



## 128Kx8 MONOLITHIC SRAM, SMD 5962-96691

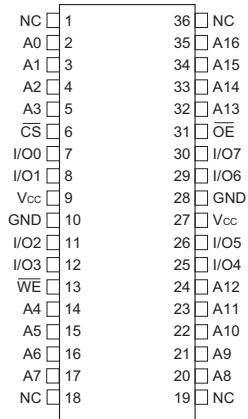
### FEATURES

- Access Times 15, 17, 20, 25, 35, 45, 55ns
- Revolutionary, Center Power/Ground Pinout JEDEC Approved
  - 32 lead Ceramic SOJ (Package 101)
  - 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 206)
- 32 pin, Rectangular Ceramic Leadless Chip Carrier (Package 601)
- MIL-STD-883 Compliant Devices Available
- Commercial, Industrial and Military Temperature Range
- 5 Volt Power Supply
- Low Power CMOS
- 2V Data Retention Devices Available (Low Power Version)
- TTL Compatible Inputs and Outputs

### REVOLUTIONARY PINOUT

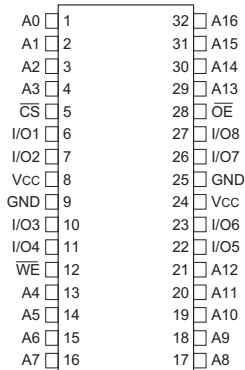
#### 36 FLAT PACK

##### TOP VIEW



#### 32 CSOJ (DR)

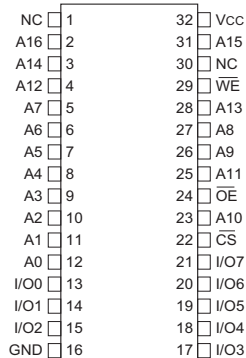
##### TOP VIEW



### EVOLUTIONARY PINOUT

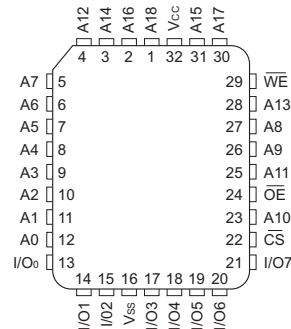
#### 32 DIP 32 CSOJ (DE) 32 FLATPACK (FE)

##### TOP VIEW



#### 32 CLCC

##### TOP VIEW



### PIN DESCRIPTION

|        |                   |
|--------|-------------------|
| A0-16  | Address Inputs    |
| I/O0-7 | Data Input/Output |
| CS     | Chip Select       |
| OE     | Output Enable     |
| WE     | Write Enable      |
| Vcc    | +5.0V Power       |
| GND    | Ground            |



## ABSOLUTE MAXIMUM RATINGS

| Parameter                      | Symbol           | Min  | Max                  | Unit |
|--------------------------------|------------------|------|----------------------|------|
| Operating Temperature          | T <sub>A</sub>   | -55  | +125                 | °C   |
| Storage Temperature            | T <sub>STG</sub> | -65  | +150                 | °C   |
| Signal Voltage Relative to GND | V <sub>G</sub>   | -0.5 | V <sub>CC</sub> +0.5 | V    |
| Junction Temperature           | T <sub>J</sub>   |      | 150                  | °C   |
| Supply Voltage                 | V <sub>CC</sub>  | -0.5 | 7.0                  | V    |

## TRUTH TABLE

| $\overline{CS}$ | $\overline{OE}$ | $\overline{WE}$ | 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 <sub>CC</sub> | 4.5  | 5.5                   | V    |
| Input High Voltage     | V <sub>IH</sub> | 2.2  | V <sub>CC</sub> + 0.3 | V    |
| Input Low Voltage      | V <sub>IL</sub> | -0.5 | +0.8                  | V    |
| Operating Temp. (Mil.) | T <sub>A</sub>  | -55  | +125                  | °C   |

