

TC55329P/J-17, TC55329P/J-20
TC55329P/J-25, TC55329P/J-35

32,768 WORD × 9 BIT CMOS STATIC RAM

DESCRIPTION

The TC55329P/J is a 294,912 bits high speed static random access memory organized as 32,768 words by 9 bits using CMOS technology, and operated from a single 5-volt supply. Toshiba's CMOS technology and advanced circuit form provide high speed feature.

The TC55329P/J has low power feature with device control using Chip Enable ($\overline{CE1}/\overline{CE2}$), and has Output Enable Input ($\overline{OE}$) for fast memory access. Also the device power at memory access is reduced by automatic power down circuit form.

The TC55329P/J is suitable for use in cache memory where high speed is required. All Inputs and Outputs are directly TTL compatible.

The TC55329P/J is packaged in a 32 pin standard DIP and SOJ with 300 mil width for high density surface assembly.

FEATURES

- Fast access time :

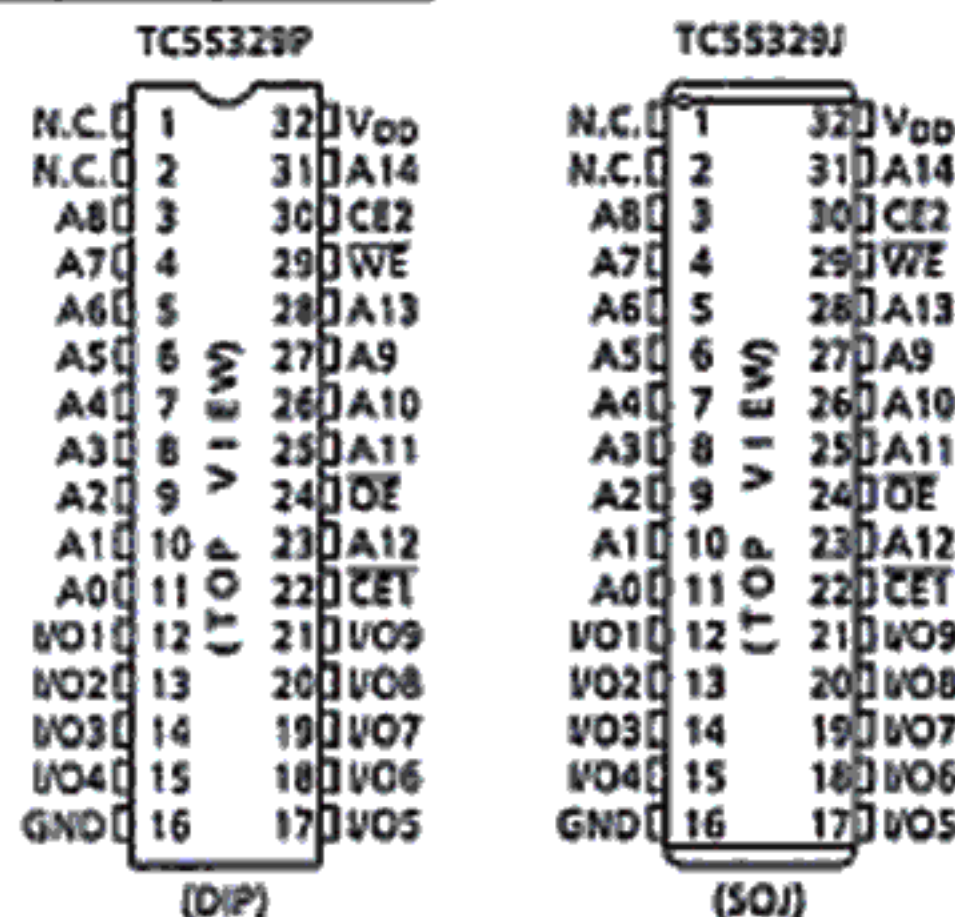
TC55329P/J-17	17ns(MAX.)
TC55329P/J-20	20ns(MAX.)
TC55329P/J-25	25ns(MAX.)
TC55329P/J-35	35ns(MAX.)
- Low power dissipation

