



512Kx8 MONOLITHIC SRAM, SMD 5962-95613

FEATURES

- Access Times 15, 17, 20, 25, 35, 45, 55ns
- MIL-STD-883 Compliant Devices Available
- Revolutionary, Center Power/Ground Pinout JEDEC Approved
 - 36 lead Ceramic SOJ (Package 100)
 - 36 lead Ceramic Flat Pack (Package 226)
- Evolutionary, Corner Power/Ground Pinout JEDEC Approved
 - 32 pin Ceramic DIP (Package 300)
 - 32 lead Ceramic SOJ (Package 101)
 - 32 lead Ceramic Flat Pack (Package 220)
 - 32 lead Ceramic Flat Pack (Package 142)
- 32 pin, Rectangular Ceramic Leadless Chip Carrier (Package 601)
- Commercial, Industrial and Military Temperature Range
- 5 Volt Power Supply
- Low Power CMOS
- Low Power Data Retention for Battery Back-up Operation
- TTL Compatible Inputs and Outputs

REVOLUTIONARY PINOUT

36 FLAT PACK
36 CSOJ

TOP VIEW



EVOLUTIONARY PINOUT

32 DIP
32 CSOJ (DE)
32 FLAT PACK (FE)*
32 FLAT PACK (FD)

TOP VIEW



32 CLCC

TOP VIEW



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 |
| GND | Ground |

*Package not recommended for new designs, "FD" recommended for new designs.



ABSOLUTE MAXIMUM RATINGS

| Parameter | Symbol | Min | Max | Unit |
|--------------------------------|------------------|------|----------------------|------|
| Operating Temperature | T _A | -55 | +125 | °C |
| Storage Temperature | T _{STG} | -65 | +150 | °C |
| Signal Voltage Relative to GND | V _G | -0.5 | V _{CC} +0.5 | V |
| Junction Temperature | T _J | | 150 | °C |
| Supply Voltage | V _{CC} | -0.5 | 7.0 | V |

TRUTH TABLE

| CS | OE | WE | Mode | Data I/O | Power |
|----|----|----|-------------|----------|---------|
| H | X | X | Standby | High Z | Standby |
| L | L | H | Read | Data Out | Active |
| L | X | L | Write | Data In | Active |
| L | H | H | Out Disable | High Z | Active |

RECOMMENDED OPERATING CONDITIONS

| Parameter | Symbol | Min | Max | Unit |
|------------------------|-----------------|------|-----------------------|------|
| Supply Voltage | V _{CC} | 4.5 | 5.5 | V |
| Input High Voltage | V _{IH} | 2.2 | V _{CC} + 0.3 | V |
| Input Low Voltage | V _{IL} | -0.3 | +0.8 | V |
| Operating Temp. (Mil.) | T _A | -55 | +125 | °C |

CAPACITANCE

(T_A = +25°C)

| Parameter | Symbol | Condition | Package | Speed (ns) | Max | Unit |
|--------------------|------------------|-----------------------------------|---|----------------------|----------|----------|
| Input capacitance | C _{IN} | V _{IN} = 0V, f = 1.0MHz | 32 Pin CSOJ, DIP, Flat Pack Evolutionary | 15 to 55 | 20 | pF |
| | | | 32 Pin CLCC | 15 to 55 | 15 | pF |
| | | | 36 Pin CSOJ & Flat Pack Revolutionary | 15 to 35 45 to 55 | 12 20 | pF pF |
| Output capacitance | C _{OUT} | V _{OUT} = 0V, f = 1.0MHz | 32 Pin CSOJ, DIP, Flat Pack Evolutionary | 15 to 55 | 20 | pF |
| | | | 36 Pin CSOJ & Flat Pack Revolutionary | 15 to 35 | 12 | pF |
| | | | | 45 to 55 | 20 | pF |

This parameter is guaranteed by design but not tested.

DC CHARACTERISTICS

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

| Parameter | Sym | Conditions | Min | Max | Units |
|---------------------------|-----------------|--|-----|-----|-------|
| Input Leakage Current | I _{LI} | V _{CC} = 5.5, V _{IN} = GND to V _{CC} | | 10 | μA |
| Output Leakage Current | I _{LO} | CS = V _{IH} , OE = V _{IH} , V _{OUT} = GND to V _{CC} | | 10 | μA |
| Operating Supply Current* | I _{CC} | CS = V _{IL} , OE = V _{IH} , f = 5MHz, V _{CC} = 5.5 | | 160 | mA |
| Standby Current | I _{SB} | CS = V _{IH} , OE = V _{IH} , f = 5MHz, V _{CC} = 5.5 | | 15 | mA |
| Output Low Voltage | V _{OL} | I _{OL} = 8mA for 17 - 35ns, I _{OL} = 2.1mA for 45 - 55ns, V _{CC} = 4.5 | | 0.4 | V |
| Output High Voltage | V _{OH} | I _{OH} = -4.0mA for 17 - 35ns, I _{OH} = -1.0mA for 45 - 55ns, V _{CC} = 4.5 | 2.4 | | V |

