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

TC55416P-35
TC55416P-45

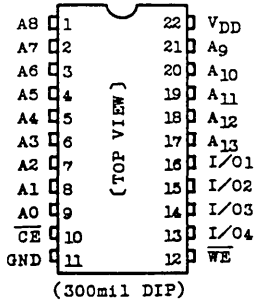
DESCRIPTION

The TC55416P 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 TC55416P also features an automatic stand-by mode. When deselected by Chip Enable ($\overline{CE}$), the operating current is reduced to 10mA.
The TC55416P is suitable for use in cache memory and high speed storage, where high speed/high density are required.
The TC55416P is molded in a 22 pin standard plastic package with 0.3 inch width for high density assembly.
The TC55416P is fabricated with ion implanted CMOS silicon gate MOS technology for high performance and high reliability.

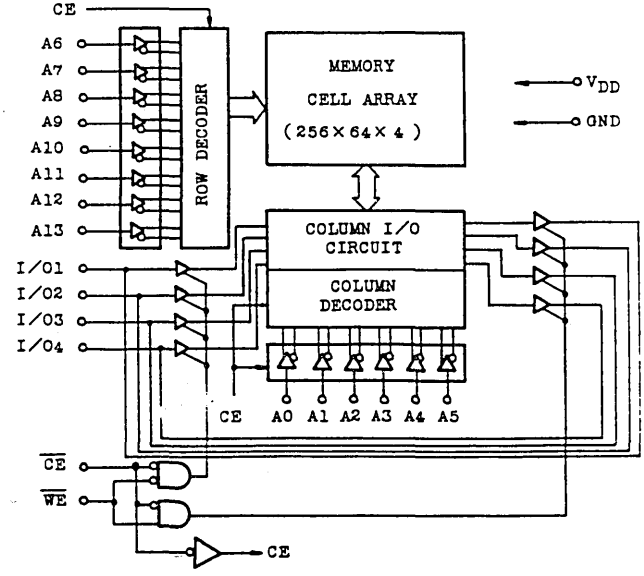
FEATURES

- Fast access time : TC55416P-35 35ns (Max.)
  TC55416P-45 45ns (Max.)
- Low power dissipation : Operation TC55416P-35 80mA (Max.)
  TC55416P-45 60mA (Max.)
  Standby 10mA (Max.)
- 5V single power supply
- Fully static operation
- Directly TTL compatible : All Input and Output
- Package : 22 pins standard plastic package, 300 mil width.

PIN CONNECTION



BLOCK DIAGRAM



PIN NAMES

A0~A13	Address Inputs
I/O1~I/O4	Data Input/Output
$\overline{CE}$	Chip Enable Input
$\overline{WE}$	Write Enable Input
V_{DD}	Power (+5V)
GND	Ground

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	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.

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

Read Cycle

SYMBOL	PARAMETER	TC55416P-35		TC55416P-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_{COE}	Chip Enable to Output in Low-Z	0	-	0	-	ns
t_{COD}	Chip Enable to Output in High-Z	-	15	-	20	ns
t_{OH}	Output Data Hold Time	5	-	5	-	ns

Write Cycle

SYMBOL	PARAMETER	TC55416P-35		TC55416P-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

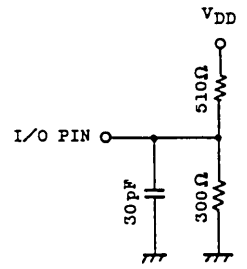
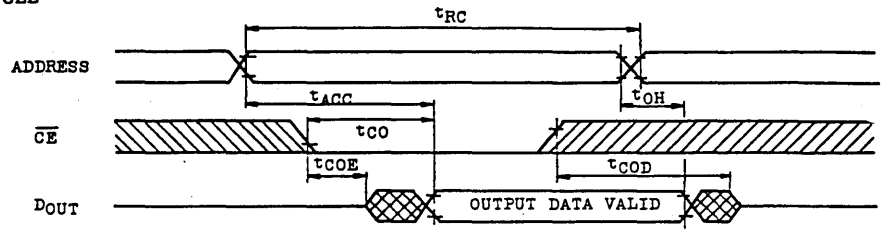


