

MOS Read-Only Memory Character Generators

MOSTEK

Read Only
Memories

FEATURES:

- ☐ 64 dot-matrix (5×7) characters with column-by-column output
- ☐ High speed character access time and column select access time
- ☐ Completely static operation—no clocks required
- ☐ MK 2002 P is pre-programmed with ASCII encoding
- ☐ Easy interfacing to TTL/DTL
- ☐ Single mask custom programming

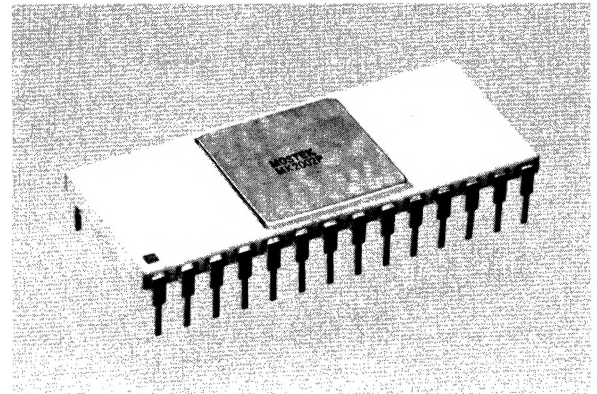
APPLICATIONS

- ☐ CRT alphanumeric displays
- ☐ Light-Emitting Diode (LED) array driver
- ☐ Billboard and stock market displays

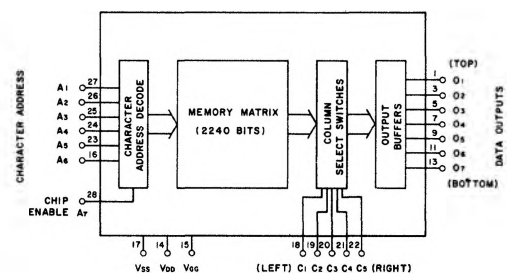
DESCRIPTION

This MK 2000 P Series MOS Read-Only Memories (ROMs) is designed specifically for dot-matrix character generation where column-by-column data output is desired. Each ROM contains 2240 bits of programmable storage, organized as 64 characters, each having 5 columns of 7 bits. P-channel, enhancement-mode, MOS technology is employed in this series. All inputs are protected to prevent damage due to static charge accumulation. Programming is accomplished during the manufacturing process by modification of a single mask in accordance with customer specifications. The MK 2002 P is pre-programmed with ASCII-encoded characters with the font shown on the back page.

Memory operation is static and no refresh clocks are required to maintain output information. Character selection is achieved by presenting a seven-bit binary word at the address inputs. The most significant bit (A_7) is generally used as a Chip Enable. (See Operating Notes.) Column select lines, C_1 through C_5 , select the column information that appears at the seven data outputs. (See Operating Notes.) By sequentially strobing C_1 through C_5 , the font for the addressed character would be displayed. The output buffers are open-ended current sources, sourcing current from the V_{SS} supply only in the "dot-on" condition.



FUNCTIONAL DIAGRAM



OPERATING NOTES

"1" = V_{DD} "0" = V_{SS}						
A_7	C_1	C_2	C_3	C_4	C_5	Column Selected
0	X	X	X	X	X	None*
1	0	0	0	0	0	None*
1	1	0	0	0	0	1 (left)
1	0	1	0	0	0	2
1	0	0	1	0	0	3
1	0	0	0	1	0	4
1	0	0	0	0	1	5 (right)

X=No effect on columns
* Outputs open-circuited

ABSOLUTE MAXIMUM RATINGS

Voltage on any terminal relative to V_{SS} +0.3V to -30V
 Operating temperature range -25°C to +85°C
 Storage temperature range -55°C to +150°C

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RECOMMENDED OPERATING CONDITIONS ($-0^{\circ}\text{C} < T_A < 70^{\circ}\text{C}$)

	PARAMETER	MIN	TYP	MAX	UNITS	COMMENTS
POWER	V_{SS} Supply voltage		0.0		V	See note 1
	V_{DD} Supply voltage	-12.0	-14.0	-16.0	V	
	V_{GG} Supply voltage	-24.0	-28.0	-29.0	V	
INPUTS	$V_{in(0)}$ Input voltage, logic "0"	$V_{SS} - 3$	V_{SS}		V	
	$V_{in(1)}$ Input voltage, logic "1"		V_{DD}	$V_{SS} - 11$	V	

($V_{SS} = 0.0\text{V}$; $V_{DD} = -14.0\text{V}$; $V_{GG} = -28.0\text{V}$, $T_A = 25^{\circ}\text{C}$)

