

16,384 WORD × 4 BIT CMOS STATIC RAM

**DESCRIPTION**

The TC55417P/J-H is a 65,536 bit high speed static random access memory organized as 16,384 words by 4 bits using CMOS technology, and operated from a single 5-volt supply. Toshiba's high performance device technology provides both high speed and low power features with a maximum access time of 15ns/20ns/25ns/35ns and maximum operating current of 120mA/100mA/100mA/80mA at minimum cycle time.

The TC55417P/J-H also features an automatic stand-by mode. When deselected by Chip Enable (CE), the operating current is reduced to 1mA.

The TC55417P/J-H is suitable for use in cache memory and high speed storage, where high speed/high density are required.

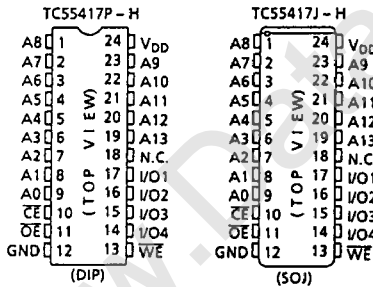
The TC55417P/J-H is packaged in a 24 pin standard plastic DIP and a 24 pin plastic SOJ, with 0.3 inch width for high density assembly.

The TC55417P/J-H is fabricated with ion implanted CMOS silicon gate MOS technology for high performance and high reliability.

**FEATURES**

- Fast access time :
  - TC55417P/J-15H 15ns(MAX.)
  - TC55417P/J-20H 20ns(MAX.)
  - TC55417P/J-25H 25ns(MAX.)
  - TC55417P/J-35H 35ns(MAX.)
- 5V single power supply : 5V±10%
- Fully static operation
- Directly TTL compatible :
  - All Input and Output
- Low power dissipation :
  - Operation TC55417P/J-15H 120mA(MAX.)
  - TC55417P/J-20H 100mA(MAX.)
  - TC55417P/J-25H 100mA(MAX.)
  - TC55417P/J-35H 80mA(MAX.)
  - Standby 1mA(MAX.)
- Output buffer control : OE
- Package TC55417P-H : DIP24-P-300B  
 TC55417J-H : SOJ24-P-300A

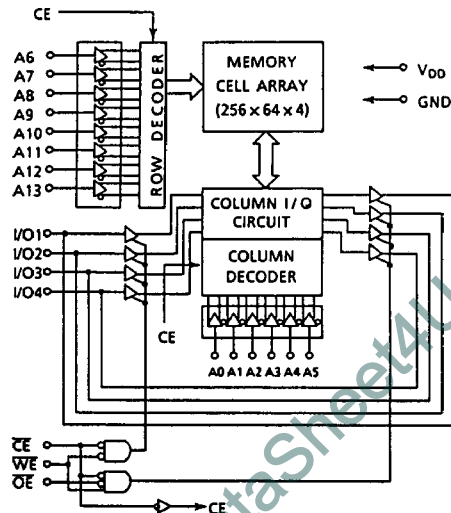
**PIN CONNECTION**



**PIN NAMES**

A0 ~ A13	Address Inputs
I/O1 ~ I/O4	Data Input/Output
CE	Chip Enable Input
WE	Write Enable Input
OE	Output Enable Input
V <sub>DD</sub>	Power (+ 5V)
GND	Ground
N.C.	No Connection

**BLOCK DIAGRAM**



# TC55417P/J-15H, TC55417P/J-20H TC55417P/J-25H, TC55417P/J-35H

## MAXIMUM RATINGS

SYMBOL	ITEM	RATING	UNITS
V <sub>DD</sub>	Power Supply Voltage	-0.5~7.0	V
V <sub>IN</sub>	Input Voltage	-2.0~7.0	V
V <sub>OUT</sub>	Output Voltage	-0.5~V <sub>DD</sub> +0.5	V
P <sub>D</sub>	Power Dissipation	650	mW
T <sub>solder</sub>	Soldering Temperature · Time	260 · 10	°C · sec
T <sub>strg</sub>	Storage Temperature	-65~150	°C
T <sub>opr</sub>	Operating Temperature	-10~85	°C

## DC RECOMMENDED OPERATING CONDITIONS (T<sub>a</sub> = 0~70°C)

SYMBOL	PARAMETER	MIN.	TYP.	MAX.	UNIT
V <sub>DD</sub>	Power Supply Voltage	4.5	5.0	5.5	V
V <sub>IH</sub>	Input High Voltage	2.2	-	V <sub>DD</sub> +0.5	V
V <sub>IL</sub>	Input Low Voltage	*-3.0	-	0.8	V

