

CXK5T8512TM/TN -10LLX/12LLX

65536-word × 8-bit High Speed CMOS Static RAM *Preliminary*

Description

The CXK5T8512TM/TN is a high speed CMOS static RAM organized as 65536-words by 8-bits.

Special feature are low power consumption and high speed.

The CXK5T8512TM/TN is a suitable RAM for portable equipment with battery back up.

Features

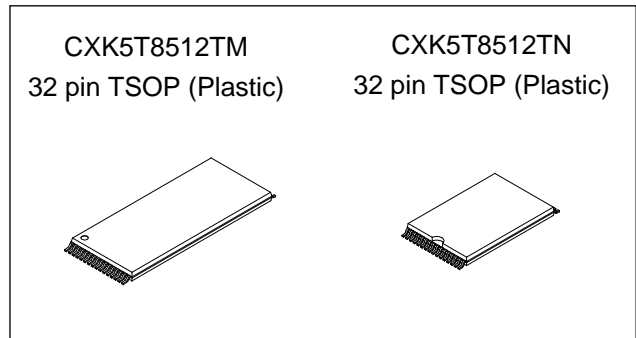
- Extended operating temperature range:
-25 to +85°C
- Wide supply voltage range operation: 2.7 to 3.6V
- Fast access time: (Access time)
- 3.0V operation
- CXK5T8512TM/TN-10LLX 100ns (Max.)
- CXK5T8512TM/TN-12LLX 120ns (Max.)
- 3.3V operation
- CXK5T8512TM/TN-10LLX 85ns (Max.)
- CXK5T8512TM/TN-12LLX 100ns (Max.)
- Low standby current: 14µA (Max.)
- Low data retention current: 12µA (Max.)
- Low power data retention: 2.0V (Min.)
- Package line-up
- CXK5T8512TM
 8mm × 20mm 32 pin TSOP package
- CXK5T8512TN
 8mm × 13.4mm 32 pin TSOP package

Function

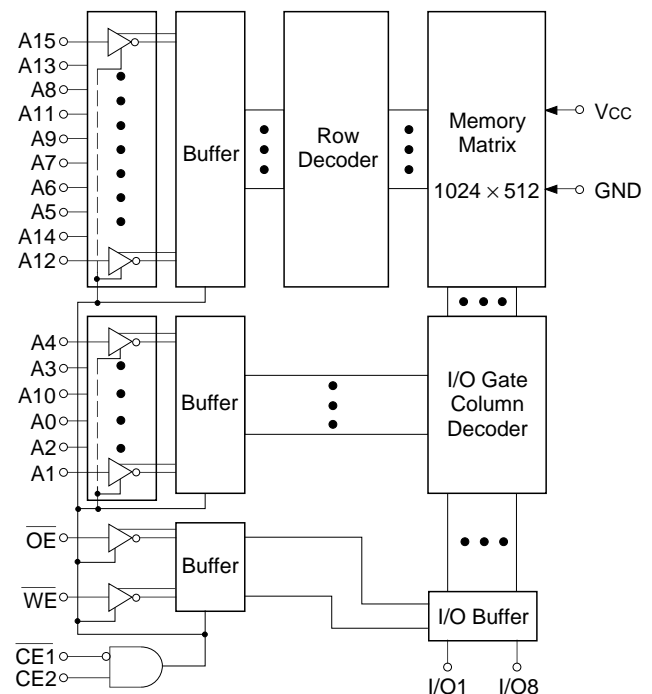
65536-word × 8-bit static RAM

Structure

Silicon gate CMOS IC

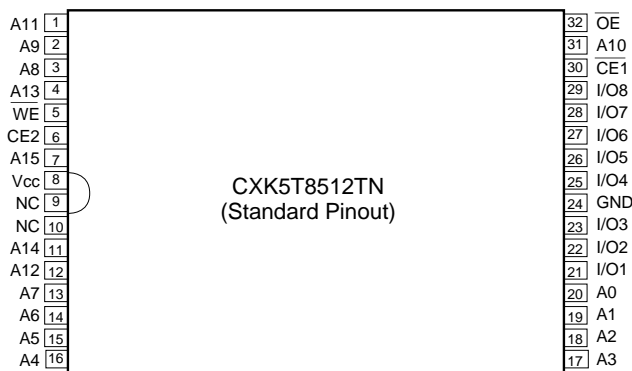
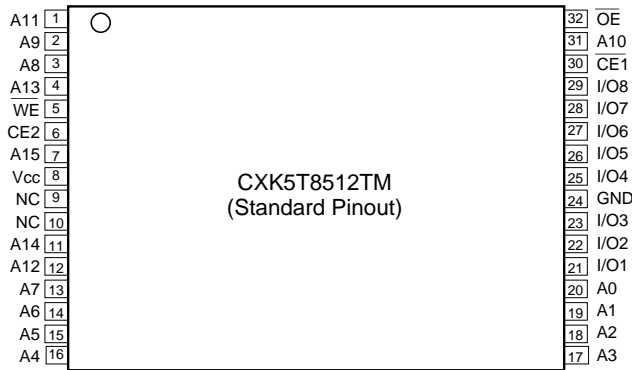


