

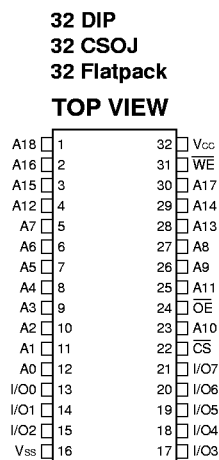
512Kx8 MONOLITHIC FLASH, SMD 5962-96692

FEATURES

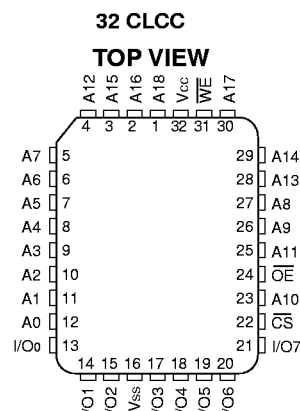
- Access Times of 70, 90, 120, 150ns
- Packaging
 - 32 pin, Hermetic Ceramic, 0.600" DIP (Package 300)
 - 32 lead, Hermetic Ceramic, 0.400" SOJ (Package 101)
 - 32 pin, Rectangular Ceramic Leadless Chip Carrier (Package 601)
 - 32 lead Flatpack (Package 220)
- 1,000,000 Erase/Program Cycles Minimum
- 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. $5V \pm 10\%$ Supply.
- Low Power CMOS
- Embedded Erase and Program Algorithms
- TTL Compatible Inputs and CMOS Outputs
- Page Program Operation and Internal Program Control Time.

Note: For programming information refer to Flash Programming 4M5 Application Note.

PIN CONFIGURATION FOR WMF512K8-XXX5

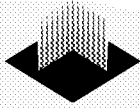


PIN CONFIGURATION FOR WMF512K8-XCLX5



PIN DESCRIPTION

A0-18	Address Inputs
I/O0-7	Data Input/Output
CS	Chip Select
OE	Output Enable
WE	Write Enable
Vcc	+5.0V Power
Vss	Ground



ABSOLUTE MAXIMUM RATINGS (1)

Parameter		Unit
Operating Temperature	-55 to +125	°C
Supply Voltage (V _{CC}) (1)	-2.0 to +7.0	V
Signal Voltage Range(any pin except A ₉) (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	20	years
Endurance - erase/program cycles (Mil Temp)	100,000 min	cycles
A ₉ Voltage for sector protect (V _{ID}) (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 V_{SS} to -2.0 V for periods of up to 20ns. Maximum DC voltage on output and I/O pins is V_{CC} + 0.5V. During voltage transitions, outputs may overshoot to V_{CC} + 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 V_{SS} 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	V _{CC}	4.5	5.5	V
Input High Voltage	V _{IH}	2.0	V _{CC} + 0.5	V
Input Low Voltage	V _{IL}	-0.5	+0.8	V
Operating Temp. (Mil.)	T _A	-55	+125	°C
Operating Temp. (Ind.)	T _A	-40	+85	°C
A ₉ Voltage for Sector Protect	V _{ID}	11.5	12.5	V

CAPACITANCE

(T_A = +25°C)

Parameter	Symbol	Conditions	Max	Unit
Address Input capacitance	C _{AD}	V _{I/O} = 0 V, f = 1.0 MHz	15	pF
Output Enable capacitance	C _{OE}	V _{IN} = 0 V, f = 1.0 MHz	15	pF
Write Enable capacitance	C _{WE}	V _{IN} = 0 V, f = 1.0 MHz	15	pF
Chip Select capacitance	C _{CS}	V _{IN} = 0 V, f = 1.0 MHz	15	pF
Data I/O capacitance	C _{I/O}	V _{I/O} = 0 V, f = 1.0 MHz	15	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		Unit
				Max	
Input Leakage Current	I _{LI}	V _{CC} = 5.5, V _{IN} = GND to V _{CC}		10	μA
Output Leakage Current	I _{LOx32}	V _{CC} = 5.5, V _{IN} = GND to V _{CC}		10	μA
V _{CC} Active Current for Read (1)	I _{CC1}	$\overline{CS} = V_{IL}, \overline{OE} = V_{IH}, f = 5\text{MHz}$		50	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 _{CC4}	V _{CC} = 5.5, $\overline{CS} = V_{IH}, f = 5\text{MHz}$		1.6	mA
Output Low Voltage	V _{OL}	I _{OL} = 8.0 mA, V _{CC} = 4.5		0.45	V
Output High Voltage	V _{OH1}	I _{OH} = -2.5 mA, V _{CC} = 4.5	0.85 x V _{CC}		V
Low V _{CC} Lock-Out Voltage	V _{LKO}		3.2	4.2	V

