2Mx8 MONOLITHIC FLASH *ADVANCED**

FEATURES

- Access Times of 90, 120, 150nS
- Packaging:
  - 56 lead, Hermetic Ceramic, 0.520" CSOP (Package 207). Fits standard 56 SSOP footprint.
- Sector Architecture
  - 32 equal size sectors of 64KBytes each
  - Any combination of sectors can be erased. Also supports full chip erase.
- 100,000 Write/Erase Cycles Minimum (0°C to 70°)
- Organized as 2Mx8
- Commercial, Industrial, and Military Temperature Ranges
- 5 Volt Read and Write. 5V ± 10% Supply.
- Low Power CMOS
- $\overline{\text{Data}}$ Polling and Toggle Bit feature for detection of program or erase cycle completion.
- Supports reading or programming data to a sector not being erased.
- $\overline{\text{RESET}}$ pin resets internal state machine to the read mode.
- Multiple Ground Pins for Low Noise Operation

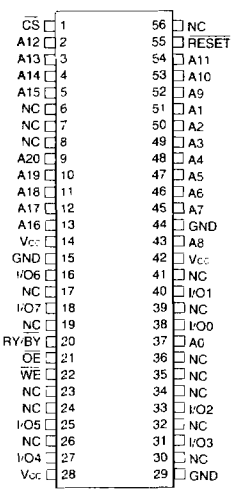
* *This data sheet describes a product that may or may not be under development, and is subject to change or cancellation without notice*

Note: Programming information available upon request

FIG. 1 PIN CONFIGURATION FOR WMF2M8-XOPX5

56 CSOP

TOP VIEW



PIN DESCRIPTION

I/O_{0-7}	Data Inputs/Outputs
A_{0-20}	Address Inputs
$\overline{WE}$	Write Enable
$\overline{CS}$	Chip Select
$\overline{OE}$	Output Enable
V_{CC}	Power Supply
GND	Ground
RY/$\overline{BY}$	Ready/Busy
$\overline{RESET}$	Reset

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Ratings	Unit
Voltage on Any Pin Relative to V_{SS}	V_T	-2.0 to +7.0	V
Power Dissipation	P_T	8	W
Storage Temperature	Tstg	-65 to +125	°C
Short Circuit Output Current	Ios	100	mA

RECOMMENDED DC OPERATING CONDITIONS

Parameter	Symbol	Min	Typ	Max	Unit
Supply Voltage	V_{CC}	4.5	5.0	5.5	V
Ground	V_{SS}	0	0	0	V
Input High Voltage	V_{IH}	2.0	-	V_{CC} + 0.5	V
Input Low Voltage	V_{IL}	-0.5	-	+0.8	V
Operating Temperature (Mil.)	T_A	-55	-	+125	°C
Operating Temperature (Ind.)	T_A	-40	-	+85	°C

CAPACITANCE

(T_A = +25°C)

Parameter	Symbol	Conditions	Max	Unit
Address Input capacitance	C_{AD}	$V_{I/O}$ = 0 V, f = 1.0 MHz	9	pF
Output Enable capacitance	C_{OE}	V_{IN} = 0 V, f = 1.0 MHz	9	pF
Write Enable capacitance	C_{WE}	V_{IN} = 0 V, f = 1.0 MHz	9	pF
Chip Select capacitance	C_{CS}	V_{IN} = 0 V, f = 1.0 MHz	9	pF
Data I/O capacitance	$C_{I/O}$	$V_{I/O}$ = 0 V, f = 1.0 MHz	12	pF

This parameter is guaranteed by design but not tested.

