512Kx8 MONOLITHIC FLASH, SMD 5962-96692

FEATURES

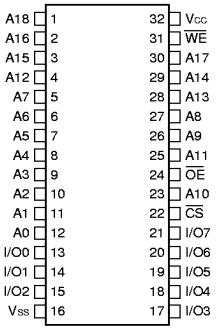
- Access Times of 70, 90, 120, 150ns
- Packaging
  - 32 pin, Hermetic Ceramic, 0.600" DIP (Package 300)
  - 32 lead, Hermetic Ceramic, 0.400" SOJ (Package 101)
  - 32 pin, Rectangular Ceramic Leadless Chip Carrier (Package 601)
  - 32 lead Flat Pack (Package 206)
- 100,000 Erase/Program Cycles Minimum (0°C to 70°C)
- Sector Erase Architecture
  - 8 equal size sectors of 64K bytes each
  - Any combination of sectors can be concurrently erased. Also supports full chip erase
- Organized as 512Kx8
- Commercial, Industrial and Military Temperature Ranges
- 5 Volt Programming. 5V ±10% Supply.
- Low Power CMOS
- Embedded Erase and Program Algorithms
- TTL Compatible Inputs and CMOS Outputs
- Page Program Operation and Internal Program Control Time.

Note: Programming information available upon request.

PIN CONFIGURATION FOR WMF512K8-XXX5

32 DIP
32 CSOJ
32 FP

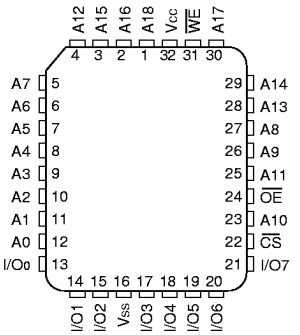
TOP VIEW



PIN CONFIGURATION FOR WMF512K8-XCLX5

32 CLCC

TOP VIEW



PIN DESCRIPTION

A_{0-18}	Address Inputs
I/O_{0-7}	Data Input/Output
$\overline{CS}$	Chip Select
$\overline{OE}$	Output Enable
$\overline{WE}$	Write Enable
V_{CC}	+5.0V Power
V_{SS}	Ground

ABSOLUTE MAXIMUM RATINGS (1)

Parameter		Unit
Operating Temperature	-55 to +125	°C
Supply Voltage (Vcc) (1)	-2.0 to +7.0	V
Signal Voltage Range(any pin except A9) (2)	-2.0 to +7.0	V
Storage Temperature Range	-65 to +150	°C
Lead Temperature (soldering, 10 seconds)	+300	°C
Data Retention Mil Temp	10 years	
Endurance (erase/program cycles) Mil Temp	10,000 cycles min	
A9 Voltage for sector protect (VID) (3)	-2.0 to +14.0	V

NOTES:
1. Stresses above the absolute maximum rating may cause permanent damage to the device. Extended operation at the maximum levels may degrade performance and affect reliability.
2. Minimum DC voltage on input or I/O pins is -0.5V. During voltage transitions, inputs may overshoot VSS to -2.0 V for periods of up to 20ns. Maximum DC voltage on output and I/O pins is VCC + 0.5V. During voltage transitions, outputs may overshoot to VCC + 2.0 V for periods of up to 20ns.
3. Minimum DC input voltage on A9 pin is -0.5V. During voltage transitions, A9 may overshoot Vss to -2V for periods of up to 20ns. Maximum DC input voltage on A9 is +13.5V which may overshoot to 14.0 V for periods up to 20ns.

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Min	Max	Unit
Supply Voltage	VCC	4.5	5.5	V
Input High Voltage	VIH	2.0	VCC + 0.5	V
Input Low Voltage	VIL	-0.5	+0.8	V
Operating Temp. (Mil.)	TA	-55	+125	°C
Operating Temp. (Ind.)	TA	-40	+85	°C
A9 Voltage for Sector Protect	VID	11.5	12.5	V

CAPACITANCE

(TA = +25°C)

Parameter	Symbol	Conditions	Max	Unit
Address Input capacitance	CAD	VI/O = 0 V, f = 1.0 MHz	15	pF
Output Enable capacitance	COE	VIN = 0 V, f = 1.0 MHz	15	pF
Write Enable capacitance	CWE	VIN = 0 V, f = 1.0 MHz	15	pF
Chip Select capacitance	CCS	VIN = 0 V, f = 1.0 MHz	15	pF
Data I/O capacitance	CI/O	VI/O = 0 V, f = 1.0 MHz	15	pF

This parameter is guaranteed by design but not tested.

