FLASH-ROM MODULE 4MByte (1M x 32-Bit), 72pin-SIMM, 5V
Part No. HMF1M32M8S (Switching for write enable/disable)

GENERAL DESCRIPTION

The HMF1M32M8S is a high-speed flash read only memory (FROM) module containing 1,048,576 words organized in a x32bit configuration. The module consists of eight 512K x 8 FROM mounted on a 72-pin, both-sided, FR4-printed circuit board.In order to write control, the HMF1M32M8S provides Write Enable and Write Disable selection by SMT switch. Commands are written to the command register using standard microprocessor write timings.

Register contents serve as input to an internal state-machine, which controls the erase and programming circuitry. Write cycles also internally latch addresses and data needed for the programming and erase operations. Reading data out of the device is similar to reading from 12.0V flash or EPROM devices. Eight chip enable inputs, (/CE-UU1, /CE_UM1, /CE_LM1, /CE_LL1, /CE_UU2, /CE_UM2, /CE_LM2, /CE_LL2) are used to enable the module's 4 bytes independently. Output enable (/OE) and write enable (/WE) can set the memory input and output..

When FROM module is disable condition the module is becoming power standby mode, system designer can get low-power design. All module components may be powered from a single +5V DC power supply and all inputs and outputs are TTL-compatible

FEATURES

- Access time: 70, 90 and 120ns
- Switching for write enable and disable.
- High-density 4MByte design
- High-reliability, low-power design
- Single + 5V ± 0.5V power supply
- Easy memory expansion
- All inputs and outputs are TTL-compatible
- FR4-PCB design
- Low profile 72-pin SIMM
- Minimum 100,000 write/erase cycle
- Sector erases architecture
- Sector group protection
- Temporary sector group unprotection

OPTIONS MARKING

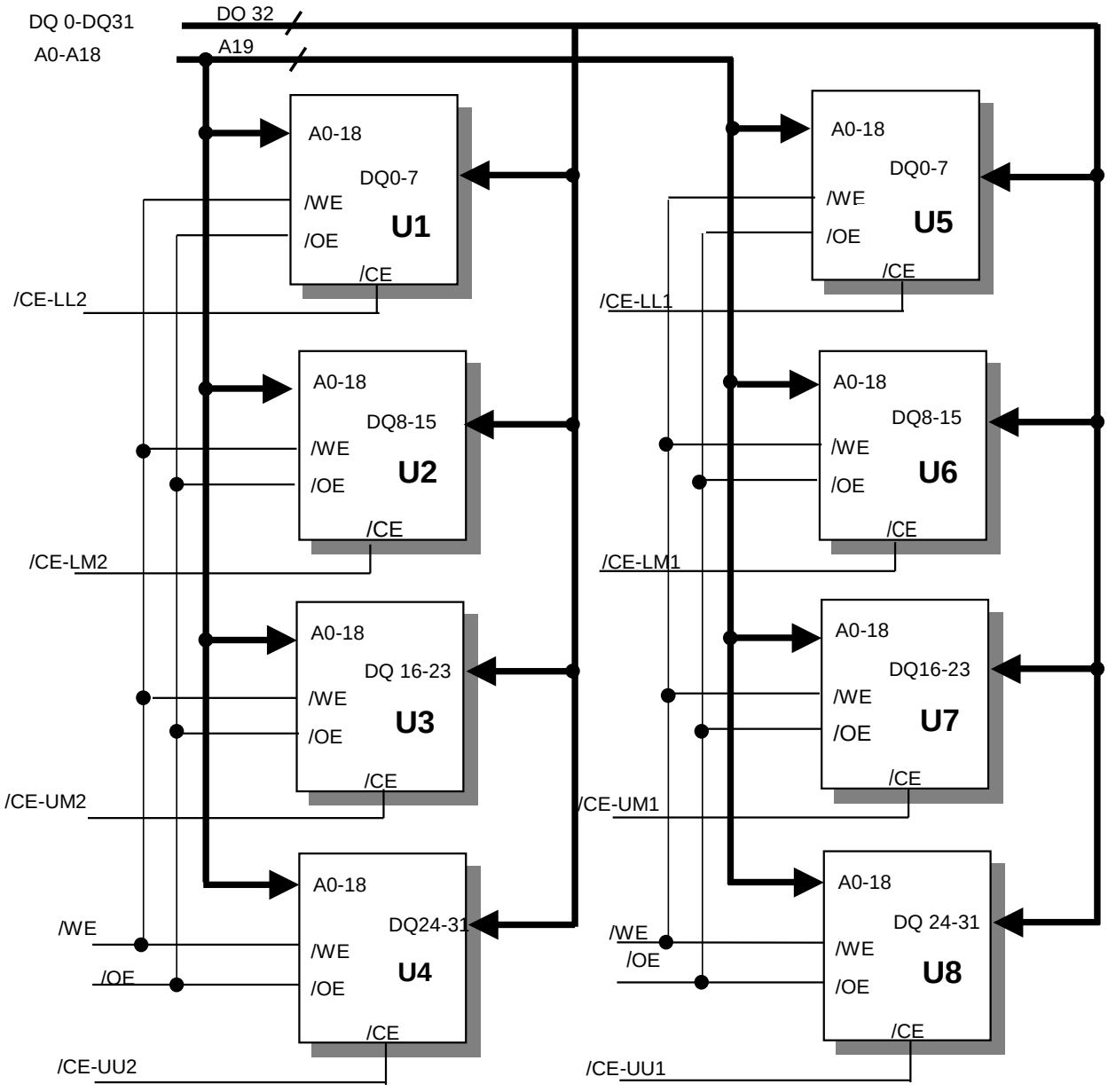
- Timing
  - 70ns access -70
  - 90ns access -90
  - 120ns access -120
- Packages
  - 72-pin SIMM M