DC CHARACTERISTICS - CMOS COMPATIBLE

(V_{CC} = 5.0V, V_{SS} = 0V, T_A = -55°C to +125°C)

Parameter	Symbol	Conditions	Min	Max	Unit
Input Leakage Current	I_{LI}	V_{CC} = 5.5, V_{IN} = GND to V_{CC}		10	µA
Output Leakage Current	I_{LO}	V_{CC} = 5.5, V_{IN} = GND to V_{CC}		10	µA
V_{CC} Active Current for Read (1)	I_{CC1}	$\overline{CS}$ = V_{IL}, $\overline{OE}$ = V_{IH}, f = 5MHz		40	mA
V_{CC} Active Current for Program or Erase (2)	I_{CC2}	$\overline{CS}$ = V_{IL}, $\overline{OE}$ = V_{IH}		60	mA
V_{CC} Standby Current	I_{CC3}	V_{CC} = 5.5, $\overline{CS}$ = V_{IH}, f = 5MHz, $\overline{RESET}$ = V_{CC} ± 0.3V		0.25	mA
Output Low Voltage	V_{OL}	I_{OL} = 12.0 mA, V_{CC} = 4.5		0.45	V
Output High Voltage	V_{OH}	I_{OH} = -2.5 mA, V_{CC} = 4.5	0.85xV_{CC}		V
Low V_{CC} Lock-Out Voltage	V_{LKO}		3.2	4.2	V

NOTES:

1 The Icc current listed includes both the DC operating current and the frequency dependent component (@ 5MHz). The frequency component typically is less than 2mA/MHz, with $\overline{OE}$ at V_{IH}

2 Icc active while Embedded Algorithm (program or erase) is in progress.

3 DC test conditions V_{IL} = 0.3V, V_{IH} = V_{CC} - 0.3V

AC CHARACTERISTICS – WRITE/ERASE/PROGRAM OPERATIONS - $\overline{WE}$ CONTROLLED

(V_{CC} = 5.0V, T_A = -55°C to +125°C)

Parameter	Symbol		-90		-120		-150		Unit
			Min	Max	Min	Max	Min	Max	
Write Cycle Time	t_{AVAV}	t_{WC}	90		120		150		nS
Chip Select Setup Time	t_{ELWL}	t_{CS}	0		0		0		nS
Write Enable Pulse Width	t_{WLWH}	t_{WP}	45		50		50		nS
Address Setup Time	t_{AVWL}	t_{AS}	0		0		0		nS
Data Setup Time	t_{DVWH}	t_{DS}	45		50		50		nS
Data Hold Time	t_{WHDX}	t_{DH}	0		0		0		nS
Address Hold Time	t_{WLAX}	t_{AH}	45		50		50		nS
Write Enable Pulse Width High	t_{WHWL}	t_{WPH}	20		20		20		nS
Duration of Byte Programming Operation	t_{WHWH1}			1		1		1	mS
Sector Erase	t_{WHWH2}			15		15		15	Sec
Read Recovery Time before Write	t_{GHWL}		0		0		0		µS
V_{CC} Setup Time	t_{VCS}		50		50		50		µS
Chip Programming Time				100		100		100	Sec
Output Enable Hold Time (1)		t_{OEH}	10		10		10		nS
Chip Erase Time				480		480		480	Sec
$\overline{RESET}$ Pulse Width		t_{RP}	500		500		500		nS

1 For Toggle and Data Polling

AC CHARACTERISTICS – READ-ONLY OPERATIONS

(V_{CC} = 5.0V, T_A = -55°C to +125°C)

Parameter	Symbol		-90		-120		-150		Unit
			Min	Max	Min	Max	Min	Max	
Read Cycle Time	t_{AVAV}	t_{RC}	90		120		150		nS
Address Access Time	t_{AVQV}	t_{ACC}		90		120		150	nS
Chip Select Access Time	t_{ELQV}	t_{CE}		90		120		150	nS
Output Enable to Output Valid	t_{GLQV}	t_{OE}		40		50		55	nS
Chip Select High to Output High Z (1)	t_{EHQZ}	t_{DF}		20		30		35	nS
Output Enable High to Output High Z (1)	t_{GHQZ}	t_{DF}		20		30		35	nS
Output Hold from Addresses, $\overline{CS}$ or $\overline{OE}$ Change, whichever is First	t_{AXQX}	t_{OH}	0		0		0		nS
$\overline{RESET}$ Low to Read Mode (1)		t_{Ready}		20		20		20	µS