\* Pulse width ≤ 10ns, DC: -0.5V (min)

## DC CHARACTERISTICS (T<sub>a</sub> = 0~70°C, V<sub>DD</sub> = 5V ± 10%)

SYMBOL	PARAMETER	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
I <sub>IL</sub>	Input Leakage Current	V <sub>IN</sub> = 0~V <sub>DD</sub>	-	-	± 1	μA	
I <sub>OH</sub>	Output High Current	V <sub>OH</sub> = 2.4V	-4	-	-	mA	
I <sub>OL</sub>	Output Low Current	V <sub>OL</sub> = 0.4V	8	-	-	mA	
I <sub>LO</sub>	Output Leakage Current	CE = V <sub>IH</sub> or OE = V <sub>IH</sub> or WE = V <sub>IL</sub> V <sub>OUT</sub> = 0~V <sub>DD</sub>	-	-	± 1	μA	
I <sub>DDO</sub>	Operating Current	V <sub>DD</sub> = 5.5V, t <sub>cycle</sub> = Min cycle CE = V <sub>IL</sub> , I <sub>OUT</sub> = 0mA Other Input = V <sub>IH</sub> /V <sub>IL</sub>	-15H	-	-	120	mA
			-20H	-	-	100	
			-25H	-	-	100	
			-35H	-	-	80	
I <sub>DDs1</sub>	Standby Current	V <sub>DD</sub> = 5.5V, t <sub>cycle</sub> = Min cycle CE = V <sub>IH</sub> , Other Input = V <sub>IH</sub> /V <sub>IL</sub>	-	-	25	mA	
			I <sub>DDs2</sub>	CE = V <sub>DD</sub> - 0.2V Other Input = V <sub>DD</sub> - 0.2V or 0.2V	-		-

## CAPACITANCE (T<sub>a</sub> = 25°C)

SYMBOL	PARAMETER	TEST CONDITION	MAX.	UNIT
C <sub>IN</sub>	Input Capacitance	V <sub>IN</sub> = GND	5	pF
C <sub>OUT</sub>	Output Capacitance	V <sub>OUT</sub> = GND	7	pF

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

# TC55417P/J-15H, TC55417P/J-20H TC55417P/J-25H, TC55417P/J-35H

AC CHARACTERISTICS ( $T_a = 0 \sim 70^\circ\text{C}$  <sup>(4)</sup>,  $V_{DD} = 5V \pm 10\%$ )

## READ CYCLE

SYMBOL	PARAMETER	TC55417P/J-15H		TC55417P/J-20H		TC55417P/J-25H		TC55417P/J-35H		UNIT
		MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	
$t_{RC}$	Read Cycle Time	15	-	20	-	25	-	35	-	ns
$t_{ACC}$	Address Access Time	-	15	-	20	-	25	-	35	ns
$t_{CO}$	Chip Enable Access Time	-	15	-	20	-	25	-	35	ns
$t_{OE}$	Output Enable to Output Valid	-	9	-	10	-	10	-	10	ns
$t_{COE}$	Output Enable Time from $\overline{CE}$	5	-	5	-	5	-	5	-	ns
$t_{COD}$	Output Disable Time from $\overline{CE}$	-	6	-	6	-	6	-	6	ns
$t_{OEE}$	Output Enable Time from $\overline{OE}$	0	-	0	-	0	-	0	-	ns
$t_{OOD}$	Output Disable Time from $\overline{OE}$	-	5	-	5	-	5	-	5	ns
$t_{OH}$	Output Data Hold Time	5	-	5	-	5	-	5	-	ns
$t_{PU}$	Power Up Time	0	-	0	-	0	-	0	-	ns
$t_{PD}$	Power Down Time	-	15	-	20	-	25	-	35	ns