Operation :	TC55329P/J-17	140mA(MAX.)
	TC55329P/J-20	140mA(MAX.)
	TC55329P/J-25	140mA(MAX.)
	TC55329P/J-35	120mA(MAX.)
Standby :		1mA(MAX.)
- 5V single power supply :

-17	: 5V±5%
-20/25/35	: 5V±10%
- Fully static operation
- All Inputs and Outputs : TTL compatible
- Output buffer control : $\overline{OE}$
- Package

32 pin plastic 300 mil DIP	: TC55329P
32 pin plastic 300 mil SOJ	: TC55329J

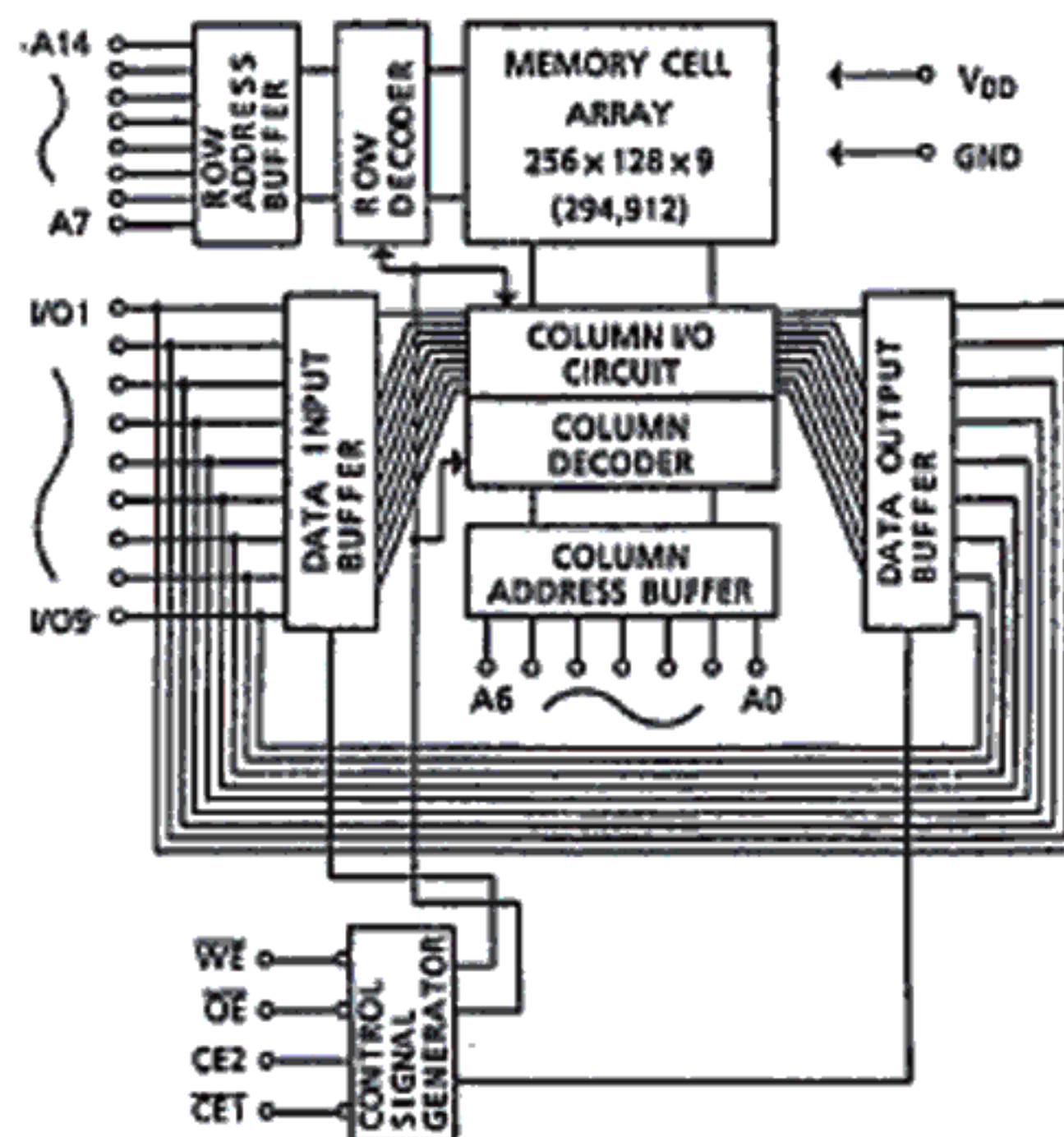
PIN CONNECTION



PIN NAMES

A0~A14	Address Inputs
VO1~VO9	Data Inputs/Outputs
$\overline{CE1}$, $\overline{CE2}$	Chip Enable Inputs
WE	Write Enable Input
$\overline{OE}$	Output Enable Input
VDD	Power (+5V)
GND	Ground
N.C.	No Connection

BLOCK DIAGRAM



MAXIMUM RATINGS

SYMBOL	ITEM	RATING	UNIT
V_{DD}	Power Supply Voltage	-0.5~7.0	V
V_{IH}	Input Voltage	-2.0~7.0	V
V_{IO}	Input/Output Voltage	-0.5~ $V_{DD}+0.5$	V
P_D	Power Dissipation	1.0	W
T_{solder}	Soldering Temperature · Time	260 · 10	°C · sec
T_{stg}	Storage Temperature	-65~150	°C
T_{opr}	Operating Temperature	-10~85	°C

DC RECOMMENDED OPERATING CONDITIONS ($T_a=0\sim70^\circ\text{C}$)

SYMBOL	PARAMETER	MIN.	TYP.	MAX.	UNIT
V_{DD}	Power Supply Voltage	-17	4.75	5.0	V
