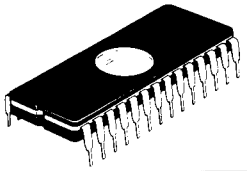
M5L27256K, -2

262144-BIT (32768-WORD BY 8-BIT) ERASABLE AND ELECTRICALLY REPROGRAMMABLE ROM



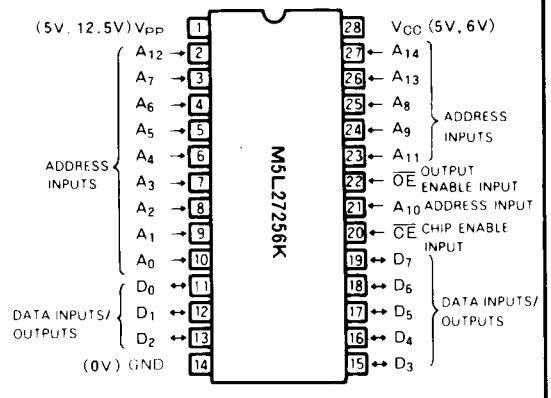
DESCRIPTION

The Mitsubishi M5L27256K is a high-speed 262144-bit ultraviolet erasable and electrically reprogrammable read only memory. It is suitable for microprocessor programming applications where rapid turn-around is required. The M5L27256K is fabricated by N-channel double polysilicon gate technology and is available in a 28-pin DIP with a transparent lid.

FEATURES

- 32768 Word x 8 bit organization
- Access time M5L27256K-2 . . . . . 200ns (max.)
  M5L27256K . . . . . 250ns (max.)
- Programming voltage: 12.5V
- Two line control $\overline{OE}$, $\overline{CE}$
- Low power current (I_{CC}): Active . . . . . 80mA (max.)
  Stand by . . . . 25mA (max.)
- Single 5V power supply
- 3-State output buffer
- Input and output TTL-compatible in read and program mode
- Standard 28-pin DIP
- Fast programming algorithm

PIN CONFIGURATION (TOP VIEW)

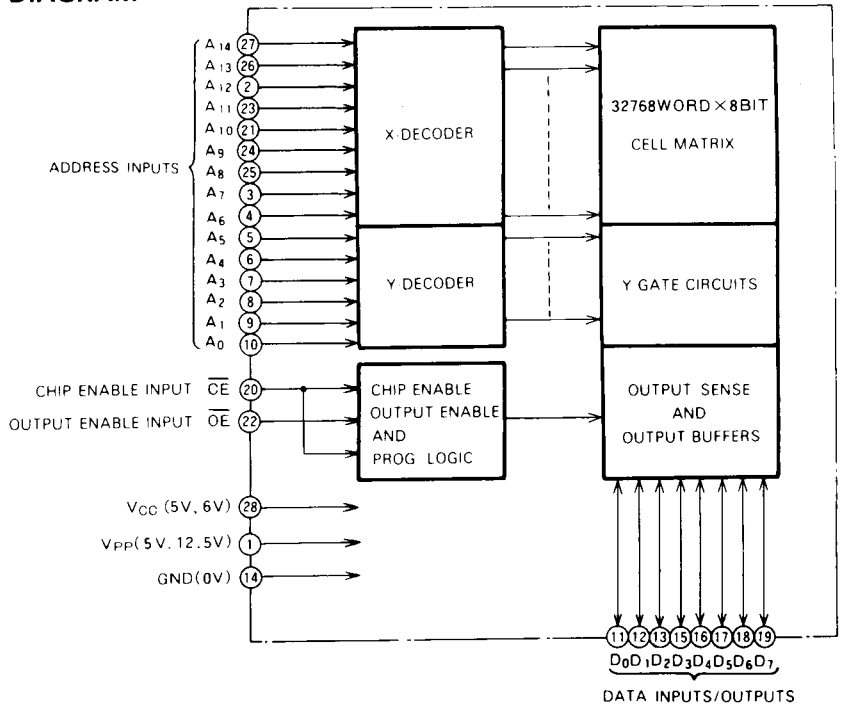


Outline 28K4

APPLICATION

Microcomputer systems and peripheral equipment

BLOCK DIAGRAM



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 ($A_0 \sim A_{14}$) make the data contents of the designated address location available at the data input/output ($D_0 \sim D_7$). When 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 standby mode or power-down mode.

