

MOSTEK®

256K-BIT MOS READ-ONLY MEMORY

MK38000(P/N)-25

FEATURES

- Organized 32K x 8
- Pin compatible with Mostek's BYTEWYDE™ Memory Family
- Access Time = Cycle Time
- Static Operation
- Automatic Power Down

- \overline{CE} and \overline{OE} functions facilitate bus control
- Pin 27 no connection permits interchange with static RAM (\overline{WE})
- High performance

Part No.	Access Time	Cycle Time
MK38000-25	250 ns	250 ns

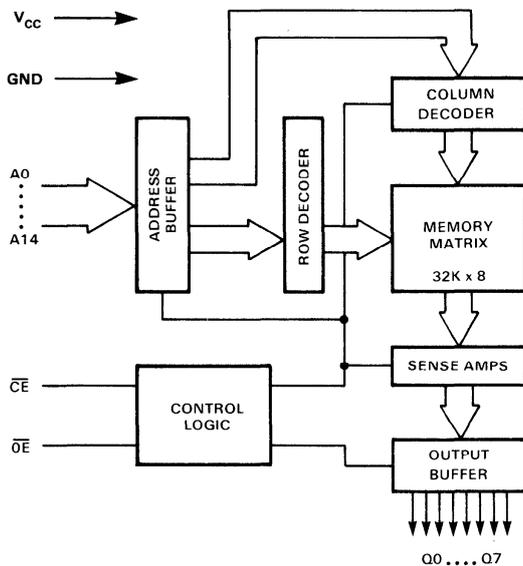
DESCRIPTION

The MK38000 is a N-channel silicon gate MOS Read Only Memory, organized as 32,768 words by 8 bits. As a state-of-the-art device, the MK38000 incorporates advanced circuit techniques designed to provide maximum circuit density

and reliability with the highest possible performance, while maintaining low power dissipation and wide operating margins.

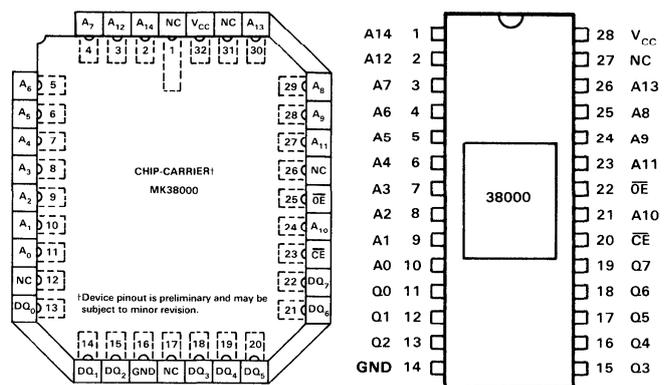
FUNCTIONAL DIAGRAM (MK38000)

Figure 1



PIN CONNECTIONS

Figure 2



TRUTH TABLE

\overline{CE}	\overline{OE}	MODE	OUTPUTS	POWER
H	X	Deselect	High-Z	Standby
L	H	Inhibit	High-Z	Active
L	L	Read	D _{OUT}	Active

PIN NAMES

A0-A14	Address	\overline{OE}	Output Enable
\overline{CE}	Chip Enable	V _{CC}	+5 V
NC	No Connection	GND	Ground
		Q0-Q7	Data Outputs

ABSOLUTE MAXIMUM RATINGS*

Voltage on Any Terminal Relative to GND	-1.0 V to +7 V
Operating Temperature T_A (Ambient)	0°C to +70°C
Storage Temperature—Ceramic (Ambient)	-65°C to +150°C
Storage Temperature—Plastic (Ambient)	-55°C to +125°C
Power Dissipation	1 Watt

*Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operating sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

RECOMMENDED DC OPERATING CONDITIONS^{1,6}

(0°C ≤ T_A ≤ +70°C)

SYM	PARAMETER	MIN	TYP	MAX	UNITS	NOTES
V_{CC}	Power Supply Voltage	4.75	5.0	5.25	V	
V_{IL}	Input Logic 0 Voltage	-1.0		0.8	V	8
V_{IH}	Input Logic 1 Voltage	2.0		V_{CC}	V	

DC ELECTRICAL CHARACTERISTICS^{1,6}

($V_{CC} = 5 V \pm 5\%$) (0°C ≤ T_A ≤ +70°C)