1 Guaranteed by design, not tested.

AC CHARACTERISTICS – WRITE/ERASE/PROGRAM OPERATIONS, $\overline{CS}$ CONTROLLED

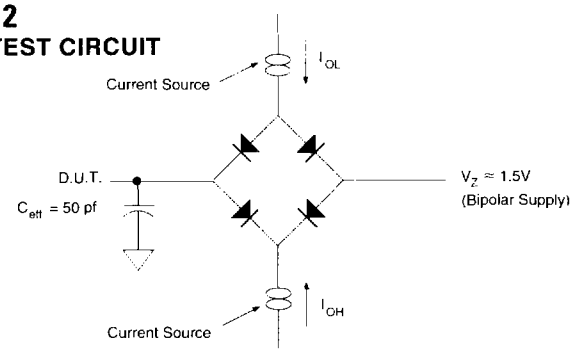
(V_{CC} = 5.0V, V_{SS} = 0V, T_A = -55°C to +125°C)

Parameter	Symbol		-90		-120		-150		Unit
			Min	Max	Min	Max	Min	Max	
Write Cycle Time	t_{AVAV}	t_{WC}	90		120		150		nS
Write Enable Setup Time	t_{WLEL}	t_{WS}	0		0		0		nS
Chip Select Pulse Width	t_{ELEH}	t_{CP}	45		50		50		nS
Address Setup Time	t_{AVEL}	t_{AS}	0		0		0		nS
Data Setup Time	t_{DVEH}	t_{DS}	45		50		50		nS
Data Hold Time	t_{EHDX}	t_{DH}	0		0		0		nS
Address Hold Time	t_{ELAX}	t_{AH}	45		50		50		nS
Chip Select Pulse Width High	t_{EHEL}	t_{CPH}	20		20		20		nS
Duration of Byte Programming Operation	t_{WHWH1}			1		1		1	mS
Sector Erase Time	t_{WHWH2}			15		15		15	Sec
Read Recovery Time	t_{GHEL}		0		0		0		µS
Chip Programming Time				100		100		100	Sec
Chip Erase Time				480		480		480	Sec
Output Enable Hold Time (1)		t_{OEH}	10		10		10		nS

1 For Toggle and Data Polling.

5 FLASH MONOLITHICS

FIG. 2
AC TEST CIRCUIT



AC TEST CONDITIONS

Parameter	Typ	Unit
Input Pulse Levels	V_{IL} = 0, V_{IH} = 3.0	V
Input Rise and Fall	5	nS
Input and Output Reference Level	1.5	V
Output Timing Reference Level	1.5	V

NOTES:
V_Z is programmable from -2V to +7V
I_{OL} & I_{OH} programmable from 0 to 16mA
Tester Impedance Z_0 = 75
V_Z is typically the midpoint of V_{OH} and V_{OL}
I_{OL} & I_{OH} are adjusted to simulate a typical resistive load circuit
ATE tester includes jig capacitance

