

M5M27401AK-10,-12,-15

4194304-BIT(524288-WORD BY 8-BIT)
CMOS ERASABLE AND ELECTRICALLY REPROGRAMMABLE ROM

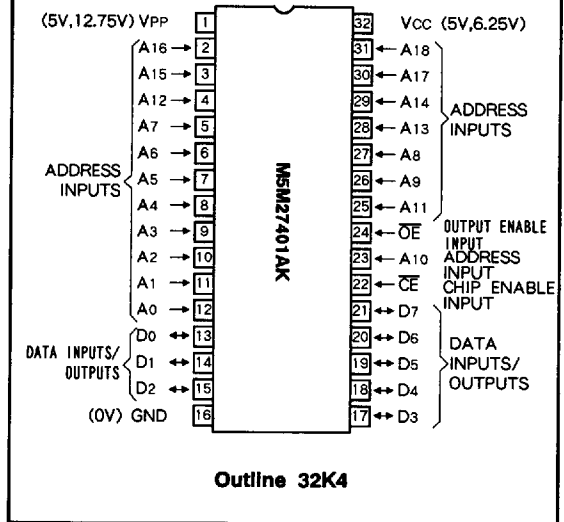
DESCRIPTION

The Mitsubishi M5M27401AK is a high-speed 4194304-bit ultraviolet erasable and electrically reprogrammable read only memory. It is suitable for microprocessor programming applications where rapid turn-around is required. The M5M27401AK is fabricated by N-channel double polysilicon gate for Memory and CMOS technology for peripheral circuits, and is available in a 32 pin DIP with a transparent lid.

FEATURES

- 524288 word × 8 bit organization
- Access time M5M27401AK-10 100ns (max.)
M5M27401AK-12 120ns (max.)
M5M27401AK-15 150ns (max.)
- Two line control \overline{OE} , \overline{CE}
- Low power current (Icc) : Active 70mA (max.)
(Iss2) : Stand-by 0.1mA (max.)
- Single 5V power supply (read operation)
- Programming voltage 12.75V
- 3-State output buffer
- Input and output TTL-compatible in read and program mode
- Standard 32 pin DIP

PIN CONFIGURATION (TOP VIEW)