		-20/25/35	4.5	5.0	
V_{OH}	Input High Voltage	2.2	-	$V_{DD}+0.5$	V
V_{IL}	Input Low Voltage	-0.5*	-	0.8	V

* -3V Pulse Width : 10ns

DC and OPERATING CHARACTERISTICS ($T_a=0\sim70^\circ\text{C}$, -17: $V_{DD}=5V\pm5\%$, -20/25/35: $V_{DD}=5V\pm10\%$)

SYMBOL	PARAMETER	TEST CONDITION			MIN.	TYP.	MAX.	UNIT
I_L	Input Leakage Current	$V_{IN} = 0 \sim V_{DD}$			-	-	± 1	μA
I_{OH}	Output High Current	$V_{OH} = 2.4V$			-4	-	-	mA
I_{OL}	Output Low Current	$V_{OL} = 0.4V$			8	-	-	mA
I_{LO}	Output Leakage Current	$\overline{CE}T = V_{IH}$ or $CE2 = V_{IL}$ or $\overline{OE} = V_{IH}$ or $\overline{WE} = V_{IL}$ $V_{OUT} = 0 \sim V_{DD}$			-	-	± 1	μA
I_{DDO}	Operating Current	tcycle = Min cycle $\overline{CE}T = V_{IL}$ and $CE2 = V_{IH}$ Other Input = V_{IH}/V_{IL}	$V_{DD} = 5.25V$	-17	-	-	140	mA
			$V_{DD} = 5.5V$	-20	-	-	140	
				-25	-	-	140	
				-35	-	-	120	
I_{DD1}	Standby Current	tcycle = Min cycle $\overline{CE}T = V_{IH}$ or $CE2 = V_{IL}$ Other Input = V_{IH}/V_{IL}	$V_{DD} = 5.25V$	-17	-	-	20	mA
			$V_{DD} = 5.5V$	-20				
				-25				
				-35				
I_{DD2}		$\overline{CE}T = V_{DD} - 0.2V$ or $CE2 = 0.2V$ Other Input = $V_{DD} - 0.2V$ or $0.2V$			-	-	1	