FIG. 3
RESET TIMING DIAGRAM

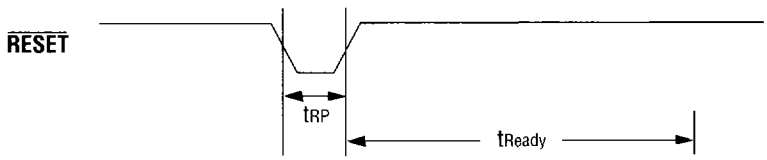


FIG. 4
AC WAVEFORMS FOR READ OPERATIONS

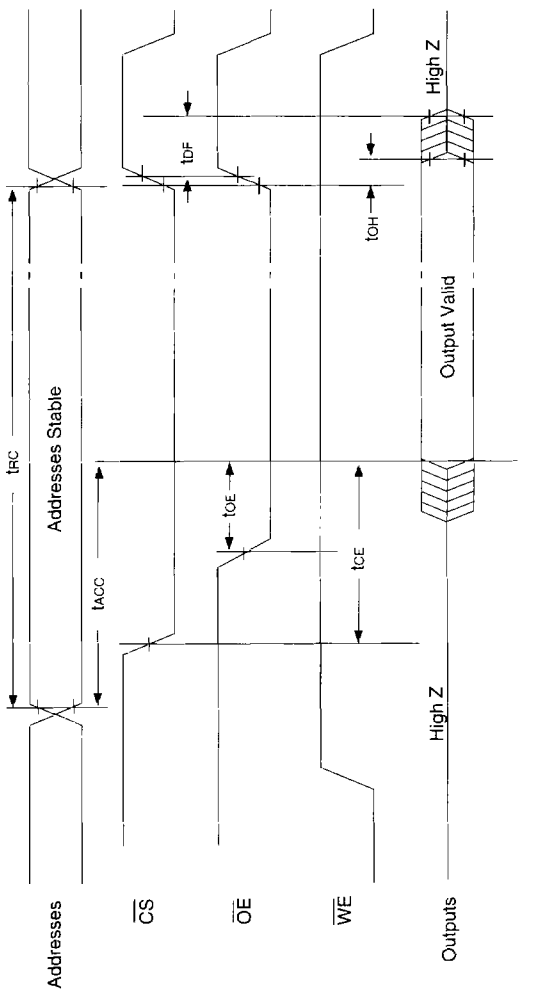
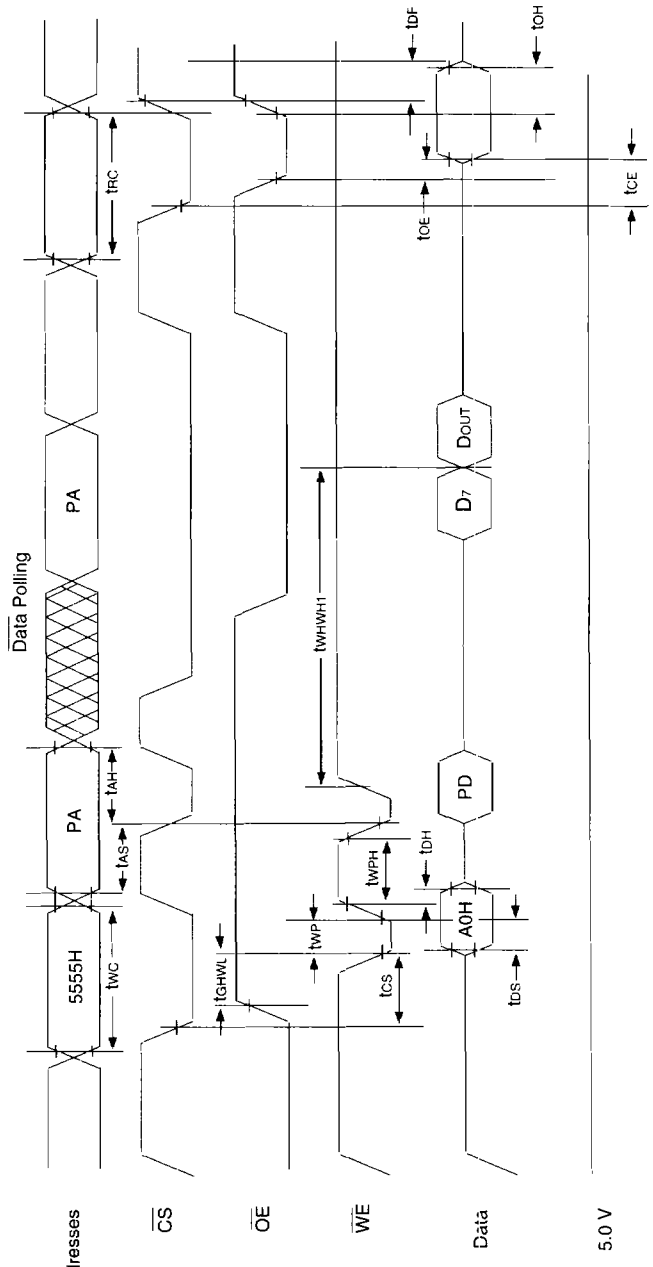
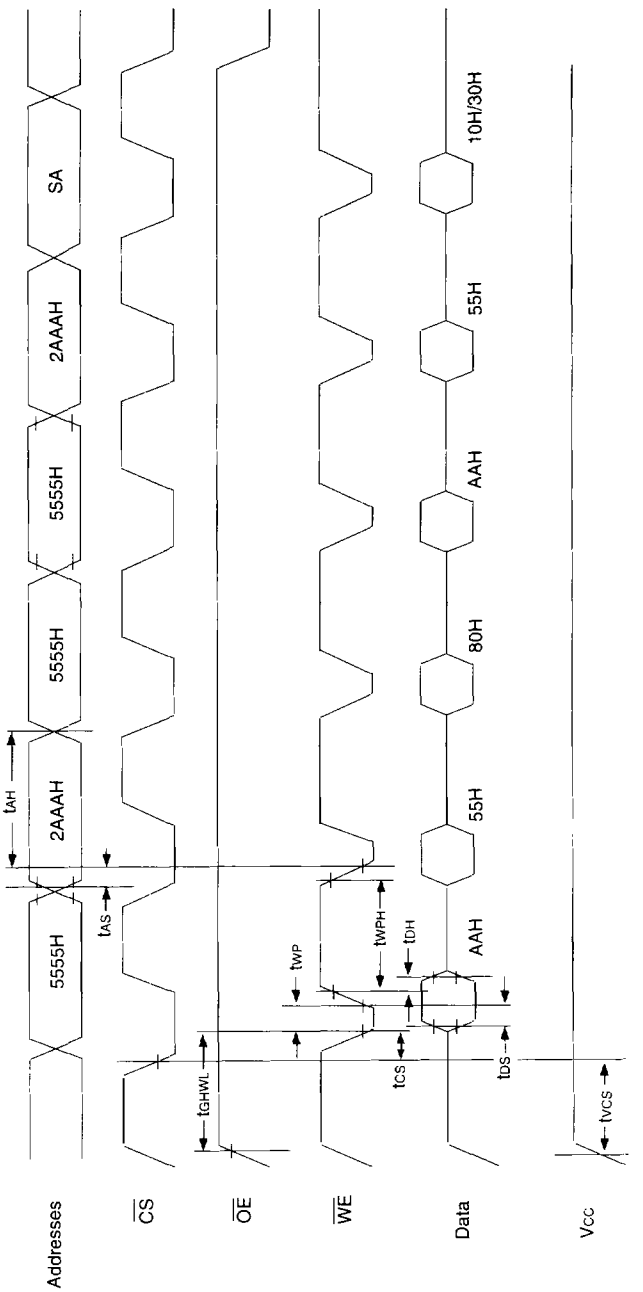


