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 technolgy 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 ($\overline{CE}$), 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 :

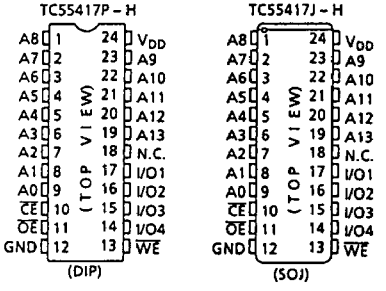
TC55417P/J-15H	15ns(MAX.)
TC55417P/J-20H	20ns(MAX.)
TC55417P/J-25H	25ns(MAX.)
TC55417P/J-35H	35ns(MAX.)

- 5V single power supply : 5V±10%
- Fully static operation
- Diractly 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.)

- Outpot buffer control : $\overline{OE}$
- Package TC55417P-H : DIP24-P-300B
  TC55417J-H : SOJ24-P-300A

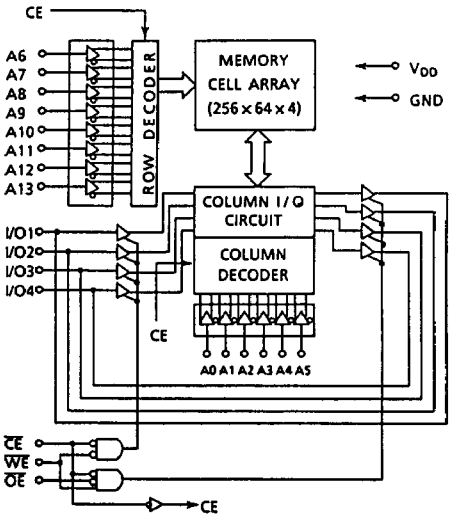
PIN CONNECTION



PIN NAMES

A0 ~ A13	Address Inputs
I/O1 ~ I/O4	Data Input/Output
$\overline{CE}$	Chip Enable Input
$\overline{WE}$	Write Enable Input
$\overline{OE}$	Output Enable Input
V_{DD}	Power (+5V)
GND	Ground
N.C.	No Connection

BLOCK DIAGRAM



MAXIMUM RATINGS

SYMBOL	ITEM	RATING	UNITS
V_{DD}	Power Supply Voltage	-0.5~7.0	V
V_{IN}	Input Voltage	-2.0~7.0	V
V_{OUT}	Output Voltage	-0.5~V_{DD}+0.5	V
P_D	Power Dissipation	650	mW
Tsolder	Soldering Temperature · Time	260 · 10	°C · sec
Tstrg	Storage Temperature	-65~150	°C
Topr	Operating Temperature	-10~85	°C

DC RECOMMENDED OPERATING CONDITIONS (Ta = 0~70°C)

SYMBOL	PARAMETER	MIN.	TYP.	MAX.	UNIT
V_{DD}	Power Supply Voltage	4.5	5.0	5.5	V
V_{IH}	Input High Voltage	2.2	-	V_{DD}+0.5	V
V_{IL}	Input Low Voltage	*-3.0	-	0.8	V

* Pulse width ≦10ns, DC: -0.5V (min)

DC CHARACTERISTICS (Ta = 0~70°C, V_{DD} = 5V ± 10%)

SYMBOL	PARAMETER	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
I_{IL}	Input Leakage Current	V_{IN} = 0~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	$\overline{CE}$ = V_{IH} or $\overline{OE}$ = V_{IH} or $\overline{WE}$ = V_{IL} V_{OUT} = 0~V_{DD}		-	-	±1	μA
I_{DDO}	Operating Current	V_{DD} = 5.5V, tcycle = Min cycle $\overline{CE}$ = V_{IL}, I_{OUT} = 0mA Other Input = V_{IH}/V_{IL}	-15H	-	-	120	mA
			-20H	-	-	100	
			-25H	-	-	100	
			-35H	-	-	80	
I_{DDS1}	Standby Current	V_{DD} = 5.5V, tcycle = Min cycle $\overline{CE}$ = V_{IH}, Other Input = V_{IH}/V_{IL}		-	-	25	mA
I_{DDS2}		$\overline{CE}$ = V_{DD} - 0.2V Other Input = V_{DD} - 0.2V or 0.2V		-	-	1	

CAPACITANCE (Ta = 25°C)