Block Diagram



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Pin Configuration (Top View)



Pin Description

Symbol	Description
A0 to A15	Address input
I/O1 to I/O8	Data input output
$\overline{CE1}$, $\overline{CE2}$	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 +4.6	V
Input voltage	V _{IN}	-0.5*1 to Vcc + 0.5	V
Input and output voltage	V _{I/O}	-0.5*1 to Vcc + 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

$\overline{CE1}$	$\overline{CE2}$	\overline{OE}	\overline{WE}	Mode	I/O pin	Vcc 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	Vcc = 2.7 to 3.6V			Vcc = 3.3V ± 0.3V			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
Supply voltage	Vcc	2.7	3.3	3.6	3.0	3.3	3.6	V
Input high voltage	V _{IH}	2.4	—	Vcc + 0.3	2.2	—	Vcc + 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**

(Vcc = 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 Vcc	-1	—	+1	μA	
Output leakage current	I _{LO}	$\overline{CE1} = V_{IH}$ or $\overline{CE2} = V_{IL}$ or $\overline{OE} = V_{IH}$ or $\overline{WE} = V_{IL}$ V _{I/O} = GND to Vcc	-1	—	+1	μA	
Operating power supply current	I _{CC1}	$\overline{CE1} = V_{IL}$, $\overline{CE2} = V_{IH}$ 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 $\overline{CE1} \leq 0.2V$ $\overline{CE2} \geq V_{cc} - 0.2V$ V _{IL} ≤ 0.2V V _{IH} ≥ Vcc - 0.2V	—	5	10	mA	
Standby current	I _{SB1}	$\overline{CE2} \leq 0.2V$ or $\begin{cases} \overline{CE1} \geq V_{cc} - 0.2V \\ \overline{CE2} \geq V_{cc} - 0.2V \end{cases}$	-25 to +85°C	—	—	14	μA
			-25 to +70°C	—	—	7	
			+25°C	—	0.24	—	
	I _{SB2}	$\overline{CE1} = V_{IH}$ or $\overline{CE2} = V_{IL}$	—	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 Vcc = 3.3V, Ta = 25°C

*2 I_{CC2} = 30mA for 3.3V operation (Vcc = 3.3V ± 0.3V)

*3 I_{CC2} = 40mA for 3.3V operation (Vcc = 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.

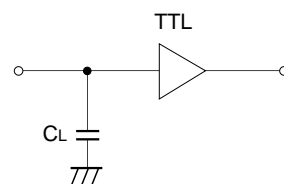
AC Characteristics

• 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

• Test circuit



*1 C_L includes scope and jig capacitances.

• 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.

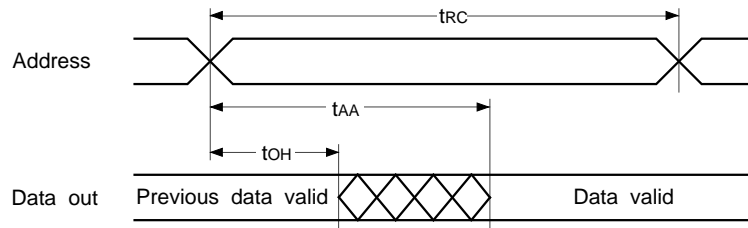
• Write cycle

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}	5	—	5	—	5	—	5	—	ns
Write recovery time ($\overline{CE1}$, CE2)	t _{WR1}	5	—	5	—	5	—	5	—	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

