MOSTEK

MILITARY/HIGH-REL PRODUCTS

Extended Temperature, Extended Burn-in Industrial Processing

2048 x 8-Bit UV Erasable PROM

MKI2716(J)-77/78

FEATURES

- 44 hr. min., 125°C burn-in plus Industrial screening for greater reliability (see Figure 3 for processing description)
- Extended operating temperature ($-40°C \leq T_A \leq 85°C$)
- Pin compatible with Mostek's BYTEWYDE™ memory family
- Single +5 volt power supply during read operation
- Fast 450ns access time in read mode
- Low power dissipation: 633 mW max active
- Power down mode: 165 mW max standby
- Three state output OR-tie capability
- Five modes of operation for greater system flexibility (see Table)
- Single programming requirement: single location programming with one 50 msec pulse
- Military MKB version available (-55°C to 125°C)
- TTL compatible in all operating modes
- Standard 24 pin DIP with transparent lid

DESCRIPTION

The MKI2716 is a 2048 x 8 bit electrically programmable/ultraviolet erasable read only memory. The circuit is fabricated with Mostek's advanced N-channel silicon gate technology for the highest performance and reliability. The MKI2716 offers significant advances over hardwired logic cost, system flexibility, turnaround time and performance.

The MKI2716 has many useful system oriented features including a standby mode of operation which lowers the device power from 633mW maximum active power to 165mW maximum for an overall savings of 75%.

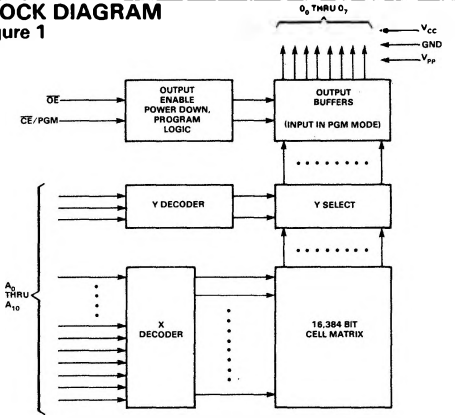
MODE SELECTION

Pin / Mode	$\overline{CE}$/PGM (18)	$\overline{OE}$ (20)	V_{PP} (21)	Output
Read	V_{IL}	V_{IL}	+5	Valid Out
Standby	V_{IH}	Don't Care	+5	Open
Program	Pulsed V_{IL} to V_{IH}	V_{IH}	+25	Input
Program Verify	V_{IL}	V_{IL}	+25	Valid Out
Program Inhibit	V_{IL}	V_{IH}	+25	Open

V_{CC}(24) = 5V all modes

BLOCK DIAGRAM

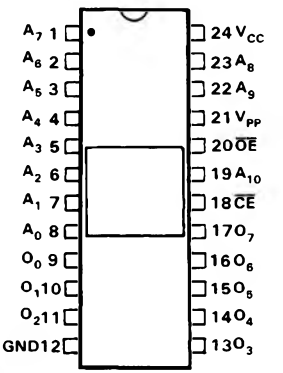
Figure 1



NOTE: Pin 18 and 20 have been renamed for compatibility with presently available 16K, 32K and 64K ROMs and future generation 32K and 64K EPROMs. All other specifications for this device remain unaffected by this change

PIN CONNECTIONS

Figure 2



PIN NAMES

A0 - A10	Addresses	OE	Output Enable
$\overline{CE}$/PGM	Chip Enable/ Program	O_0 - O_7	Outputs

ABSOLUTE MAXIMUM RATINGS*

Voltage on any pin relative to V_{SS} (Except V_{PP}) ..... -0.3 V to +6 V
Voltage on V_{PP} supply pin relative to V_{SS} ..... -0.3 V to +28 V
Operating Temperature T_A (Ambient) ..... $-40°C \leq T_A \leq 85°C$
Storage Temperature (Ambient) ..... $-65°C \leq T_A \leq +125°C$
Power Dissipation ..... 1 Watt
Short Circuit Output Current ..... 50 mA

*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.

