TOSHIBA MOS MEMORY PRODUCTS

256K BIT (32K WORD × 8 BIT) MASK ROM
N-CHANNEL SILICON GATE

020668

TMM23256P

DESCRIPTION

The TMM23256P is a 262,144 bit read only memory organized as 32,768 words by 8 bits with a low bit cost, thus being most suitable for use in character generator.

Consisting of static memory cells and clocked peripheral circuitry, the TMM23256P provides a high speed and low power dissipation (access time 150ns, operating current 40mA).

The TMM23256P also features an automatic stand-by power mode. When deselected by Chip Enable ($\overline{CE}$), the operating current is reduced from 40mA to 10mA. Output Enable ($\overline{OE}$) is effective in preventing data confliction on a common bys line.

The TMM23256P uses the address latch system that the falling edge of $\overline{CE}$ latches all inputs except for $\overline{OE}$, thus can be easily connected to a system where address and data buses are commonly used.

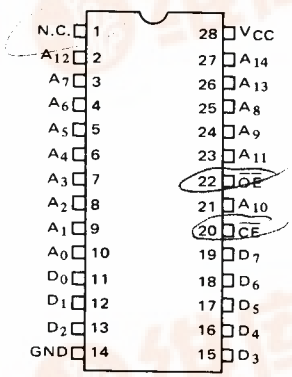
The TMM23256P is fabricated with ion implanted N-channel silicon gate technology. This technology allows a production on high performance.

The TMM23256P is moulded in a 28 pin standard plastic package, 0.6 inch in width.

FEATURES

- Single 5V Power Supply
- Fast Access Time : 150ns (Max.)
- Low Power Dissipation
  - Average Current : 40mA (Max.)
  - Standby Current : 10mA (Max.)
- Inputs protected : All Inputs have Protection Against Static Charge
- Edge Enabled Operation : $\overline{CE}$
- Output Buffer Control : $\overline{OE}$
- Input and Output : TTL Compatible
- Three State Outputs : Wired OR Capability
- 28 pin Standard Plastic DIP

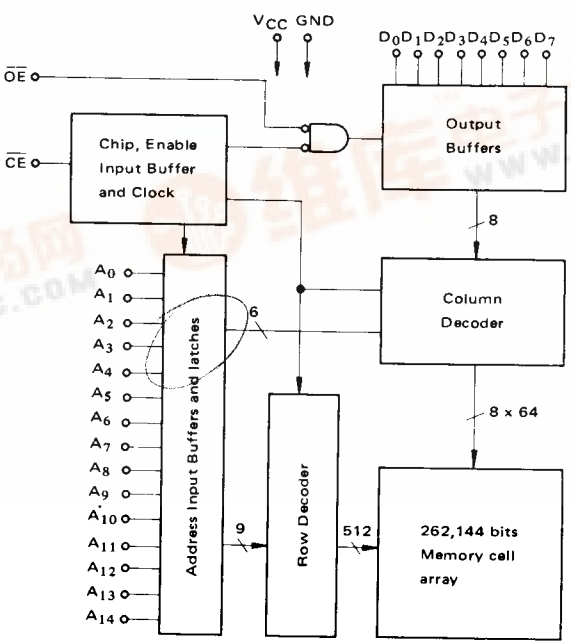
PIN CONNECTION



PIN NAMES

$A_0 \sim A_{14}$	Address Inputs
$D_0 \sim D_7$	Data Outputs
$\overline{OE}$	Output Enable Input
$\overline{CE}$	Chip Enable Input
N.C	No Connection
V_{CC}	Power Supply Terminal
GND	Ground

BLOCK DIAGRAM



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MAXIMUM RATINGS

SYMBOL	ITEM	RATING	UNIT
V_{CC}	Power Supply Voltage	−0.5 ~ 7.0	V
V_{IN}, V_{OUT}	Input and Output Voltage	−0.5 ~ 7.0	V
T_{OPR}	Operating Temperature	0 ~ 70	°C
T_{STRG}	Storage Temperature	−55 ~ 150	°C
T_{SOLDER}	Soldering Temperature · Time	260 · 10	°C · sec
P_D	Power Dissipation (Ta = 70°C)	1.0	W

D.C. OPERATING CONDITIONS (Ta = 0 ~ 70°C)

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{IH}	Input High Voltage	–	2.2	–	V_{CC} + 1	V
V_{IL}	Input Low Voltage	–	−0.5	–	0.8	V
V_{CC}	Power Supply Voltage	–	4.5	5.0	5.5	V

D.C. and OPERATING CHARACTERISTICS (Ta = 0 ~ 70°C)