PIN ASSIGNMENT

PIN	SYMBOL	PIN	SYMBOL	PIN	SYMBOL	PIN	SYMBOL
1	VSS	19	DQ4	37	A18	55	VCC
2	A3	20	DQ3	38	A16	56	A15
3	A2	21	/WE	39	VSS	57	A12
4	A1	22	A17	40	A6	58	A7
5	A0	23	A14	41	VCC	59	VCC
6	VCC	24	A13	42	A5	60	A8
7	A11	25	VCC	43	A4	61	A9
8	/OE	26	DQ8	44	VCC	62	DQ24
9	A10	27	DQ9	45	/CE-UM2	63	DQ25
10	VCC	28	DQ10	46	/CE-UM1	64	DQ26
11	/CE-LL2	29	/CE-LM2	47	DQ23	65	/CE-UU2
12	/CE-LL1	30	VCC	48	DQ16	66	/CE-UU1
13	DQ7	31	/CE-LM1	49	DQ17	67	DQ31
14	DQ0	32	DQ15	50	DQ18	68	DQ30
15	DQ1	33	DQ14	51	DQ22	69	DQ29
16	DQ2	34	DQ13	52	DQ21	70	DQ28
17	DQ6	35	DQ12	53	DQ20	71	DQ27
18	DQ5	36	DQ11	54	DQ19	72	VSS

SIMM TOP VIEW

FUNCTIONAL BLOCK DIAGRAM



TRUTH TABLE

MODE	/OE	/CE	/WE	DQ	POWER
STANDBY	X	H	X	HIGH-Z	STANDBY
NOT SELECTED	H	L	H	HIGH-Z	ACTIVE
READ	L	L	H	Q	ACTIVE
WRITE	H	L	L	D	ACTIVE

NOTE: X means don't care

ABSOLUTE MAXIMUM RATINGS

RATING	VALUE
Ambient Operating Temperature	0 ^{o}C to 70 ^{o}C
Storage Temperature	-65 ^{o}C to 125 ^{o}C
Applied Input Voltage	-0.5V to 7.0V
Applied Output Voltage	-0. 5V to 7.0V
VCC to Ground Potential	-0.2V to 7.0V
A9 & /OE	-0.2V to 12.5V

wNOTICE: Stresses greater than those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended period may affect reliability.
Specifications contained within the following tables are subject to change.

RECOMMENDED DC OPERATING CONDITIONS

PARAMETER	SYMBOL	MIN	TYP.	MAX
Vcc for ±5% device Supply Voltages	V_{CC}	4.75V		5.25V
Vcc for ± 10% device Supply Voltages	Vcc	4.5V		5.5V
Ground	V_{SS}	0	0	0

DC AND OPERATING CHARACTERISTICS ($0^{o}C \leq T_A \leq 70\ ^{o}C$; Vcc = 5V ± 0.5V)

PARAMETER	TEST CONDITIONS	SYMBOL	MIN	MAX	UNITS
Input Leakage Current	Vcc=Vcc max, V_{IN}= GND to Vcc	I_{L1}		±1.0	µA
Output Leakage Current	Vcc=Vcc max, VOUT= GND to Vcc	I_{L0}		±10	µA
Input High Voltage		V_{IH}	0.7x V_{CC}	V_{CC} + 0.3	V