## CAPACITANCE (T<sub>A</sub> = +25°C)

| Parameter          | Symbol           | Condition                         | Package   | Speed (ns) | Max | Unit |
|--------------------|------------------|-----------------------------------|---|------------|-----|------|
| Input capacitance  | C <sub>IN</sub>  | V <sub>IN</sub> = 0V, f = 1.0MHz  | 32 Pin CSOJ, DIP,<br>Flat Pack Evolutionary       | 15 to 55   | 20  | pF   |
|                    |                  |                                   | 36 Pin Flat Pack and<br>32 Pin CSOJ Revolutionary | 15 to 25   | 12  | pF   |
|                    |                  |                                   |   | 35 to 55   | 20  | pF   |
| Output capacitance | C <sub>OUT</sub> | V <sub>OUT</sub> = 0V, f = 1.0MHz | 32 Pin CSOJ, DIP,<br>Flat Pack Evolutionary       | 15 to 55   | 20  | pF   |
|                    |                  |                                   | 36 Pin Flat Pack and<br>32 Pin CSOJ Revolutionary | 15 to 25   | 12  | pF   |
|                    |                  |                                   |   | 35 to 55   | 20  | pF   |
|                    |                  |                                   | 32 Pin CLCC                                       | 15 to 55   | 15  | pF   |

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

## DC CHARACTERISTICS (V<sub>CC</sub> = 5.0V, GND = 0V, T<sub>A</sub> = -55°C TO +125°C)

| Parameter                | Sym             | Conditions   | -15 |     | -17 |     | -20 |     | -25 |     | Units |
|--------------------------|-----------------|--|-----|-----|-----|-----|-----|-----|-----|-----|-------|
|                          |                 |  | Min | Max | Min | Max | Min | Max | Min | Max |       |
| Input Leakage Current    | I <sub>LI</sub> | V <sub>CC</sub> = 5.5, V <sub>IN</sub> = GND to V <sub>CC</sub>                    |     | 10  |     | 10  |     | 10  |     | 10  | μA    |
| Output Leakage Current   | I <sub>LO</sub> | $\overline{CS} = V_{IH}, \overline{OE} = V_{IH}, V_{OUT} = GND \text{ to } V_{CC}$ |     | 10  |     | 10  |     | 10  |     | 10  | μA    |
| Operating Supply Current | I <sub>CC</sub> | $\overline{CS} = V_{IL}, \overline{OE} = V_{IH}, f = 5\text{MHz}, V_{CC} = 5.5$    |     | 150 |     | 150 |     | 150 |     | 150 | mA    |
| Standby Current          | I <sub>SB</sub> | $\overline{CS} = V_{IH}, \overline{OE} = V_{IH}, f = 5\text{MHz}, V_{CC} = 5.5$    |     | 20  |     | 20  |     | 20  |     | 15  | mA    |
| Output Low Voltage       | V <sub>OL</sub> | I <sub>OL</sub> = 8mA, V <sub>CC</sub> = 4.5                                       |     | 0.4 |     | 0.4 |     | 0.4 |     | 0.4 | V     |
| Output High Voltage      | V <sub>OH</sub> | I <sub>OH</sub> = -4.0mA, V <sub>CC</sub> = 4.5                                    | 2.4 |     | 2.4 |     | 2.4 |     | 2.4 |     | V     |

| Parameter                | Sym             | Conditions   | -35 |     | -45 |     | -55 |     | Units |
|--------------------------|-----------------|--|-----|-----|-----|-----|-----|-----|-------|
|                          |                 |  | Min | Max | Min | Max | Min | Max |       |
| Input Leakage Current    | I <sub>LI</sub> | V <sub>CC</sub> = 5.5, V <sub>IN</sub> = GND to V <sub>CC</sub>                    |     | 10  |     | 10  |     | 10  | μA    |
| Output Leakage Current   | I <sub>LO</sub> | $\overline{CS} = V_{IH}, \overline{OE} = V_{IH}, V_{OUT} = GND \text{ to } V_{CC}$ |     | 10  |     | 10  |     | 10  | μA    |
| Operating Supply Current | I <sub>CC</sub> | $\overline{CS} = V_{IL}, \overline{OE} = V_{IH}, f = 5\text{MHz}, V_{CC} = 5.5$    |     | 150 |     | 150 |     | 150 | mA    |
| Standby Current          | I <sub>SB</sub> | $\overline{CS} = V_{IH}, \overline{OE} = V_{IH}, f = 5\text{MHz}, V_{CC} = 5.5$    |     | 15  |     | 15  |     | 15  | mA    |
| Output Low Voltage       | V <sub>OL</sub> | I <sub>OL</sub> = 2.1mA, V <sub>CC</sub> = 4.5                                     |     | 0.4 |     | 0.4 |     | 0.4 | V     |
| Output High Voltage      | V <sub>OH</sub> | I <sub>OH</sub> = -1.0mA, V <sub>CC</sub> = 4.5                                    | 2.4 |     | 2.4 |     | 2.4 |     | V     |

