M5L27512K, -17, -2

524288-BIT (65536-WORD BY 8-BIT) ERASABLE AND ELECTRICALLY REPROGRAMMABLE ROM

DESCRIPTION

The Mitsubishi M5L27512K is a high-speed 524288 bit ultraviolet erasable and electrically reprogrammable read only memory. It is suitable for microprocessor programming applications where rapid turn-around is required. The M5L27512K is fabricated by N-channel double polysilicon gate technology and is available in a 28-pin DIP with a transparent lid.

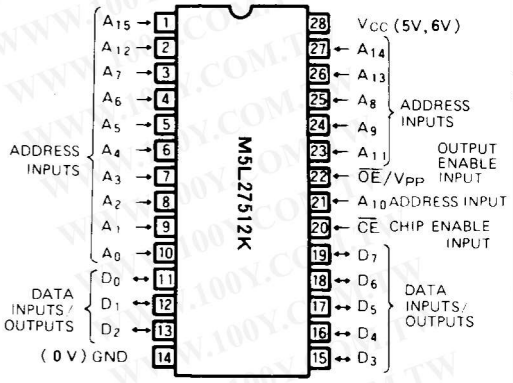
FEATURES

- 65536 Word x 8 bit organization
- Access time M5L27512K-17 . . . . . 170ns (max.)
  M5L27512K-2 . . . . . 200ns (max.)
  M5L27512K . . . . . 250ns (max.)
- Programming voltage: 12.5V
- Two line control $\overline{OE}$, $\overline{CE}$
- Lower power current (I_{CC}): Active . . 100mA (max.)
  Stand by . . 40mA (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

APPLICATION

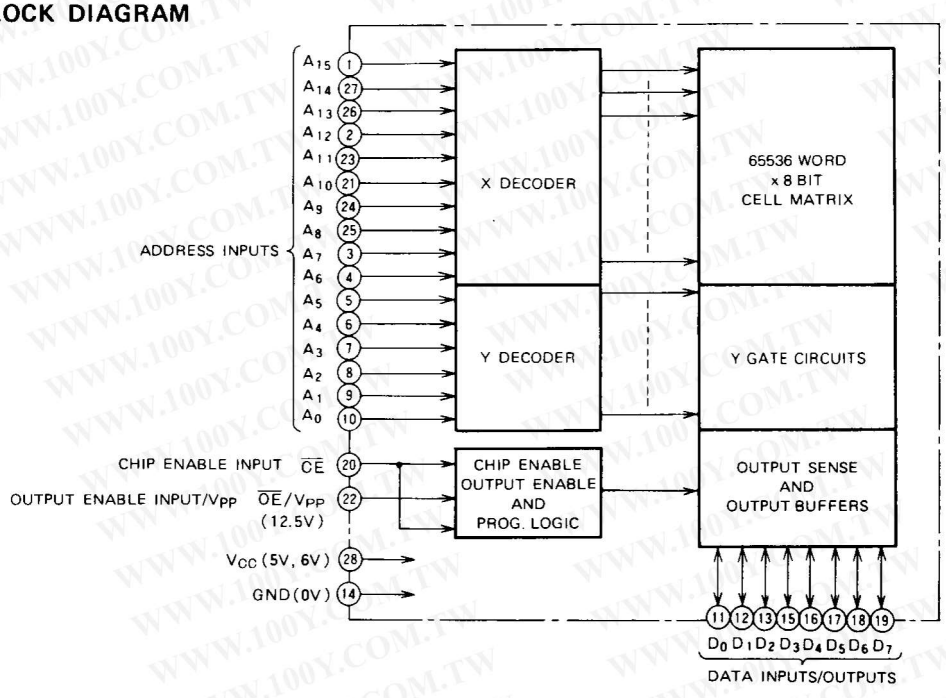
Microcomputer systems and peripheral equipment

PIN CONFIGURATION (TOP VIEW)



Outline 28K4

BLOCK DIAGRAM



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FUNCTION

Read

Set the $\overline{CE}$ and $\overline{OE}/V_{PP}$ terminals to the read mode (low level). Low level input to $\overline{CE}$ and $\overline{OE}/V_{PP}$ and address signals to the address inputs ($A_0 \sim A_{15}$) 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 $\overline{OE}/V_{PP}$ signal is high, data input/output are in a floating state.

When the $\overline{CE}$ signals is high, the device is in the standby mode or power-down mode.