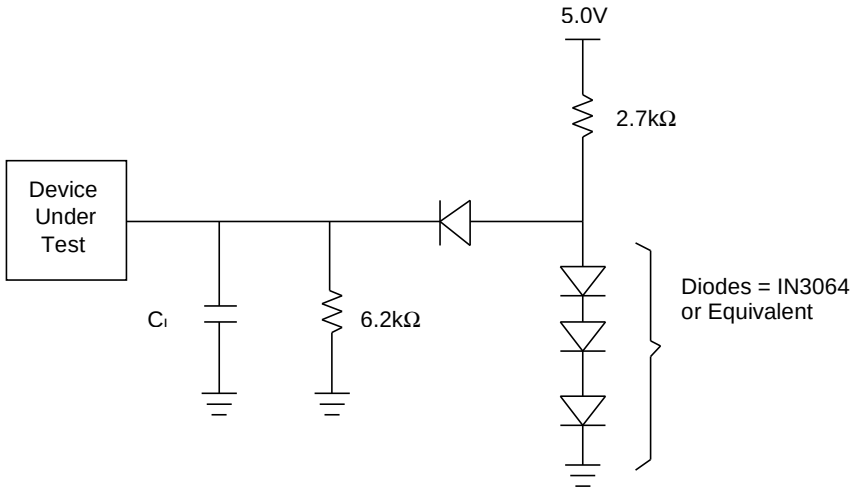
Input Low Voltage		V_{IL}	-0.5	0.8	V
Output High Voltage	I_{OH} = -2.5mA, Vcc = Vcc min	V_{OH}	2.4		V
Output Low Voltage	I_{OL} = 12mA, Vcc =Vcc min	V_{OL}		0.45	V
Vcc Active Current for Read	/CE=$V_{IL,}$ /OE=V_{IH}	I_{CC1}		30	mA
Vcc Active Current for Program	/CE=$V_{IL,}$ /OE=V_{IH}	I_{CC2}		40	mA
Vcc Active Current for Erase	/CE=$V_{IL,}$ /OE=V_{IH}	I_{CC2}		40	mA
Vcc Standby Current	/CE= $V1_H$	I_{cc3}		5	mA

Notes

1.$V_{1L\ min.}$=-1.0V for pulse width is equal to or less than 50ns. $V_{1L\ min.}$ =-2.0V for pulse width is equal to or less than 20

2.$V_{1H\ max.}$ =V_{CC}+1.5V for pulse width is equal to or less than 20ns. If V_{1H} is over the specified maximum value, read operation cannot be guaranteed.

SWITCHING TEST CIRCUITS



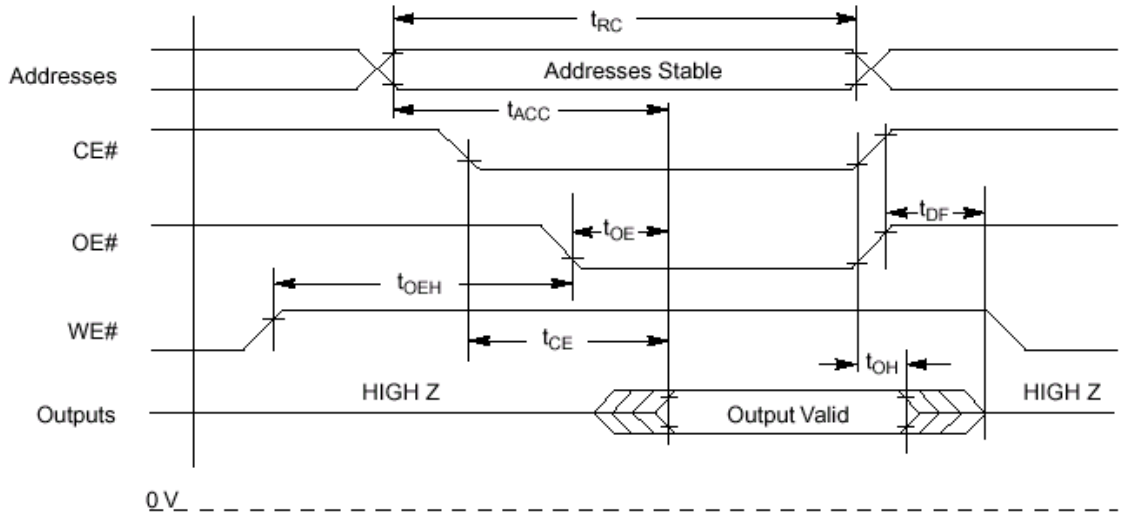
Note : C_L = 100pF including jig capacitance

AC CHARACTERISTICS

u Read Only Operations Characteristics

PARAMETER	DESCRIPTION	SPEED			UNIT
		- 70	-90	-120	
t_{RC}	Read Cycle Time	70	90	120	ns
t_{ACC}	Address Access time	70	90	120	ns
t_{CE}	Chip Enable to Access time	70	90	120	ns
t_{OE}	Output Enable time	30	35	50	ns
t_{DF}	Chip Enable to Output High-Z	20	20	30	ns
t_{OEH}	Output Enable Hold Time	0	0	0	ns