Programming
(Fast programming algorithm)

First set $V_{CC} = 6V$, $V_{PP} = 12.5V$ and then set an address to first address to be programmed. After applying 1 ms program pulse ($\overline{CE}$) to the address, verify is performed. If the output data of that address is not verified correctly, apply one more 1 ms program pulse. The programmer continues 1 ms pulse-then-verify routines until the device verify correctly or twenty five of these pulse-then-verify routines have been completed. The programmer also maintains its total number of 1ms pulses applied to that address in register X. And then applied a program pulse 3 times of register X value long as an overprogram pulse. When the programming procedure above is finished, step to the next address and repeat this procedure till last address to be programmed.

Erase

Erase is effected by exposure to ultraviolet light with a wavelength of 2537Å at an intensity of appoximately 15WS/cm^2. 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	$\overline{CE}$(20)	$\overline{OE}$(22)	V_{PP}(1)	V_{CC}(28)	Outputs (11~13, 15~19)
Read	V_{IL}	V_{IL}	5V	5V	Data out
Output disable	V_{IL}	V_{IH}	5V	5V	Floating
Standby	V_{IH}	X*	5V	5V	Floating
Program	V_{IL}	V_{IH}	12.5V	6V	Data in
Program verify	V_{IH}	V_{IL}	12.5V	6V	Data out
Program inhibit	V_{IH}	V_{IH}	12.5V	6V	Floating

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

ABSOLUTE MAXIMUM RATINGS (Note 1)

Symbol	Parameter	Ratings	Unit
T_{opr}	Operating temperature	−10~80	°C
T_{stg}	Storage temperature	−65~125	°C
V_{I1}	All input or output voltage except V_{PP}, A_9 (Note 2)	−0.6~7	V
V_{I2}	V_{PP} supply voltage during programming (Note 2)	−0.6~14.0	V
V_{I3}	A_9 input voltage (Note 2)	−0.6~13.5	V

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 these 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.

2. With respect to Ground.

READ OPERATION

DC ELECTRICAL CHARACTERISTICS ($Ta = 0 \sim 70°C$, $V_{CC} = 5V \pm 5\%$, $V_{PP} = V_{CC}$, unless otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
I_{LI}	Input load current	$V_{IN} = 5.5V$			10	μA
I_{LO}	Output leakage current	$V_{OUT} = 5.5V$			10	μA
I_{PP1}	V_{PP} current read	$V_{PP} = 5.5V$			5	mA
I_{CC1}	V_{CC} current standby	$\overline{CE} = V_{IH}$			25	mA
I_{CC2}	V_{CC} current Active	$\overline{CE} = \overline{OE} = V_{IL}$			80	mA
V_{IL}	Input low voltage		−0.1		0.8	V
V_{IH}	Input high voltage		2.0		$V_{CC}+1$	V
V_{OL}	Output low voltage	$I_{OL} = 2.1mA$			0.45	V
V_{OH}	Output high voltage	$I_{OH} = -400\mu A$	2.4			V

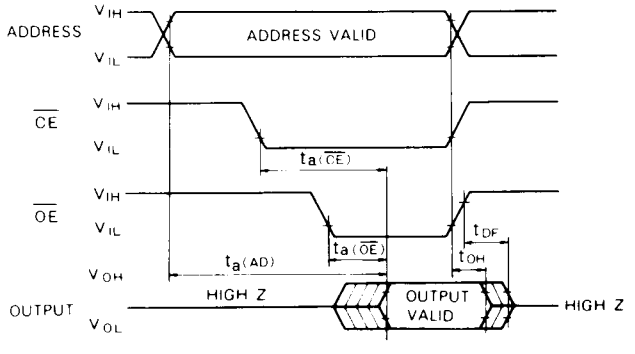
Note 3: Typical values are at $Ta = 25°C$ and nominal supply voltages.