Programming
(Fast programming algorithm)

First set V_{CC} = 6V, $\overline{OE}/V_{PP}$ = 12.5V and then set an address to first address to be programmed. After applying 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 1ms program pulse. The programmer continues 1ms 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)	$\overline{OE}/V_{PP}$ (22)	V_{CC} (28)	Outputs (11 ~ 13, 15 ~ 19)
Read	V_{IL}	V_{IL}	5 V	Data out
Output disable	V_{IL}	V_{IH}	5 V	Floating
Standby	V_{IH}	X*	5 V	Floating
Program	V_{IL}	12.5V	6 V	Data in
Program inhibit	V_{IH}	12.5V	6 V	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 (Note 2)	−0.6~7.0	V
V_{I2}	$\overline{OE}/V_{PP}$ supply voltage (Note 2)	−0.6~14.0	V
V_{I3}	A9 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 (T_a = 0 ~ 70°C, V_{CC} = 5V ± 5%, unless otherwise noted)

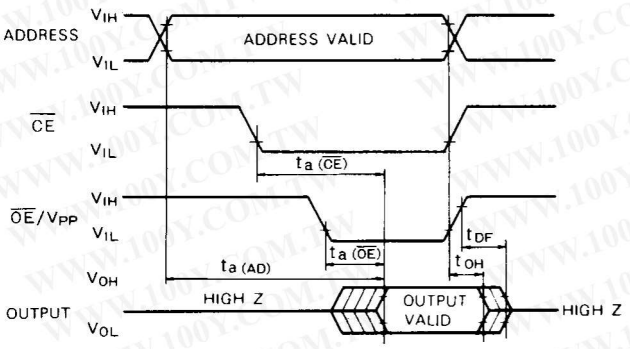
Symbol	Parameter	Conditions	Limits			Unit
			Min	Typ	Max	
I_{LI}	Input leakage current	V_{IN} = 5.5V			10	μA
I_{LO}	Output leakage current	V_{OUT} = 5.5V			10	μA
I_{CC1}	V_{CC} current standby	$\overline{CE} = V_{IH}$			40	mA
I_{CC2}	V_{CC} current active	$\overline{CE} = \overline{OE}/V_{PP} = V_{IL}$			100	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} = −400μA	2.4			V

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

AC ELECTRICAL CHARACTERISTICS (T_a = 0 ~ 70°C, V_{CC} = 5V ± 5%, unless otherwise noted)

Symbol	Parameter	Test conditions	Limits						Unit
			M5L27512K-17		M5L27512K-2		M5L27512K		
			Min	Max	Min	Max	Min	Max	
$t_{a(AD)}$	Address to output delay	$\overline{CE} = \overline{OE}/V_{PP} = V_{IL}$		170		200		250	ns
$t_{a(\overline{CE})}$	$\overline{CE}$ to output delay	$\overline{OE}/V_{PP} = V_{IL}$		170		200		250	ns
$t_{a(\overline{OE})}$	$\overline{OE}$ to output delay	$\overline{CE} = V_{IL}$		60		75		100	ns
t_{DF}	$\overline{OE}$ high to output float	$\overline{CE} = V_{IL}$	0	50	0	60	0	60	ns
t_{OH}	Output hold from $\overline{CE}$, $\overline{OE}$ or addresses		0		0		0		ns

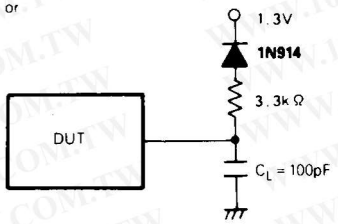
AC WAVEFORMS



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

Output load: 1TTL gate + C_L (100pF)

or



CAPACITANCE

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
C_{IN}	Input capacitance	T_a = 25°C, f = 1MHz, V_I = V_O = 0V		4	6	pF
C_{OUT}	Output capacitance			8	12	pF
$C_{\overline{OE}/V_{PP}}$	$\overline{OE}/V_{PP}$ Input capacitance			30	40	pF

PROGRAM OPERATION

FAST PROGRAMMING ALGORITHM

DC ELECTRICAL CHARACTERISTICS

(T_a = 25±5°C, V_{CC} = 6V±0.25V, V_{PP} = 12.5V±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}=−400μA	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				100	mA
I_{PP2}	$\overline{OE}$/V_{PP} supply current	$\overline{CE}$ = V_{IL}			50	mA