Fig.1 OUTPUT LOAD

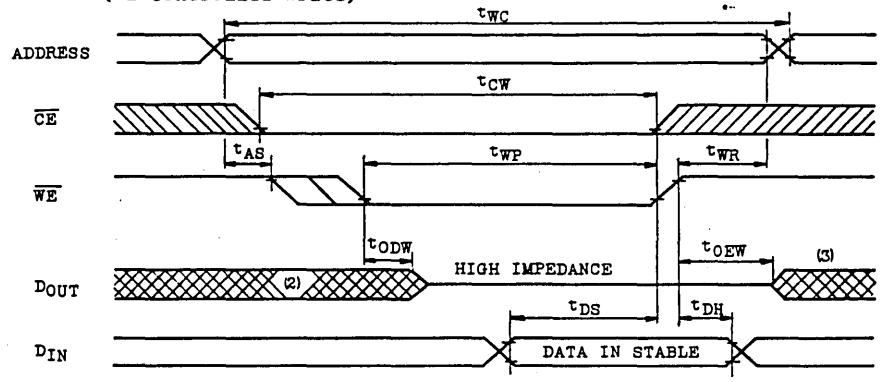
Note: In all condition, t_{COD} max is less than t_{COE} min both for a given device and from device to device.

TIMING WAVEFORMS

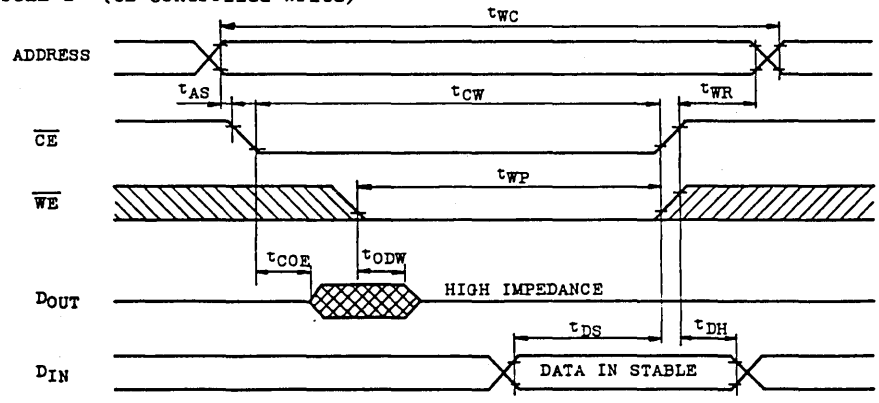
READ CYCLE(1)



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



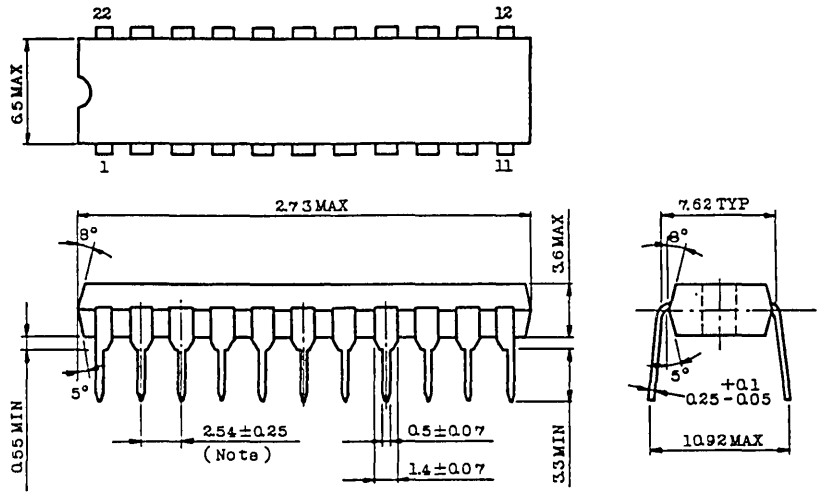
WRITE CYCLE 2 ($\overline{CE}$ Controlled Write)



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 (Ta) 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.22 leads.