

TOSHIBA MOS MEMORY PRODUCT

16,384 WORD × 4 BIT CMOS STATIC RAM
SILICON GATE CMOS

TC55417P-35
TC55417P-45

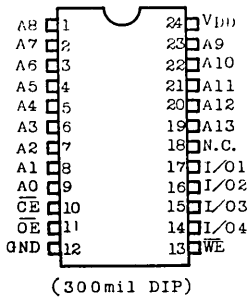
DESCRIPTION

The TC55417P 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 35ns/45ns and maximum operating current of 80mA/60mA at minimum cycle time. The TC55417P also features an automatic stand-by mode. When deselected by Chip Enable (\overline{CE}), the operating current is reduced to 10mA. The TC55417P is suitable for use in cache memory and high speed storage, where high speed/high density are required. The TC55417P is molded in a 24 pin standard plastic package with 0.3 inch width for high density assembly. The TC55417P is fabricated with ion implanted CMOS silicon gate MOS technology for high performance and high reliability.

FEATURES

- Fast access time : TC55417P-35 35ns (Max.)
TC55417P-45 45ns (Max.)
- Low power dissipation: Operation TC55417P-35 80mA (Max.)
TC55417P-45 60mA (Max.)
Standby 10mA (Max.)
- 5V single power supply
- Fully static operation
- Directly TTL compatible: All Input and Output
- Output buffer control : \overline{OE}
- Package : 24 pins standard plastic package, 300 mil width.

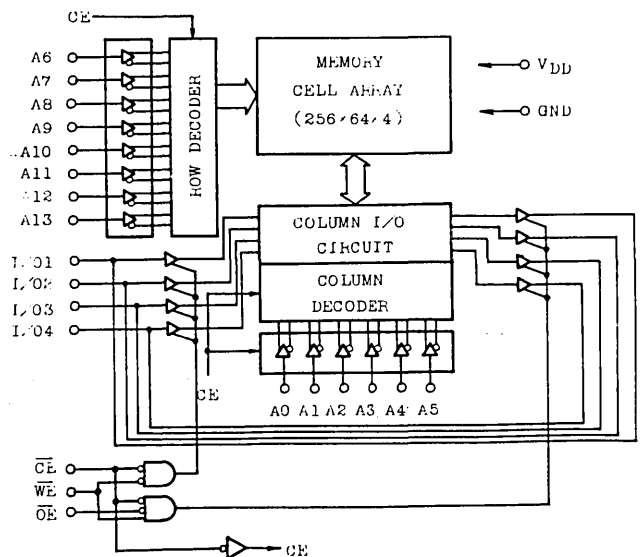
PIN CONNECTION



PIN NAMES

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

BLOCK DIAGRAM



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MAXIMUM RATINGS

SYMBOL	ITEM	RATING	UNIT
V _{DD}	Power Supply Voltage	-0.3 ~ 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
T _{solder}	Soldering Temperature · Time	260 · 10	°C·sec
T _{stg}	Storage Temperature	-65 ~ 150	°C
T _{opr}	Operating Temperature	0 ~ 70	°C

D.C. RECOMMENDED OPERATING CONDITIONS

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} +0.3	V
V _{IL}	Input Low Voltage	-0.3	-	0.8	V

D.C. and OPERATING CHARACTERISTICS (T_a=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}	-	-	±1.0	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 $\overline{WE}=V_{IL}$ V _{OUT} =0 ~ V _{DD}	-	-	±1.0	μA
I _{DDO}	Operating Current	V _{DD} =5.5V t _{cycle} =Min cycle $\overline{CE}=V_{IL}$ Other Input=V _{IH} /V _{IL}	-35	-	80	mA
			-45	-	60	
I _{DDS1}	Standby Current	V _{DD} =5.5V, t _{cycle} =Min cycle $\overline{CE}=V_{IH}$, Other Input=V _{IH} /V _{IL}	-	-	20	mA
I _{DDS2}		$\overline{CE}=V_{DD}-0.2V$ Other Input=V _{DD} -0.2V or 0.2V	-	-	1	

CAPACITANCE (T_a=25°C)

SYMBOL	PARAMETER	TEST CONDITION	MAX.	UNIT
C _{IN}	Input Capacitance	V _{IN} =GND	10	pF
C _{OUT}	Output Capacitance	V _{OUT} =GND	10	pF

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

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A.C. CHARACTERISTICS (Ta=0 ~ 70°C, VDD=5V±10%)

Read Cycle

SYMBOL	PARAMETER	TC55417P-35		TC55417P-45		UNIT
		MIN.	MAX.	MIN.	MAX.	
t _{RC}	Read Cycle Time	35	-	45	-	ns
t _{ACC}	Address Access Time	-	35	-	45	ns
t _{CO}	Chip Enable Access Time	-	35	-	45	ns
t _{OE}	Output Enable to Output Valid	-	20	-	20	ns
t _{COE}	Chip Enable to Output in Low-Z	0	-	0	-	ns
t _{COD}	Chip Enable to Output in High-Z	-	15	-	20	ns
t _{OEE}	Output Enable to Output in Low-Z	0	-	0	-	ns
t _{ODO}	Output Disable to Output in High-Z	-	15	-	15	ns
t _{OH}	Output Data Hold Time	5	-	5	-	ns

