



128Kx8 Monolithic SRAM, SMD 5962-89598

FEATURES

- Access Times of 15*, 17, 20, 25, 35, 45, 55ns
- Battery Back-up Operation
 - 2V Data Retention (EDI88130LPS)
- CS1#, CS2 & OE# Functions for Bus Control
- Inputs and Outputs Directly TTL Compatible
- Organized as 128Kx8
- Commercial, Industrial and Military Temperature Ranges
- Thru-hole and Surface Mount Packages JEDEC Pinout
 - 32 pin Sidebraced Ceramic DIP, 400 mil (Package 102)
 - 32 pin Sidebraced Ceramic DIP, 600 mil (Package 9)
 - 32 lead Ceramic SOJ (Package 140)
 - 32 pad Ceramic Quad LCC (Package 12)
 - 32 pad Ceramic LCC (Package 141)
 - 32 lead Ceramic Flatpack (Package 142)

- Single +5V (±10%) Supply Operation
The EDI88130CS is a high speed, high performance, 128Kx8 bits monolithic Static RAM.

An additional chip enable line provides system memory security during power down in non-battery backed up systems and memory banking in high speed battery backed systems where large multiple pages of memory are required.

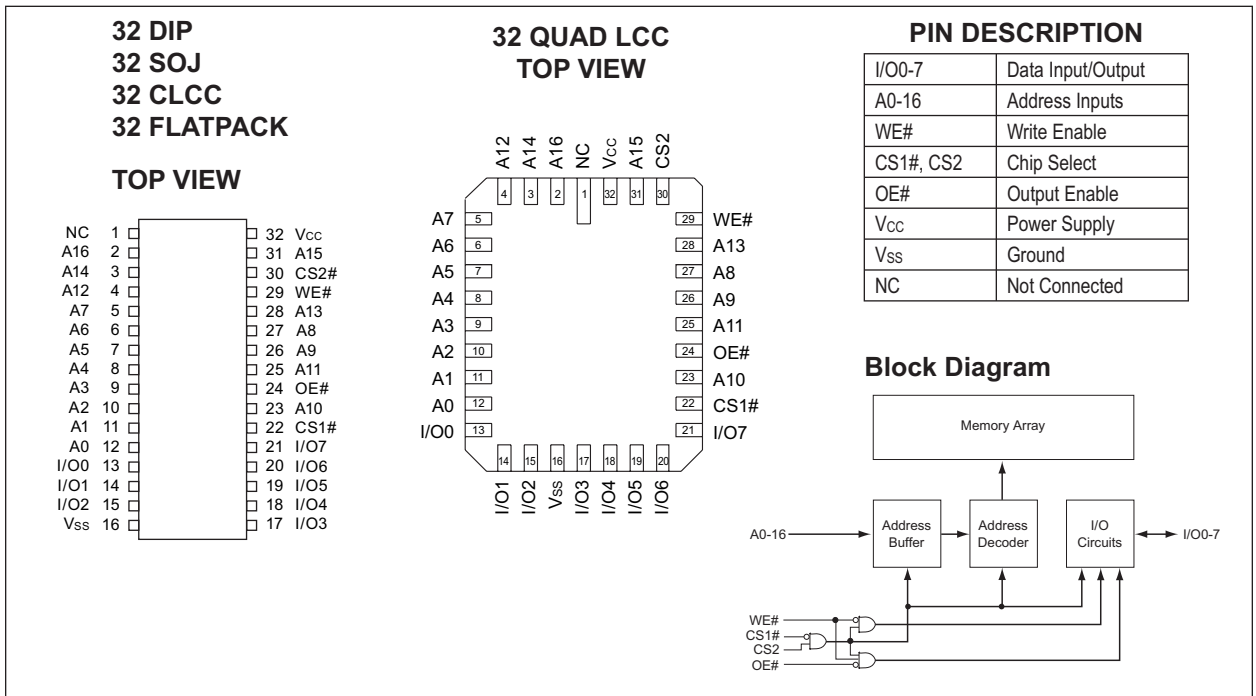
The EDI88130CS has eight bi-directional input-output lines to provide simultaneous access to all bits in a word.

A low power version, EDI88130LPS, offers a 2V data retention function for battery back-up applications.

Military product is available compliant to MIL-PRF-38535.

* 15ns access time is advanced information, contact factory for availability.

FIGURE 1 – PIN CONFIGURATION





ABSOLUTE MAXIMUM RATINGS

| Parameter | | Unit |
|--|-------------|------|
| Voltage on any pin relative to V _{SS} | -0.2 to 7.0 | V |
| Operating Temperature T _A (Ambient) | | |
| Industrial | -40 to +85 | °C |
| Military | -55 to +125 | °C |
| Storage Temperature, Ceramic | -65 to +150 | °C |
| Power Dissipation | 1.7 | W |
| Output Current | 40 | mA |
| Junction Temperature, T _J | 175 | °C |

NOTE:

Stress greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions greater than those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

TRUTH TABLE

| OE# | CS1# | CS2 | WE# | Mode | Output | Power |
|-----|------|-----|-----|-----------------|----------|-------------------------------------|
| X | H | X | X | Standby | High Z | I _{CC2} , I _{CC3} |
| X | X | L | X | Standby | High Z | I _{CC2} , I _{CC3} |
| H | L | H | H | Output Deselect | High Z | I _{CC1} |
| L | L | H | H | Read | Data Out | I _{CC1} |
| X | L | H | L | Write | Data In | I _{CC1} |

CAPACITANCE

T_A = +25°C

| Parameter | Symbol | Condition | Max | | Unit |
|---------------|----------------|---|-----|---------------------|------|
| | | | LCC | CSOJ, DIP, Flatpack | |
| Address Lines | C _I | V _{IN} = V _{CC} or V _{SS} , f = 1.0MHz | 6 | 12 | pF |
| Data Lines | C _O | V _{OUT} = V _{CC} or V _{SS} , f = 1.0MHz | 8 | 14 | pF |

These parameters are sampled, not 100% tested.