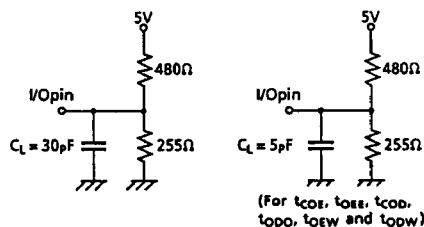
## WRITE CYCLE

SYMBOL	PARAMETER	TC55417P/J-15H		TC55417P/J-20H		TC55417P/J-25H		TC55417P/J-35H		UNIT
		MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	
$t_{WC}$	Write Cycle Time	15	-	20	-	25	-	35	-	ns
$t_{WP}$	Write Pulse Width	12	-	13	-	13	-	13	-	ns
$t_{CW}$	Chip Enable to End of Write	12	-	13	-	13	-	13	-	ns
$t_{AS}$	Address Set Up Time	0	-	0	-	0	-	0	-	ns
$t_{WR}$	Write Recovery Time	0	-	0	-	0	-	0	-	ns
$t_{OEW}$	Output Enable Time from $\overline{WE}$	0	-	0	-	0	-	0	-	ns
$t_{OOD}$	Output Disable Time from $\overline{WE}$	-	6	-	6	-	6	-	6	ns
$t_{DS}$	Data Set Up Time	9	-	10	-	10	-	10	-	ns
$t_{DH}$	Data Hold Time	0	-	0	-	0	-	0	-	ns

## AC TEST CONDITIONS

Input Pulse Levels	3.0V/0.0V
Input 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	See Fig. 1

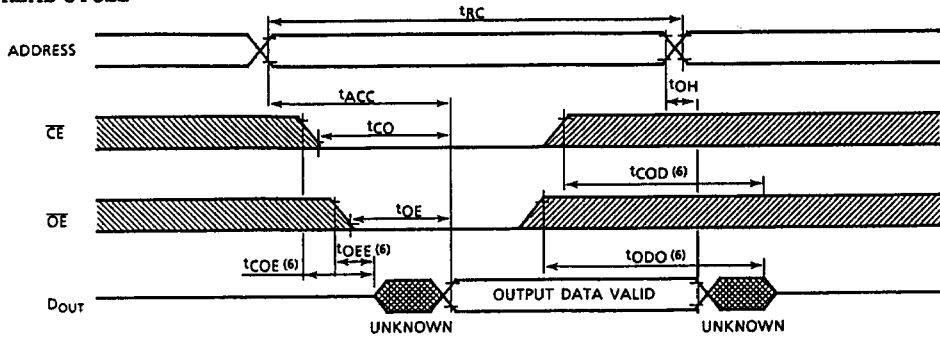
Fig. 1



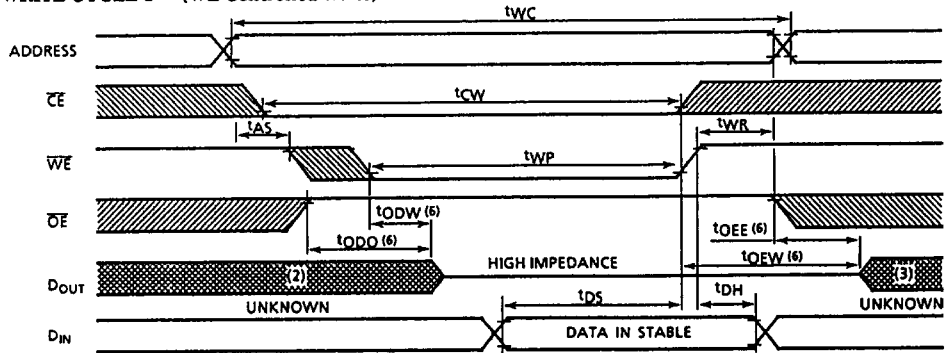
# TC55417P/J-15H, TC55417P/J-20H TC55417P/J-25H, TC55417P/J-35H