NOTE: DC test conditions: V<sub>IH</sub> = V<sub>CC</sub> - 0.3V, V<sub>IL</sub> = 0.3V



### AC CHARACTERISTICS (VCC = 5.0V, GND = 0V, TA = -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 <sub>RC</sub>               | 15  |     | 17  |     | 20  |     | 25  |     | 35  |     | 45  |     | 55  |     | ns    |
| Address Access Time                | t <sub>AA</sub>               |     | 15  |     | 17  |     | 20  |     | 25  |     | 35  |     | 45  |     | 55  | ns    |
| Output Hold from Address Change    | t <sub>OH</sub>               | 0   |     | 0   |     | 0   |     | 0   |     | 0   |     | 0   |     | 0   |     | ns    |
| Chip Select Access Time            | t <sub>ACS</sub>              |     | 15  |     | 17  |     | 20  |     | 25  |     | 35  |     | 45  |     | 55  | ns    |
| Output Enable to Output Valid      | t <sub>OE</sub>               |     | 10  |     | 10  |     | 12  |     | 15  |     | 20  |     | 25  |     | 30  | ns    |
| Chip Select to Output in Low Z     | t <sub>CLZ</sub> <sup>1</sup> | 3   |     | 3   |     | 3   |     | 3   |     | 3   |     | 3   |     | 3   |     | ns    |
| Output Enable to Output in Low Z   | t <sub>OLZ</sub> <sup>1</sup> | 0   |     | 0   |     | 0   |     | 0   |     | 0   |     | 0   |     | 0   |     | ns    |
| Chip Disable to Output in High Z   | t <sub>CHZ</sub> <sup>1</sup> |     | 10  |     | 10  |     | 10  |     | 12  |     | 20  |     | 20  |     | 20  | ns    |
| Output Disable to Output in High Z | t <sub>OHZ</sub> <sup>1</sup> |     | 10  |     | 10  |     | 10  |     | 12  |     | 20  |     | 20  |     | 20  | ns    |

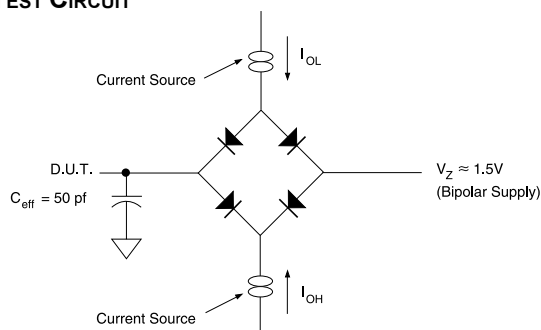
1. This parameter is guaranteed by design but not tested.