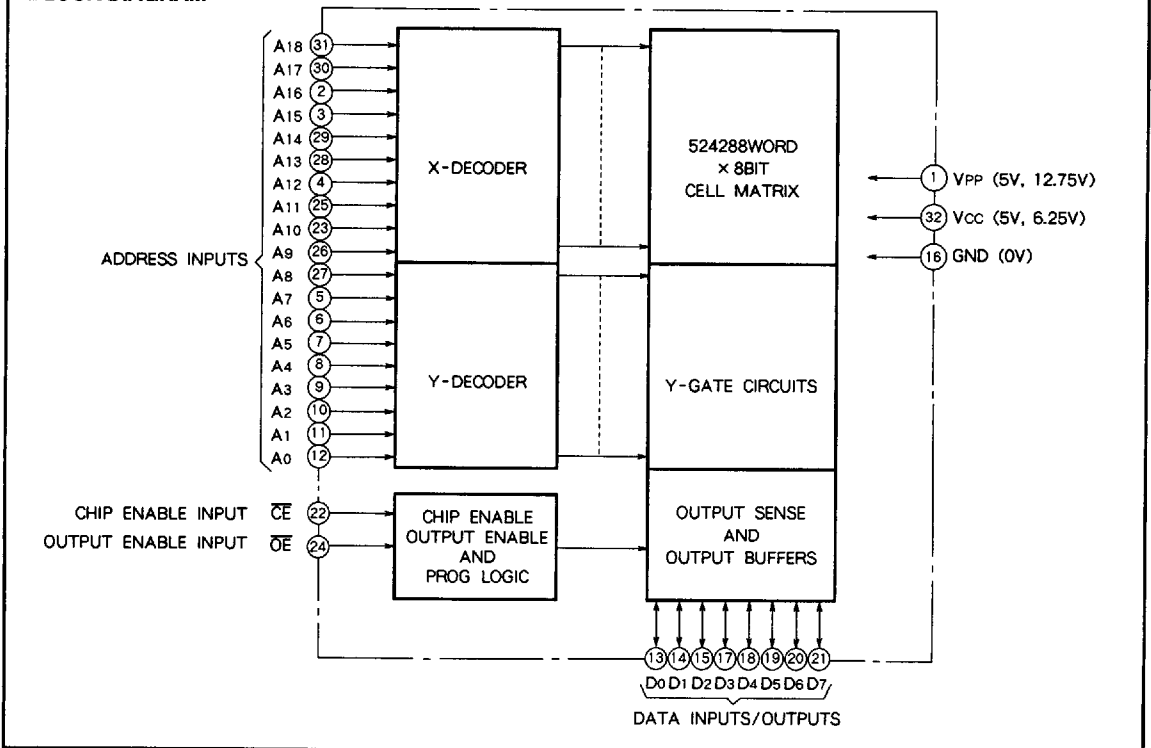


- Byte programming algorithm

APPLICATION

Microcomputer systems and peripheral equipment

BLOCK DIAGRAM



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FUNCTION

Read

Set the \overline{CE} and \overline{OE} terminals to the read mode (low level). Low level input to \overline{CE} and \overline{OE} and address signals to the address inputs ($A_0 \sim A_{18}$) make the data contents of the designated address location available at the data input/output ($D_0 \sim D_7$). Where the \overline{CE} or \overline{OE} signal is high, data input/output are in a floating state.

When the \overline{CE} signal is high, the device is in the stand by mode or power-down mode.

Programming

(Byte programming algorithm)

The M5M27401AK enters the byte programming mode when 12.75V is supplied to the V_{PP} power supply input and \overline{OE}

is at high level. A location is designated by address signals ($A_0 \sim A_{18}$), and the data to be programmed must be applied at 8-bits in parallel to the data inputs ($D_0 \sim D_7$). In this state, byte programming is completed when \overline{CE} is at low level.

Erase

Erase is effected by exposure to ultraviolet light with a wavelength of 2537 Å at an intensity of approximately 15WS/cm². Sunlight and fluorescent light may contain ultraviolet light sufficient to erase the programmed information. For any operation in the read mode, the transparent lid should be covered with opaque tape.

MODE SELECTION

Mode \ Pins	\overline{CE} (22)	\overline{OE} (24)	V_{PP} (1)	V_{CC} (32)	Data I/O (13~15, 17~21)
Read	V _{IL}	V _{IL}	5V	5V	Data out
Output disable	V _{IL}	V _{IH}	5V	5V	Floating
Standby (Power down)	V _{IH}	X*	5V	5V	Floating
Programming	V _{IL}	V _{IH}	12.75V	6.25V	Data in
Program verify	V _{IH}	V _{IL}	12.75V	6.25V	Data out
Program inhibit	V _{IH}	V _{IH}	12.75V	6.25V	Floating

* : X can be either V_{IL} or V_{IH}

ABSOLUTE MAXIMUM RATINGS (Note 1)

Symbol	Parameter	Conditions	Ratings	Unit
V _{I1}	All input or output voltage except $V_{PP} \cdot A_9$	With respect to Ground	-0.6~7	V
V _{I2}	V_{PP} supply voltage		-0.6~14.0	V
V _{I3}	A_9 supply voltage		-0.6~13.5	V
T _{opr}	Operating temperature		-10~80	°C
T _{stg}	Storage temperature		-65~125	°C

Note 1 : Stresses above those listed may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or at any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods affects device reliability.

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READ OPERATION

DC ELECTRICAL CHARACTERISTICS (Ta = 0~70°C, Vcc = 5V ± 10%, Vpp = Vcc, unless otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
ILI	Input leakage current	VIN = 0~VCC			10	μA
ILO	Output leakage current	VOUT = 0~VCC			10	μA
IPP1	VPP current read/stand-by	VPP = VCC = 5.5V		1	100	μA
ISB1	Vcc current stand-by	CE = VIH			1	mA
ISB2		CE = VCC		1	100	μA
ICC1	Vcc current Active	CE = OE = VIL, DC, IOUT = 0mA			30	mA
ICC2		CE = VIL, f = 10MHz, IOUT = 0mA			70	mA
VIL	Input low voltage		-0.1		0.8	V
VIH	Input high voltage		2.2		Vcc+1	V
VOL	Output low voltage	IOL = 2.1mA			0.45	V
VOH	Output high voltage	IOH = -400 μA	2.4			V

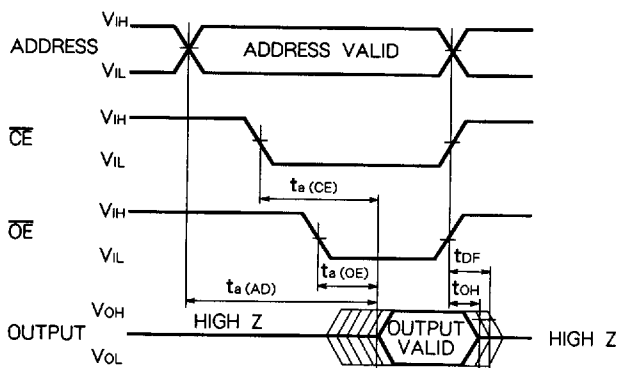
Note 2: Typical values are at Ta = 25°C and nominal supply voltages