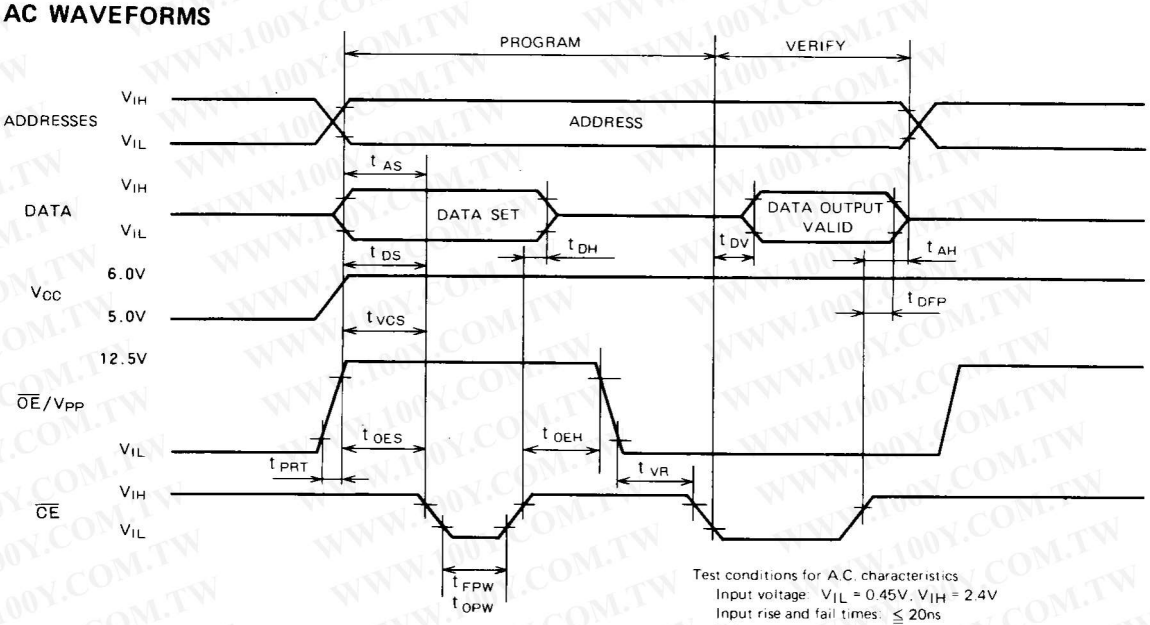
AC ELECTRICAL CHARACTERISTICS

(T_a = 25±5°C, V_{CC} = 6V±0.25V, V_{PP} = 12.5V±0.3V, unlesee otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
t_{AS}	Address setup time		2			μs
t_{OES}	$\overline{OE}$/V_{PP} setup time		2			μs
t_{OEH}	$\overline{OE}$/V_{PP} hold 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}	$\overline{CE}$ to output float delay		0		130	ns
t_{VCS}	V_{CC} setup time		2			μs
t_{FPW}	$\overline{CE}$ initial program pulse width		0.95	1.0	1.05	ms
t_{OPW}	$\overline{CE}$ over program pulse width		2.85		78.75	ms
t_{DV}	Data valid from $\overline{CE}$				1	μs
t_{VR}	$\overline{OE}$/V_{PP} recovery time		2			μs
t_{PRT}	$\overline{OE}$/V_{PP} pulse rise time during program		50			ns

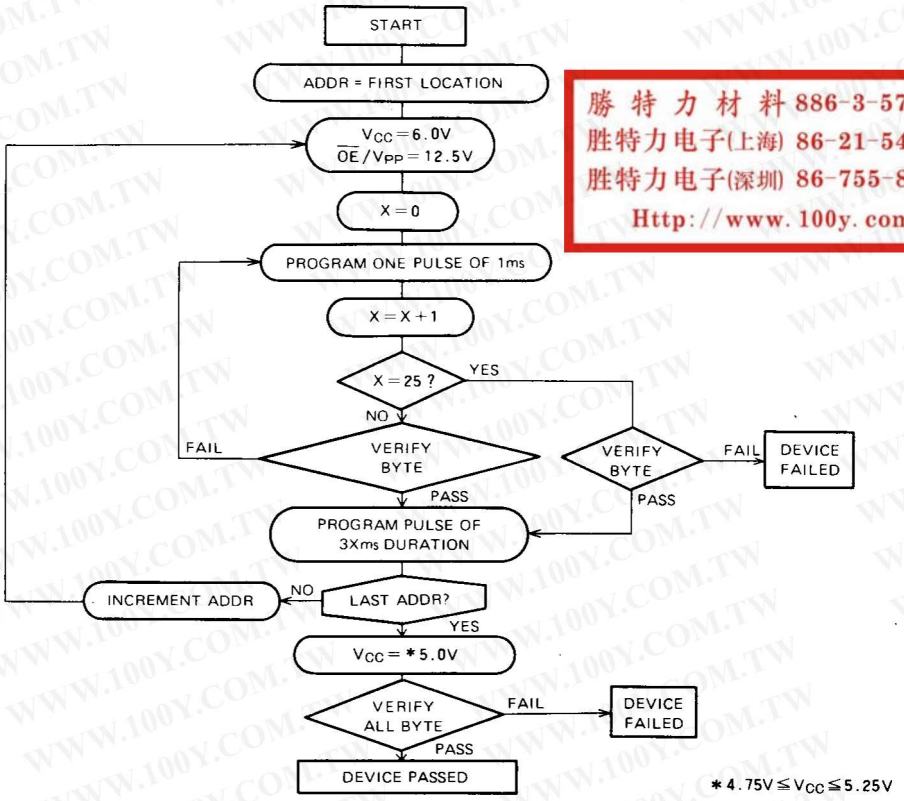
Note 4: V_{CC} must be applied simultaneously or before $\overline{OE}$/V_{PP} and removed simultaneously or after $\overline{OE}$/V_{PP}.

AC WAVEFORMS



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

FAST PROGRAMMING ALGORITHM FLOW CHART



*4.75V ≤ Vcc ≤ 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.

M5L27512K DEVICE IDENTIFIER CODE

Pin / Code	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	1	1	0	1	0D

Note 5: $V_{CC} = 5V \pm 5\%$, $A_9 = 12.0 \pm 0.5V$, $A_1 \sim A_8$, $A_{10} \sim A_{15}$, $\overline{CE}$, $\overline{OE}/V_{PP} = V_{IL}$