### AC CHARACTERISTICS (VCC = 5.0V, GND = 0V, TA = -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 <sub>WC</sub>               | 15  |     | 17  |     | 20  |     | 25  |     | 35  |     | 45  |     | 55  |     | ns    |
| Chip Select to End of Write      | t <sub>CW</sub>               | 14  |     | 14  |     | 15  |     | 20  |     | 25  |     | 30  |     | 45  |     | ns    |
| Address Valid to End of Write    | t <sub>AW</sub>               | 14  |     | 15  |     | 15  |     | 20  |     | 25  |     | 30  |     | 45  |     | ns    |
| Data Valid to End of Write       | t <sub>DW</sub>               | 10  |     | 10  |     | 12  |     | 15  |     | 20  |     | 25  |     | 25  |     | ns    |
| Write Pulse Width                | t <sub>WP</sub>               | 14  |     | 14  |     | 15  |     | 20  |     | 25  |     | 30  |     | 45  |     | ns    |
| Address Setup Time               | t <sub>AS</sub>               | 0   |     | 0   |     | 0   |     | 0   |     | 0   |     | 0   |     | 0   |     | ns    |
| Address Hold Time                | t <sub>AH</sub>               | 0   |     | 0   |     | 0   |     | 0   |     | 0   |     | 0   |     | 0   |     | ns    |
| Output Active from End of Write  | t <sub>OW</sub> <sup>1</sup>  | 3   |     | 3   |     | 3   |     | 3   |     | 4   |     | 4   |     | 4   |     | ns    |
| Write Enable to Output in High Z | t <sub>WHZ</sub> <sup>1</sup> |     | 10  |     | 10  |     | 12  |     | 15  |     | 20  |     | 25  |     | 25  | ns    |
| Data Hold Time                   | t <sub>DH</sub>               | 0   |     | 0   |     | 0   |     | 0   |     | 0   |     | 0   |     | 0   |     | ns    |

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

### AC TEST CIRCUIT



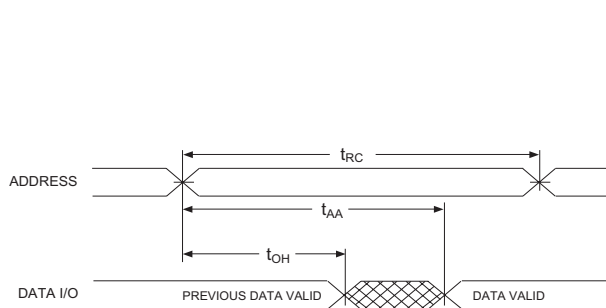
### AC TEST CONDITIONS

| 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    |

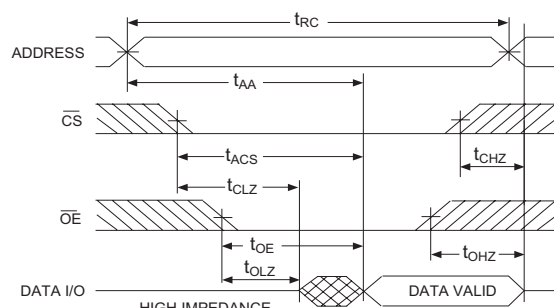
Notes:  
 $V_Z$  is programmable from -2V to +7V.  
 $I_{OL}$  &  $I_{OH}$  programmable from 0 to 16mA.  
 Tester Impedance  $Z_0 = 75\Omega$ .  
 $V_Z$  is typically the midpoint of  $V_{OH}$  and  $V_{OL}$ .  
 $I_{OL}$  &  $I_{OH}$  are adjusted to simulate a typical resistive load circuit.  
 ATE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



### TIMING WAVEFORM - READ CYCLE

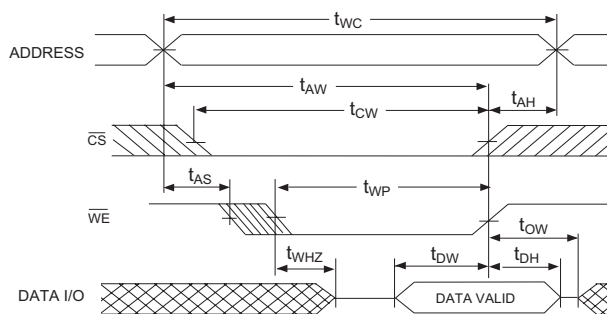


READ CYCLE 1 ( $\overline{CS} = \overline{OE} = V_{IL}, \overline{WE} = V_{IH}$ )