READ OPERATION

RECOMMENDED DC OPERATING CONDITIONS

($-40°C \leq T_A \leq 85°C$)

SYM	PARAMETER	MIN	TYP	MAX	UNITS	NOTES
V_{IH}	Input High Voltage	2.0		$V_{CC}+1$	V	
V_{IL}	Input Low Voltage	-0.1		0.8	V	

DC ELECTRICAL CHARACTERISTICS[1,2,4,8]

($-40°C \leq T_A \leq 85°C$) (V_{CC} = +5 V ± 5%, $V_{PP} = V_{CC}$)[2]

SYM	PARAMETER	MIN	TYP	MAX	UNITS	NOTES
I_{CC1}	V_{CC} Standby Power Supply Current ($\overline{OE} = V_{IL}$; $\overline{CE} = V_{IH}$)		10	30	mA	2
I_{CC2}	V_{CC} Active Power Supply Current ($\overline{OE} = \overline{CE} = V_{IL}$)		57	115	mA	2
I_{PP1}	V_{PP} Current (V_{PP} = 5.25 V)			10	mA	2
V_{OH}	Output High Voltage (I_{OH} = -400 µA)	2.4			V	
V_{OL}	Output Low Voltage (I_{OL} = 2.1mA)			.45	V	
I_{IL}	Input Leakage Current (V_{IN} = 5.25 V)			10	µA	
I_{OL}	Output Leakage Current (V_{OUT} = 5.25 V)			10	µA	

AC ELECTRICAL CHARACTERISTICS[1,2,5]

($-40°C \leq T_A \leq 85°C$) (V_{CC} = +5 V ± 5%, $V_{PP} = V_{CC}$)[2]

SYM	PARAMETER	-77		-78		UNITS	NOTES
		MIN	MAX	MIN	MAX		
t_{ACC}	Address to Output Delay ($\overline{CE} = \overline{OE} = V_{IL}$)		390		450	ns	
t_{CE}	$\overline{CE}$ to Output Delay ($\overline{OE} = V_{IL}$)		390		450	ns	5
t_{OE}	Output Enable to Output Delay ($\overline{CE} = V_{IL}$)		150		150	ns	9
t_{DF}	Chip Deselect to Output Float ($\overline{CE} = V_{IL}$)	0	130	0	130	ns	8
t_{OH}	Address to Output Hold ($\overline{CE} = \overline{OE} = V_{IL}$)	0		0		ns	

RECOMMENDED AC OPERATING CONDITIONS AND ELECTRICAL CHARACTRISTICS[1,2,6,7]

(T_A = 25°C ± 5°C) (V_{CC} = +5V ± 5%, V_{PP} = 25V ± 1V)

SYM	PARAMETER	MIN	TYP	MAX	UNITS	NOTES
t_{AS}	Address Setup Time	2			μs	
t_{OES}	$\overline{OE}$ Setup Time	2			μs	
t_{DS}	Data Setup Time	2			μs	
t_{AH}	Address Hold Time	2			μs	
t_{OEH}	$\overline{OE}$ Hold Time	2			μs	
t_{DH}	Data Hold Time	2			μs	
t_{DF}	Output Enable to Output Float	0		130	ns	4
t_{OE}	Output Enable to Output Delay			120	ns	4
t_{PW}	Program Pulse Width	45	50	55	ms	
t_{PRT}	Program Pulse Rise Time	5			ns	
t_{PFT}	Program Pulse Fall Time	5			ns	

PROGRAM OPERATION NOTES:

1. V_{CC} must be applied at the same time or before V_{PP} and removed after or at the same time as V_{PP}. To prevent damage to the device it must not be inserted into a board with V_{PP} at 25V.
2. Care must be taken to prevent overshoot of the V_{PP} supply when switching to -25V.
3. $0.45V \leq V_{IN} \leq 5.25V$
4. $\overline{CE}$/PGM - V_{IL}
5. $\overline{CE}$/PGM - V_{IH}
6. t_T - 20nsec
7. 1V or 2V for inputs and 8V or 2V for outputs are used as timing reference levels.
8. Although speed selections are made for read operation all programming specifications are the same for all dash numbers.