t_{OH}	Output Hold Time From Addresses, /CE or /OE	0	0	0	ns



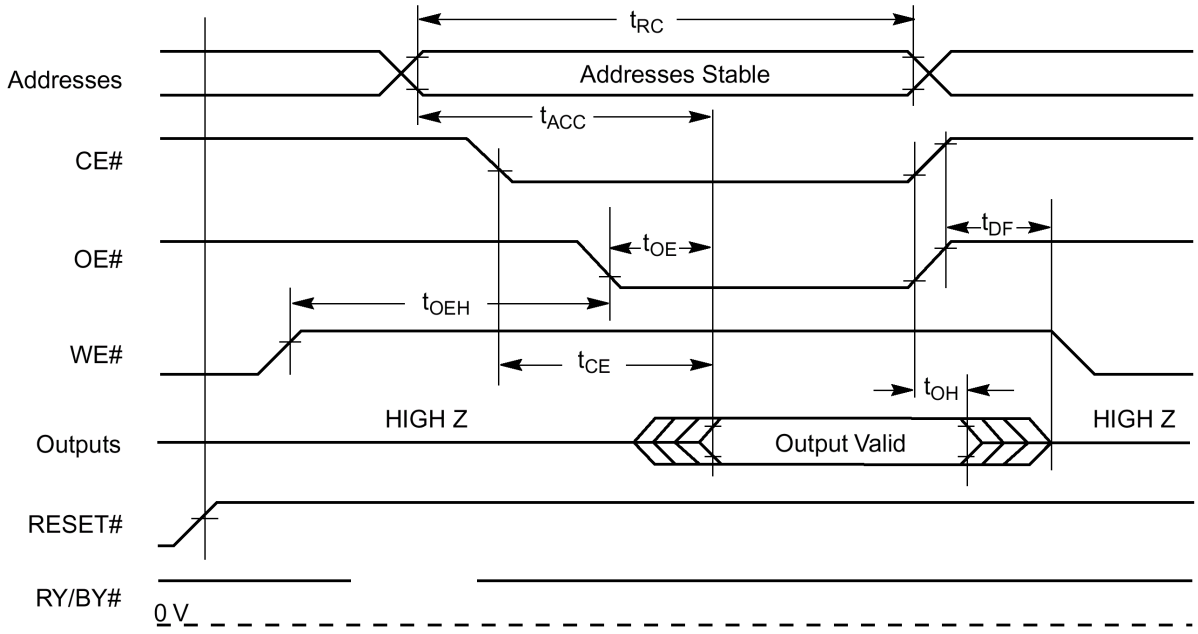
Read Operation Timings

u Erase/Program Operations

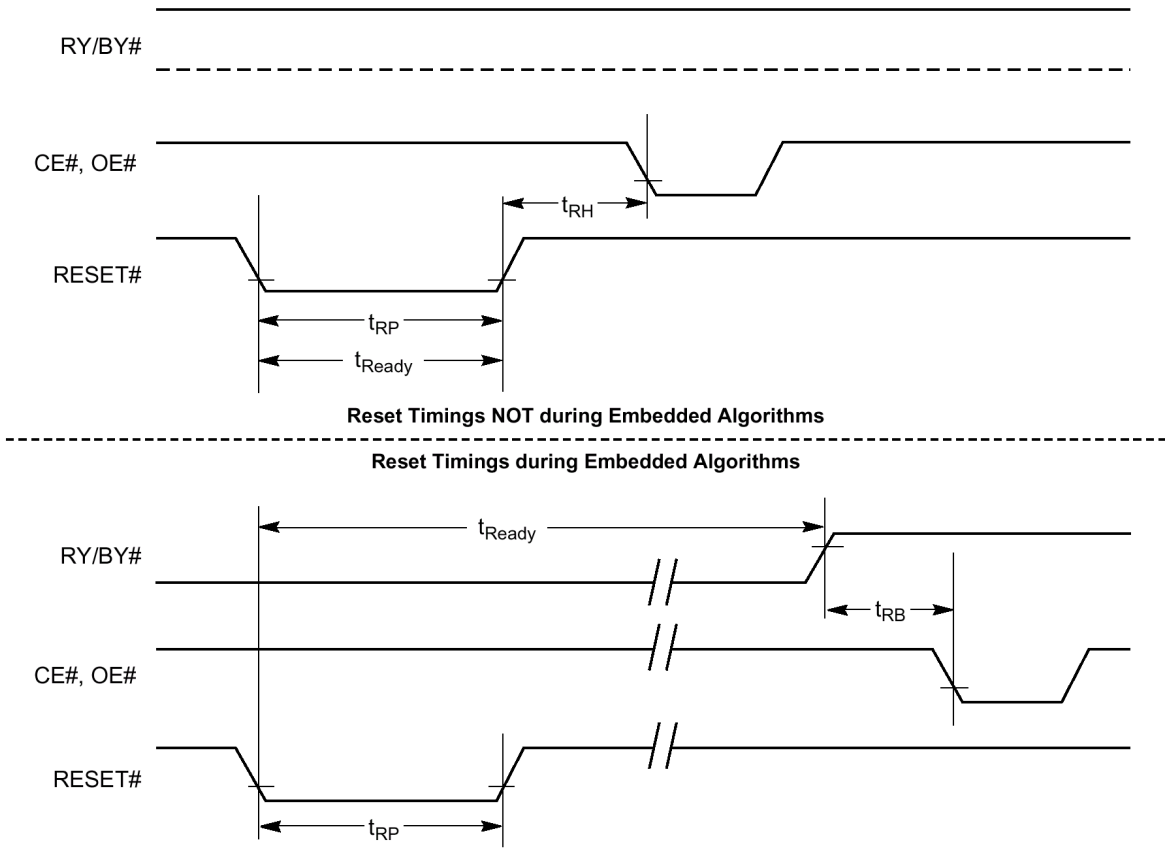
PARAMETER	DESCRIPTION	-70	-90	-120	UNIT
t_{WC}	Write Cycle Time (Note 1)	70	90	120	ns
t_{AS}	Address Setup Time	0	0	0	ns
t_{AH}	Address Hold Time	45	45	50	ns
t_{DS}	Data Setup Time	30	45	50	ns
t_{DH}	Data Hold Time	0	0	0	ns
t_{OES}	Output Enable Setup Time	0	0	0	ns
t_{GHWL}	Read Recover Time Before Write	0	0	0	ns
t_{CS}	/CE Setup Time	0	0	0	ns
t_{CH}	/CE Hold Time	0	0	0	ns
t_{WP}	Write Pulse Width	35	45	50	ns
t_{WPH}	Write Pulse Width Hi	20	20	20	ns
t_{WHWH1}	Byte Programming Operation	7	7	7	µs
t_{WHWH2}	Sector Erase Operation	1	1	1	sec
t_{VCS}	Vcc set up time (Note 1)	50	50	50	µs