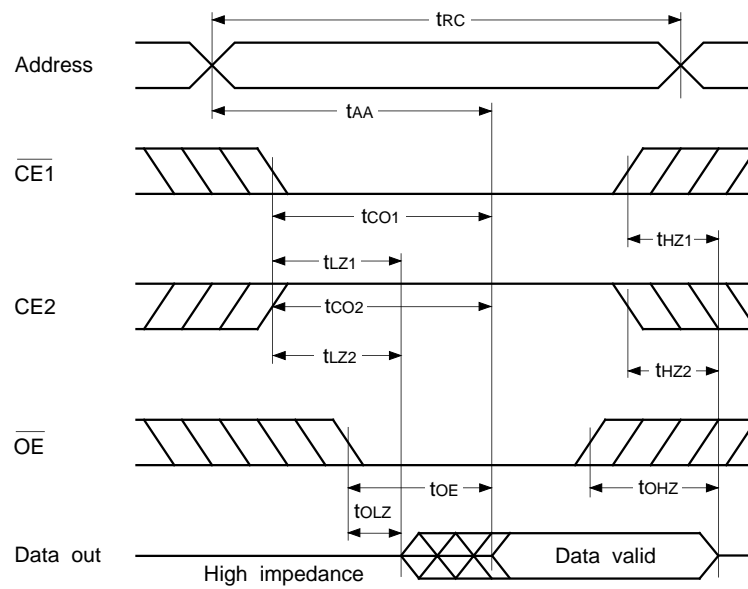
*2 t_{WHZ} is defined as the time required for outputs to turn to high impedance state and is not referred to as output voltage level.

Timing Waveform

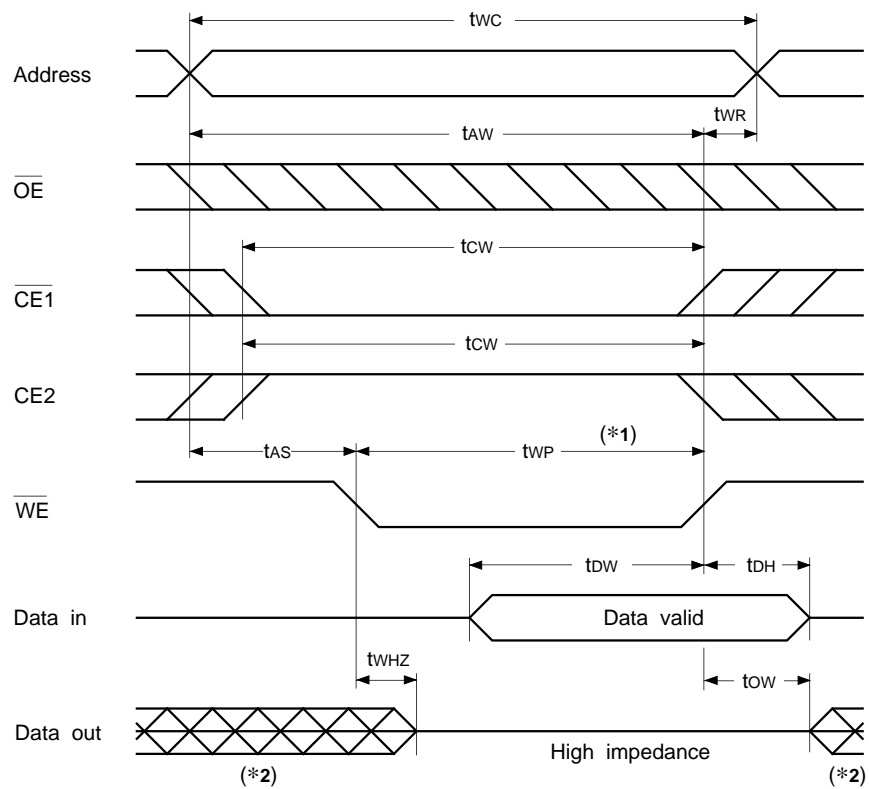
- Read cycle (1) : $\overline{CE1} = \overline{OE} = V_{IL}$, $CE2 = V_{IH}$, $\overline{WE} = V_{IH}$