Write Cycle

SYMBOL	PARAMETER	TC55417P-35		TC55417P-45		UNIT
		MIN.	MAX.	MIN.	MAX.	
t _{WC}	Write Cycle Time	35	-	45	-	ns
t _{WP}	Write Pulse Width	30	-	35	-	ns
t _{CW}	Chip Enable to End of Write	30	-	35	-	ns
t _{AS}	Address Set Up Time	0	-	0	-	ns
t _{WR}	Write Recovery Time	0	-	0	-	ns
t _{ODW}	\overline{WE} to Output High-Z	-	15	-	15	ns
t _{OEW}	\overline{WE} to Output Low-Z	0	-	0	-	ns
t _{DS}	Data Set Up Time	15	-	20	-	ns
t _{DH}	Data Hold Time	0	-	0	-	ns

A.C. TEST CONDITIONS

Input Pulse Levels	0.6V, 2.4V
Input Rise and Fall Time	5ns
Input and Output Timing Reference Levels	0.8V, 2.0V
Output Load	See Fig. 1

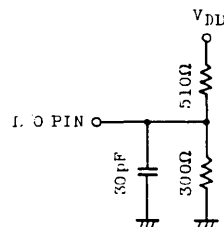


Fig. 1 OUTPUT LOAD

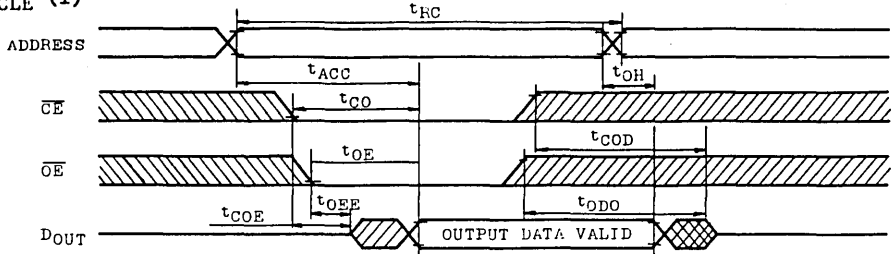
Note: In all condition, t_{COD} max is less than t_{COE} min both for a given device and from device to device.

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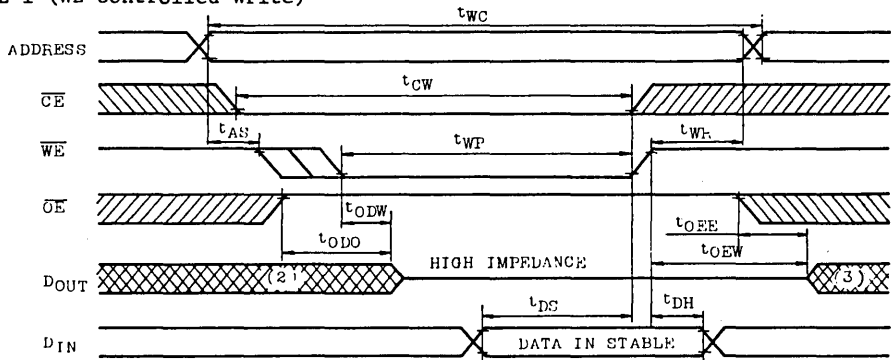
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TIMING WAVEFORMS

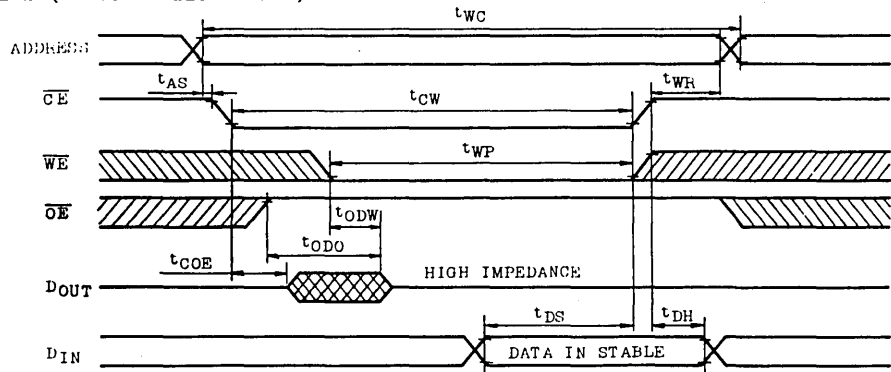
READ CYCLE (1)



WRITE CYCLE 1 (\overline{WE} Controlled Write)



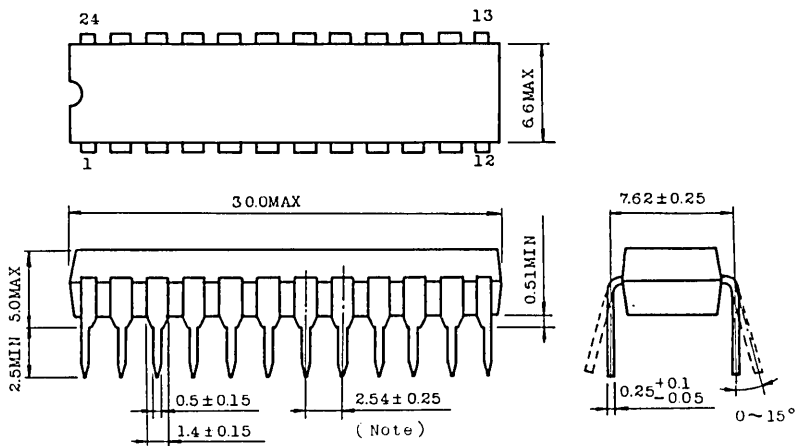
WRITE CYCLE 2 (\overline{CE} Controlled Write)



- 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.

OUTLINE DRAWINGS

Unit in mm



Note: Each lead pitch is 2.54mm.

All leads are located within 0.25mm of the true longitudinal position with respect to No.1 and No.24 leads.