SONY

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.

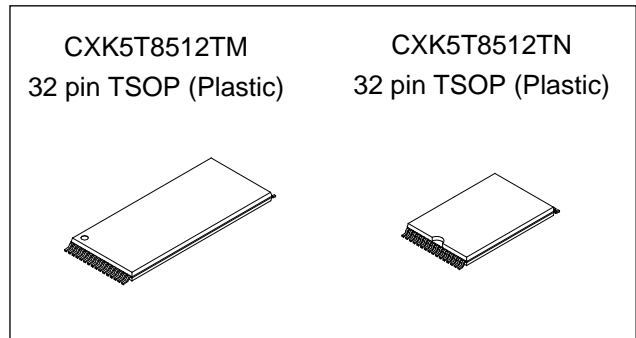The CXK5T8512TM/TN is a suitable RAM for portable equipment with battery back up.

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
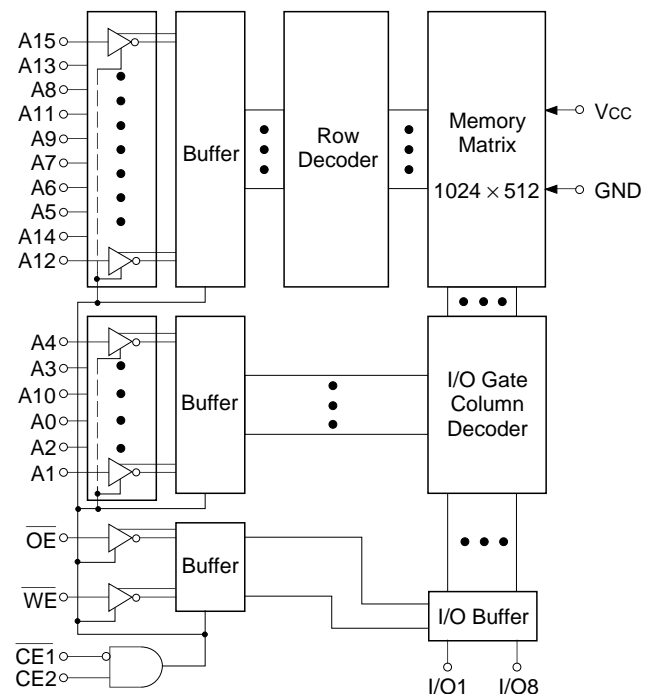 CXK5T8512TN
    8mm × 13.4mm 32 pin TSOP package

Function

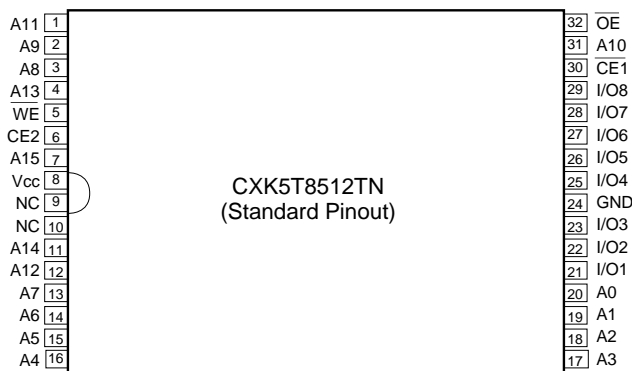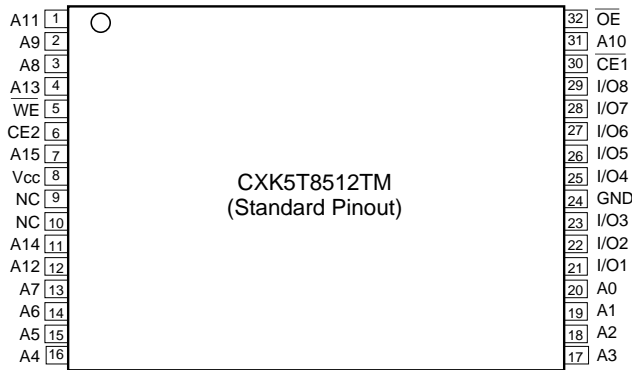65536-word × 8-bit static RAM

Structure

Silicon gate CMOS IC

CXK5T8512TM
32 pin TSOP (Plastic)

CXK5T8512TN
32 pin TSOP (Plastic)

Block Diagram

PE96727-PS

Pin Configuration (Top View)