DC CHARACTERISTICS - CMOS COMPATIBLE

(VCC = 5.0V, VSS = 0V, TA = -55°C to +125°C)

Parameter	Symbol	Conditions	Min	Max	Unit
Input Leakage Current	ILI	VCC = 5.5, VIN = GND to VCC		10	µA
Output Leakage Current	ILOx32	VCC = 5.5, VIN = GND to VCC		10	µA
Vcc Active Current for Read (1)	ICC1	$\overline{CS}$ = VIL, $\overline{OE}$ = VIH, f = 5MHz		50	mA
Vcc Active Current for Program or Erase (2)	ICC2	$\overline{CS}$ = VIL, $\overline{OE}$ = VIH		60	mA
Vcc Standby Current	ICC4	VCC = 5.5, $\overline{CS}$ = VIH, f = 5MHz		1.6	mA
Output Low Voltage	VOL	IOL = 8.0 mA, VCC = 4.5		0.45	V
Output High Voltage	VOH1	IOH = -2.5 mA, VCC = 4.5	0.85 x VCC		V
Low Vcc Lock-Out Voltage	VLKO		3.2	4.2	V

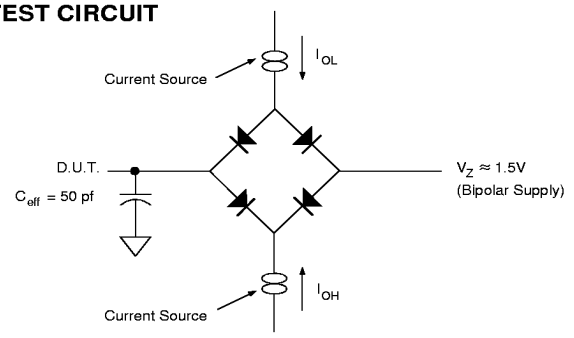
NOTES:
1. The ICC current listed includes both the DC operating current and the frequency dependent component (at 5 MHz). The frequency component typically is less than 2 mA/MHz, with $\overline{OE}$ at VIH.
2. ICC active while Embedded Algorithm (program or erase) is in progress.
3. DC test conditions: VIL = 0.3V, VIH = VCC - 0.3V

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		-70		-90		-120		-150		Unit
			Min	Max	Min	Max	Min	Max			
Write Cycle Time	t_{AVAV}	t_{WC}	70		90		120		150		ns
Write Enable Setup Time	t_{WLEL}	t_{WS}	0		0		0		0		ns
Chip Select Pulse Width	t_{ELEH}	t_{CP}	45		45		50		50		ns
Address Setup Time	t_{AVEL}	t_{AS}	0		0		0		0		ns
Data Setup Time	t_{DVEH}	t_{DS}	45		45		50		50		ns
Data Hold Time	t_{EHDX}	t_{DH}	0		0		0		0		ns
Address Hold Time	t_{ELAX}	t_{AH}	45		45		50		50		ns
Chip Select Pulse Width High	t_{EHEL}	t_{CPH}	20		20		20		20		ns
Duration of Byte Programming Operation	t_{WHWH1}		16		16		16		16		µs
Sector Erase Time	t_{WHWH2}			30		30		30		30	sec
Read Recovery Time	t_{GHEL}		0		0		0		0		ns
Chip Programming Time				50		50		50		50	sec
Chip Erase Time				120		120		120		120	sec

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 Ω.
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.