ELECTRICAL CHARACTERISTICS (unless noted otherwise)

	PARAMETER	MIN	TYP	MAX	UNITS	CONDITIONS
POWER	I_{DD} Supply current (V_{DD})		13	25	mA	Outputs unconnected
	I_{GG} Supply current (V_{GG})		1.5	3.0	mA	See note 2
INPUTS	C_{in} Input capacitance			10	pF	$V_{in} = V_{SS}$, $f_{meas} = 1\text{MHz}$
	I_{in} Input leakage current			10	μA	$V_{in} = V_{SS} - 14\text{V}$
OUTPUTS	V_{out} Output voltage			$V_{SS} - 2$ $V_{SS} - 5$	V	See Figure #3
	$I_{out(on)}$ Output current, "dot-on"	6	12		mA	
	$I_{out(off)}$ Output current, "dot-off"			+10	μA	
DYNAMIC CHARACTERISTICS	$t_{A(on)}$ Character access time, I_{off} to I_{on}		320 380	700 700	ns	See Figures #1, #2 and Timing
					ns	
	$t_{A(off)}$ Character access time, I_{on} to I_{off}		190 220	700 700	ns	
					ns	
	$t_{C(on)}$ Column select delay time, I_{off} to I_{on}		90 95	250 300	ns	See Figure #1 and Timing
					ns	
	$t_{C(off)}$ Column select delay time, I_{on} to I_{off}		180 205	250 300	ns	
					ns	
	t_{OE} Output enable/disable delay time		320	700	ns	$V_{DD} = -14\text{V}$, $V_{GG} = -28\text{V}$
	t_{AV} Character access time (V_{out})		500		ns	$V_{SS} = +14\text{V}$, $V_{DD} = 0\text{V}$, $V_{GG} = -14\text{V}$ See Figure #4 and Timing

- NOTES:** 1. Other supply voltages may be used if V_{DD} and V_{GG} maintain the same relationship to V_{SS} ,
 e.g., $V_{SS} = +14.0\text{V}$, $V_{DD} = 0.0\text{V}$, $V_{GG} = -14.0\text{V}$.
 2. $I_{SS} = I_{DD} + I_{GG}$

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The MK 2000 P Series output buffers source current from the V_{SS} supply as indicated in Figure 3. Figure 4 is a suggested TTL/DTL interface. Delay time, t_{AV} , is measured to the output of the TTL shown in Figure 4.

FIGURE #1

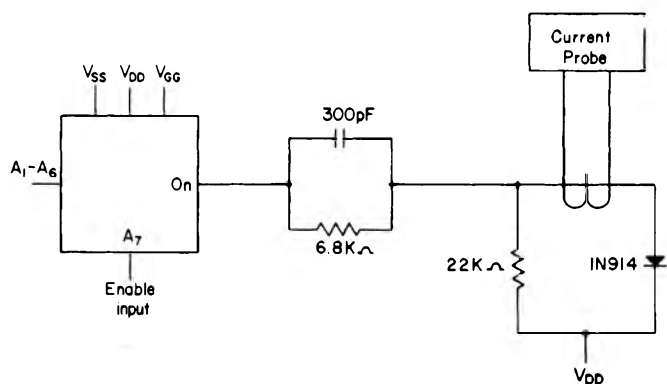
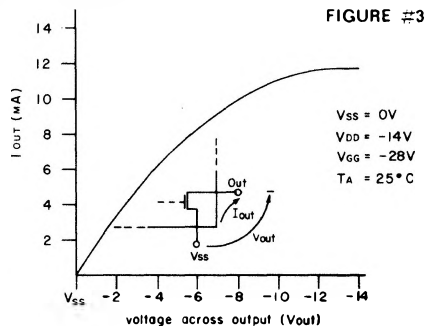
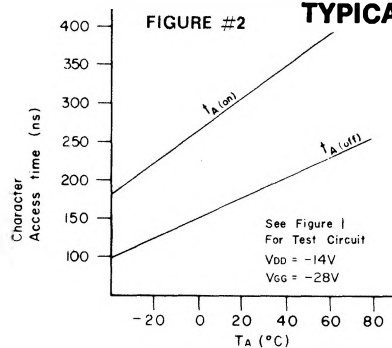