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

* Not 100% duty cycle

DATA RETENTION CHARACTERISTICS FOR LOW POWER "L" VERSION

| Parameter | Symbol | Conditions | Units | |
|-------------------------------|--------------------|-----------------------------|-------|-----|
| | | | Min | Max |
| Data Retention Supply Voltage | V _{DR} | CS ≥ V _{CC} - 0.2V | 2.0 | 5.5 |
| Low Power Data Retention | I _{CCDR1} | V _{CC} = 3V | | 7 |
| Low Power Data Retention | I _{CCDR2} | V _{CC} = 2V | | 2 |



AC CHARACTERISTICS

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

| Parameter | Symbol | -15 | | -17 | | -20 | | -25 | | -35 | | -45 | | -55 | | Units |
|------------------------------------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| | | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | |
| Read Cycle Time | t _{RC} | 15 | | 17 | | 20 | | 25 | | 35 | | 45 | | 55 | | ns |
| Address Access Time | t _{AA} | | 15 | | 17 | | 20 | | 25 | | 35 | | 45 | | 55 | ns |
| Output Hold from Address Change | t _{OH} | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | ns |
| Chip Select Access Time | t _{ACS} | | 15 | | 17 | | 20 | | 25 | | 35 | | 45 | | 55 | ns |
| Output Enable to Output Valid | t _{OE} | | 8 | | 9 | | 10 | | 12 | | 25 | | 25 | | 25 | ns |
| Chip Select to Output in Low Z | t _{CLZ} ¹ | 2 | | 2 | | 2 | | 2 | | 4 | | 4 | | 4 | | ns |
| Output Enable to Output in Low Z | t _{OLZ} ¹ | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | ns |
| Chip Disable to Output in High Z | t _{CHZ} ¹ | | 8 | | 9 | | 10 | | 12 | | 15 | | 20 | | 20 | ns |
| Output Disable to Output in High Z | t _{OHZ} ¹ | | 8 | | 9 | | 10 | | 12 | | 15 | | 20 | | 20 | ns |

1. This parameter is guaranteed by design but not tested.

AC CHARACTERISTICS

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

| Parameter | Symbol | -15 | | -17 | | -20 | | -25 | | -35 | | -45 | | -55 | | Units |
|----------------------------------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| | | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | |
| Write Cycle Time | t _{WC} | 15 | | 17 | | 20 | | 25 | | 35 | | 45 | | 55 | | ns |
| Chip Select to End of Write | t _{CW} | 13 | | 14 | | 14 | | 15 | | 25 | | 35 | | 50 | | ns |
| Address Valid to End of Write | t _{AW} | 13 | | 14 | | 14 | | 15 | | 25 | | 35 | | 50 | | ns |
| Data Valid to End of Write | t _{DW} | 8 | | 9 | | 10 | | 10 | | 20 | | 25 | | 25 | | ns |
| Write Pulse Width | t _{WP} | 13 | | 14 | | 14 | | 15 | | 25 | | 35 | | 40 | | ns |
| Address Setup Time | t _{AS} | 2 | | 2 | | 2 | | 2 | | 2 | | 2 | | 2 | | ns |
| Address Hold Time | t _{AH} | 0 | | 0 | | 0 | | 0 | | 0 | | 5 | | 5 | | ns |
| Output Active from End of Write | t _{OW} ¹ | 2 | | 2 | | 3 | | 4 | | 4 | | 5 | | 5 | | ns |
| Write Enable to Output in High Z | t _{WHZ} ¹ | | 8 | | 9 | | 9 | | 10 | | 15 | | 20 | | 25 | ns |
| Data Hold Time | t _{DH} | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | ns |

1. This parameter is guaranteed by design but not tested.

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 Z₀ = 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.