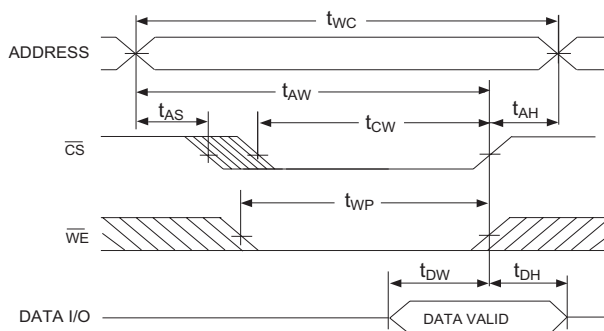
READ CYCLE 2 ( $\overline{WE} = V_{IH}$ )

### WRITE CYCLE - $\overline{WE}$ CONTROLLED



WRITE CYCLE 1,  $\overline{WE}$  CONTROLLED

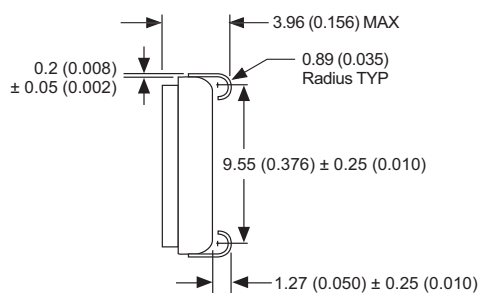
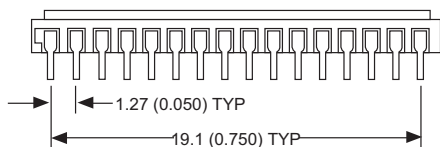
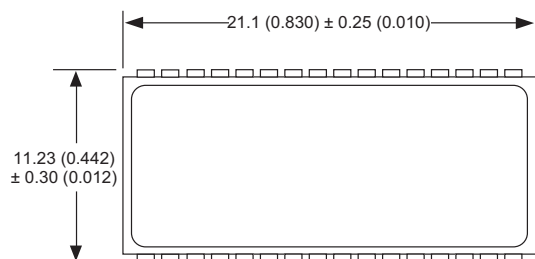
### WRITE CYCLE - $\overline{CS}$ CONTROLLED