NOTES:

1. The I_{CC} 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 V_{IH}.
2. I_{CC} 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, $\overline{CS}$ CONTROLLED

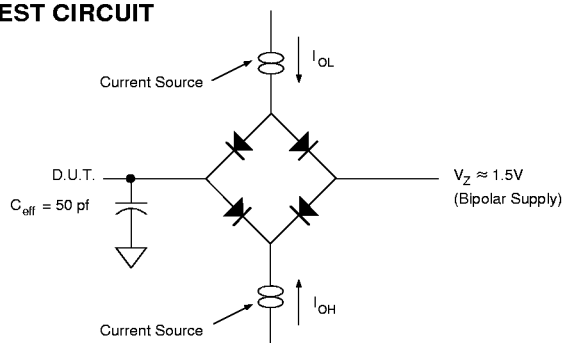
($V_{CC} = 5.0V$, $V_{SS} = 0V$, $T_A = -55^\circ C$ to $+125^\circ C$)

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
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 (1)	t_{BWH1}			300		300		300		300	μs
Sector Erase Time (2)	t_{BWH2}			15		15		15		15	sec
Read Recovery Time	t_{GHEL}		0		0		0		0		ns
Chip Programming Time				11		11		11		11	sec
Chip Erase Time (3)				64		64		64		64	sec

NOTES:

1. Typical value for t_{BWH1} is 7 μs .
2. Typical value for t_{BWH2} is 1sec.
3. Typical value for Chip Erase time is 8sec.

AC TEST CIRCUIT

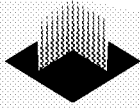


AC TEST CONDITIONS

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 $Z_0 = 75 \Omega$.
 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 (1)	t _{WHWH1}			300		300		300		300	μs
Sector Erase Time (2)	t _{WHWH2}			15		15		15		15	sec
Read Recovery Time before Write	t _{GHWL}		0		0		0		0		ms
V _{CC} Set-up Time		t _{VCS}	50		50		50		50		μs
Chip Programming Time				11		11		11		11	sec
Output Enable Setup Time		t _{OES}	0		0		0		0		ns
Output Enable Hold Time (4)		t _{OEH}	10		10		10		10		ns
Chip Erase Time (3)				64		64		64		64	sec

NOTES:

1. Typical value for t_{WHWH1} is 7μs.
2. Typical value for t_{WHWH2} is 1sec.
3. Typical value for Chip Erase time is 8sec.
4. For Toggle and Data Polling.

AC CHARACTERISTICS – READ ONLY OPERATIONS(V_{CC} = 5.0V, T_A = -55°C to +125°C)

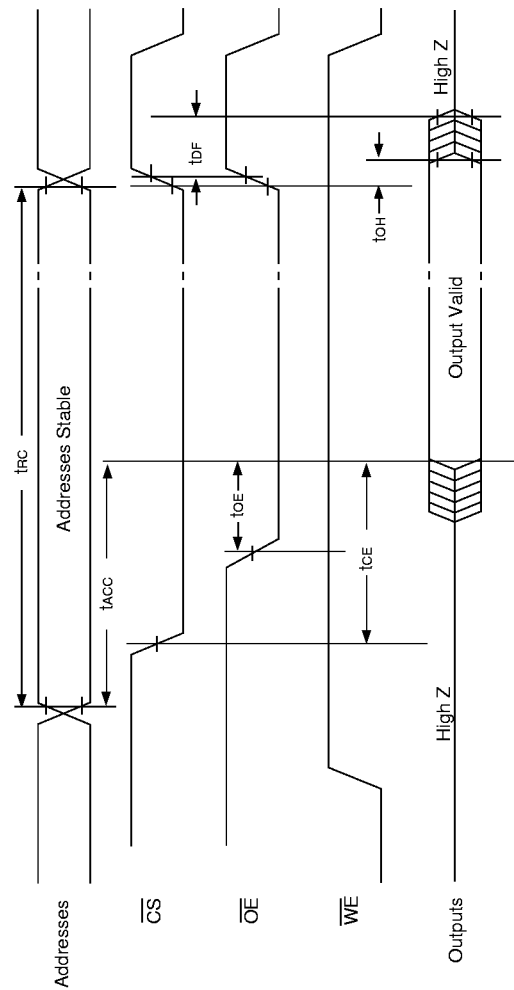
Parameter	Symbol		-70		-90		-120		-150		Unit
			Min	Max	Min	Max	Min	Max	Min	Max	
Read Cycle Time	t _{AVAV}	t _{RC}	70		90		120		150		ns
Address Access Time	t _{AVOV}	t _{ACC}		70		90		120		150	ns
Chip Select Access Time	t _{ELQV}	t _{CE}		70		90		120		150	ns
Output Enable to Output Valid	t _{GLQV}	t _{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