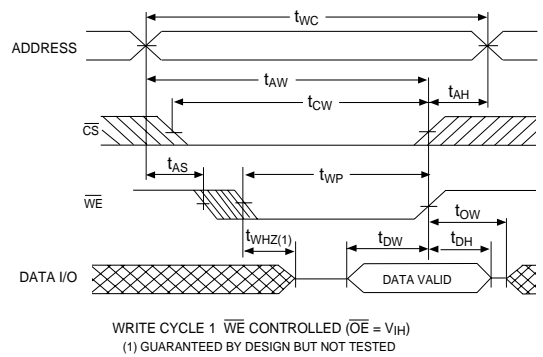
TIMING WAVEFORM - READ CYCLE



WRITE CYCLE - \overline{WE} CONTROLLED



WRITE CYCLE - \overline{CS} CONTROLLED





PACKAGE 100: 36 LEAD, CERAMIC SOJ



ALL LINEAR DIMENSIONS ARE MILLIMETERS AND PARENTHETICALLY IN INCHES

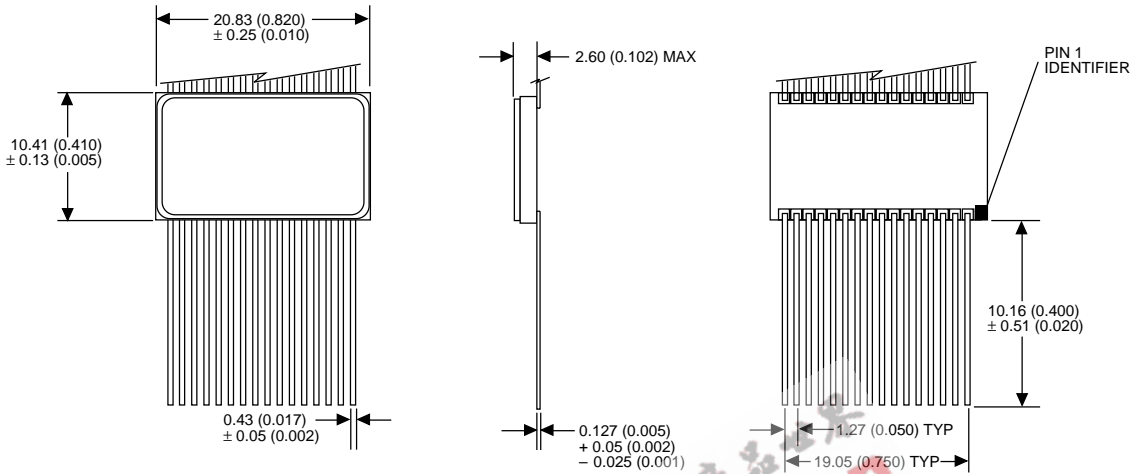
PACKAGE 101: 32 LEAD, CERAMIC SOJ



ALL LINEAR DIMENSIONS ARE MILLIMETERS AND PARENTHETICALLY IN INCHES

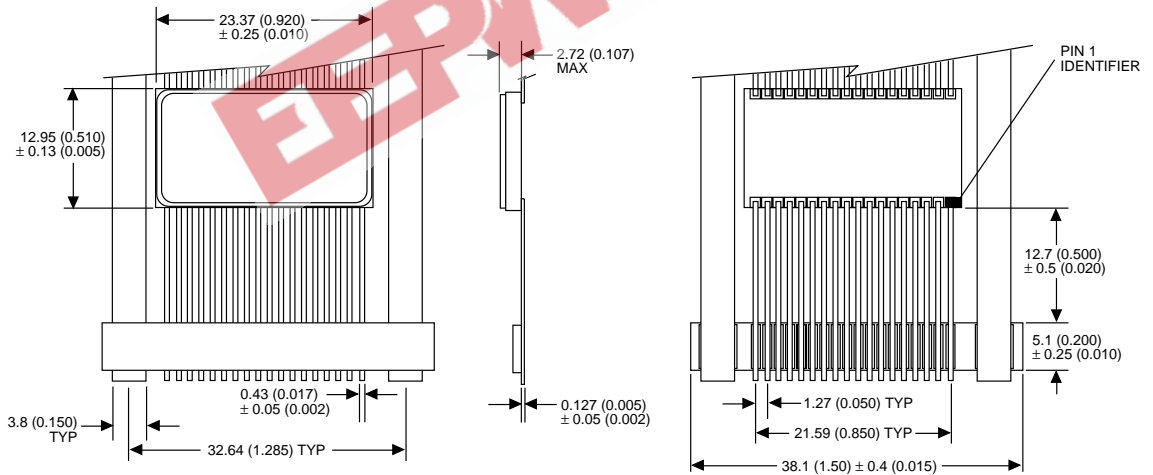


PACKAGE 220: 32 LEAD, CERAMIC FLAT PACK



ALL LINEAR DIMENSIONS ARE MILLIMETERS AND PARENTHETICALLY IN INCHES

PACKAGE 226: 36 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





ORDERING INFORMATION

W M S 512K 8 X - XXX X X X

LEAD FINISH:

- Blank = Gold plated leads
- A = Solder dip leads

DEVICE GRADE:

- M = Military Screened -55°C to +125°C
- I = Industrial -40°C to +85°C
- C = Commercial 0°C to +70°C

PACKAGE:

- C = 32 Pin Ceramic 0.600" DIP (Package 300)
- CL = 32 Pin Rectangular Ceramic Leadless Chip Carrier (Package 601)
- DE = 32 Lead Ceramic SOJ (Package 101) Evolutionary
- DJ = 36 Lead Ceramic SOJ (Package 100)
- F = 36 Lead Ceramic Flat Pack (Package 226)
- FE = 32 Lead Ceramic Flat Pack (Package 220)

ACCESS TIME (ns)

IMPROVEMENT MARK:

- Blank = Standard
- L = Low Power Data Retention

ORGANIZATION, 512K x 8

SRAM

MONOLITHIC

WHITE ELECTRONIC DESIGNS CORP.





| DEVICE TYPE | SPEED | PACKAGE | SMD NO. |
|--------------------------|-------|-----------------------|------------------|
| 512K x 8 SRAM Monolithic | 55ns | 32 pin DIP (C) | 5962-95613 05HYX |
| 512K x 8 SRAM Monolithic | 45ns | 32 pin DIP (C) | 5962-95613 06HYX |
| 512K x 8 SRAM Monolithic | 35ns | 32 pin DIP (C) | 5962-95613 07HYX |
| 512K x 8 SRAM Monolithic | 25ns | 32 pin DIP (C) | 5962-95613 08HYX |
| 512K x 8 SRAM Monolithic | 20ns | 32 pin DIP (C) | 5962-95613 09HYX |
| 512K x 8 SRAM Monolithic | 17ns | 32 pin DIP (C) | 5962-95613 10HYX |
| 512K x 8 SRAM Monolithic | 15ns | 32 pin DIP (C) | 5962-95613 14HYX |
| | | | |
| 512K x 8 SRAM Monolithic | 55ns | 32 lead SOJ Evol (DE) | 5962-95613 05HTX |
| 512K x 8 SRAM Monolithic | 45ns | 32 lead SOJ Evol (DE) | 5962-95613 06HTX |
| 512K x 8 SRAM Monolithic | 35ns | 32 lead SOJ Evol (DE) | 5962-95613 07HTX |
| 512K x 8 SRAM Monolithic | 25ns | 32 lead SOJ Evol (DE) | 5962-95613 08HTX |
| 512K x 8 SRAM Monolithic | 20ns | 32 lead SOJ Evol (DE) | 5962-95613 09HTX |
| 512K x 8 SRAM Monolithic | 17ns | 32 lead SOJ Evol (DE) | 5962-95613 10HTX |
| 512K x 8 SRAM Monolithic | 15ns | 32 lead SOJ Evol (DE) | 5962-95613 14HTX |
| | | | |
| 512K x 8 SRAM Monolithic | 55ns | 36 lead SOJ (DJ) | 5962-95613 05HZX |
| 512K x 8 SRAM Monolithic | 45ns | 36 lead SOJ (DJ) | 5962-95613 06HZX |
| 512K x 8 SRAM Monolithic | 35ns | 36 lead SOJ (DJ) | 5962-95613 07HZX |
| 512K x 8 SRAM Monolithic | 25ns | 36 lead SOJ (DJ) | 5962-95613 08HZX |
| 512K x 8 SRAM Monolithic | 20ns | 36 lead SOJ (DJ) | 5962-95613 09HZX |
| 512K x 8 SRAM Monolithic | 17ns | 36 lead SOJ (DJ) | 5962-95613 10HZX |
| 512K x 8 SRAM Monolithic | 15ns | 36 lead SOJ (DJ) | 5962-95613 14HZX |
| | | | |
| 512K x 8 SRAM Monolithic | 55ns | 36 lead Flatpack (F) | 5962-95613 05HXX |
| 512K x 8 SRAM Monolithic | 45ns | 36 lead Flatpack (F) | 5962-95613 06HXX |
| 512K x 8 SRAM Monolithic | 35ns | 36 lead Flatpack (F) | 5962-95613 07HXX |
| 512K x 8 SRAM Monolithic | 25ns | 36 lead Flatpack (F) | 5962-95613 08HXX |
| 512K x 8 SRAM Monolithic | 20ns | 36 lead Flatpack (F) | 5962-95613 09HXX |
| 512K x 8 SRAM Monolithic | 17ns | 36 lead Flatpack (F) | 5962-95613 10HXX |
| 512K x 8 SRAM Monolithic | 15ns | 36 lead Flatpack (F) | 5962-95613 14HXX |