SYM	PARAMETER	MIN	TYP	MAX	UNITS	NOTES
I_{CC1}	V_{CC} Power Supply Current (Active)		75	100	mA	5
I_{CC2}	V_{CC} Power Supply Current (Standby)		35	50	mA	7
$I_{I(L)}$	Input Leakage Current	-10	0.1	10	μA	3
$I_{O(L)}$	Output Leakage Current	-10	0.1	10	μA	2
V_{OL}	Output Logic "0" Voltage @ $I_{OUT} = 4 \text{ mA}$			0.4	V	
V_{OH}	Output Logic "1" Voltage @ $I_{OUT} = -1 \text{ mA}$	2.4			V	

AC ELECTRICAL CHARACTERISTICS^{1,4,6,9,10}

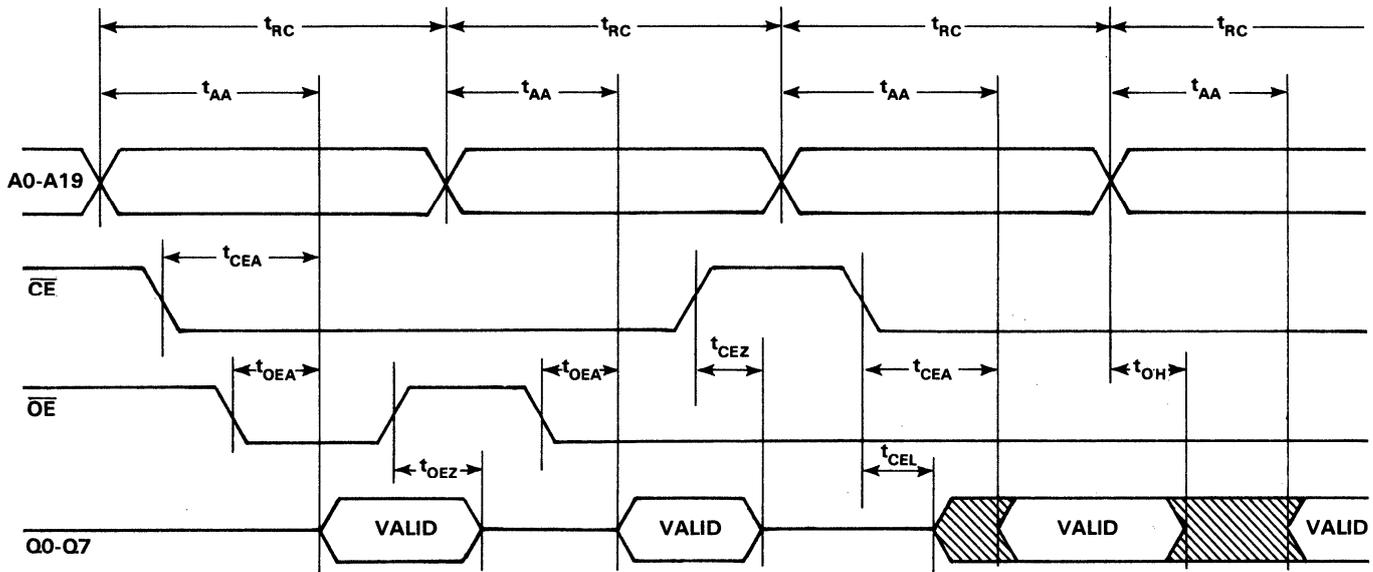
($V_{CC} = 5 V \pm 5\%$) (0°C ≤ T_A ≤ +70°C)

SYM	PARAMETER	-25		UNITS	NOTES
		MIN	MAX		
t_{RC}	Read Cycle Time	250		ns	
t_{AA}	Address Access Time		250	ns	
t_{CEA}	CE Access Time		250	ns	
t_{CEZ}	Chip Enable Data Off Time		40	ns	
t_{CEL}	Chip Enable to Data Bus Active	5		ns	
t_{OEA}	Output Enable Access Time		50	ns	
t_{OEZ}	Output Enable Data Off Time		40	ns	
t_{OH}	Output Hold from Address Change	5		ns	

CAPACITANCE
 $(0^{\circ}\text{C} \leq T_A \leq 70^{\circ}\text{C})$

SYM	PARAMETER	TYP	MAX	UNITS	NOTES
C_I	Input Capacitance	5		pF	
C_O	Output Capacitance	7		pF	5