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

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

Parameter	Symbol		-70		-90		-120		-150		Unit
			Min	Max	Min	Max	Min	Max	Min	Max	
Write Cycle Time	t_{AVAV}	t_{WC}	70		90		120		150		ns
Chip Select Setup Time	t_{ELWL}	t_{CS}	0		0		0		0		ns
Write Enable Pulse Width	t_{WLWH}	t_{WP}	45		45		50		50		ns
Address Setup Time	t_{AVWH}	t_{AS}	0		0		0		0		ns
Data Setup Time	t_{DVWH}	t_{DS}	45		45		50		50		ns
Data Hold Time	t_{WHDX}	t_{DH}	0		0		0		0		ns
Address Hold Time	t_{WHAX}	t_{AH}	45		45		50		50		ns
Write Enable Pulse Width High	t_{WHWL}	t_{WPH}	20		20		20		20		ns
Duration of Byte Programming Operation	t_{WHWH1}		16		16		16		16		µs
Sector Erase Time	t_{WHWH2}			30		30		30		30	sec
Read Recovery Time before Write	t_{GHWL}		0		0		0		0		ms
Vcc Set-up Time		t_{VCS}	50		50		50		50		µs
Chip Programming Time				50		50		50		50	sec
Output Enable Setup Time		t_{OES}	0		0		0		0		ns
Output Enable Hold Time (1)		t_{OEH}	10		10		10		10		ns
Chip Erase Time				120		120		120		120	sec

1. For Toggle and Data Polling.

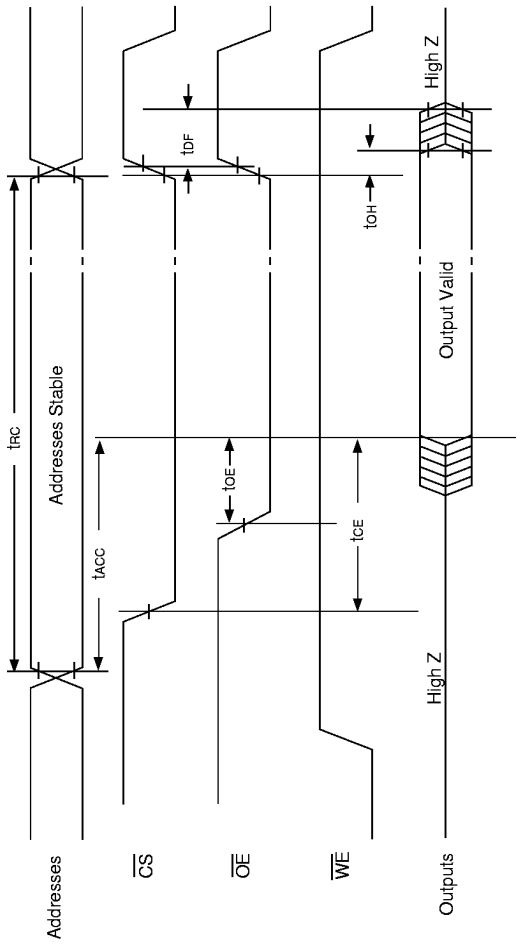
AC CHARACTERISTICS – READ ONLY OPERATIONS