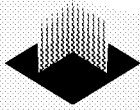
NOTES:

1. Guaranteed by design, but not tested

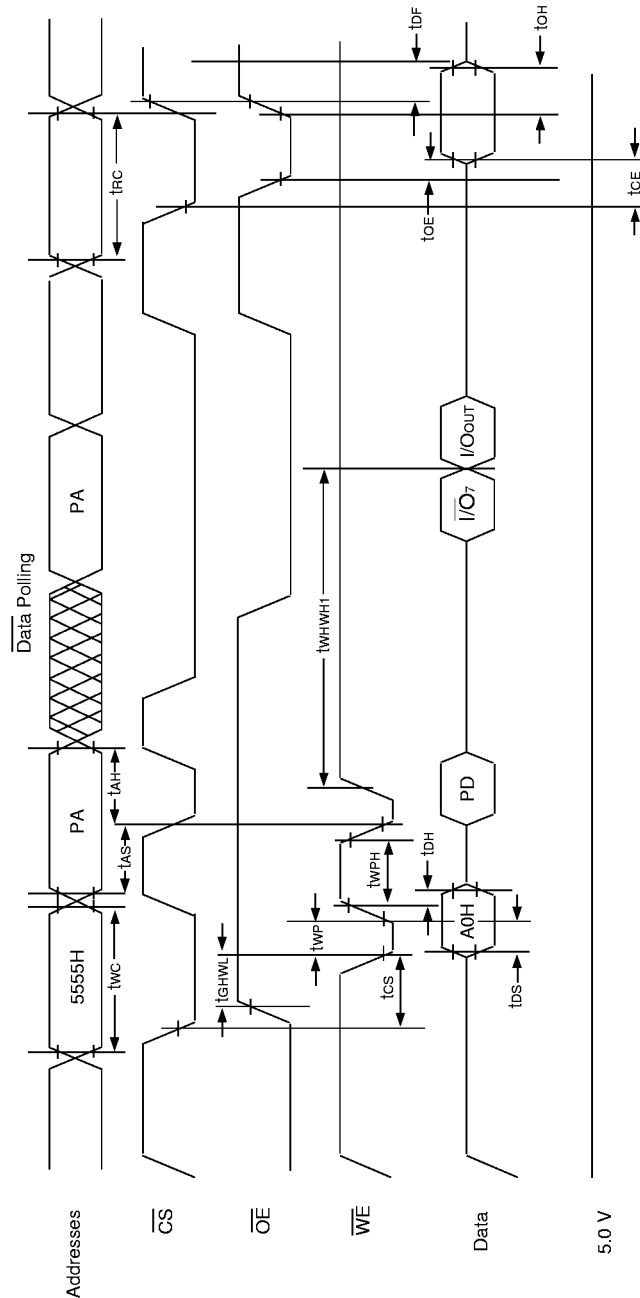


AC WAVEFORMS FOR READ OPERATIONS