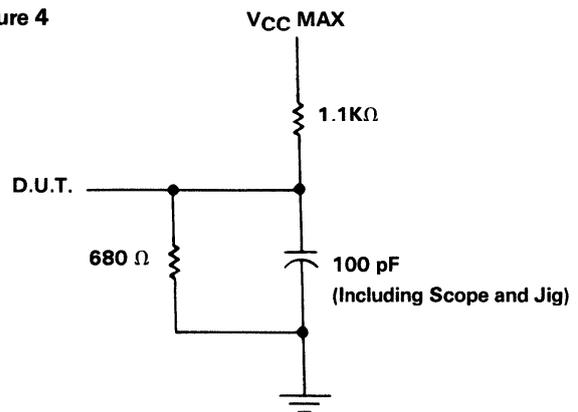
TIMING DIAGRAM
 Figure 3



NOTES:

1. All voltages referenced to GND.
2. Measured with $0.4\text{ V} \leq V_O \leq 5.0\text{ V}$ outputs deselected and $V_{CC} = 5\text{ V}$.
3. $V_{IN} = 0\text{ V}$ to 5.25 V .
4. Input and output timing reference levels are at 1.5 V for inputs and $.8$ and 2.0 for outputs.
5. Measured with outputs open.
6. A minimum of 2 ms time delay is required after the application of $V_{CC} (+5)$ before proper device operation is achieved. \overline{CE} must be at V_{IH} for this time period.
7. \overline{CE} high.
8. Negative undershoots to a minimum of -1.5 V are allowed with a maximum of 10 ns pulse width.
9. Measured with a load as shown in Figure 4.
10. A.C. measurements assume transition time = 5 ns levels GND to 3 V .

OUTPUT LOAD
 Figure 4



DESCRIPTION (continued)

As a member of the Mostek BYTEWYDE Memory Family, the MK38000 allows compatibility between RAM, ROM, and EPROM. The MK38000 can be used as a pin/function density upgrade to the MK37000 8K x 8 bit ROM.

The output enable function controls only the outputs. The \overline{CE} input can be used for device selection and the \overline{OE} input used to avoid bus conflicts so that outputs can be 'OR'ed together when using multiplexed or bi-directional busses.

Other system oriented features include fully TTL compatible inputs and outputs. The three state outputs, controlled by the \overline{OE} input, will drive a minimum of 2 standard TTL loads. The MK38000 operates from a single +5 volt power supply. It is packaged in the industry standard 28 pin DIP. Pin 27 is not connected in order to maintain compatibility with RAMs which use this pin as a write enable (\overline{WE}) control function.

MK38000 ROM CODE DATA INPUT PROCEDURE

The preferred method of supplying code data to Mostek is in the form of programmed EPROMs (see table). In addition to the programmed set, Mostek requires an additional set of blank EPROMs for supplying customer code verification. When multiple EPROMs are required to describe the ROM, they shall be designated in ascending address space with the numbers 1, 2, 3, etc. As an example, EPROM #1 would start with address space 0000 and go to 1FFF for an 8K x 8 device. EPROM #2 would then start at address space 2000 and so on. A total of four 8K x 8 devices would be required to totally describe the address space of the 32K x 8 MK38000.

A paper printout and verification approval letter will accompany each verification EPROM set returned to the

customer. Approval is considered to be accepted when the signed verification letter is returned to Mostek. The original set of EPROMs will be retained by Mostek for the duration of the prototyping process.

OPERATION

Any application requiring a high performance high bit density ROM can be satisfied by the MK38000. This device is ideally suited for 8 bit microprocessor systems such as those which can utilize the MK3880. It can offer significant cost advantages over PROM.

The MK38000 is controlled by the chip enable (\overline{CE}) and output enable (\overline{OE}) inputs. A low level at the \overline{CE} input powers up the memory for an active cycle. The output buffers, under the control of \overline{OE} , will become active in \overline{CE} access time (t_{CEA}) if the output enable access time (t_{OEA}) requirement is met.

By maintaining valid address, the outputs will remain valid and active until either \overline{CE} or \overline{OE} is returned to the high state or until an address is changed. After chip deselect time (t_{CEZ}) or output enable deselect time (t_{OEZ}), the output buffers will go to a high impedance state.

customer. Approval is considered to be accepted when the signed verification letter is returned to Mostek. The original set of EPROMs will be retained by Mostek for the duration of the prototyping process.