A11	1			32	$\overline{OE}$
A9	2			31	A10
A8	3			30	$\overline{CE1}$
A13	4			29	I/O8
$\overline{WE}$	5			28	I/O7
CE2	6			27	I/O6
A15	7		CXK5T8512TM	26	I/O5
Vcc	8		(Standard Pinout)	25	I/O4
NC	9			24	GND
NC	10			23	I/O3
A14	11			22	I/O2
A12	12			21	I/O1
A7	13			20	A0
A6	14			19	A1
A5	15			18	A2
A4	16			17	A3

A11	1			32	$\overline{OE}$
A9	2			31	A10
A8	3			30	$\overline{CE1}$
A13	4			29	I/O8
$\overline{WE}$	5			28	I/O7
CE2	6			27	I/O6
A15	7		CXK5T8512TN	26	I/O5
Vcc	8		(Standard Pinout)	25	I/O4
NC	9			24	GND
NC	10			23	I/O3
A14	11			22	I/O2
A12	12			21	I/O1
A7	13			20	A0
A6	14			19	A1
A5	15			18	A2
A4	16			17	A3

Pin Description

Symbol	Description
A0 to A15	Address input
I/O1 to I/O8	Data input output
$\overline{CE1}$, 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	Topr	−25 to +85	°C
Storage temperature	Tstg	−55 to +150	°C
Soldering temperature · time	Tsolder	235 · 10	°C · s

[1] V_{IN}, $V_{I/O}$ = −3.0V Min. for pulse width less than 50ns.

Truth Table

$\overline{CE1}$	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	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	
Input high voltage	V_{IH}	2.4	—	V_{CC} + 0.3	2.2	—	V_{CC} + 0.3	V
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}	$\overline{CE1}$ = V_{IH} or CE2 = V_{IL} or $\overline{OE}$ = V_{IH} or $\overline{WE}$ = V_{IL} $V_{I/O}$ = GND to V_{CC}		−1	—	+1	µA
Operating power supply current	I_{CC1}	$\overline{CE1}$ = V_{IL}, 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 $\overline{CE1}$ ≤ 0.2V CE2 ≥ Vcc − 0.2V V_{IL} ≤ 0.2V V_{IH} ≥ Vcc − 0.2V		—	5	10	mA
Standby current	I_{SB1}	CE2 ≤ 0.2V or { $\overline{CE1}$ ≥ Vcc − 0.2V CE2 ≥ Vcc − 0.2V	−25 to +85°C	—	—	14	µA
			−25 to +70°C	—	—	7	
			+25°C	—	0.24	—	
	I_{SB2}	$\overline{CE1}$ = V_{IH} or 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		• Test circuit
	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
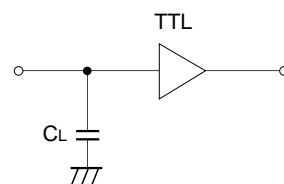
[1] C_L includes scope and jig capacitances.

• **Read cycle** ($\overline{WE}$ = "H")

| Item | Symbol | Vcc = 2.7 to 3.6V | | | | Vcc = 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.
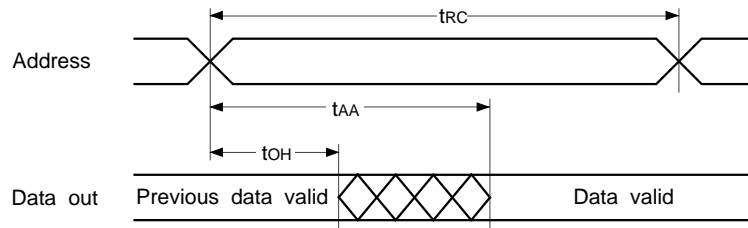
• **Write cycle**