MKI INDUSTRIAL HI-REL SCREENING

Figure 3

	Screen	MIL-STD 883 Method	Reqmt.
Package Assembly	Die Inspect Pre-Seal Inspect	75X Mostek Spec. 30X-60X Mostek Spec.	100% 100%
Environmental	Temperature Cycle Centrifuge Fine Leak Gross Leak	1010 Cond. C, 5 Cycles 2001 Cond. D, 20Kg Y_1 1014 Cond. B, 1 X 10^{-7} atm cc/sec Mostek Spec.	100% 100% 100% 100%
Electrical	Electrical Screens	5005 Grp. A electrical sub-groups, testing conditions and limits which guarantee ac, dc and functional performance over the full temperature range.	100%
Voltage Stress (DRAMs only)		1015 Cond. D, 10 hrs. min., 125°C	100%
Burn-in		1015 Cond. D, 44 hrs. min., 125°C	100%
QA Acceptance	Hermeticity Electrical Tests Visual/Mechanical Solderability Pre-shipment Inspect	Fine and gross leak samples 5005 Grp. A sample testing to guarantee performance to data sheet over full temp. range. Visual tests to guarantee marking, construction and mechanical integrity	.25% AQL .4% AQL .65% AQL LTPD 10 .65% AQL

CAPACITANCE

(T_A = 25°C) [8]

SYM	PARAMETER	TYP	MAX	UNITS	NOTES
C_{IN}	Input Capacitance	4	6	pF	6
C_{OUT}	Output Capacitance	8	12	pF	6

READ OPERATION NOTES:

1. V_{CC} must be applied on or before V_{PP} and removed after or at the same time as V_{PP}.
2. V_{PP} and V_{CC} may be connected together except during programming, in which case the supply current is the sum of I_{CC} and I_{PP1}.
3. All voltages with respect to V_{SS}.
4. Load conditions = I_{TTL} load and 100pF., tr = tF - 20ns, reference levels are 1V and 2V for inputs and .8V and 2V for outputs.
5. t_{OE} is referenced to $\overline{CE}$ or the addresses, whichever occurs last.
6. Effective Capacitance calculated from the equation $C = \frac{\Delta Q}{\Delta V}$ where ΔV = 3V.
7. Typical numbers are for T_A = 25°C and V_{CC} = 5.0 V.
8. t_{DF} is applicable to both $\overline{CE}$ and $\overline{OE}$, whichever occurs first.
9. OE may follow up to t_{ACC}-t_{OE} after the falling edge of $\overline{CE}$ without effecting t_{ACC}.

PROGRAM OPERATION[8]

RECOMMENDED DC OPERATING CONDITIONS[8]

(T_A = 25°C ± 5°C) (V_{CC} = +5V ± 5%, V_{PP} = 25V ± 1V)

SYM	PARAMETER	MIN	MAX	UNITS	NOTES
V_{IL}	Input Low Level	-0.1	0.8	V	
V_{IH}	Input High Level	2.0	V_{CC} + 1	V	

DC ELECTRICAL CHARACTERISTICS

(T_A = 25°C ± 5°C) (V_{CC} = +5V ± 5%, V_{PP} = 25V ± 1V)

SYM	PARAMETER	MIN	MAX	UNITS	NOTES
I_{IL}	Input Leakage Current		10	μA	3
I_{CC}	V_{CC} Power Supply Current		100	mA	
I_{PP1}	V_{PP} Supply Current		10	mA	4
I_{PP2}	V_{PP} Supply Current during Programming Pulse		30	mA	5