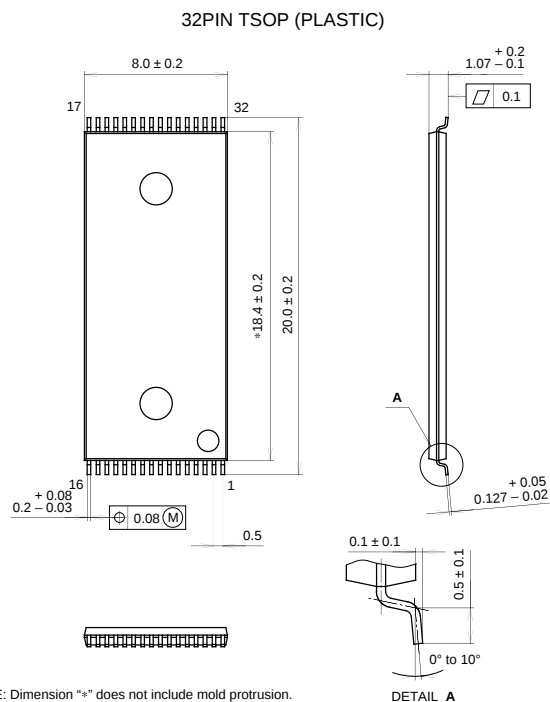


PACKAGE STRUCTURE

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

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

CXK5T81000AYM



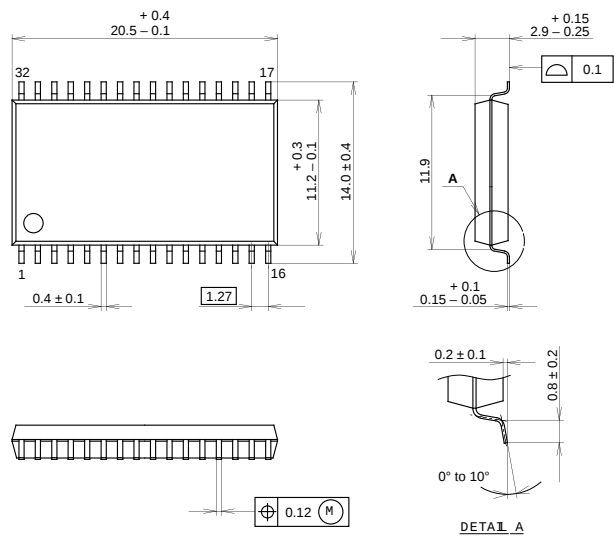
PACKAGE STRUCTURE

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

CXK5T81000AM

32PIN SOP (PLASTIC)



PACKAGE STRUCTURE

SONY CODE	SOP-32P-L02
EIAJ CODE	SOP032-P-0525
JEDEC CODE	

PACKAGE MATERIAL	EPOXY RESIN
LEAD TREATMENT	SOLDER PLATING
LEAD MATERIAL	42 ALLOY
PACKAGE WEIGHT	1.2g