**WRITE/ERASE/PROGRAM
OPERATION, WE CONTROLLED**

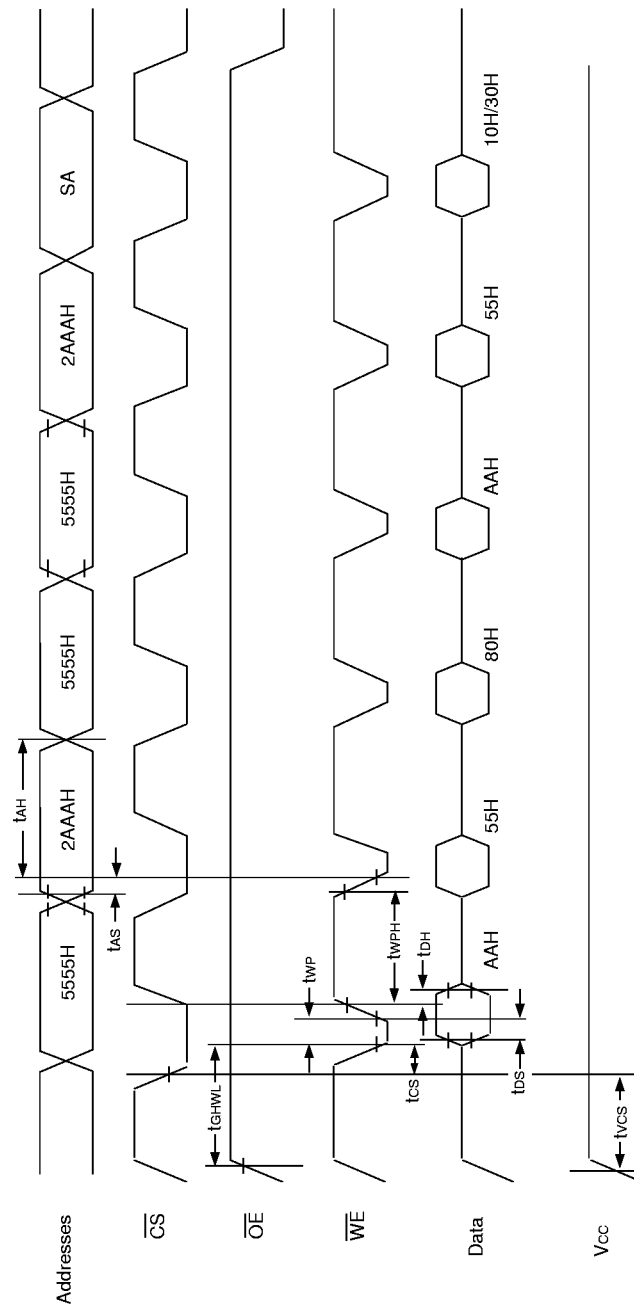


NOTES:

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

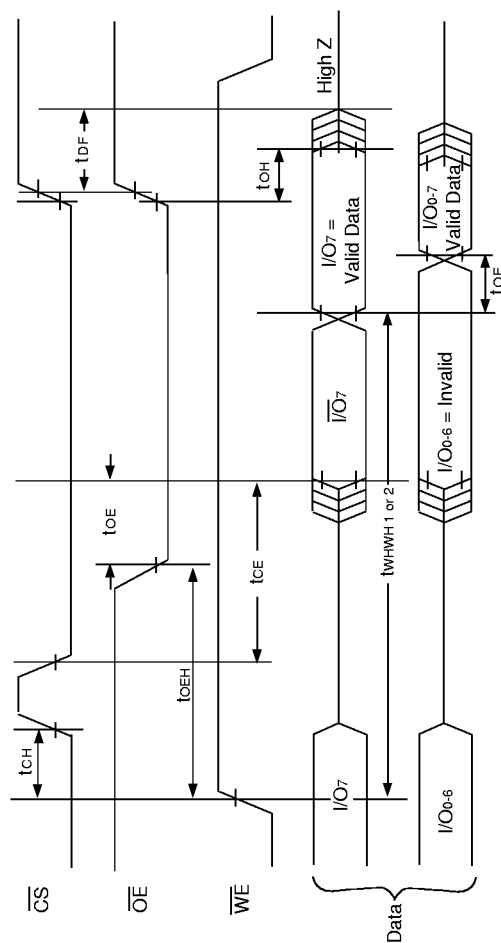


NOTES:

1. SA is the Sector Address for Sector Erase.

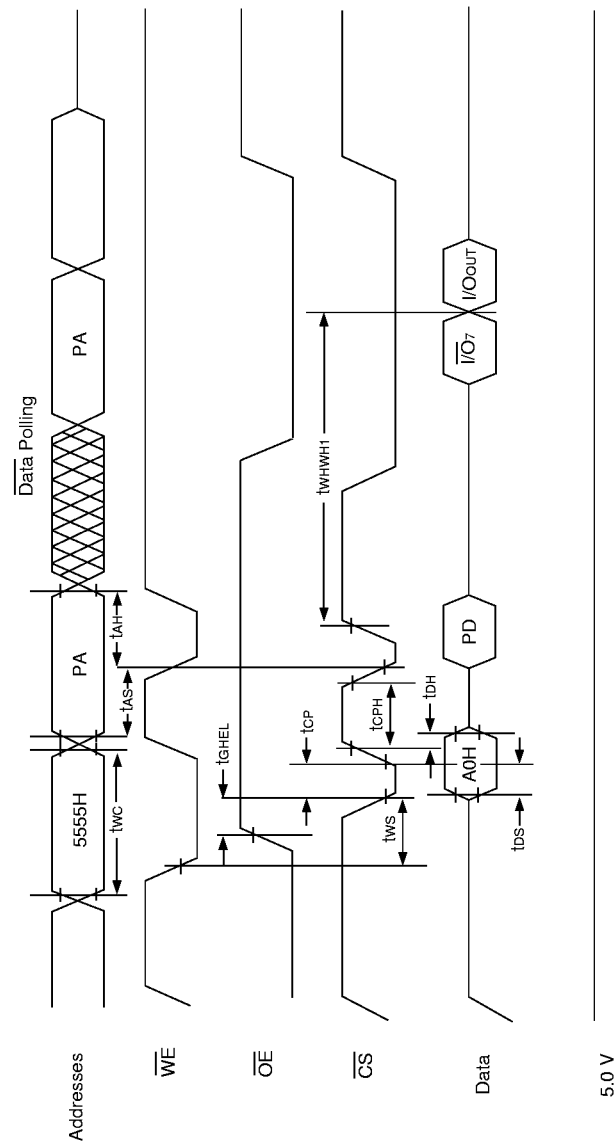


AC WAVEFORMS FOR DATA POLLING DURING EMBEDDED ALGORITHM OPERATIONS



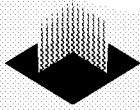


ALTERNATE $\overline{CS}$ CONTROLLED PROGRAMMING OPERATION TIMINGS

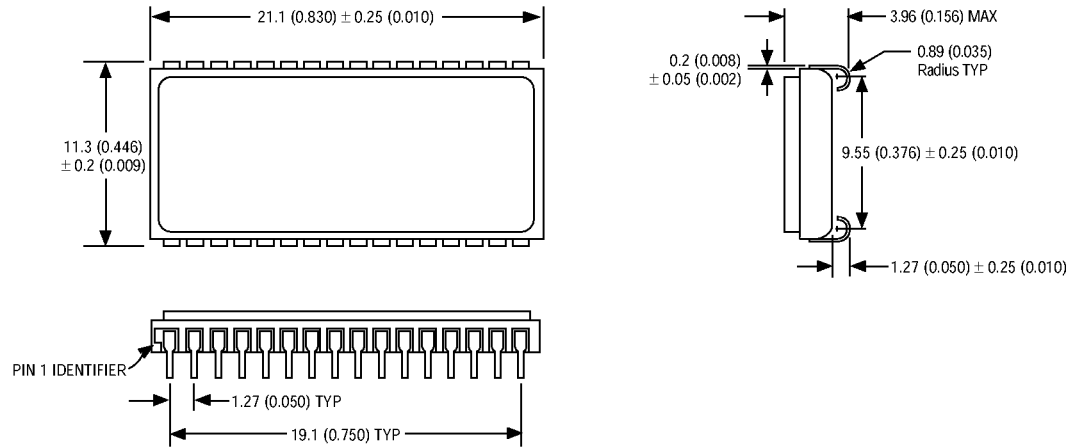


NOTES:

1. PA represents the address of the memory location to be programmed.
2. PD represents the data to be programmed at byte address.
3. I/O₇ 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 the last two bus cycles of a four bus cycle sequence.