CAPACITANCE ($T_a=25^\circ\text{C}$, $f=1.0\text{MHz}$)

SYMBOL	PARAMETER	TEST CONDITION	MAX.	UNIT
C_{IH}	Input Capacitance	$V_{IH}=GND$	6	pF
C_{OUT}	Output Capacitance	$V_{OUT}=GND$	8	pF

- Note : This parameter is periodically sampled and is not 100% tested.

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AC CHARACTERISTICS ($T_a = 0 \sim 70^\circ\text{C}$), -17: $V_{DD} = 5V \pm 5\%$, -20/25/35: $V_{DD} = 5V \pm 10\%$)

READ CYCLE

SYMBOL	PARAMETER	TC55329P/J-17		TC55329P/J-20		TC55329P/J-25		TC55329P/J-35		UNIT
		MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	
t_{RC}	Read Cycle Time	17	-	20	-	25	-	35	-	ns
t_{ACC}	Address Access Time	-	17	-	20	-	25	-	35	
t_{CQ1}	CE1 Access Time	-	17	-	20	-	25	-	35	
t_{CQ2}	CE2 Access Time	-	17	-	20	-	25	-	35	
t_{OS}	OE Access Time	-	9	-	10	-	12	-	15	
t_{OH}	Output Data Hold Time from Address Change	5	-	5	-	5	-	5	-	
t_{COE}	Output Enable Time from CE1 or CE2	5	-	5	-	5	-	5	-	
t_{ODD}	Output Disable Time from CE1 or CE2	-	10	-	10	-	10	-	15	
t_{OES}	Output Enable Time from OE	0	-	0	-	0	-	0	-	
t_{ODD}	Output Disable Time from OE	-	8	-	8	-	10	-	15	
t_{PU}	Chip Selection to Power Up Time	0	-	0	-	0	-	0	-	ns
t_{PD}	Chip Deselection to Power Down Time	-	17	-	20	-	25	-	35	

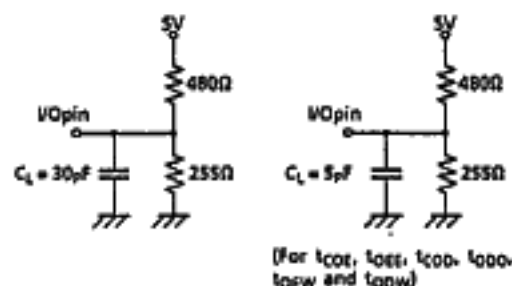
WRITE CYCLE

SYMBOL	PARAMETER	TC55329P/J-17		TC55329P/J-20		TC55329P/J-25		TC55329P/J-35		UNIT
		MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	
t_{WC}	Write Cycle Time	17	-	20	-	25	-	35	-	ns
t_{CW}	Chip Enable to End of Write	13	-	13	-	15	-	20	-	
t_{AS}	Address Set Up Time	0	-	0	-	0	-	0	-	
t_{WP}	Write Pulse Width	13	-	13	-	15	-	20	-	
t_{WR}	Write Recovery Time	0	-	0	-	0	-	0	-	
t_{DS}	Data Set Up Time	10	-	10	-	12	-	15	-	
t_{DH}	Data Hold Time	0	-	0	-	0	-	0	-	
t_{OW}	Output Enable Time from WE	0	-	0	-	0	-	0	-	
t_{ODW}	Output Disable Time from WE	-	8	-	8	-	10	-	15	