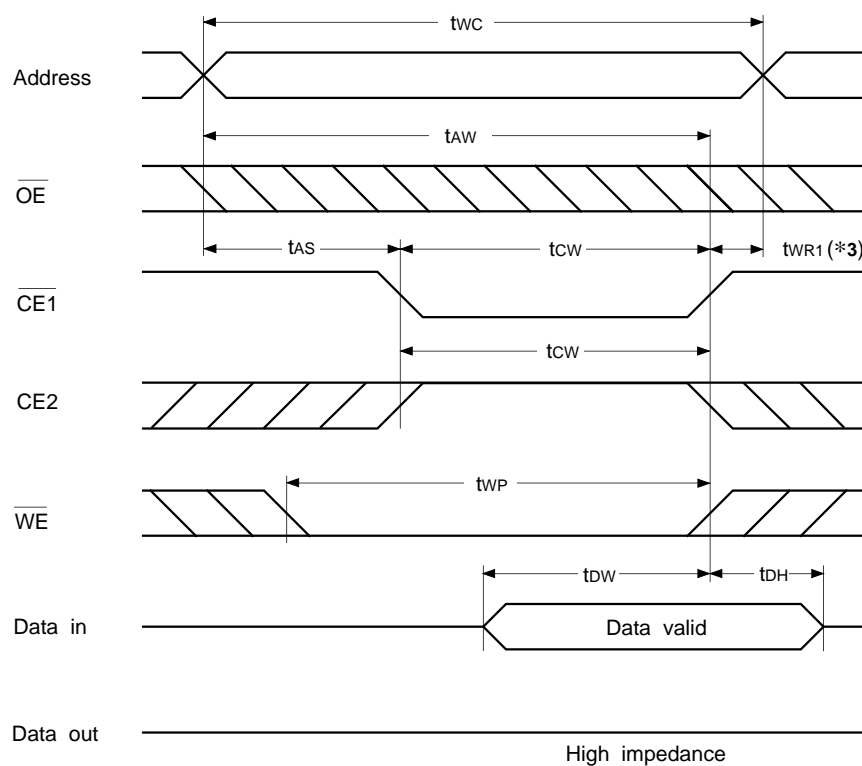
- Read cycle (2) : $\overline{WE} = V_{IH}$



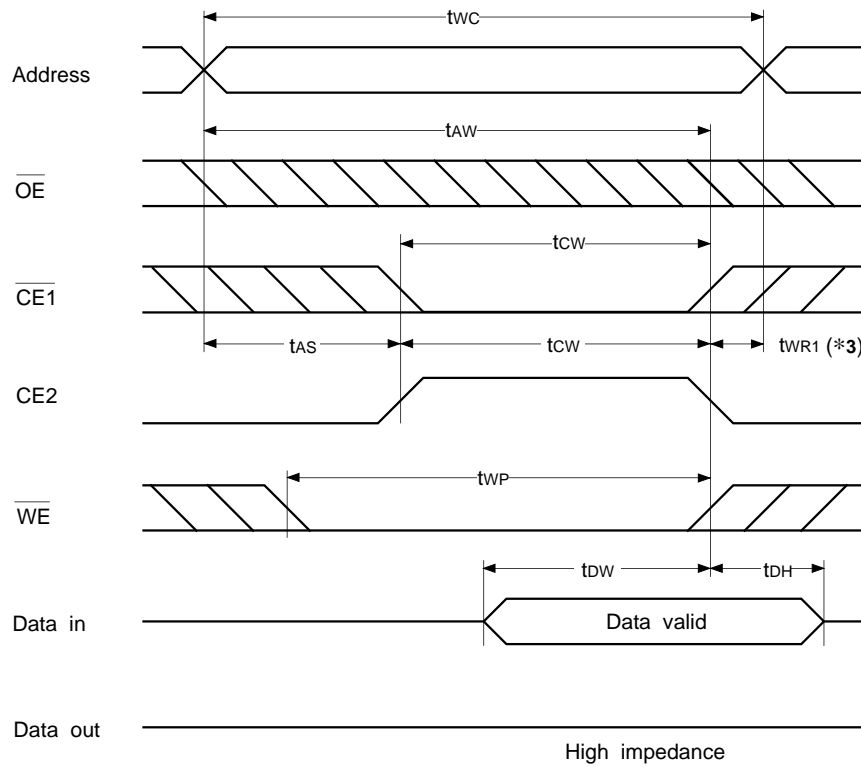
• Write cycle (1) : \overline{WE} control



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



• Write cycle (3) : CE2 control



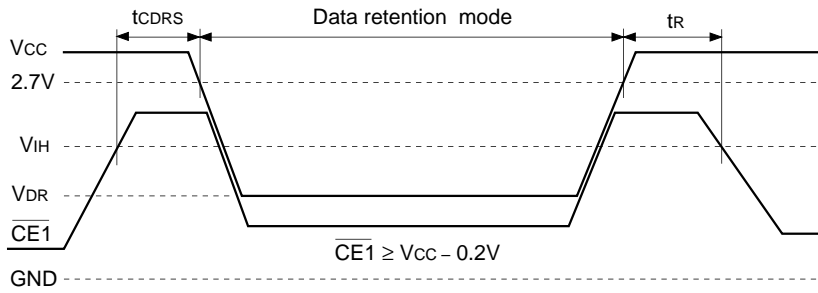
*1 Write is executed when both $\overline{CE1}$ and \overline{WE} are at low and CE2 is at high simultaneously.