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

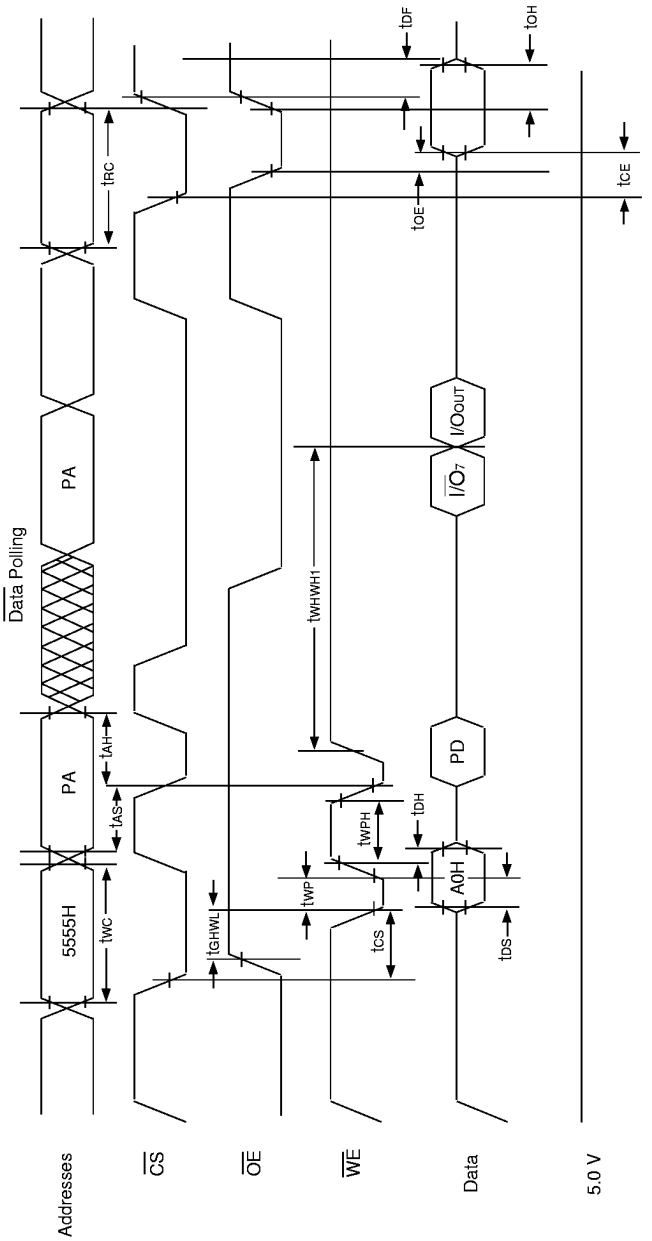
Parameter	Symbol		-70		-90		-120		-150		Unit
			Min	Max	Min	Max	Min	Max	Min	Max	
Read Cycle Time	t_{AVAV}	t_{RC}	70		90		120		150		ns
Address Access Time	t_{AVQV}	t_{ACC}		70		90		120		150	ns
Chip Select Access Time	t_{ELQV}	t_{CE}		70		90		120		150	ns
Output Enable to Output Valid	t_{GLQV}	t_{OE}		35		35		50		55	ns
Chip Select to Output High Z (1)	t_{EHQZ}	t_{DF}		20		20		30		35	ns
Output Enable High to Output High Z (1)	t_{GHQZ}	t_{DF}		20		20		30		35	ns
Output Hold from Address, $\overline{CS}$ or $\overline{OE}$ Change, whichever is First	t_{AXQX}	t_{OH}	0		0		0		0		ns