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
I_{IH}	Input High Current	V_{IN} = 5.5V		–	0.05	10	μA
I_{IL}	Input Low Current	V_{IN} = GND		–	−0.05	−10	μA
V_{OH}	Output High Voltage	I_{OH} = −400μA		2.4	3.3	–	V
V_{OL}	Output Low Voltage	I_{OL} = 3.2mA		–	0.3	0.4	V
I_{LOH}	Output Leakage Current	V_{OUT} = 5.5V	$\overline{CE}$ = 2.2V or	–	0.05	10	μA
I_{LOL}		V_{OUT} = 0.4V	$\overline{OE}$ = 2.2V	–	−0.1	−20	μA
I_{CC1}	Standby Current	$\overline{CE}$ = 2.2V		–	–	10	mA
I_{CC2}	Average Current	t_{CYC} = 230ns, I_{OUT} = 0mA		–	–	40	mA

- Typical values are at Ta = 25°C and V_{CC} = 5V.

CAPACITANCE (Ta = 25°C, f = 1MHz)

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
C_{IN}	Input Capacitance	V_{IN} = A.C. GND	–	5	10	pF
C_{OUT}	Output Capacitance	V_{OUT} = A.C. GND	–	8	15	pF

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

A.C. CHARACTERISTICS ($Ta = 0 \sim 70°C$, $V_{CC} = 5V \pm 10\%$)

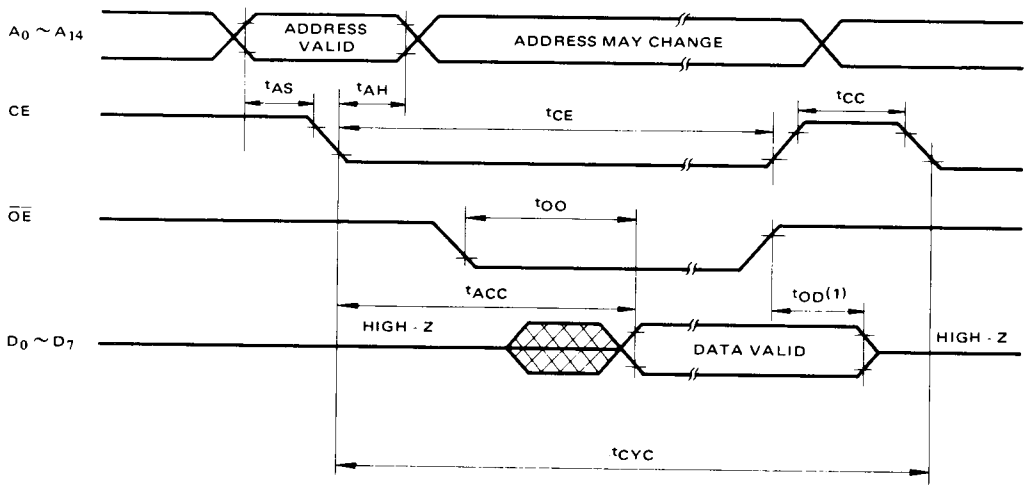
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
t_{CE}	$\overline{CE}$ pulse width	–	150	–	–	ns
t_{AS}	Address Setup Time	–	0	–	–	ns
t_{AH}	Address Hold Time	–	30	–	–	ns
t_{ACC}	Access Time	–	–	–	150	ns
t_{OO}	Output Delay Time form $\overline{OE}$	–	–	–	70	ns
t_{OD}	Output Turn off Delay	–	–	–	70	ns
t_{CC}	$\overline{CE}$ off Time	–	70	–	–	ns
t_{CYC}	Cycle Time	t_{AS} = 0ns, t_r, t_f = 5ns	230	–	–	ns

- Typical values are at $Ta = 25°C$ and $V_{CC} = 5V$.

A.C. TEST CONDITIONS

- Output Load : 1TTL Gate + 100pF
- Input Rise and Fall Times (10% ~ 90%) : 5ns
- Input Pulse Levels : 0.8 ~ 2.4V
- Timing Measurement Reference Levels : Input ; 1V and 2.2V
  Output ; 0.8V and 2.0V

TIMING WAVEFORMS



Note (1) t_{OD} is specified from $\overline{OE}$ or $\overline{CE}$, whichever occurs first.

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OPERATION INFORMATION

The TMM23256P has two control functions.

The chip enable ($\overline{CE}$) controls the operation power and should be used for device selection. The falling edge of the $\overline{CE}$ will activate the device and latch the addresses. The output enable ($\overline{OE}$) control the output buffers, independent of device selection. Assuming that $\overline{OE} = V_{IL}$, the output data is valid at the outputs after t_{ACC} (150ns) from the falling edge of the $\overline{CE}$.

The operation modes of the TMM23256P are listed in the following table.