SYMBOL	PARAMETER	TEST CONDITION	MAX.	UNIT
C_{IN}	Input Capacitance	V_{IN} = GND	5	pF
C_{OUT}	Output Capacitance	V_{OUT} = GND	7	pF

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

AC CHARACTERISTICS (Ta = 0~70°C [4], V_{DD} = 5V ± 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_{ODO}	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

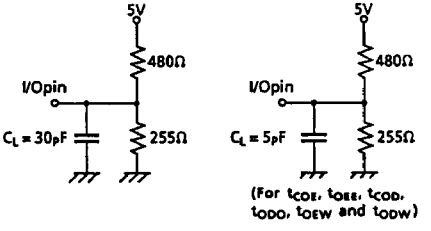
WRITE CYCLE

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_{ODW}	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

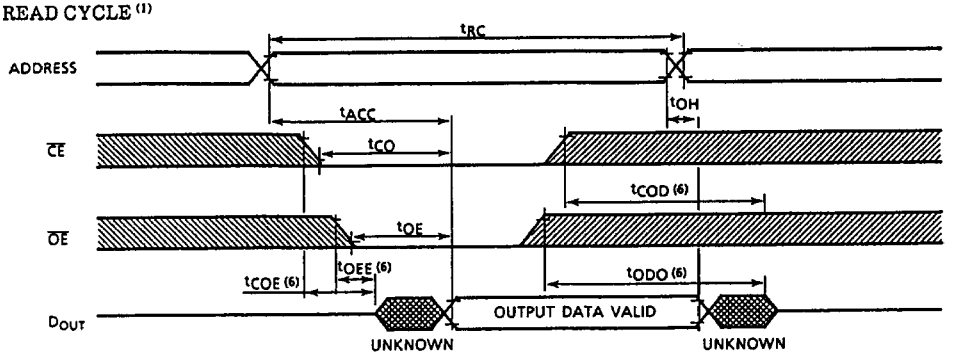
Input Pulse Levels	3.0V/0.0V
Input Rise and Fall Time	3ns
Input Timing Measurement Reference Levels	2.2V/0.8V
Output Timing Measurement Reference Levels	2.0V/0.8V
Output Load	See Fig. 1

Fig. 1

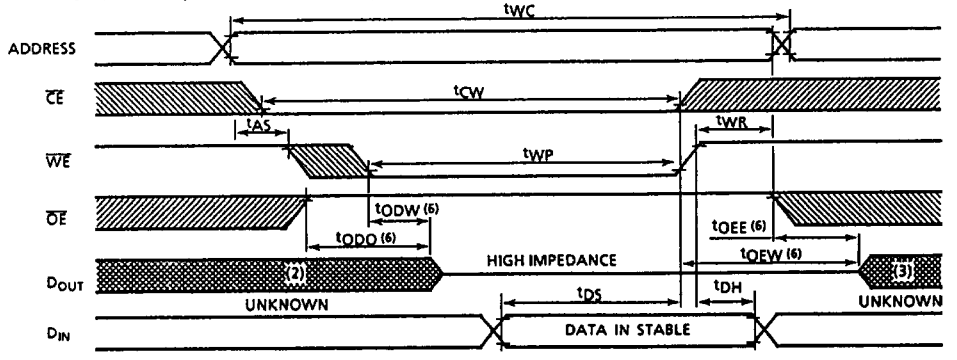


TIMING WAVEFORMS

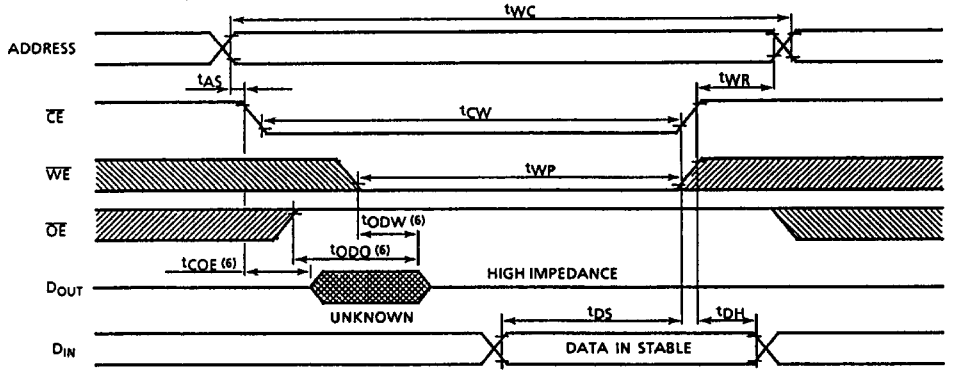
READ CYCLE [1]



WRITE CYCLE 1 [5] ($\overline{WE}$ Controlled Write)



WRITE CYCLE 2 [5] ($\overline{CE}$ Controlled Write)



Note: 1. $\overline{WE}$ is High for Read Cycle.