WRITE CYCLE 2,  $\overline{CS}$  CONTROLLED



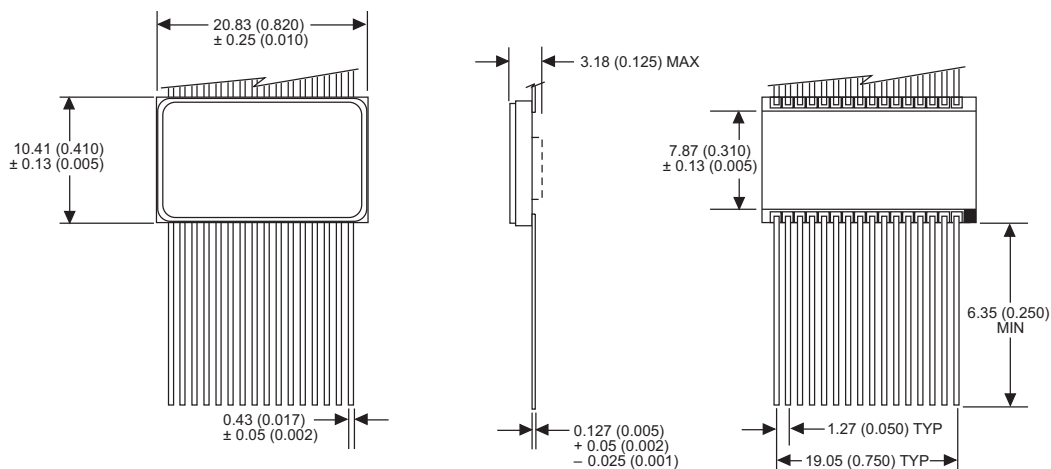
### PACKAGE 101: 32 LEAD, CERAMIC SOJ



ALL LINEAR DIMENSIONS ARE MILLIMETERS AND PARENTHETICALLY IN INCHES

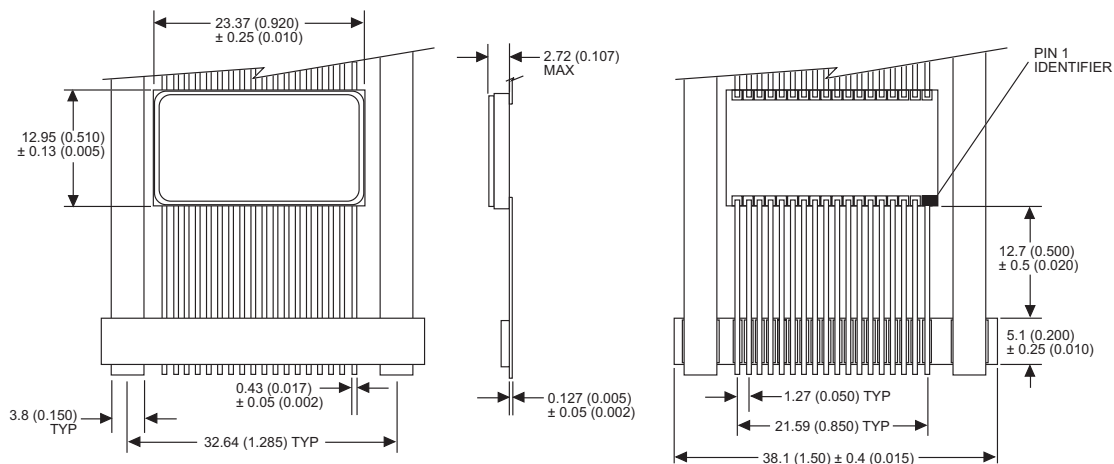


### PACKAGE 206: 32 LEAD, CERAMIC FLAT PACK



ALL LINEAR DIMENSIONS ARE MILLIMETERS AND PARENTHETICALLY IN INCHES

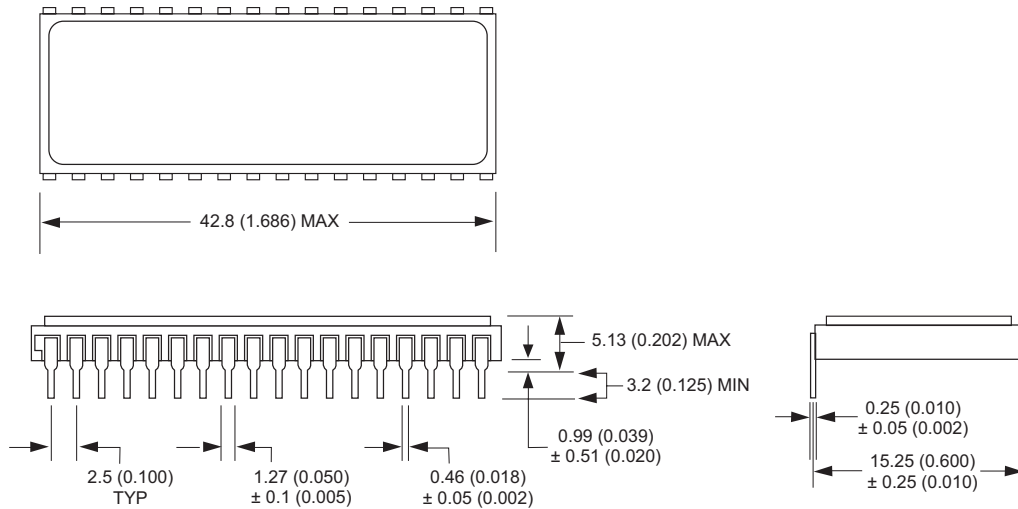
### PACKAGE 226: 36 LEAD, CERAMIC FLAT PACK