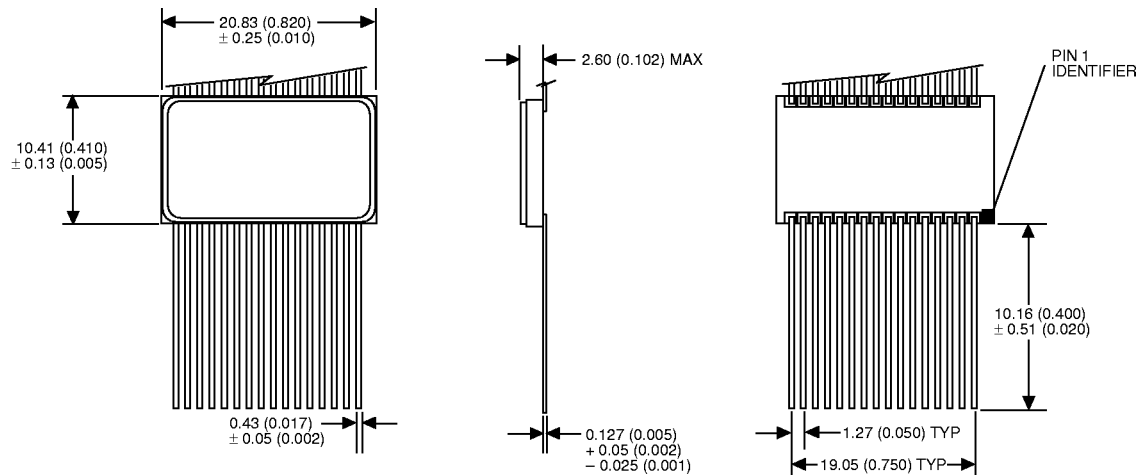


PACKAGE 101: 32 LEAD, CERAMIC SOJ

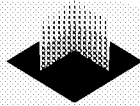


ALL LINEAR DIMENSIONS ARE MILLIMETERS AND PARENTHEMICALLY IN INCHES

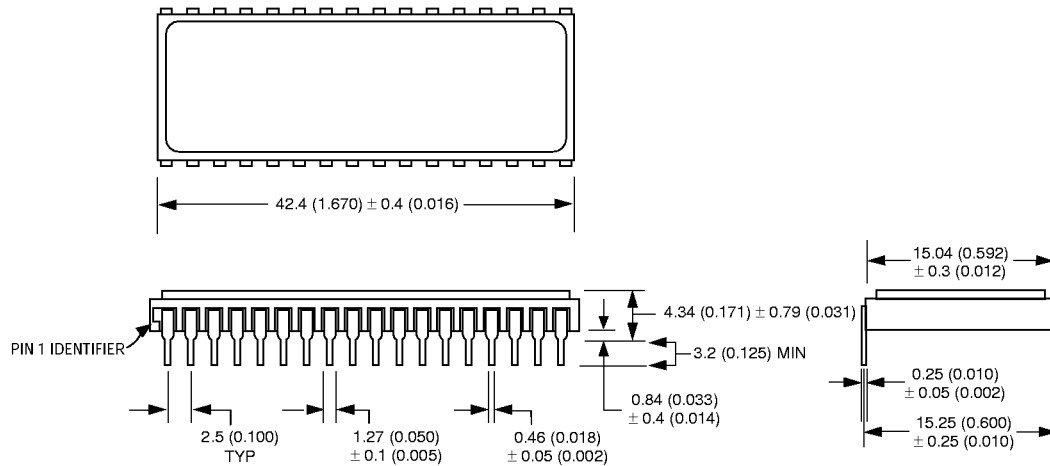
PACKAGE 220: 32 LEAD, CERAMIC FLATPACK



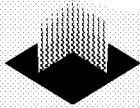
ALL LINEAR DIMENSIONS ARE MILLIMETERS AND PARENTHEMICALLY IN INCHES