1. Guaranteed by design, but not tested

AC WAVEFORMS FOR READ OPERATIONS

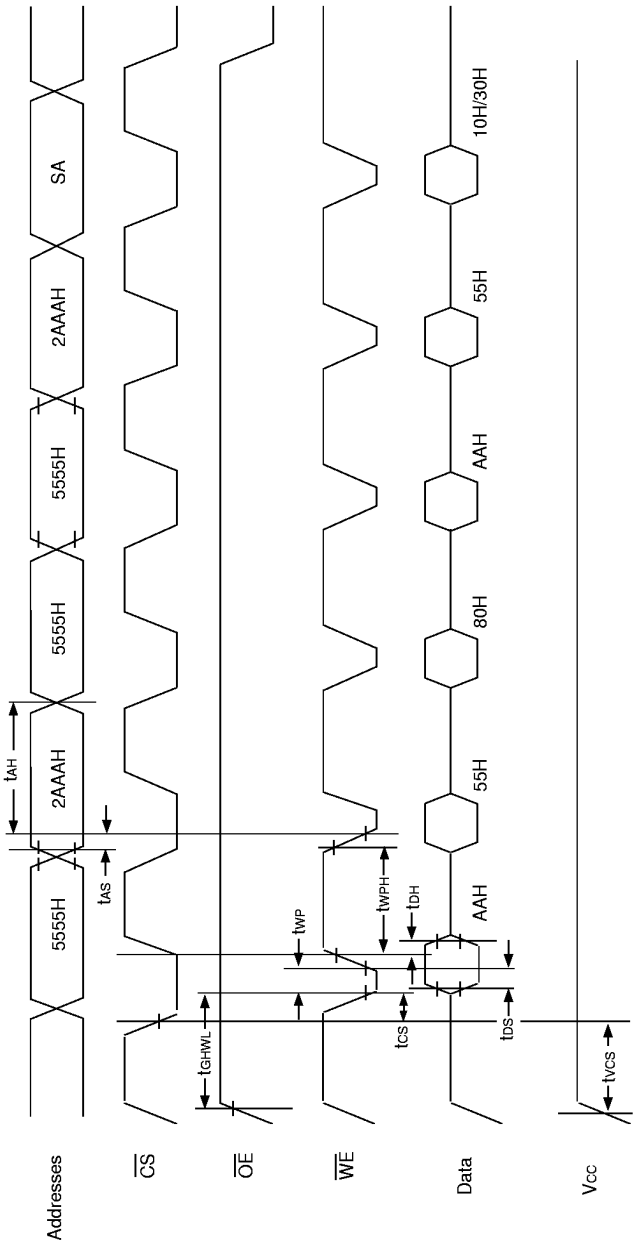


WRITE/ERASE/PROGRAM OPERATION, WE CONTROLLED



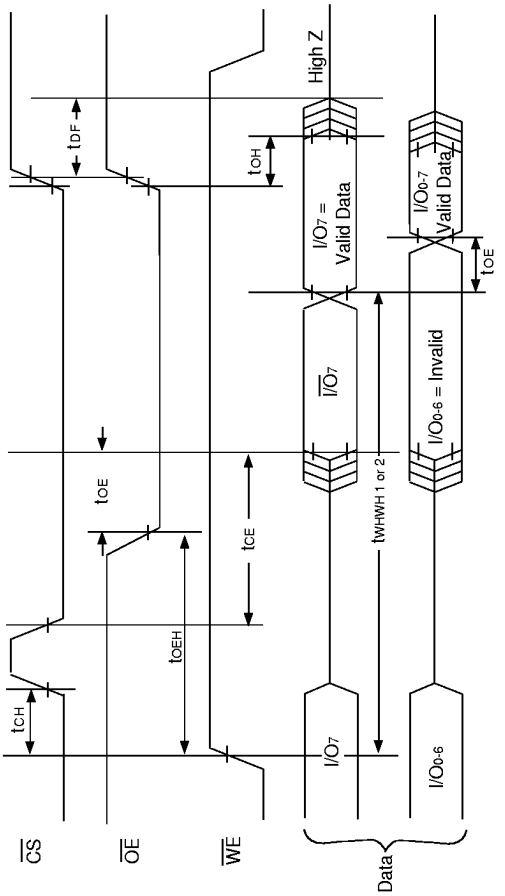
NOTES:
1. PA is the address of the memory location to be programmed.
2. PD is the data to be programmed at byte address.
3. $\overline{I/O_7}$ is the output of the complement of the data written to the device.
4. I/O_{OUT} is the output of the data written to the device.
5. Figure indicates last two bus cycles of four bus cycle sequence.

AC WAVEFORMS CHIP/SECTOR ERASE OPERATIONS

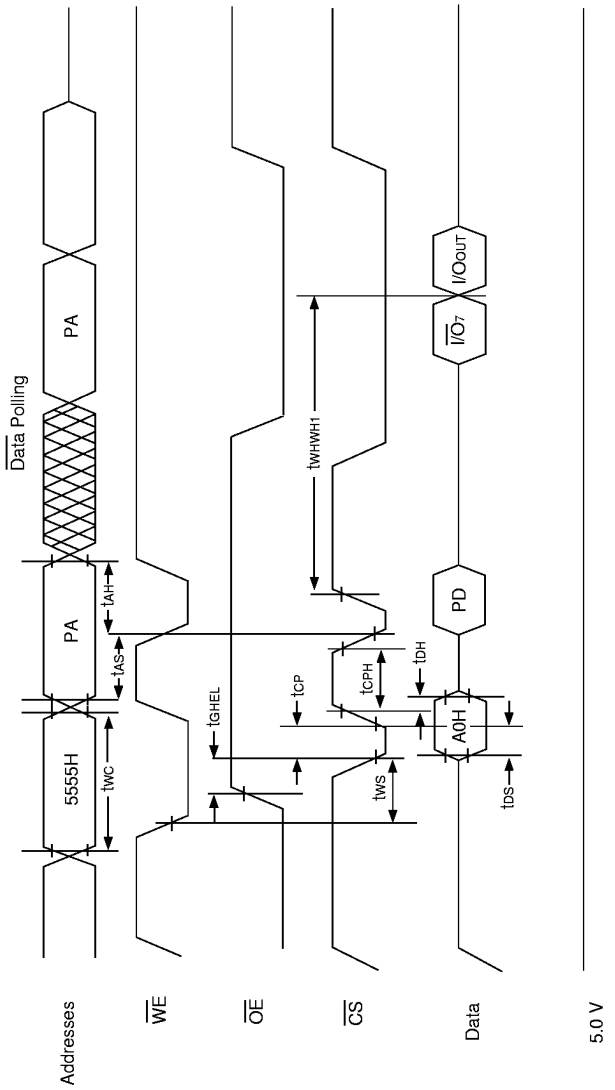


NOTES:
1. SA is the Sector Address for Sector Erase.