AC ELECTRICAL CHARACTERISTICS ($Ta = 0 \sim 70°C$, $V_{CC} = 5V \pm 5\%$, $V_{PP} = V_{CC}$, unless otherwise noted)

Symbol	Parameter	Test conditions	Limits						Unit
			M5L27256K-2			M5L27256K			
			Min	Typ	Max	Min	Typ	Max	
$t_{a(AD)}$	Address to output delay	$\overline{CE} = \overline{OE} = V_{IL}$			200			250	ns
$t_{a(\overline{CE})}$	$\overline{CE}$ to output delay	$\overline{OE} = V_{IL}$			200			250	ns
$t_{a(\overline{OE})}$	Output enable to output delay	$\overline{CE} = V_{IL}$			75			100	ns
t_{DF}	Output enable high to output float	$\overline{CE} = V_{IL}$	0		60	0		60	ns
t_{OH}	Output hold from $\overline{CE}$, $\overline{OE}$ or addresses		0			0			ns

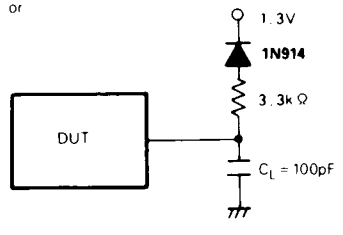
Note 4: V_{CC} must be applied simultaneously or before V_{PP} and removed simultaneously or after V_{PP}.

AC WAVEFORMS



Test conditions for A.C. charactristics
Input voltage: $V_{IL} = 0.45V$, $V_{IH} = 2.4V$
Input rise and fall times: $\leq 20ns$
Reference voltage at timing measurement: Input 0.8V and 2V Output 0.8V, and 2V.

Output load 1TTL gate + C_L(100pF)



CAPACITANCE

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
C_{IN}	Input capacitance (Address, $\overline{CE}$, $\overline{OE}$)	$Ta = 25°C$, $f = 1MHz$, $V_I = V_O = 0V$		4	6	pF
C_{OUT}	Output capacitance			8	12	pF

PROGRAM OPERATION

FAST PROGRAMMING ALGORITHM

DC ELECTRICAL CHARACTERISTICS ($Ta = 25 \pm 5°C$, $V_{CC} = 6V \pm 0.25V$, $V_{PP} = 12.5V \pm 0.3V$, unless otherwise noted)

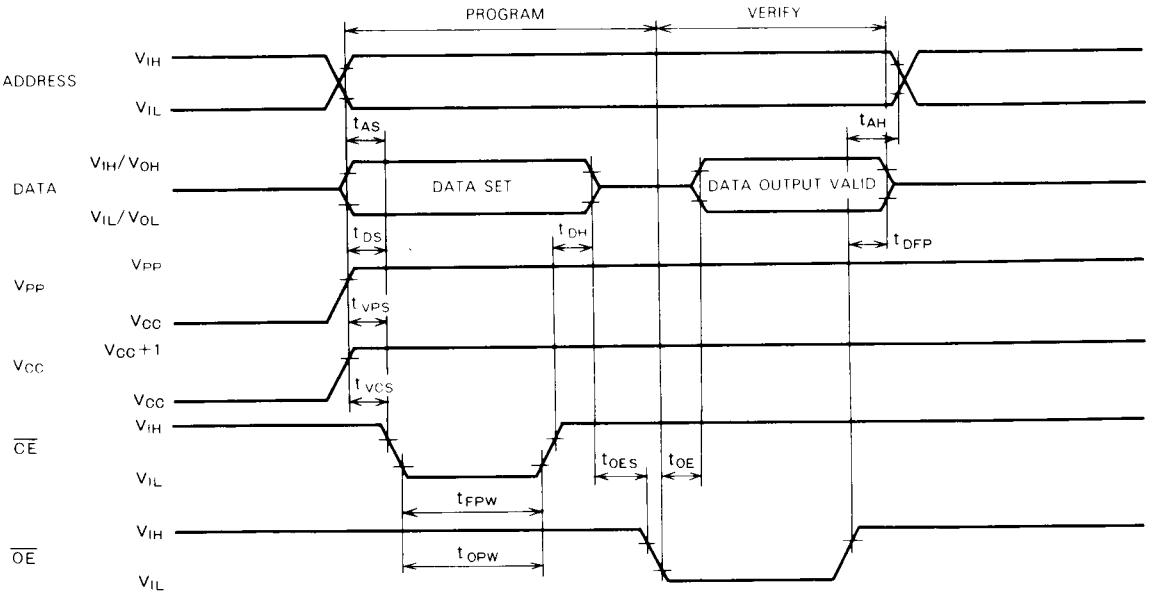
Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
I_{LI}	Input current	$V_{IN} = V_{IL}$ or V_{IH}			10	μA
V_{OL}	Output low voltage	$I_{OL} = 2.1mA$			0.45	V
V_{OH}	Output high voltage	$I_{OH} = -400\mu A$	2.4			V
V_{IL}	Input low voltage		−0.1		0.8	V
V_{IH}	Input high voltage		2.0		V_{CC}	V
I_{CC2}	V_{CC} supply current				80	mA
I_{PP2}	V_{PP} supply current	$\overline{CE} = V_{IL}$			50	mA

