M5M27C256AP,FP,VP,RV-12,-15

262144-BIT(32768-WORD BY 8-BIT) CMOS ONE TIME PROGRAMMABLE ROM

DESCRIPTION

The Mitsubishi M5M27C256AP,FP,VP,RV are high-speed 262144-bit one time programmable read only memories. They are suitable for microprocessor programming applications where rapid turnaround is required. The M5M27C256AP,FP, VP,RV are fabricated by N-channel double polysilicon gate and CMOS technology for peripheral circuits, and are available in 28-pin plastic packages.

FEATURES

- 32768 Word × 8 bit organization
- Package
  - DIP M5M27C256AP
  - SOP M5M27C256AFP
  - TSOP M5M27C256AVP
  - TSOP (Reverse) M5M27C256ARV
- Access time
  - M5M27C256A-12 ..... 120ns (max.)
  - M5M27C256A-15 ..... 150ns (max.)
- Programming voltage : 12.5V
- Two line control $\overline{OE}$, $\overline{CE}$
- Lower power current (I_{CC}) : Active ..... 30mA (max.)
  Stand-by ..... 1mA (max.)
- Single 5V power supply (read operation)
- 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

FUNCTION

Read

Set the $\overline{CE}$ and $\overline{OE}$ terminal to read mode (low level). Low level input to $\overline{CE}$ and $\overline{OE}$ and address signals to the address inputs (A_0~A_{14}) mark the datacontents of the designated address location available at the data input/output (D_0~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 the stand by mode or power-down mode.

Programming

〈Fast programming algorithm〉

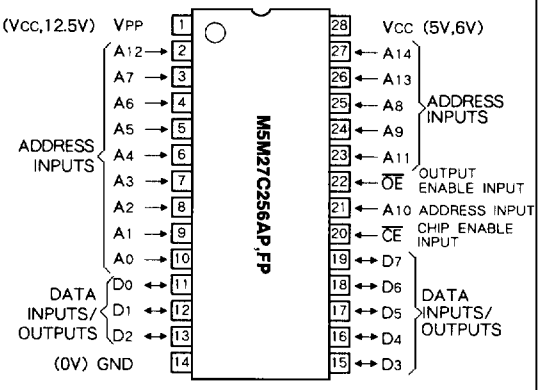
First set V_{CC} = 6V, V_{PP} = 12.5V and then set an address to first address to be programmed. After applying 1ms program pulse ($\overline{CE}$) to the address, verified correctly,apply one more 1ms program pulse.The programmer continues 1ms pulse-then-verify routines until the device verify correctly or twenty five of these pulse-then-verify routines have been completed.

The programmer also address in register X. And then applied a program pulse 3 times of register X value long as an over program pulse. When the programming procedure above is finished, step to the next address and repeat this procedure till last address to be programmed.

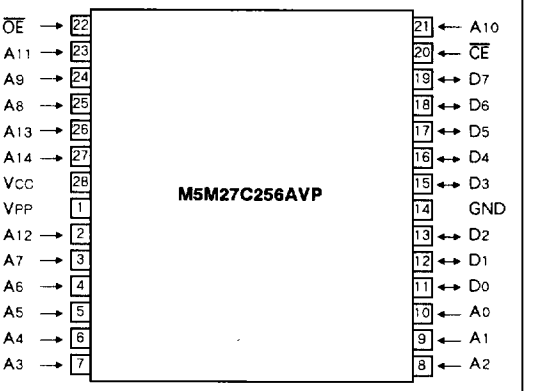
Erase

The M5M27C256AP, FP, VP, RV cannot be erased, because it is packaged in plastic without transparent lid.

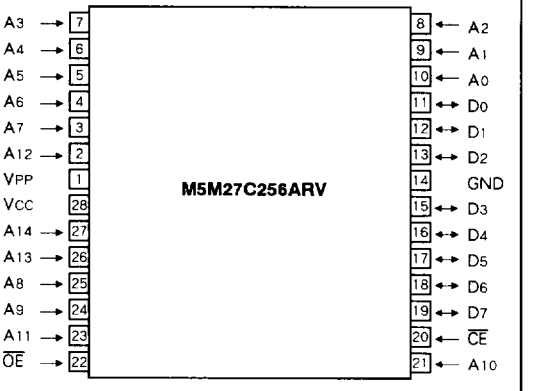
PIN CONFIGURATION (TOP VIEW)