## TIMING WAVEFORMS

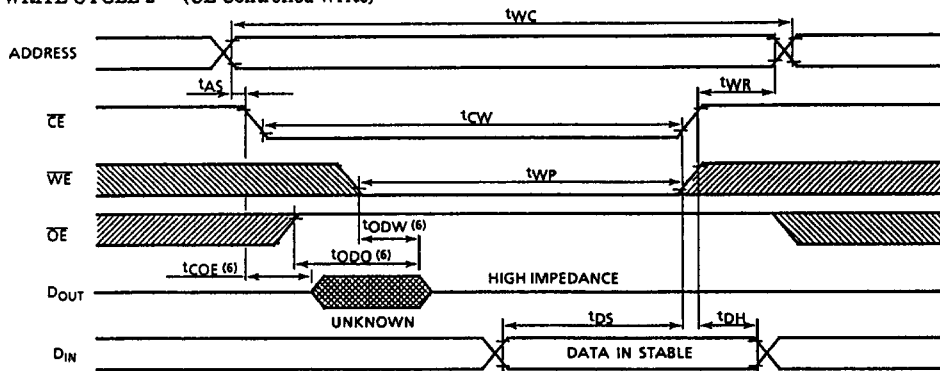
### READ CYCLE <sup>(1)</sup>



### WRITE CYCLE 1 <sup>(6)</sup> (WE Controlled Write)

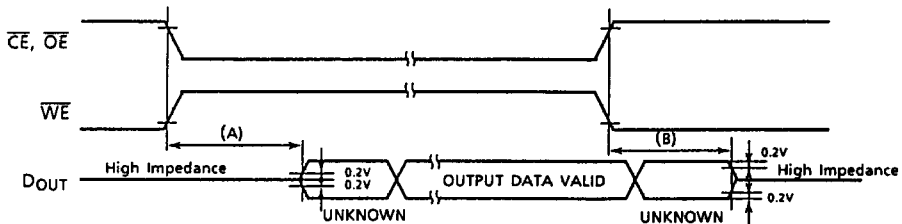


### WRITE CYCLE 2 <sup>(6)</sup> (CE Controlled Write)



# TC55417P/J—15H, TC55417P/J—20H TC55417P/J—25H, TC55417P/J—35H

- Note: 1.  $\overline{WE}$  is High for Read Cycle.
2. Assuming that  $\overline{CE}$  Low transition occurs coincident with or after  $\overline{WE}$  Low transition, outputs remain in a high impedance state.
3. Assuming that  $\overline{CE}$  High transition occurs coincident with or prior to  $\overline{WE}$  High transition, outputs remain in a high impedance state.
4. The Operating temperature ( $T_a$ ) is guaranteed with transverse air flow exceeding 400 linear feet per minute.
5. The  $\overline{OE}$  input can be held on low ( $V_{IL}$ ) in write cycle.
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

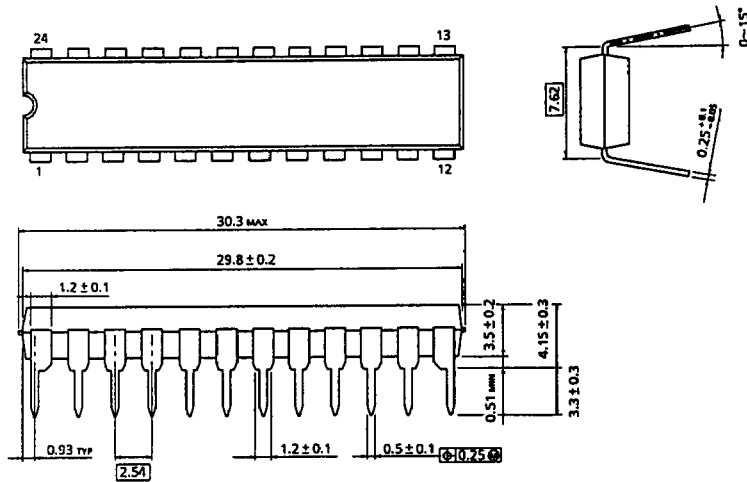


# TC55417P/J-15H, TC55417P/J-20H TC55417P/J-25H, TC55417P/J-35H

## OUTLINE DRAWINGS

Plastic DIP (DIP-24-300B)

Unit in mm



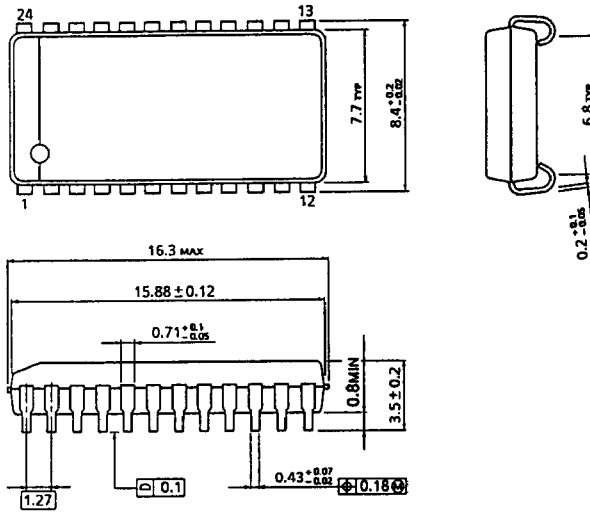
Weight : 1.72 g (TYP)

# TC55417P/J-15H, TC55417P/J-20H TC55417P/J-25H, TC55417P/J-35H

## OUTLINE DRAWINGS

Plastic SOJ (SOJ24-P-300A)

Unit in mm



Weight : 0.72 g (TYP)