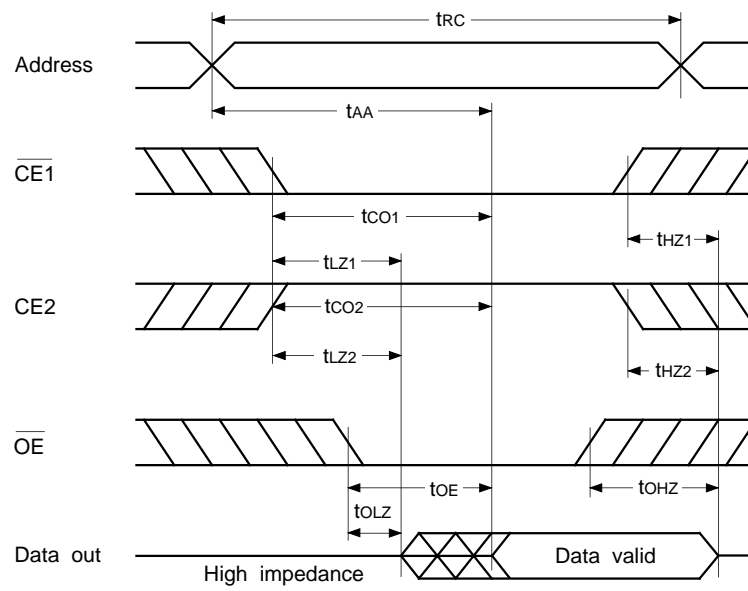| Item | Symbol | Vcc = 2.7 to 3.6V | | | | Vcc = 3.3V ± 0.3V | | | | Unit |
| | | -10LLX | | -12LLX | | -10LLX | | -12LLX | | |
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
Write cycle time	t_{WC}	100	—	120	—	85	—	100	—	ns
Address valid to end of write	t_{AW}	80	—	100	—	70	—	80	—	ns
Chip enable to end 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.
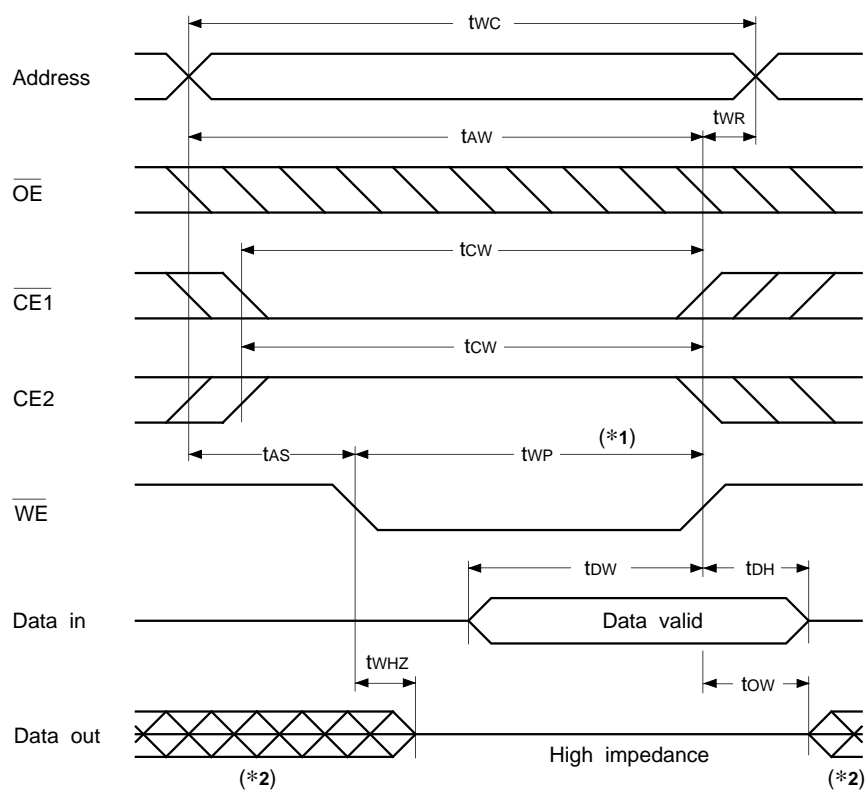
Timing Waveform

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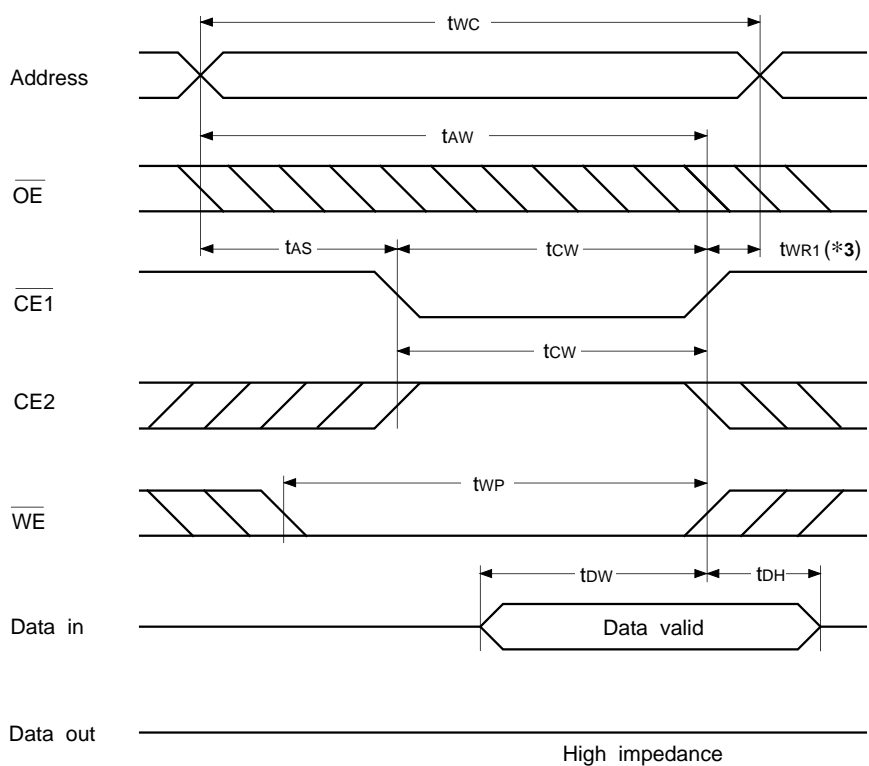
Address