Outline 28P4 (DIP : P)
28P2W-C (SOP : FP)

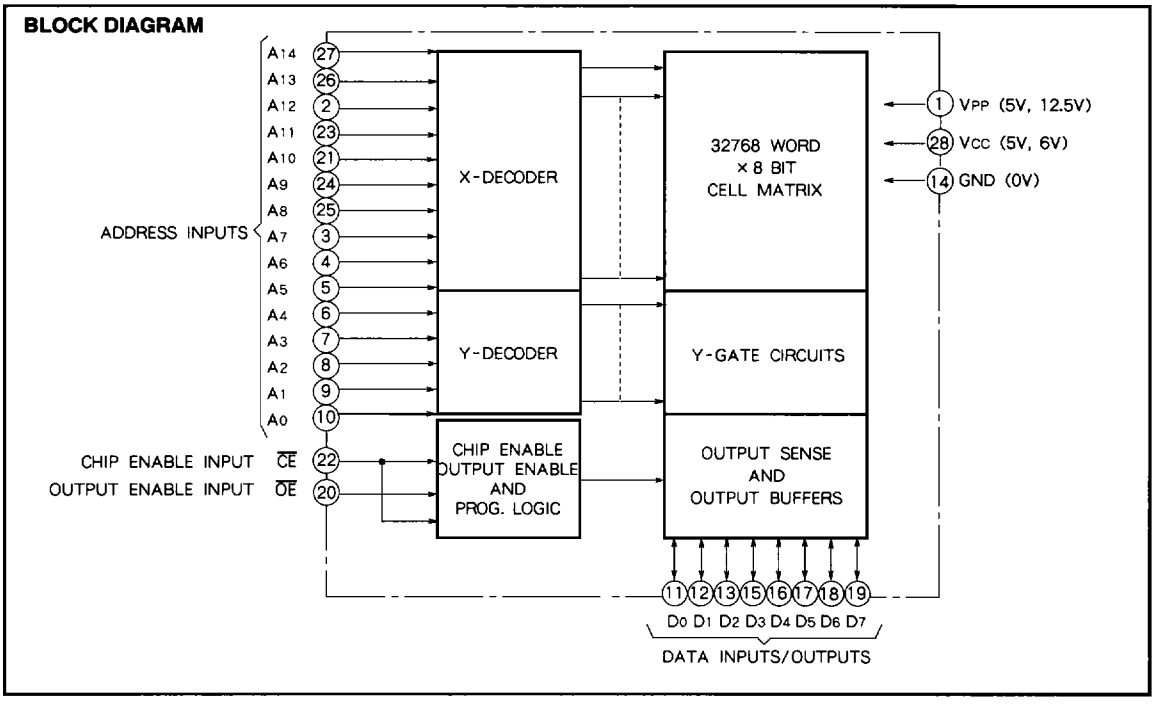


Outline 28P2C-A (TSOP : VP)



Outline 28P2C-B (TSOP : RV : Reverse)

BLOCK DIAGRAM



MODE SELECTION

Mode \ Pins	$\overline{CE}$	$\overline{OE}$	V_{PP}	V_{CC}	Data I/O
Read	V_{IL}	V_{IL}	5V	5V	Data out
Output disable	V_{IL}	V_{IH}	5V	5V	Floating
Stand-by (power-down)	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 RATING (Note 1)

Symbol	Parameter	Conditions	Ratings	Unit
V_{I1}	All input or output voltage	With respect to GND	−0.6~7	V
V_{I2}	V_{PP} supply voltage		−0.6~14.0	V
V_{I3}	A_9 input voltage		−0.6~13.5	V
V	Output voltage		−0.6~7	V
T_{opr}	Operating temperature		−10~80	℃
T_{stg}	Storage temperature		−65~150	℃

Note 1 : Stresses above listed may cause permanentdamage to device. This is a stress rating only and functional operation of the device at these or at any conditions above those indicate in the operational sections of specification is not implied. Exsolute maximum rating conditions for extended periods affects device reliability.