MODE	$\overline{CE}$	ADDRESS	$\overline{OE}$	OUTPUT	POWER
Standby	H	*	*	High Impedance	Standby
Latch	⌐‾	Valid	*	High Impedance	–
Read	L	**	L	Data Out	Active
Output Deselect	L	*	H	High Impedance	Active

Note * : Don't care

** : Address may change after t_{AH}.

APPLICATION INFORMATION

1. POWER SUPPLY DECOUPLING

The operating current I_{CC} waveforms for TMM 23256P are shown in Fig. 1, 2.

The TMM23256P is a clocked device, so the transient current peaks are produced on the $\overline{CE}$ transition and $\overline{CE}$ active level.

The I_{CC} current transients require adequate decoupling of V_{CC} power supply.

2. POWER ON

The TMM23256P requires initialization prior to normal operation. Two initialization methods are as follows:

(1) A minimum 100μs time delay is required after the application of V_{CC} (+5V) before proper device operation is achieved. And during this period, $\overline{CE}$ must be at V_{IH} level.

(2) A minimum 100μs time delay is required after the application of V_{CC} (5V), and then a minimum of one initialization cycle must be performed before proper device operation is acheived.

Initialization cycle : An initialization cycle is one Chip Enable clock cycle from the first down edge of the $\overline{CE}$ till the next down edge.

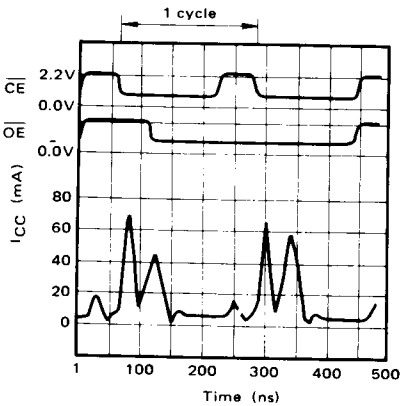


Fig. 1 I_{CC} vs. Time (1)

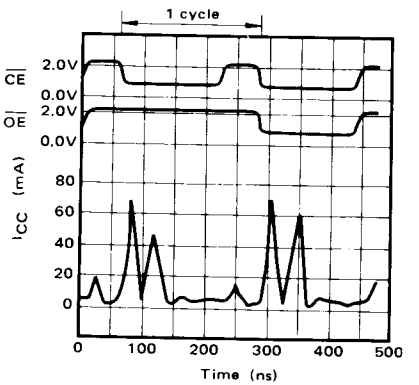
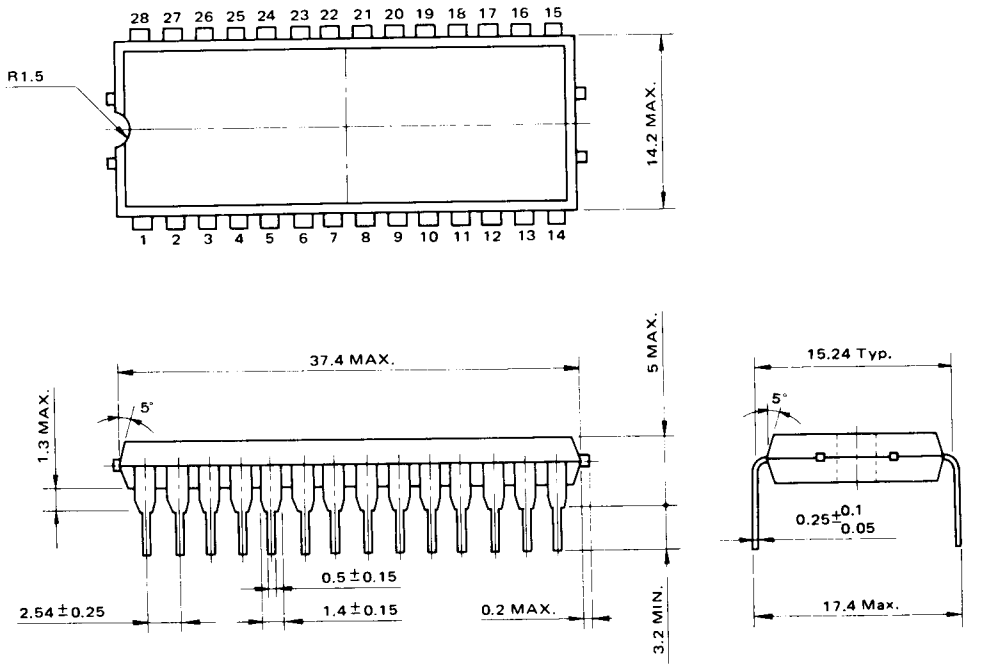


Fig. 2 I_{CC} vs. Time (2)

TMM23256P

OUTLINE DRAWINGS

Unit : mm



Note : Each lead pitch is 2.54mm. All leads are located within 0.25mm of their true longitudinal position with respect to No.1 and No.28 leads.