Notes : : 1. Not 100% tested

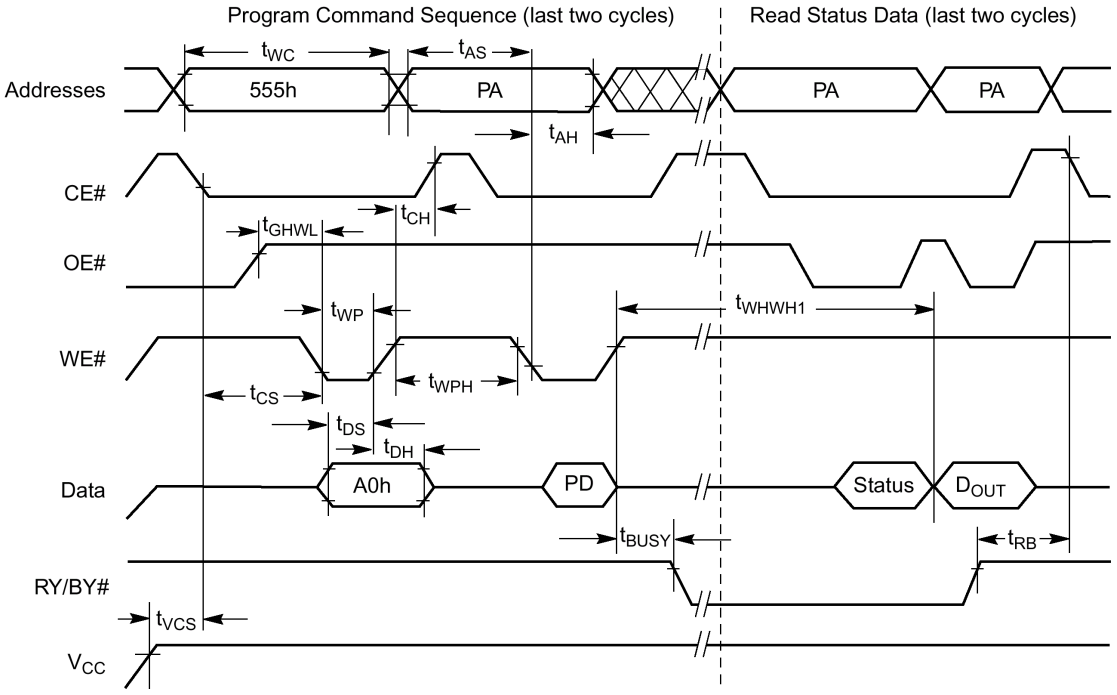
u READ OPERATIONS TIMING



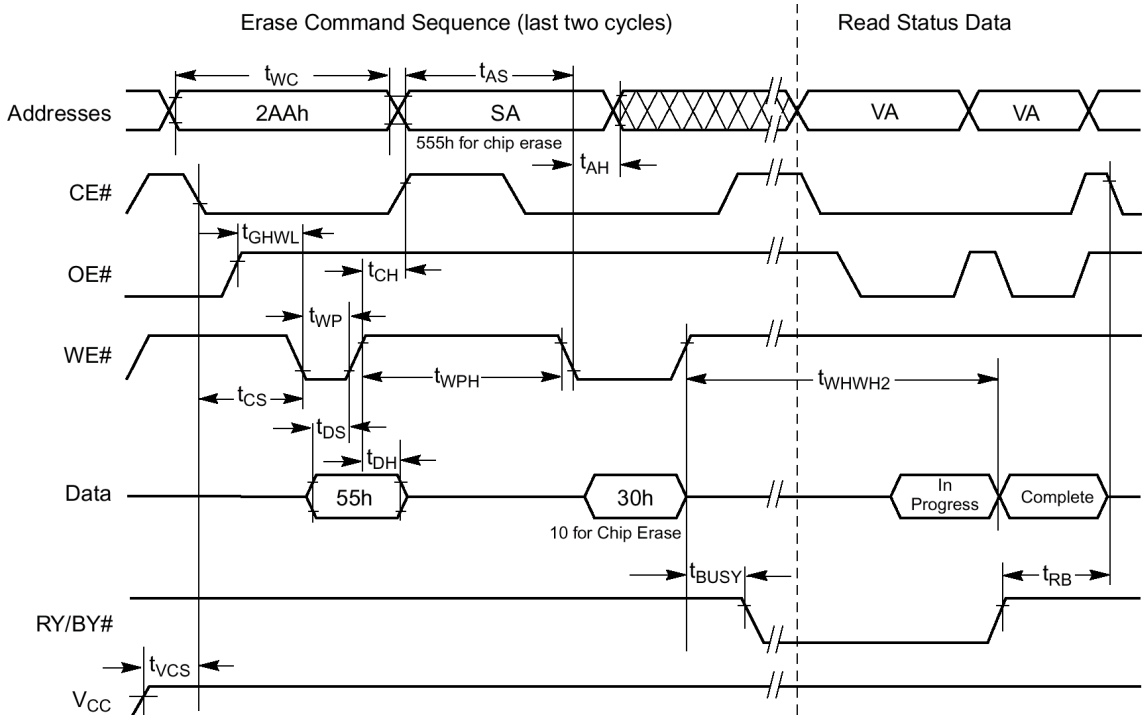
u RESET TIMING