ALL LINEAR DIMENSIONS ARE MILLIMETERS AND PARENTHETICALLY IN INCHES



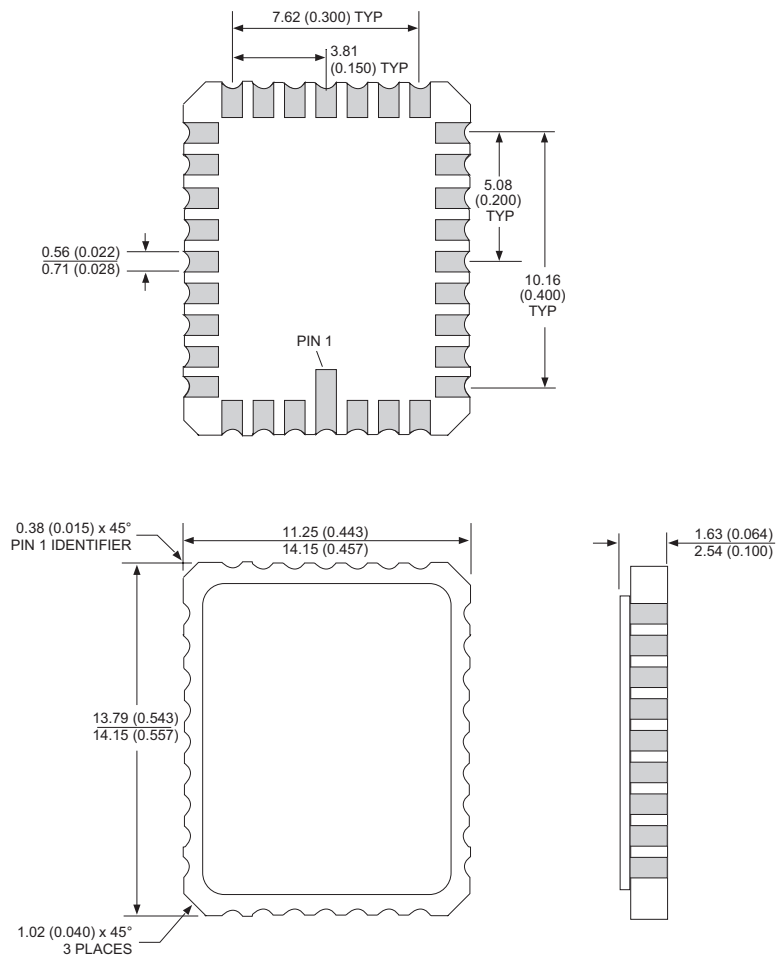
### PACKAGE 300: 32 PIN, CERAMIC DIP, SINGLE CAVITY SIDE BRAZED



ALL LINEAR DIMENSIONS ARE MILLIMETERS AND PARENTHETICALLY IN INCHES



### PACKAGE 601: 32 PIN, RECTANGULAR CERAMIC LEADLESS CHIP CARRIER



ALL LINEAR DIMENSIONS ARE MILLIMETERS AND PARENTHETICALLY IN INCHES





### DATA RETENTION CHARACTERISTICS (TA = -55°C TO +125°C) LOW POWER VERSION ONLY

| Parameter                     | Symbol             | Conditions                         | Units |     |     |
|-------------------------------|--------------------|------------------------------------|-------|-----|-----|
|                               |                    |                                    | Min   | Typ | Max |
| Data Retention Supply Voltage | V <sub>DR</sub>    | $\overline{CS} \geq V_{CC} - 0.2V$ | 2.0   |     | 5.5 |
| Data Retention Current        | I <sub>CCDR2</sub> | V <sub>CC</sub> = 2V               |       |     | 2   |

### ORDERING INFORMATION

**W M S 128K8 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 .600" DIP (Package 300)  
CL = 32 Pin Rectangular Ceramic Leadless Chip Carrier (Package 601)  
DE = 32 Lead Ceramic SOJ (Package 101) Evolutionary  
DR = 32 Lead Ceramic SOJ (Package 101) Revolutionary  
F = 36 Lead Ceramic Flat Pack (Package 226)  
FE = 32 Lead Ceramic Flat Pack (Package 220)