Data out — Previous data valid — Data valid

(t_{RC}, t_{AA}, t_{OH})

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

Address

$\overline{CE1}$

CE2

$\overline{OE}$

Data out — High impedance — Data valid

(t_{RC}, t_{AA}, t_{CO1}, t_{LZ1}, t_{HZ1}, t_{CO2}, t_{LZ2}, t_{HZ2}, t_{OE}, t_{OLZ}, t_{OHZ})
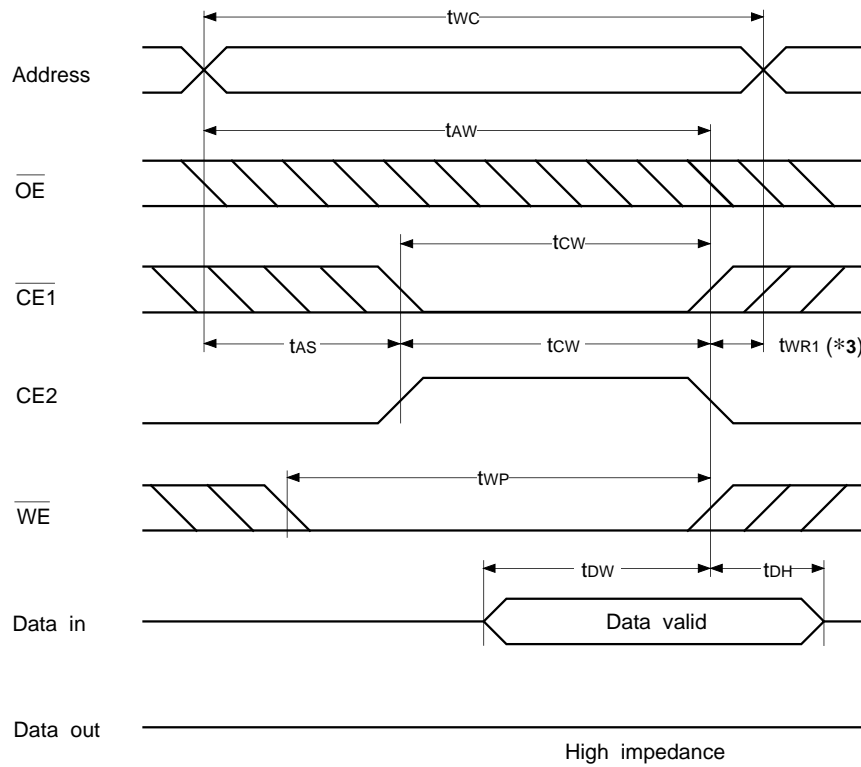
• **Write cycle (1) :** $\overline{\text{WE}}$ control

• **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.
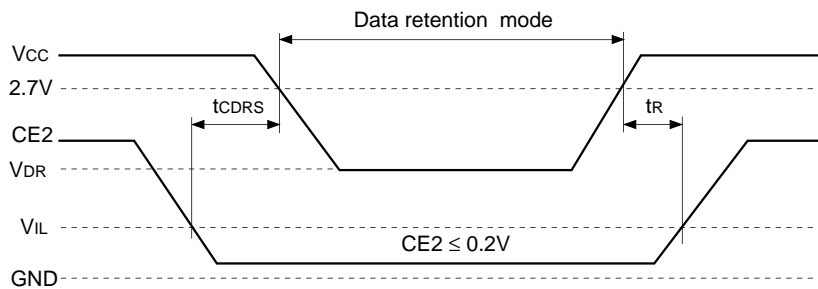
Data retention waveform