AC TEST CONDITIONS

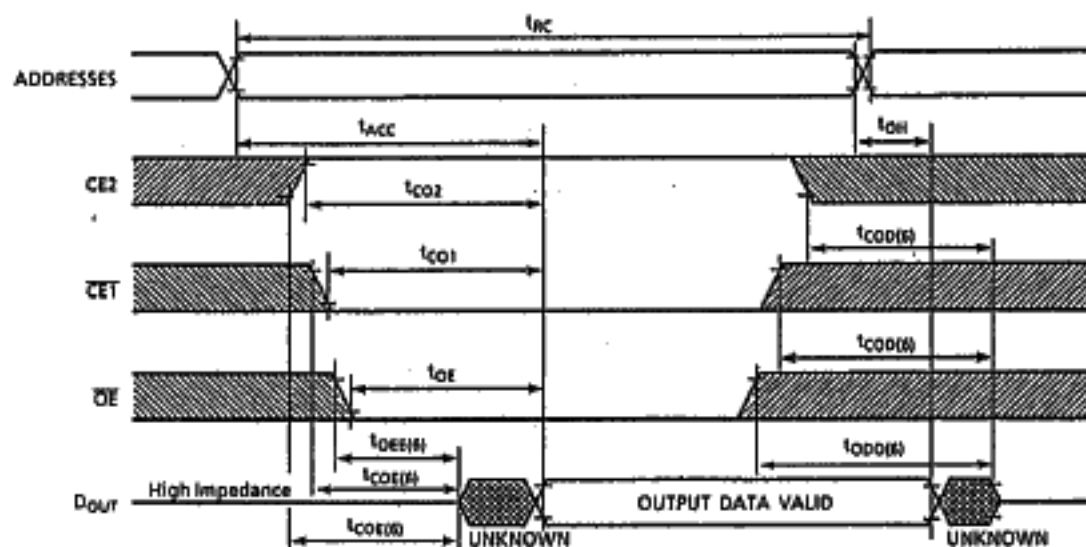
Input Pulse Levels	3.0V/0.0V
Input Pulse Rise and Fall Time	3ns
Input Timing Measurement Reference Levels	2.2V/0.8V
Output Timing Measurement Reference Levels	2.0V/0.8V
Output Load	Fig.1