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



ALTERNATE $\overline{CS}$ CONTROLLED PROGRAMMING OPERATION TIMINGS



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2. PD represents the data to be programmed at byte address.
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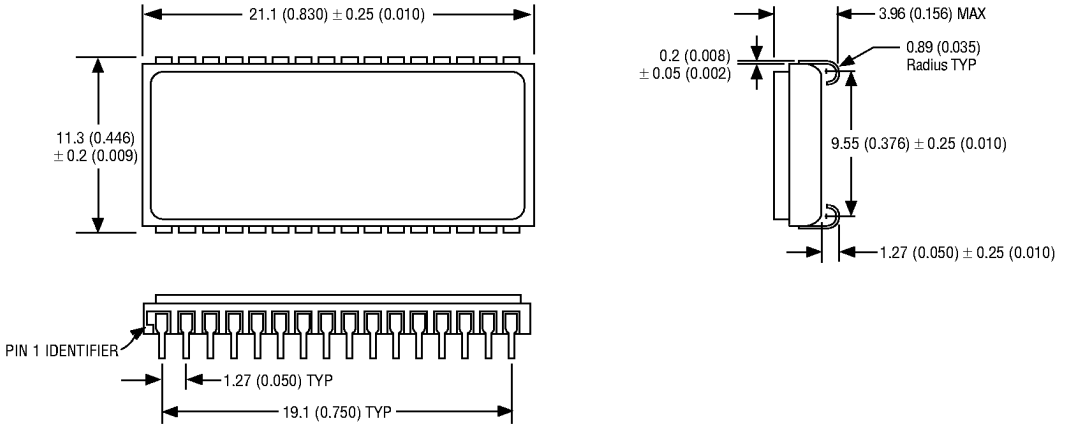
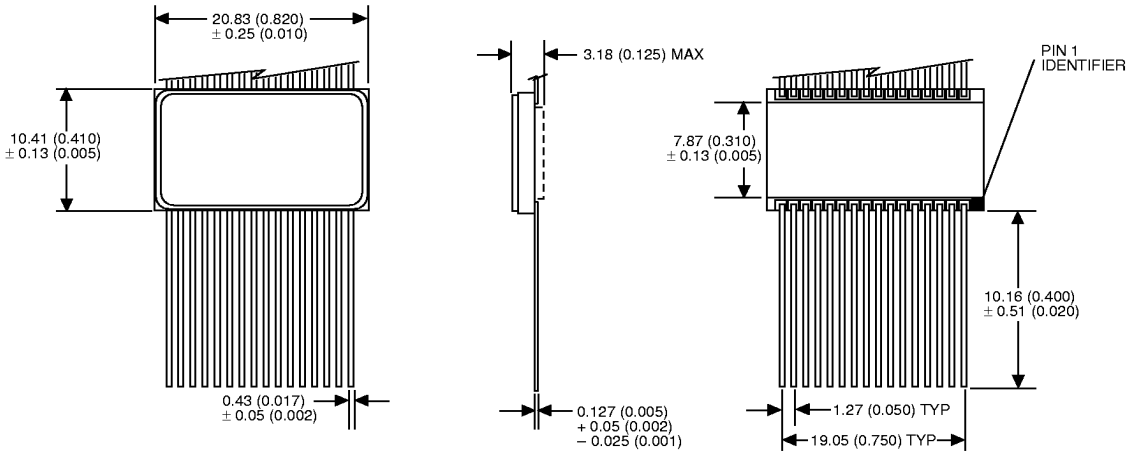
5. Figure indicates the last two bus cycles of a four bus cycle sequence.