• **Low supply voltage data retention waveform (1)** ($\overline{CE1}$ contol)
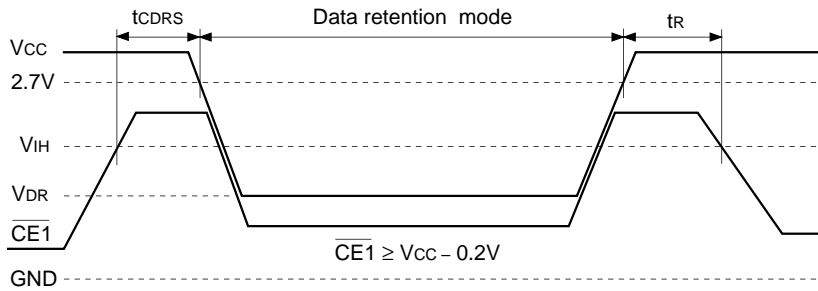
• **Low supply voltage data retention waveform (2)** (CE2 contol)

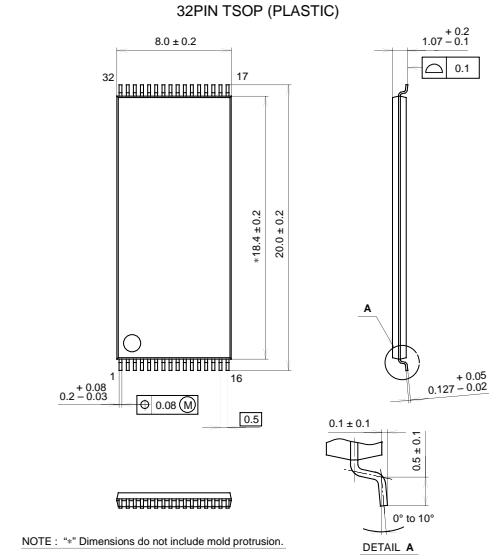**Data Retention Characteristics**   (Ta = −25 to +85°C)

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°C	—	—	12	µA
			−25 to +70°C	—	—	6	
			+25°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 $\overline{CE1}$ ≥ Vcc − 0.2V, CE2 ≥ Vcc − 0.2V ($\overline{CE1}$ control) or CE2 ≤ 0.2V (CE2 control)

*2 Vcc = 3.3V, Ta = 25°C

Package Outline   Unit: mm

CXK5T8512TM

32PIN TSOP (PLASTIC)

8.0 ± 0.2

32   17

$1.07 \begin{smallmatrix} +0.2 \\ -0.1 \end{smallmatrix}$

0.1

*18.4 ± 0.2   20.0 ± 0.2

A

1   16

$0.2 \begin{smallmatrix} +0.08 \\ -0.03 \end{smallmatrix}$

0.08 (M)

0.5

$0.127 \begin{smallmatrix} +0.05 \\ -0.02 \end{smallmatrix}$

0.1 ± 0.1

0.5 ± 0.1

0° to 10°

DETAIL **A**

NOTE : "∗" Dimensions do not include mold protrusion.

PACKAGE STRUCTURE

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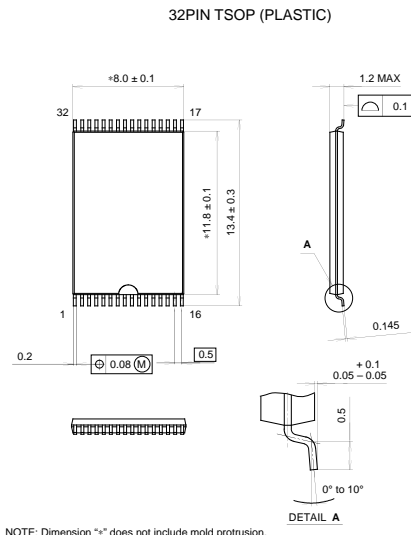
SONY CODE	TSOP-32P-L01
EIAJ CODE	TSOP032-P-0820
JEDEC CODE	————

CXK5T8512TN

32PIN TSOP (PLASTIC)

∗8.0 ± 0.1

32   17

1.2 MAX

0.1

*11.8 ± 0.1   13.4 ± 0.3

A

1   16

0.2

0.08 (M)

0.5

0.145

$0.05 \begin{smallmatrix} +0.1 \\ -0.05 \end{smallmatrix}$

0.5

0° to 10°

DETAIL **A**

NOTE: Dimension "∗" does not include mold protrusion.

PACKAGE STRUCTURE

PACKAGE MATERIAL	EPOXY RESIN
LEAD TREATMENT	SOLDER PLATING
LEAD MATERIAL	42 ALLOY
PACKAGE MASS	0.2g

SONY CODE	TSOP-32P-L02
EIAJ CODE	TSOP032-P-0813.4-C
JEDEC CODE	————