READ OPERATION

DC ELECTRICAL CHARACTERISTIC (T_a = 0~70℃, V_{CC} = 5V ± 10%, V_{PP} = V_{CC}, unless otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
I_{LI}	Input leakage current	V_{IN} = 0~V_{CC}			10	μA
I_{LO}	Output leakage current	V_{OUT} = 0~V_{CC}			10	μA
I_{SB1}	V_{CC} current stand-by	$\overline{CE}$ = V_{IH}			1	mA
I_{SB2}		$\overline{CE}$ = V_{CC}		1	100	μA
I_{CC1}	V_{CC} current active	$\overline{CE}$ = $\overline{OE}$ = V_{IL}, DC, I_{OUT} = 0mA			30	mA
I_{CC2}		$\overline{CE}$ = V_{IL}, f = 8.3MHz, I_{OUT} = 0mA			30	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 μA	2.4			V

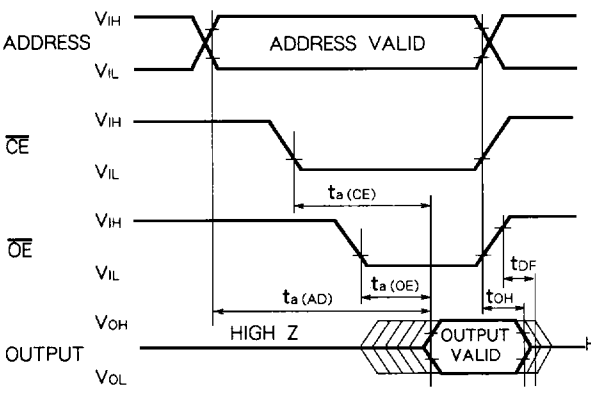
Note 2 : Typical values are at T_a = 25℃ and nominal voltages.

AC ELECTRICAL CHARACTERISTIC (T_a = 0~70℃, V_{CC} = 5V ± 10%, V_{PP} = V_{CC}, unless otherwise noted)

Symbol	Parameter	Test conditions	Limits				Unit
			M5M27C256A-12		M5M27C256A-15		
			Min	Max	Min	Max	
$t_{a(AD)}$	Address to output delay	$\overline{CE}$ = $\overline{OE}$ = V_{IL}		120		150	ns
$t_{a(CE)}$	$\overline{CE}$ to output delay	$\overline{OE}$ = V_{IL}		120		150	ns
$t_{a(OE)}$	$\overline{OE}$ to output delay	$\overline{CE}$ = V_{IL}		60		75	ns
t_{DF}	$\overline{OE}$ high to output float	$\overline{CE}$ = V_{IL}		50		60	ns
t_{OH}	Output hold from $\overline{CE}$ = $\overline{OE}$ or address		0		0		ns

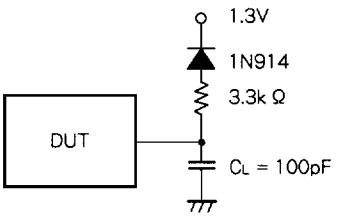
Note 3 : V_{CC} must be applied simultaneously V_{PP} and removed simultaneously V_{PP}.

AC WAVEFORM



Test condition for A.C. characteristics
Input voltage : V_{IL} = 0.45V, V_{IH} = 2.4V
Input rise and fall time : ≦ 20ns
Reference voltage at timing measurement : Input, Output "L" = 0.8V, "H" = 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℃, 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 (T_a=25±5℃, V_{CC}=6V±0.25V, V_{PP}=12.5V±0.3V, unless otherwise noted)