Fig.1

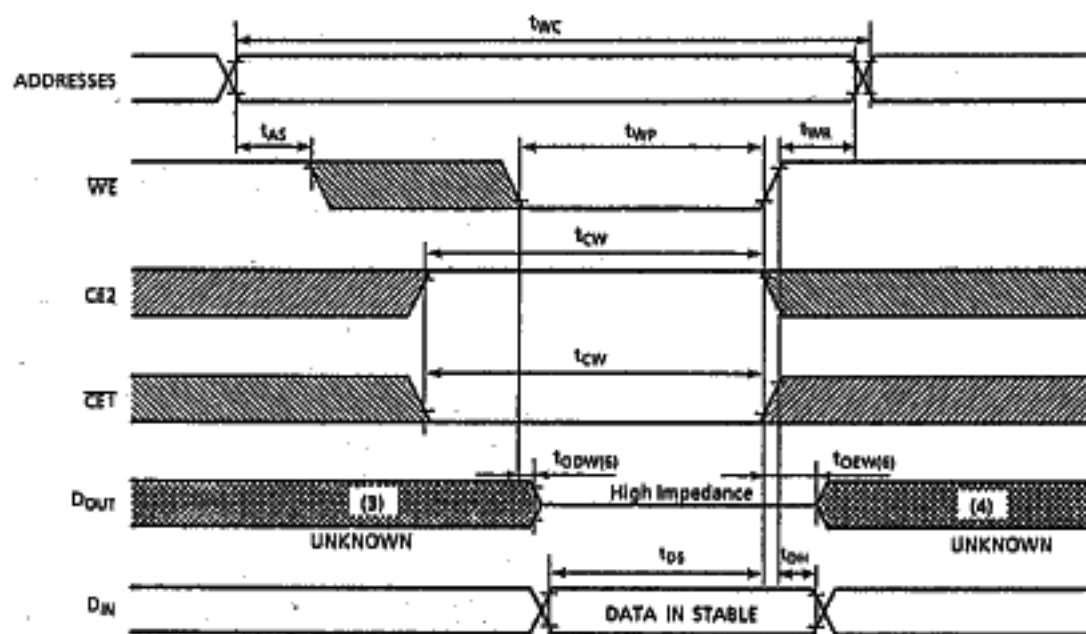


TIMING WAVEFORMS

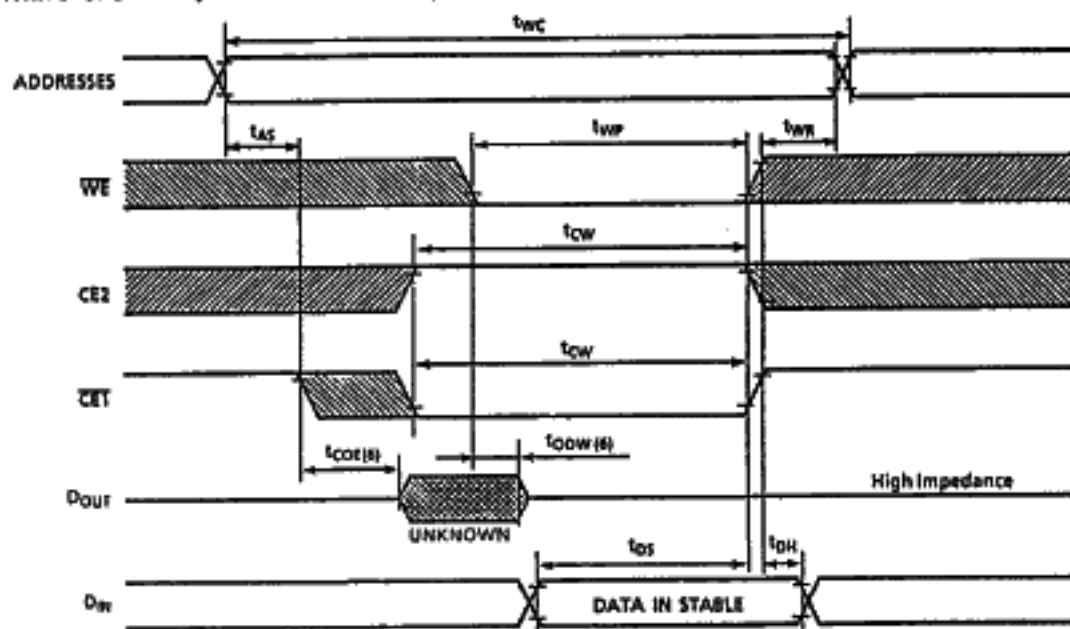
READ CYCLE (2)



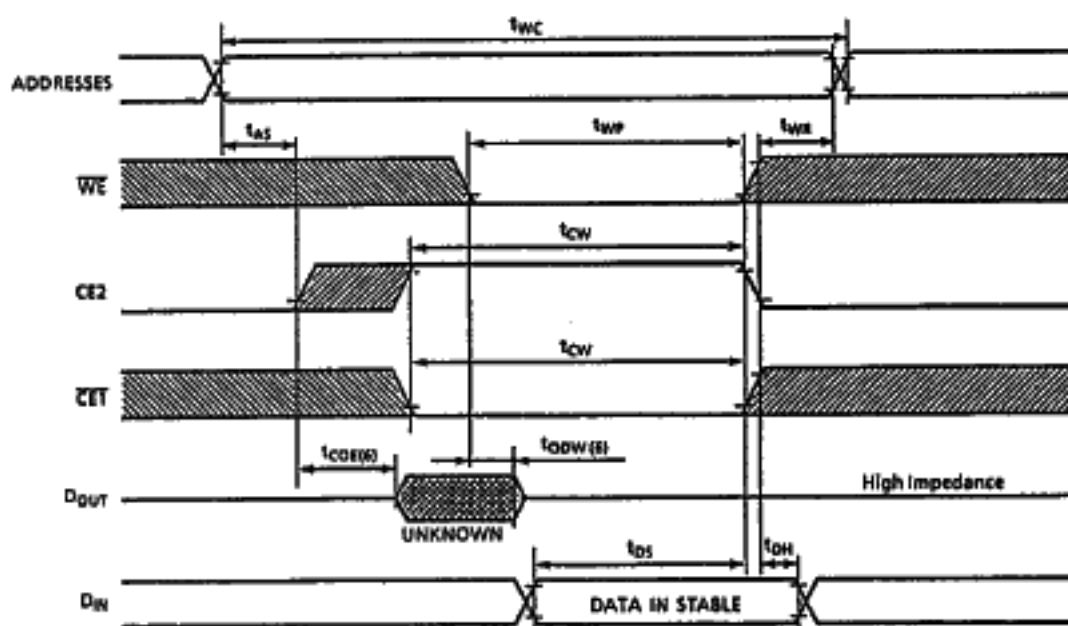
WRITE CYCLE1 (5) (WE Controlled Write)