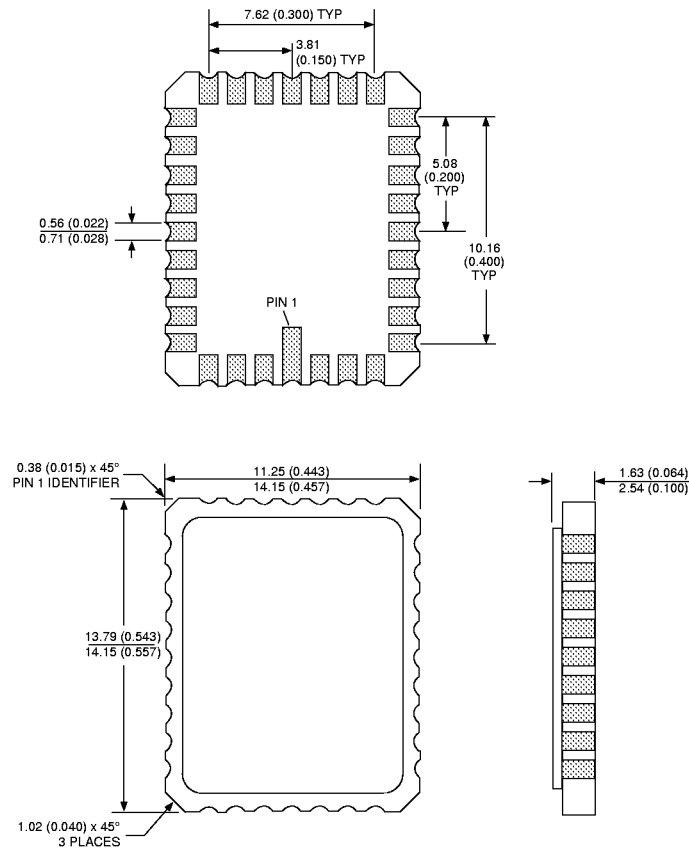
PACKAGE 300: 32 PIN, CERAMIC DIP, SINGLE CAVITY SIDE BRAZED



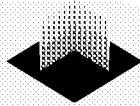
ALL LINEAR DIMENSIONS ARE MILLIMETERS AND PARENTHETICALLY IN INCHES



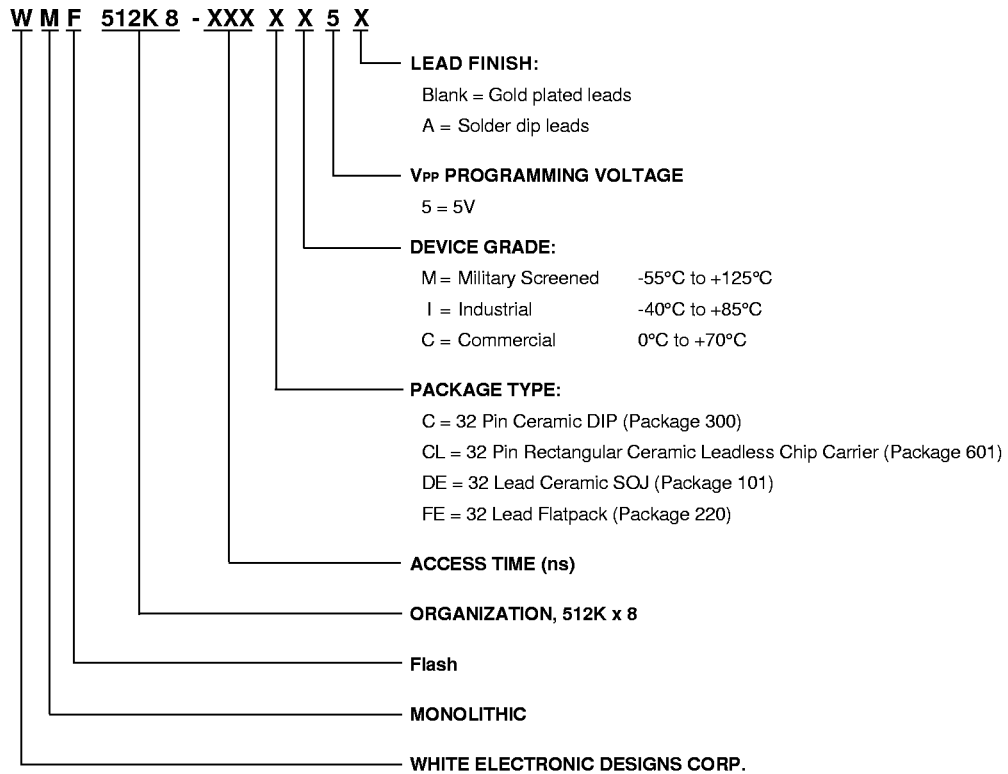
PACKAGE 601: 32 PIN, RECTANGULAR CERAMIC LEADLESS CHIP CARRIER



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