#### ACCESS TIME (ns)

#### IMPROVEMENT MARK

L = Low Power for 2V Data Retention

#### ORGANIZATION, 128K x 8

#### SRAM

#### MONOLITHIC

#### WHITE ELECTRONIC DESIGNS CORP.



| DEVICE TYPE              | SPEED | PACKAGE                | SMD No.          |
|--------------------------|-------|------------------------|------------------|
| 128K x 8 SRAM Monolithic | 55ns  | 32 lead SOJ Revol (DR) | 5962-96691 05HUX |
| 128K x 8 SRAM Monolithic | 45ns  | 32 lead SOJ Revol (DR) | 5962-96691 06HUX |
| 128K x 8 SRAM Monolithic | 35ns  | 32 lead SOJ Revol (DR) | 5962-96691 07HUX |
| 128K x 8 SRAM Monolithic | 25ns  | 32 lead SOJ Revol (DR) | 5962-96691 08HUX |
| 128K x 8 SRAM Monolithic | 20ns  | 32 lead SOJ Revol (DR) | 5962-96691 09HUX |
| 128K x 8 SRAM Monolithic | 17ns  | 32 lead SOJ Revol (DR) | 5962-96691 10HUX |
| 128K x 8 SRAM Monolithic | 15ns  | 32 lead SOJ Revol (DR) | 5962-96691 11HUX |
| 128K x 8 SRAM Monolithic | 55ns  | 32 lead SOJ Evol (DE)  | 5962-96691 05HTX |
| 128K x 8 SRAM Monolithic | 45ns  | 32 lead SOJ Evol (DE)  | 5962-96691 06HTX |
| 128K x 8 SRAM Monolithic | 35ns  | 32 lead SOJ Evol (DE)  | 5962-96691 07HTX |
| 128K x 8 SRAM Monolithic | 25ns  | 32 lead SOJ Evol (DE)  | 5962-96691 08HTX |
| 128K x 8 SRAM Monolithic | 20ns  | 32 lead SOJ Evol (DE)  | 5962-96691 09HTX |
| 128K x 8 SRAM Monolithic | 17ns  | 32 lead SOJ Evol (DE)  | 5962-96691 10HTX |
| 128K x 8 SRAM Monolithic | 15ns  | 32 lead SOJ Evol (DE)  | 5962-96691 11HTX |
| 128K x 8 SRAM Monolithic | 55ns  | 32 pin DIP (C)         | 5962-96691 05HYX |
| 128K x 8 SRAM Monolithic | 45ns  | 32 pin DIP (C)         | 5962-96691 06HYX |
| 128K x 8 SRAM Monolithic | 35ns  | 32 pin DIP (C)         | 5962-96691 07HYX |
| 128K x 8 SRAM Monolithic | 25ns  | 32 pin DIP (C)         | 5962-96691 08HYX |
| 128K x 8 SRAM Monolithic | 20ns  | 32 pin DIP (C)         | 5962-96691 09HYX |
| 128K x 8 SRAM Monolithic | 17ns  | 32 pin DIP (C)         | 5962-96691 10HYX |
| 128K x 8 SRAM Monolithic | 15ns  | 32 pin DIP (C)         | 5962-96691 11HYX |
| 128K x 8 SRAM Monolithic | 55ns  | 36 pin Flatpack (F)    | 5962-96691 05HXX |
| 128K x 8 SRAM Monolithic | 45ns  | 36 pin Flatpack (F)    | 5962-96691 06HXX |
| 128K x 8 SRAM Monolithic | 35ns  | 36 pin Flatpack (F)    | 5962-96691 07HXX |
| 128K x 8 SRAM Monolithic | 25ns  | 36 pin Flatpack (F)    | 5962-96691 08HXX |
| 128K x 8 SRAM Monolithic | 20ns  | 36 pin Flatpack (F)    | 5962-96691 09HXX |
| 128K x 8 SRAM Monolithic | 17ns  | 36 pin Flatpack (F)    | 5962-96691 10HXX |
| 128K x 8 SRAM Monolithic | 15ns  | 36 pin Flatpack (F)    | 5962-96691 11HXX |