FIG. 5
WRITE/ERASE/PROGRAM OPERATION, WE CONTROLLED



NOTES:
1. PA is the address of the memory location to be programmed.
2. PD is the data to be programmed at byte address
3. $\overline{D_7}$ is the output of the complement of the data written to the device.
4. D_{OUT} is the output of the data written to the device
5. Figure indicates last two bus cycles of four bus cycle sequence

FIG. 6
AC WAVEFORMS CHIP/SECTOR ERASE OPERATIONS



NOTE:
1 SA is the sector address for Sector Erase

FIG. 7
AC WAVEFORMS FOR $\overline{\text{DATA}}$ POLLING DURING EMBEDDED ALGORITHM OPERATIONS

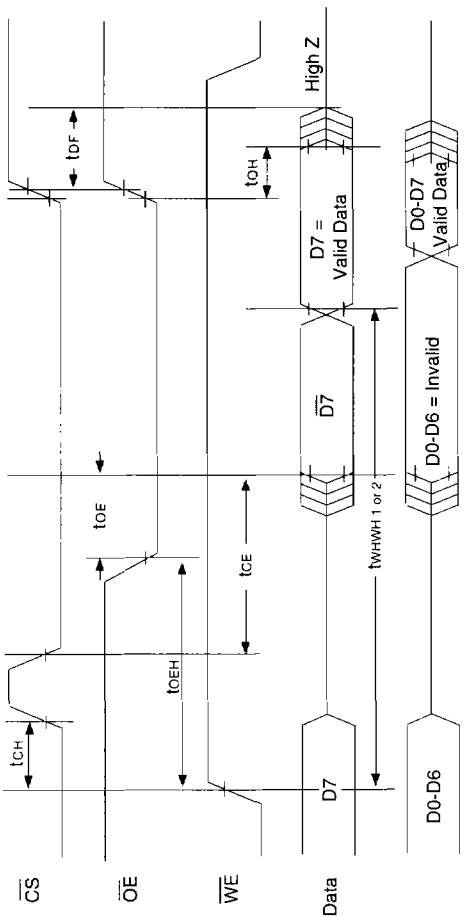
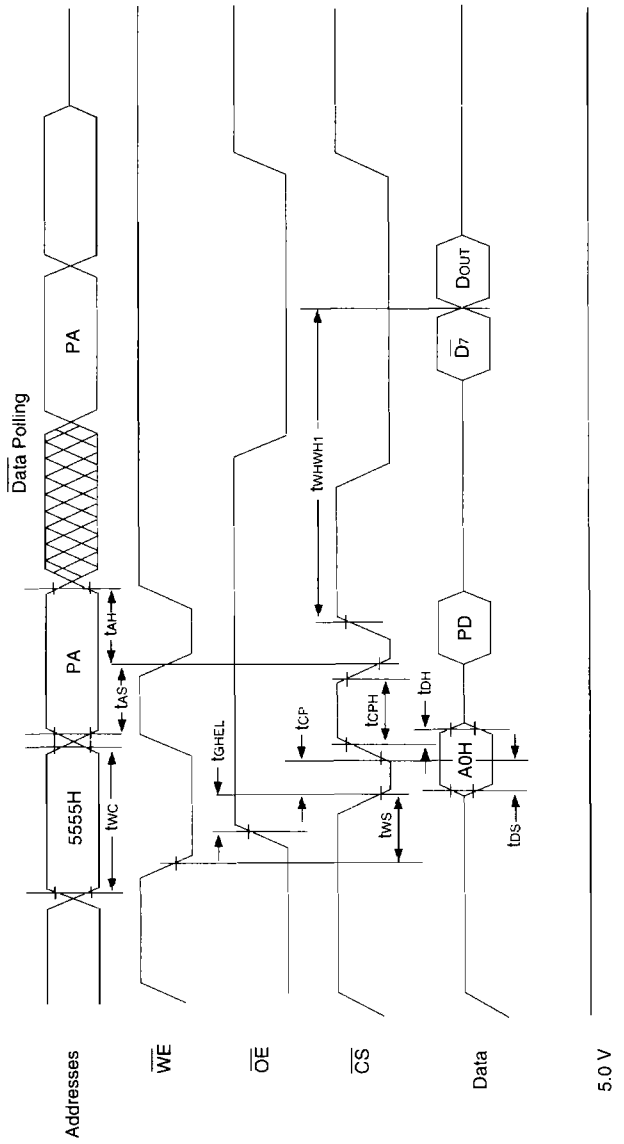


FIG. 8
ALTERNATE $\overline{CS}$ CONTROLLED PROGRAMMING OPERATION TIMINGS



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4. D_{OUT} is the output of the data written to the device
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ORDERING INFORMATION