FIGURE #2



Top View, 28 Pin CDIP

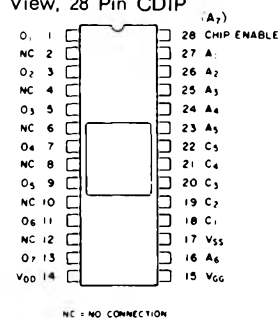
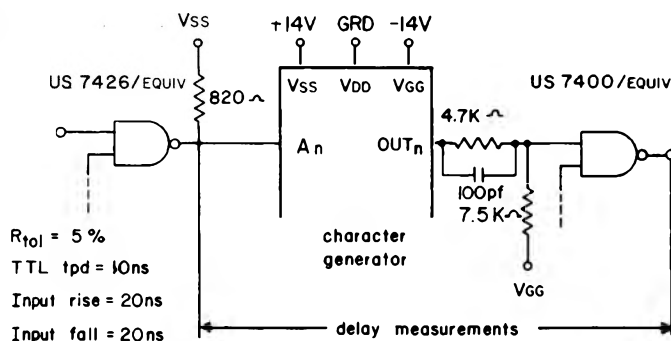
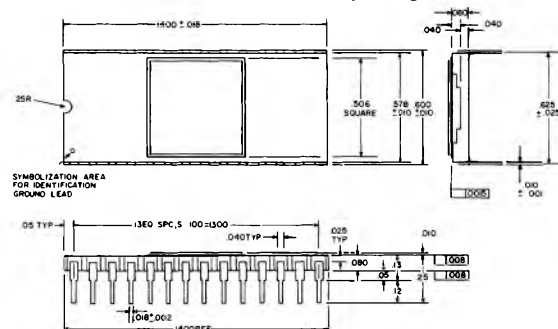


FIGURE #4



(28 lead ceramic dual-in-line hermetic package)



CODING AND CHARACTER FONTS

The MK 2002 P is a pre-programmed member of the MK 2000 P Series with ASCII encoding and the character fonts shown below. A logic "0" represents an input voltage equal to V_{SS} , or an output I_{ON} , and a logic "1" represents a voltage equal to V_{DD} , or an output I_{OFF} .

An example demonstrating the correspondence of device outputs and sequence to the 5 x 7 dot matrix fonts is shown below:

	C ₁	C ₂	C ₃	C ₄	C ₅	← Column Selected
O ₁	0	1	1	1	0	
O ₂	0	0	0	0	0	
O ₃	0	1	0	1	0	
O ₄	0	1	0	1	0	
O ₅	0	1	1	1	0	
O ₆	0	1	1	1	0	
O ₇	0	1	1	1	0	

MK 2002 P				A ₆	1	1	0	0
				A ₅	0	1	0	1
A ₄	A ₃	A ₂	A ₁	COL	2	3	4	5
				ROW				
0	0	0	0	0				
0	0	0	1	1				
0	0	1	0	2				
0	0	1	1	3				
0	1	0	0	4				
0	1	0	1	5				
0	1	1	0	6				
0	1	1	1	7				
1	0	0	0	8				
1	0	0	1	9				
1	0	1	0	10				
1	0	1	1	11				
1	1	0	0	12				
1	1	0	1	13				
1	1	1	0	14				
1	1	1	1	15				

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MOSTEK ROM PUNCHED-CARD CODING FORMAT¹

MK 2000 P

Cols. Information Field

First Card

1-30 Customer
31-50 Customer Part Number
60-72 Mostek Part Number¹

Second Card

1-30 Engineer at Customer Site
31-50 Direct Phone Number for Engineer

Third Card

1-5 Mostek Part Number¹
10-15 Organization²

Fourth Card

0-6 Data Format³ — "MOSTEK"
15-28 Logic — "Negative Logic" only
35-57 Verification Code⁴

Data Cards

1-6 Binary Address
8-12 First row of character
14-18 Second row of character
20-24 Third row of character
26-30 Fourth row of character
32-36 Fifth row of character
38-42 Sixth row of character
44-48 Seventh row of character

- Notes:**
1. Assigned by Mostek Marketing Department; may be left blank.
 2. Punched as 64x5x07 or 32x5x14.
 3. "MOSTEK" format only is accepted on this part.
 4. Punched as:
 - (a) VERIFICATION HOLD — i.e. the customer verification of the data as reproduced by MOSTEK is required prior to production of the ROM. To accomplish this MOSTEK supplies a copy of its Customer Verification Data Sheet (CVDS) to the customer.
 - (b) VERIFICATION PROCESS — i.e. the customer will receive a CVDS but production will begin prior to receipt of customer verification.
 - (c) VERIFICATION NOT NEEDED — i.e. the customer will not receive a CVDS and production will begin immediately.