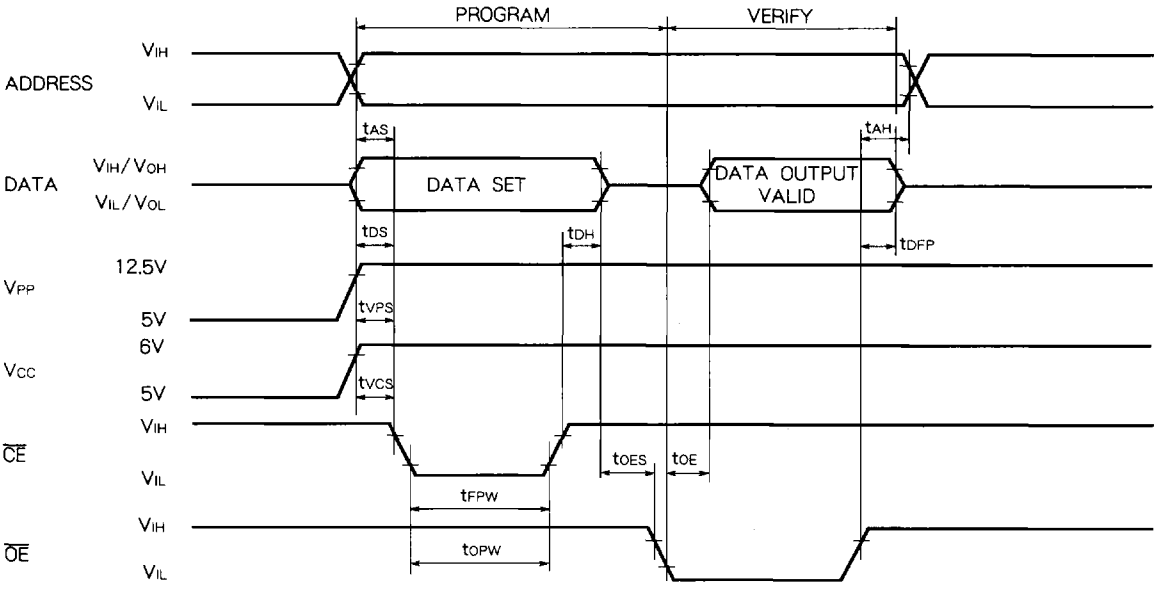
Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
I_{LI}	Input leakage current	V_{IN} = 0~V_{CC}			10	μA
V_{OL}	Output low voltage (verify)	I_{OL} = 2.1mA			0.45	V
V_{OH}	Output high voltage (verify)	I_{OH} = −400 μA	2.4			V
V_{IL}	Input low voltage		−0.1		0.8	V
V_{IH}	Input high voltage		2.0		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±5℃, V_{CC}=6V±0.25V, V_{PP}=12.5V±0.3V, unless otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
t_{AS}	Address setup time		2			μs
t_{OES}	$\overline{OE}$ 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_{DFP}	$\overline{OE}$ 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

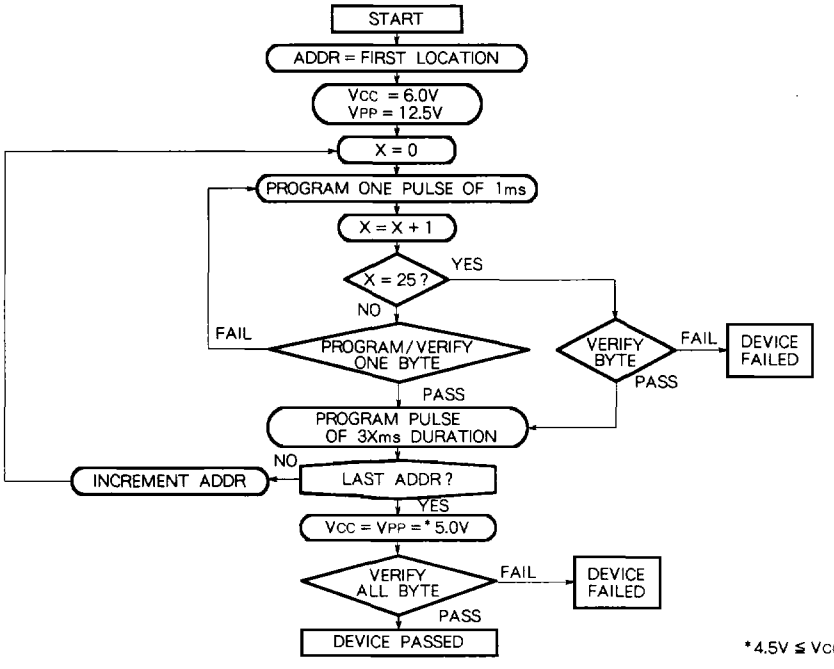
Note 4 : V_{CC} must be applied simultaneously V_{PP} and removed simultaneously V_{PP}.

AC WAVEFORMS



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

FAST PROGRAMMING ALGORITHM FLOW CHART



*4.5V ≦ VCC = VPP ≦ 5.5V

DEVICE IDENTIFIER MODE

The Device Identifier Mode allows the reading of a binary code from the OTP ROM that identifiers the manufacturer and device type.

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

M5M27C256AP,FP,VP,RV 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	1	0	0	0	08

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

RECOMMENDED SCREENING CONDITION

The following screening test is recommended before using.