ACCEPTABLE EPROMs FOR CODE DATA

Table 1

EPROM	# REQUIRED
2732	8
2764	4

MOSTEK®

MEMORY COMPONENTS

Guidelines for Submitting and Verifying Customer ROM Patterns

ROM PROGRAMMING GUIDE

It has always been Mostek's policy to service its customers ROM needs in the most efficient way possible. In continuing with this effort, Mostek has revised its ROM procedure to better facilitate the market we serve. This new ROM programming guide and information form will insure that all pertinent information is received with the purchase order. This will reduce the unnecessary delays which develop when sufficient information is not available.

DESCRIPTION OF ROM FORM

The first part of the ROM programming form is concerned with providing all necessary customer information to Mostek. This will simplify any correspondence which may be necessary to complete the order in question.

The ROM generic type simply indicates the ROM series the customer wishes to purchase. This includes the following Mostek series.

- MK34000 Series
- MK36000 Series
- MK37000 Series
- MK38000 Series

PACKAGE TYPE

The package type must be included on both the ROM form and the purchase order to prevent parts being produced in the wrong package. Currently, all prototypes and any follow-on quantities built in Dallas will be ceramic. Remember: P = Ceramic, N = Plastic, J = Cerdip.

CUSTOMER NUMBERS

In the event the customer assigns a part number to the Mostek ROM selected, this number should be entered on the ROM form. This number will simplify any communication which may be necessary between the customer and Mostek.

SPECIAL BRANDING

Special branding of Mostek ROMs is possible if the instructions are indicated on the ROM programming form. But due to space and printing limitations, any special branding desired must be limited to 12 characters on one line.

CUSTOMER SPECIFICATIONS

If the customer desires different specifications for the ROM selected than appears on the appropriate Mostek data sheet; it is imperative that these specification changes be well documented and sent to Mostek as early as possible. This is important because any specification change must be reviewed and accepted by Mostek before the ROM order can be processed.

ROM DATA

Mostek will accept a number of media and formats for the inputting of programming data. This flexibility will make it easy for a customer to have his ROM order processed as quickly as possible. The following table shows the media that can be most easily processed by Mostek. When filling out the ROM programming form, check the appropriate block under pattern media.

PATTERN MEDIA

ROMs/PROMs: On Mostek's ROMs of 16K bit and larger density, PROMs of the 2716, 2732, or 2764 type or pin compatible ROMs may be submitted for the ROM contents. They must, however, be accompanied by the information required for the Mostek ROM type in written form. Each PROM or ROM submitted must also be clearly marked so that no question arises as to its starting memory location. (See ROM Programming Form on last page).

VERIFICATION MEDIA

For pattern verification, Mostek will supply a printout and reprogrammed PROMs or magnetic tape.

To insure rapid turnaround of data verification information, acceptable media should be used as outlined in the table. If another method is desired, contact Mostek so that all arrangements can be made and an accurate schedule can be generated. Quick turnaround of verification information cannot be guaranteed in cases where new software has to be developed. Remember, when filling out the ROM programming form, check the appropriate block under verification media.

HOW THE PROGRAM WORKS

Mostek's ROM program is designed for maximum safety with two verification steps that limit the liability of both the



customer and Mostek. However, if circumstances dictate, Mostek is flexible enough to vary its procedures to better serve its customers.

PATTERN VERIFICATION

Upon receipt of the ROM programming information form and the ROM input data, Mostek engineering will re-generate the pattern data for customer verification. At this point the only customer liability is a nominal data charge in the event of a pattern change. Following customer verification, Mostek begins prototype production. Customer is now liable for mask charge and minimum order quantity work in process.

The verification step can be waived so that prototype production begins immediately upon receipt of the input data. The time savings is the time for Mostek engineering to generate verification plus the time necessary for the customer to receive and verify the data. This savings is usually less than two weeks. If data verification is waived, the customer is liable for the mask charge plus the minimum order quantity work-in-process material.

PROTOTYPE VERIFICATION

The second verification step in Mostek's ROM program is that of prototype verification. The prototype quantity is usually 25 parts which are considered part of the order quantity for billing purposes. After the customer has verified the prototype, in writing, as being correct, Mostek will proceed with the production of the total remaining order.