PACKAGE 101: 32 LEAD, CERAMIC SOJ



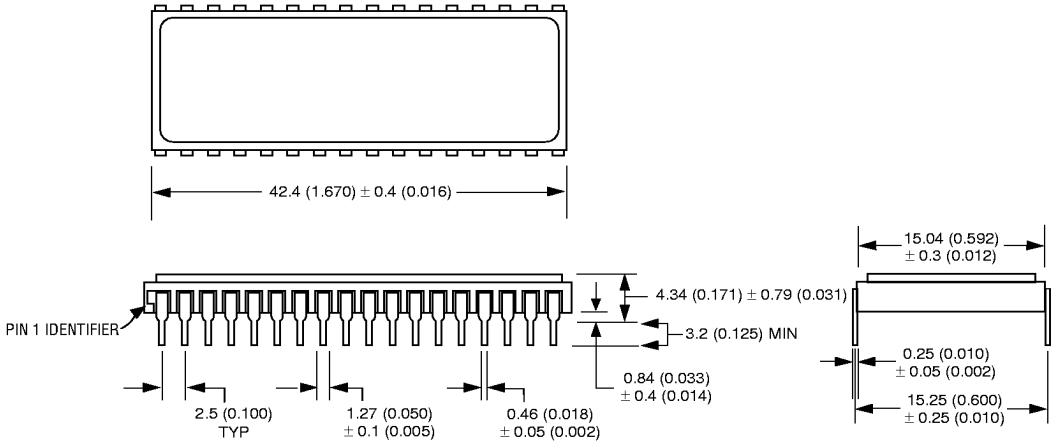
ALL LINEAR DIMENSIONS ARE MILLIMETERS AND PARENTHETICALLY IN INCHES

PACKAGE 206: 32 LEAD, CERAMIC FLAT PACK



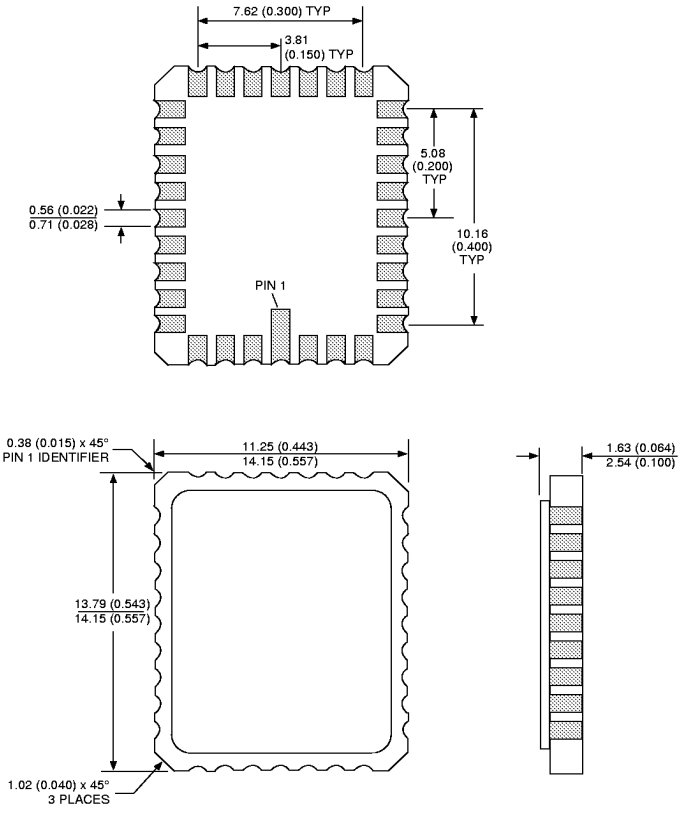
ALL LINEAR DIMENSIONS ARE MILLIMETERS AND PARENTHETICALLY IN INCHES

PACKAGE 300: 32 PIN, CERAMIC DIP, SINGLE CAVITY SIDE BRAZED



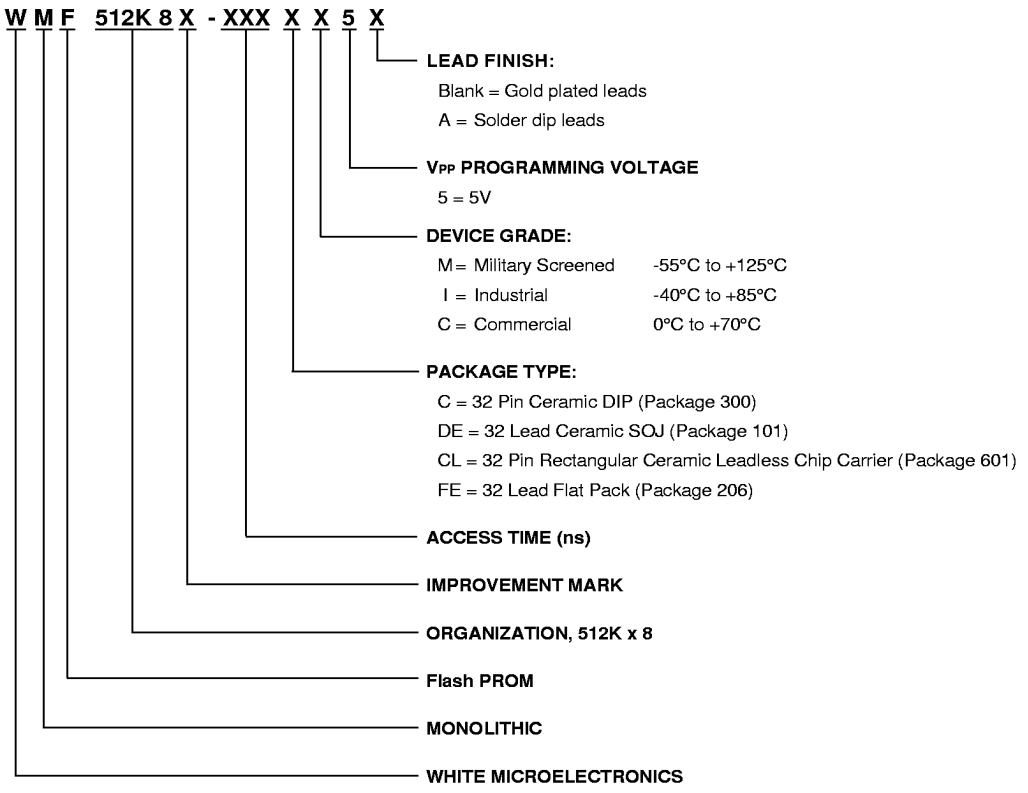
ALL LINEAR DIMENSIONS ARE MILLIMETERS AND PARENTHETICALLY IN INCHES

PACKAGE 601: 32 PIN, RECTANGULAR CERAMIC LEADLESS CHIP CARRIER



ALL LINEAR DIMENSIONS ARE MILLIMETERS AND PARENTHETICALLY IN INCHES

ORDERING INFORMATION



DEVICE TYPE	SECTOR SIZE	SPEED	PACKAGE	SMD NO.
512K x 8 Flash Monolithic	64KByte	150ns	32 pin DIP (C)	5962-96692 01HXX