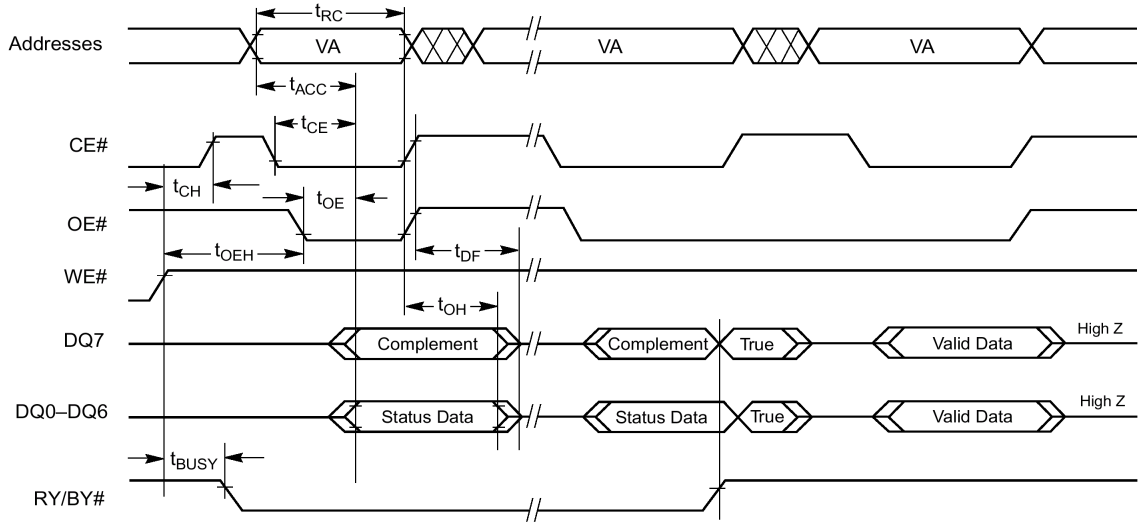
u PROGRAM OPERATIONS TIMING



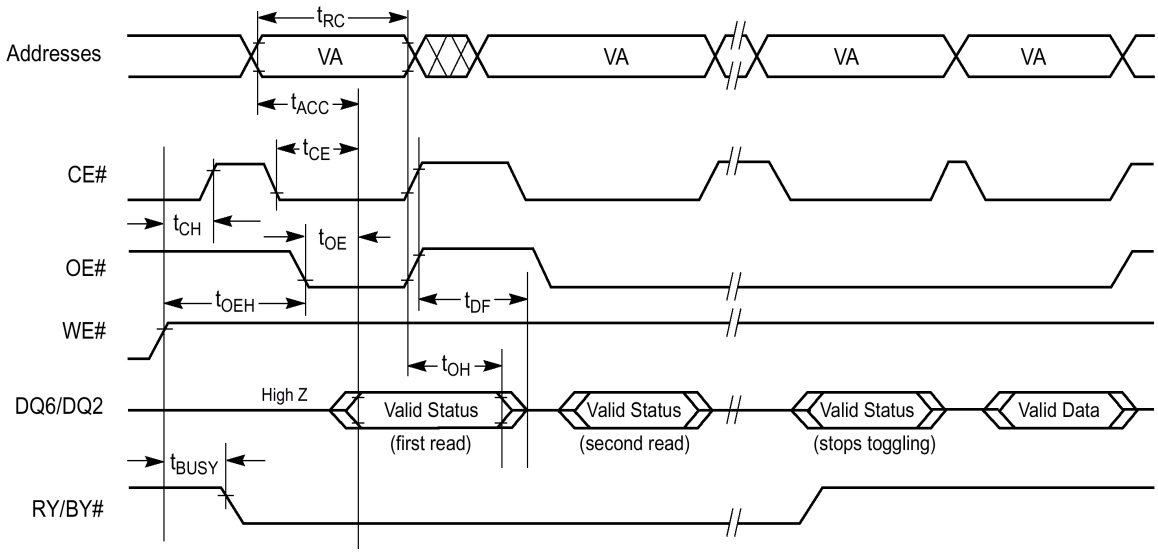
u CHIP/SECTOR ERASE OPERATION TIMINGS



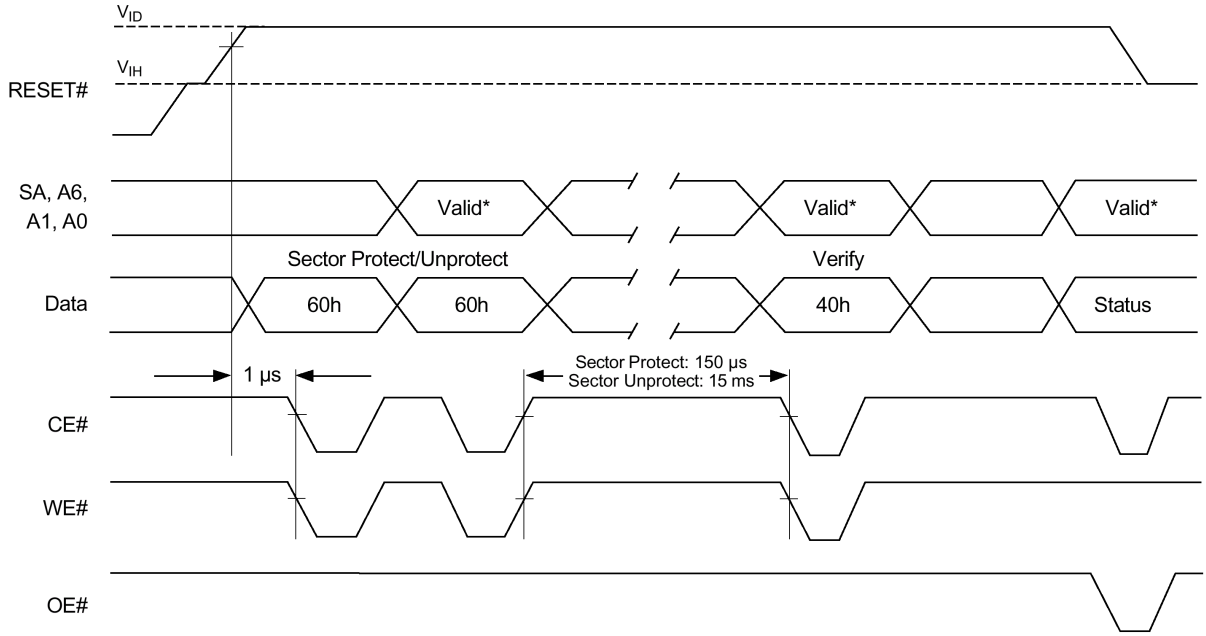