2. Assuming that $\overline{CE}$ Low transition occures 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.

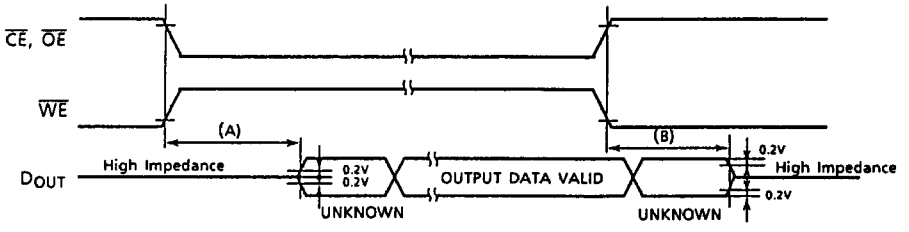
4. The Operating temperature (Ta) is guaranteed with transverse air flow exceeding 400 linear feet per minute.

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_{OEW} ..... Output Enable Time

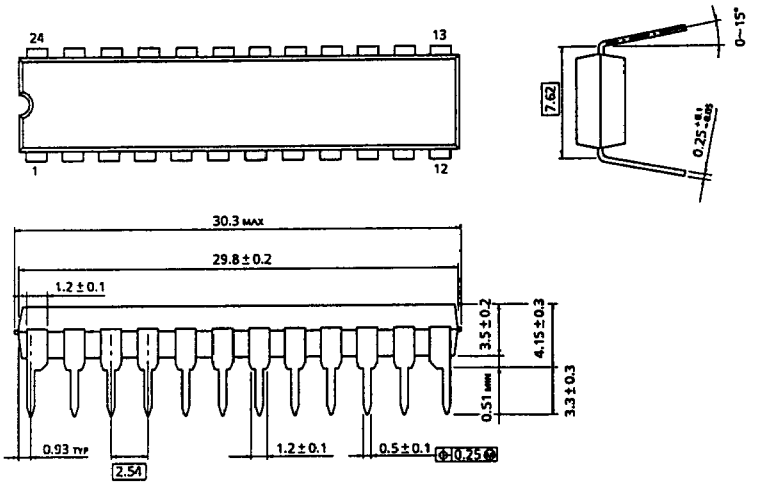
   (B) t_{COD}, t_{ODO}, t_{ODW} ..... Output Disable Time



OUTLINE DRAWINGS

Plastic DIP (DIP−24−300B)

Unit in mm

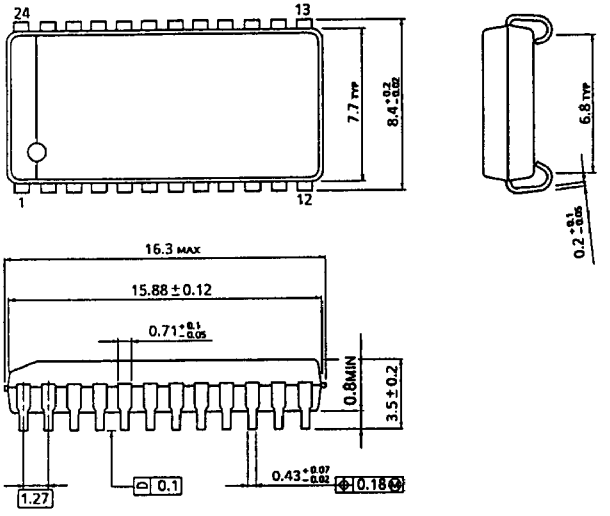


Weight : 1.72 g (TYP)

OUTLINE DRAWINGS

Plastic SOJ (SOJ24-P-300A)

Unit in mm



Weight : 0.72 g (TYP)