512K x 8 Flash Monolithic	64KByte	120ns	32 pin DIP (C)	5962-96692 02HXX
512K x 8 Flash Monolithic	64KByte	90ns	32 pin DIP (C)	5962-96692 03HXX
512K x 8 Flash Monolithic	64KByte	70ns	32 pin DIP (C)	5962-96692 04HXX
512K x 8 Flash Monolithic	64KByte	150ns	32 lead SOJ (DE)	5962-96692 01HYX
512K x 8 Flash Monolithic	64KByte	120ns	32 lead SOJ (DE)	5962-96692 02HYX
512K x 8 Flash Monolithic	64KByte	90ns	32 lead SOJ (DE)	5962-96692 03HYX
512K x 8 Flash Monolithic	64KByte	70ns	32 lead SOJ (DE)	5962-96692 04HYX
512K x 8 Flash Monolithic	64KByte	150ns	32 lead Flatpack (FE)	5962-96692 01HUX
512K x 8 Flash Monolithic	64KByte	120ns	32 lead Flatpack (FE)	5962-96692 02HUX
512K x 8 Flash Monolithic	64KByte	90ns	32 lead Flatpack (FE)	5962-96692 03HUX
512K x 8 Flash Monolithic	64KByte	70ns	32 lead Flatpack (FE)	5962-96692 04HUX