WRITE CYCLE 2 (3) (CET Controlled Write)



WRITE CYCLE 3 (3) (CE2 Controlled Write)



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NOTE: 1. The operating temperature (T_a) is guaranteed with transverse air flow exceeding 400 linear feet per minute.

2. $\overline{WE}$ is High for Read Cycle.

3. Assuming that $\overline{CE1}$ Low transition or $CE2$ High transition occurs coincident with or after $\overline{WE}$ Low transition, Outputs remain in a high impedance state.

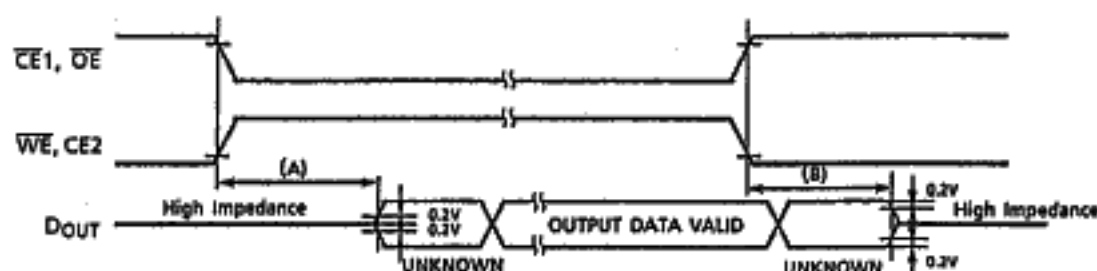
4. Assuming that $\overline{CE1}$ High transition or $CE2$ Low transition occurs coincident with or prior to $\overline{WE}$ High transition, Outputs remain in a high impedance state.