AC ELECTRICAL CHARACTERISTICS (Ta = 0~70°C, Vcc = 5V ± 10%, unless otherwise noted)

Symbol	Parameter	Test conditions	Limits						Unit
			M5M27401AK-10		M5M27401AK-12		M5M27401AK-15		
			Min.	Max.	Min.	Max.	Min.	Max.	
ta (AD)	Address to output delay	CE = OE = VIL		100		120		150	ns
ta (CE)	CE to output delay	OE = VIL		100		120		150	ns
ta (OE)	OE to output delay	CE = VIL		50		60		60	ns
tDF	OE high to output float	CE = VIL	0	45	0	50	0	50	ns
tOH	Output hold from CE, OE or address		0		0		0		ns

Note 3: VCC must be applied simultaneously VPP and removed simultaneously VPP

AC WAVEFORMS



Test conditions for A.C. characteristics

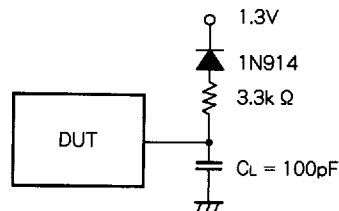
Input voltage: VIL = 0.45V, VIH = 2.4V

Input rise and fall times: ≤ 10ns

Reference voltage at timing measurement: 1.5V

Output load: 1TTL gate + CL (= 100pF)

or



CAPACITANCE

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
CIN	Input capacitance (Address, CE, OE)	Ta = 25°C, f = 1MHz, Vi = Vo = 0V			15	pF
Cout	Output capacitance				15	pF

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PROGRAM OPERATION

First set $V_{CC} = 6.25V$, $V_{PP} = 12.75V$ and then set an address to first address to be programmed. After applying 0.1ms program pulse (\overline{CE}) to the address, verify is performed. If the output data of that address is not verified correctly, apply one more 0.1ms program pulse. The programmer continues 0.1ms pulse-then-verify routines until the device verify correctly or twenty five of these pulse-then-verify routines

have been completed. When the programming procedure above is finished, step to the next address and repeat this procedure till last address to be programmed. When the entire addresses have been programmed completely, all addresses should be verified with $V_{CC} = V_{PP} = 5V$.

DC ELECTRICAL CHARACTERISTICS ($T_a = 25 \pm 5^\circ C$, $V_{CC} = 6.25V \pm 0.25V$, $V_{PP} = 12.75V \pm 0.25V$, unless otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
I _{LI}	Input leakage current	$V_{IN} = 0 \sim V_{CC}$			10	μA
V _{OL}	Output low voltage (verify)	I _{OL} = 2.1mA			0.45	V
V _{OH}	Output high voltage (verify)	I _{OH} = - 400 μA	2.4			V
V _{IL}	Input low voltage		- 0.1		0.8	V
V _{IH}	Input high voltage		2.2		V _{CC}	V
I _{CC}	V _{CC} supply current				30	mA
I _{PP}	V _{PP} supply current	$\overline{CE} = V_{IL}$			30	mA

AC ELECTRICAL CHARACTERISTICS ($T_a = 25 \pm 5^\circ C$, $V_{CC} = 6.25V \pm 0.25V$, $V_{PP} = 12.75V \pm 0.25V$, unless otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
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		0			μs
t _{DH}	Data hold time		2			μs
t _{DFF}	Chip enable to output float delay		0		130	ns
t _{VCS}	V _{CC} setup time		2			μs
t _{VPS}	V _{PP} setup time		2			μs
t _{PW}	\overline{CE} initial program pulse width		95	100	105	μs
t _{OE}	Data valid from \overline{OE}				150	ns

Note 4 : V_{CC} must be applied simultaneously V_{PP} and removed simultaneously V_{PP}.

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DEVICE IDENTIFIER MODE

The Device Identifier Mode allows the reading of a binary code from the EPROM that identifies the manufacturer and device type.

The EPROM Programmer reads the manufacturer code and the device code and automatically selects the corresponding programming algorithm.

M5M27401AK DEVICE IDENTIFIER CODE

Code \ Pin	A ₀ (12)	D ₇ (21)	D ₆ (20)	D ₅ (19)	D ₄ (18)	D ₃ (17)	D ₂ (15)	D ₁ (14)	D ₀ (13)	Hex Data
Manufacturer code	V _{IL}	0	0	0	1	1	1	0	0	1C
Device code	V _{IH}	0	0	0	1	0	0	0	0	10

Note 5: A₉ = 12.0 ± 0.5V
 A₁~A₈, A₁₀~A₁₈, \overline{CE} , \overline{OE} = V_{IL},
 V_{CC} = V_{PP} = 5V ± 10%.