AC ELECTRICAL CHARACTERISTICS ($Ta = 25 \pm 5°C$, $V_{CC} = 6V \pm 0.25V$, $V_{PP} = 12.5V \pm 0.3V$, unless otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
t_{AS}	Address setup time		2			μs
t_{OES}	$\overline{OE}$ set up 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_{DFP}	Output 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		0.95	1	1.05	ms
t_{OPW}	$\overline{CE}$ over program pulse width		2.85		78.75	ms
t_{OE}	Data valid from $\overline{OE}$				150	ns

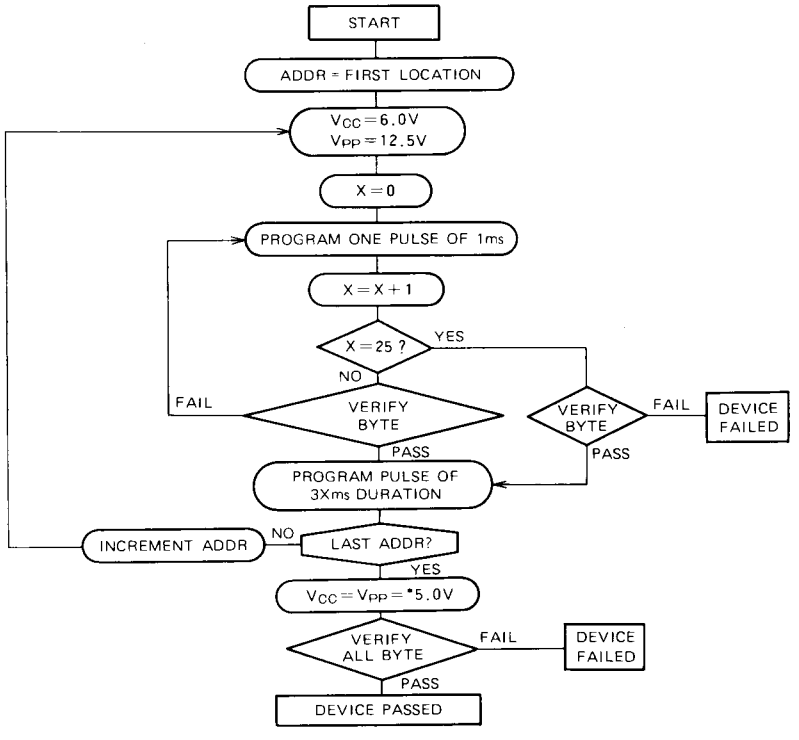
Note 5: V_{CC} must be applied simultaneously or before V_{PP} and removed simultaneously or after V_{PP}.

AC WAVEFORMS



Test conditions for A.C. charactristics
Input voltage: V_{IL} = 0.45V, V_{IH} = 2.4V
Input rise and fail times: ≦ 20ns
Reference voltage at timing measurement: Input 0.8V and 2V Output 0.8V, and 2V.

FAST PROGRAMMING ALGORITHM FLOW CHART



* 4.75V ≦ V_{CC} = V_{PP} ≦ 5.25V

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.

M5L27256K DEVICE IDENTIFIER CODE

Code \ Pin	A_0 (10)	D_7 (19)	D_6 (18)	D_5 (17)	D_4 (16)	D_3 (15)	D_2 (13)	D_1 (12)	D_0 (11)	Hex Data
Manufacturer code	V_{IL}	0	0	0	1	1	1	0	0	1C
Device code	V_{IH}	0	0	0	0	0	1	0	0	04

Note 6: $V_{CC} = V_{PP} = 5V \pm 5\%$, $A_9 = 12.0 \pm 0.5V$, $A_1 \sim A_8$, $A_{10} \sim A_{14}$, $\overline{CE}$, $\overline{OE} = V_{IL}$.