u DATA# POLLING TIMES(DURING EMBEDDED ALGORITHMS)



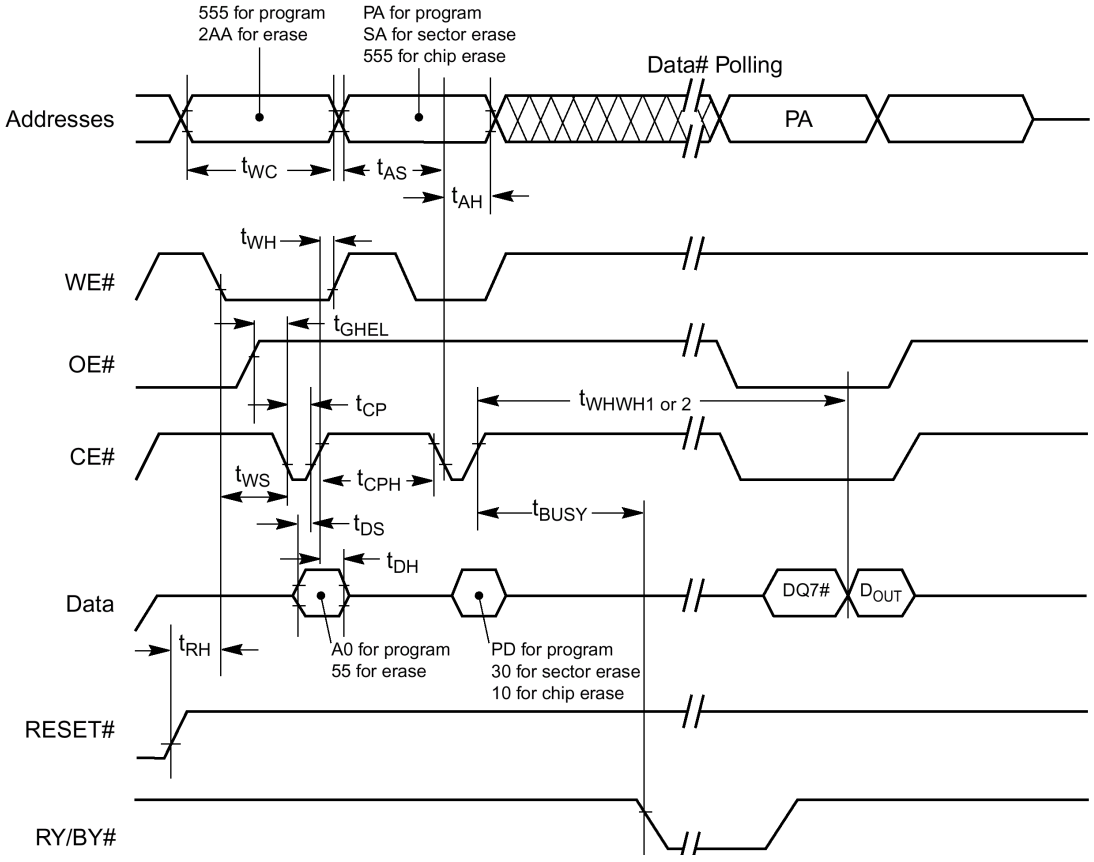
u TOGGLE# BIT TIMINGS (DURING EMBEDDED ALGORITHMS)