5. Assuming that $\overline{OE}$ is High for Write Cycle, Outputs are in a high impedance state during this period.

6. These parameters are specified as follows and measured by using the load shown in Fig.1.

(A) t_{COE} , t_{OEE} , $t_{OE\overline{W}}$ Output Enable Time

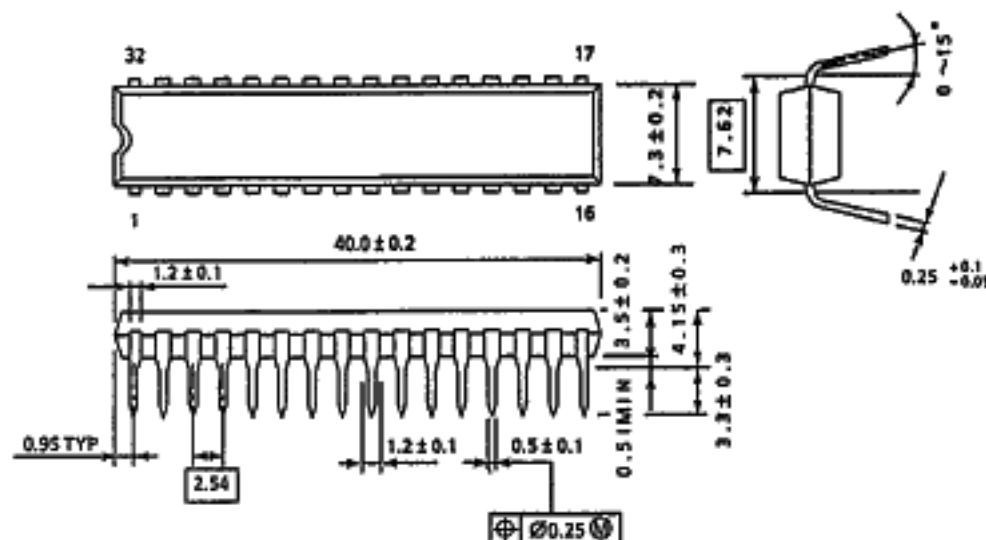
(B) t_{COD} , t_{ODO} , $t_{OD\overline{W}}$ Output Disable Time



OUTLINE DRAWINGS

Plastic DIP (DIP32-P-300)

UNIT in mm

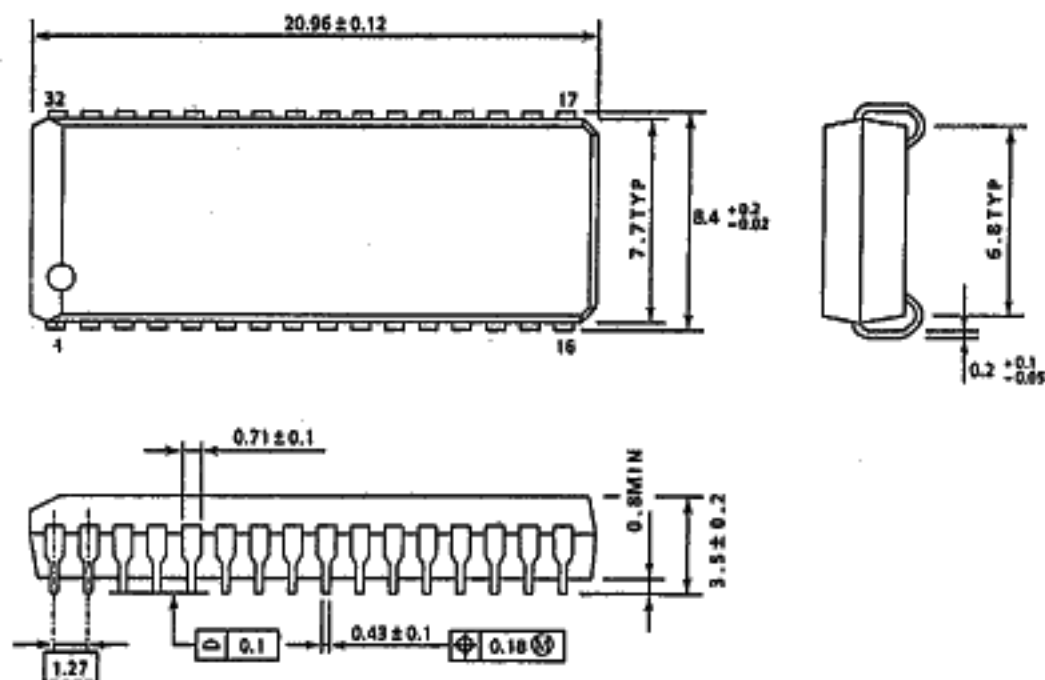


Note: Package width and length do not include mold protrusion, allowable mold protrusion is 0.15mm.

OUTLINE DRAWINGS

Plastic SOJ (SOJ32-P-300)

UNIT in mm



Note : Package width and length do not include mold protrusion, allowable mold protrusion is 0.15mm