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

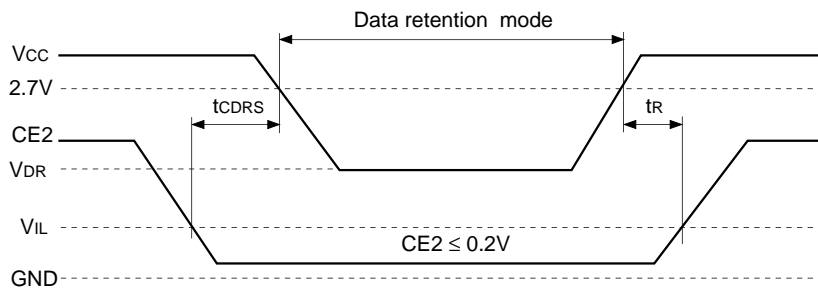
*3 t_{WR1} is tested from either the rising edge of $\overline{CE1}$ or the falling edge of CE2, whichever comes earlier, until the end of the write cycle.

Data retention waveform

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



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



Data Retention Characteristics

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

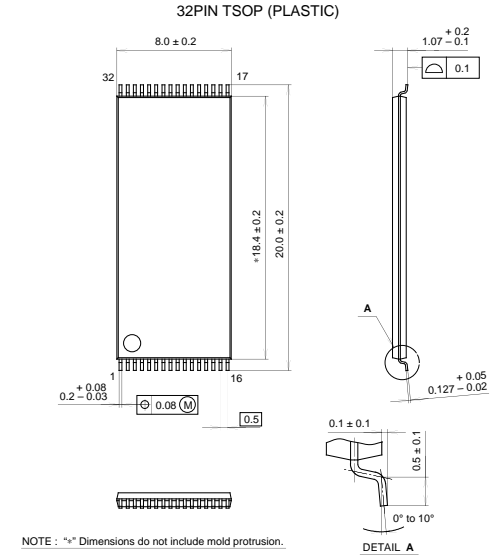
Item	Symbol	Test conditions	Min.	Typ.	Max.	Unit	
Data retention voltage	V_{DR}	*1	2.0	—	3.6	V	
Data retention current	I_{CCDR1}	$V_{CC} = 3.0\text{V}^{*1}$	-25 to $+85^\circ\text{C}$	—	—	12	μA
			-25 to $+70^\circ\text{C}$	—	—	6	
			$+25^\circ\text{C}$	—	0.2	—	
	I_{CCDR2}	$V_{CC} = 2.0$ to 3.6V^{*1}	—	0.24^{*2}	14	μA	
Data retention setup time	t_{CDRS}	Chip disable to data retention mode	0	—	—	ns	
Recovery time	t_R		5	—	—	ms	

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

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

Package Outline Unit: mm

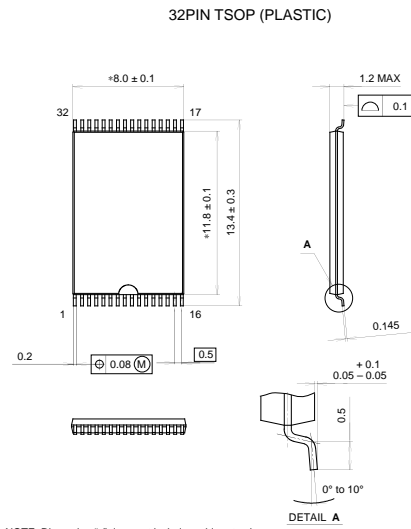
CXK5T8512TM



PACKAGE STRUCTURE

SONY CODE	TSOP-32P-L01	PACKAGE MATERIAL	EPOXY RESIN
EIAJ CODE	TSOP032-P-0820	LEAD TREATMENT	SOLDER PLATING
JEDEC CODE		LEAD MATERIAL	42 ALLOY
		PACKAGE WEIGHT	0.3g

CXK5T8512TN



PACKAGE STRUCTURE

SONY CODE	TSOP-32P-L02	PACKAGE MATERIAL	EPOXY RESIN
EIAJ CODE	TSOP032-P-0813.4-C	LEAD TREATMENT	SOLDER PLATING
JEDEC CODE		LEAD MATERIAL	42 ALLOY
		PACKAGE MASS	0.2g