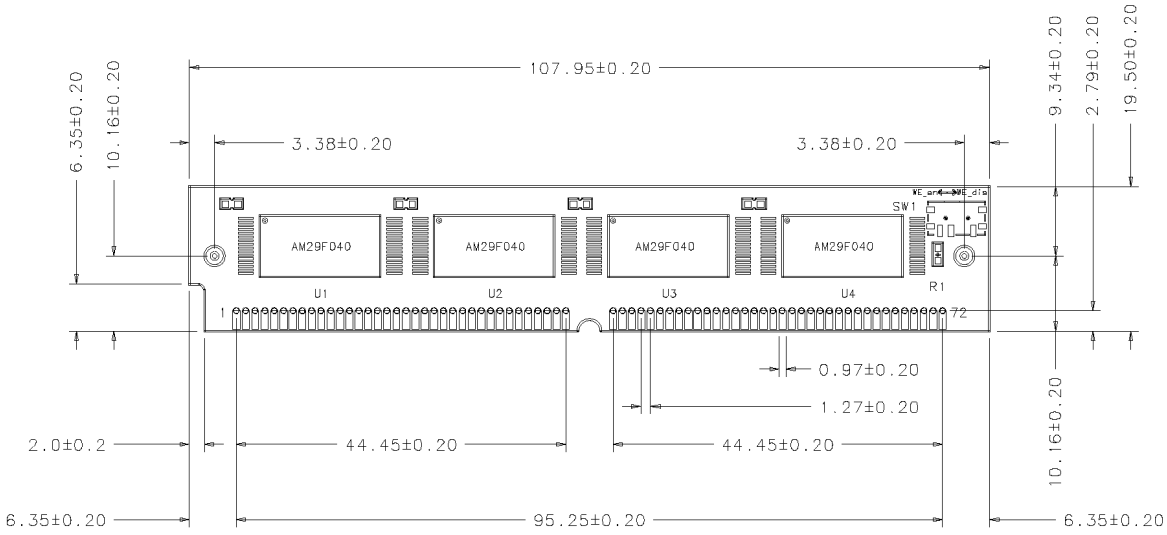
u SECTOR PROTECT UNPROTECT TIMEING DIAGRAM

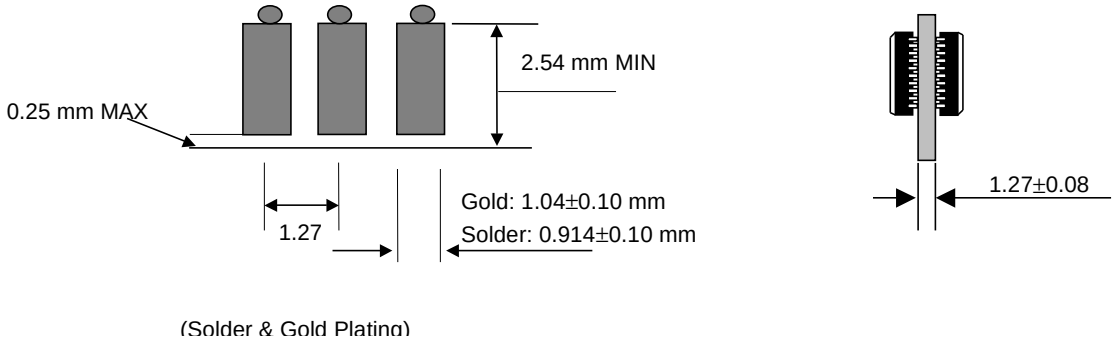


u ALTERNATE CE# CONTROLLED WRITE OPERATING TIMINGS



PACKAGE DIMMENSIONS





(Solder & Gold Plating)

ORDERING INFORMATION

Part Number	Density	Org.	Package	Component Number	Vcc	SPEED
HMF1M32M8S-70	4MByte	1MX 32bit	72 Pin-SIMM	8EA	5.0V	70ns
HMF1M32M8S-90	4MByte	1MX 32bit	72 Pin-SIMM	8EA	5.0V	90ns
HMF1M32M8S-120	4MByte	1MX 32bit	72 Pin-SIMM	8EA	5.0V	120ns