The prototype verification step can also be waived and Mostek will immediately begin production instead of prototyping. The time savings gained from waiving prototype verification is usually 5-6 weeks. If prototype verification is waived, the customer is liable for the mask charge plus all work-in-process material. If only prototype verification is waived Mostek guarantees ROM data to agree with data verified by customer.

WAIVERS OF VERIFICATION

Arrangements must be worked out with Mostek prior to committing deliveries based on verification waivers. If an order is accepted by Mostek waiving pattern verification, the quoted cycle time begins upon receipt of the input data and only a small quantity of parts will be produced as prototypes. If Mostek accepts an order waiving prototype verification, the quoted cycle time will begin upon notification of pattern verification and placement of order.

GENERAL INFORMATION

Production capacity cannot be reserved without written verification in house and a purchase order. Therefore any quotes for delivery will be subject to change until a purchase order is obtained.

Limited quantities of parts are usually available from the Mostek Dallas assembly facility shortly after prototype shipments, but prior to standard follow on production. These units will require an expedite adder in addition to the standard price.

The appropriate Mostek price sheet contains information on order minimums and price adders.

ACCEPTABLE MEDIA

Table 1

MK Type	ROM	PROM	Magnetic Tape
MK34000P/N/J	X	X	X
MK36000P/N/J	X	X	X
MK37000P/N/J	X	X	X
MK38000P/N/J	X	X	X

READ ONLY MEMORIES

Table 2

Device	Organization	Logic	Number Bits	Access	Supply Voltages		Power Dis (mW) Max	Package		BYTEWYDE Pinout
					V _{CC}	V _{SS}		Type	Pins	
MK34000	2048x8	Static	16384	350 ns	+5	0	330	P/N/J	24	Yes
MK36000	8192x8	Dynamic	65536	200 ns	+5	0	220	P/N/J	24	No
MK37000	8192x8	Dynamic	65536	200 ns	+5	0	220	P/N/J	28	Yes
MK38000	32768x8	Static	262144	150 ns	+5	0	495	P/N/J	28	Yes

ROM CROSS REFERENCE

Table 3

Mostek	AMD	NEC	Motorola	AMI	GI	Synertek	National	Signetics	Toshiba	SMC
MK34000	AM9218	μPD2316E	MCM68316E	S6831B	RO-3-9316	SY2316B	MM52116	2616	TMM334P	2316E
MK36000		μPD2364	MCM68364	S4264	RO-3-9364	SY2364	MM52164	2664A		36000
MK37000	AM9265								TMM2364P	
MK38000									TMM 23256	



ROM PROGRAMMING FORM

Customer Name _____

Address _____

City _____ State _____ Zip _____

Phone () _____ Extension _____

Customer Contact _____ Title _____

Mostek Rep or Dist _____

ROM Generic Type _____	Customer Part # _____	Brand _____
(Including Pkg, Speed)	_____	_____
<input type="checkbox"/> Standard data sheet part	_____	_____
<input type="checkbox"/> Customer Spec # _____	_____	_____
Date customer spec sent _____	_____	_____
to Mostek _____	_____	_____
Spec review complete <input type="checkbox"/> Yes	_____	_____

Pattern Media	Verification Media
<input type="checkbox"/> PROM type _____	<input type="checkbox"/> PROM type _____
<input type="checkbox"/> Pin Compatible ROMs - Note 1	<input type="checkbox"/> Pin Compatible ROMs - Note 1
<input type="checkbox"/> Magnetic Tape - Note 1	<input type="checkbox"/> Magnetic Tape - Note 1
<input type="checkbox"/> Other - Note 1	<input type="checkbox"/> Other - Note 1 (Note 1-Requires Factory Coordination)

Date Pattern Data Sent to Mostek _____

Does Customer Require Prototypes	Yes _____	No _____
Pattern Verification Required by Customer	Yes _____	Waived _____
Prototype Verification Required by Customer	Yes _____	Waived _____
Pattern Verification To Be Sent To	Rep _____	Customer _____

Customer signature approving waivers _____

Customer Order Number _____ Date _____

Order Quantity and Price _____

Delivery Requested/Committed Prototypes _____ Production _____

Form Completed By _____ Date _____