RECOMMENDED OPERATING CONDITIONS

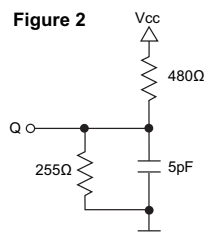
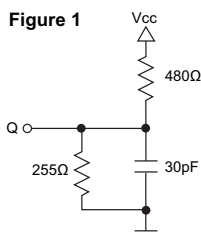
| Parameter | Symbol | Min | Typ | Max | Unit |
|--------------------|-----------------|------|-----|-----------------------|------|
| Supply Voltage | V _{CC} | 4.5 | 5.0 | 5.5 | V |
| Supply Voltage | V _{SS} | 0 | 0 | 0 | V |
| Input High Voltage | V _{IH} | 2.2 | — | V _{CC} + 0.5 | V |
| Input Low Voltage | V _{IL} | -0.5 | — | +0.8 | V |

DC CHARACTERISTICS

V_{CC} = 5.0V, -55°C ≤ T_A ≤ +125°C

| Parameter | Symbol | Conditions | Min | Typ | Max | Units | |
|------------------------------------|------------------|---|--------------|-----|-----|-------|----|
| Input Leakage Current | I _{LI} | V _{IN} = 0V to V _{CC} | — | — | ±5 | µA | |
| Output Leakage Current | I _{LO} | V _{I/O} = 0V to V _{CC} | — | — | ±10 | µA | |
| Operating Power Supply Current | I _{CC1} | WE#, CS1# = V _{IL} , I _{I/O} = 0mA, CS2 = V _{IH} | (15-17ns) | — | 300 | mA | |
| | | | (20ns) | — | 225 | mA | |
| | | | (25-55ns) | — | 200 | mA | |
| Standby (TTL) Power Supply Current | I _{CC2} | CS1# ≥ V _{IH} and/or CS2 ≤ V _{IL} , V _{IN} ≥ V _{IH} or ≤ V _{IL} | (17-55ns) | — | 25 | mA | |
| | | | (15ns) | — | 60 | mA | |
| Full Standby Power Supply Current | I _{CC3} | CS1# ≥ V _{CC} - 0.2V and/or CS2 ≤ 0.2V V _{IN} ≥ V _{CC} - 0.2V or V _{IN} ≤ 0.2V | CS (17-55ns) | — | 3 | 10 | mA |
| | | | CS (15ns) | — | — | 15 | mA |
| | | | LPS | — | — | 5 | mA |
| Output Low Voltage | V _{OL} | I _{OL} = 8.0mA | — | — | 0.4 | V | |
| Output High Voltage | V _{OH} | I _{OH} = -4.0mA | 2.4 | — | — | V | |

AC Test Conditions



| | |
|--------------------------------|-------------------------|
| Input Pulse Levels | V _{SS} to 3.0V |
| Input Rise and Fall Times | 5ns |
| Input and Output Timing Levels | 1.5V |
| Output Load | Figure 1 |

NOTE: For t_{EH0Z}, t_{GH0Z} and t_{WL0Z}, C_L = 5pF Figure 2



AC CHARACTERISTICS – READ CYCLE (15 to 20ns)

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

| Parameter | Symbol | | 15ns* | | 17ns | | 20ns | | Units |
|---------------------------------------|----------------------|------------------|-------|-----|------|-----|------|-----|-------|
| | JEDEC | Alt. | Min | Max | Min | Max | Min | Max | |
| Read Cycle Time | t _{AVAV} | t _{RC} | 15 | | 17 | | 20 | | ns |
| Address Access Time | t _{AVQV} | t _{AA} | | 15 | | 17 | | 20 | ns |
| Chip Enable Access Time | t _{E1LQV} | t _{ACS} | | 15 | | 17 | | 20 | ns |
| | t _{E2HQV} | t _{ACS} | | 15 | | 17 | | 20 | ns |
| Chip Enable to Output in Low Z (1) | t _{E1LQX} | t _{CLZ} | 5 | | 5 | | 5 | | ns |
| | t _{E2HQX} | t _{CLZ} | 5 | | 5 | | 5 | | ns |
| Chip Disable to Output in Low Z (1) | t _{E1HQZ} | t _{CHZ} | | 6 | | 7 | | 8 | ns |
| | t _{E2LQZ} | t _{CHZ} | | 6 | | 7 | | 8 | ns |
| Output Hold from Address Change | t _{AVQX} | t _{OH} | 3 | | 3 | | 3 | | ns |
| Output Enable to Output Valid | t _{GLQV} | t _{OE} | | 6 | | 6 | | 7 | ns |
| Output Enable to Output in Low Z (1) | t _{GLQX} | t _{OLZ} | 0 | | 0 | | 0 | | ns |
| Output Disable to Output in High Z(1) | t _{GHQZ} | t _{OHZ} | | 5 | | 6 | | 8 | ns |
| Chip Enable to Power Up (1) | t _{E1LICCH} | t _{PU} | 0 | | 0 | | 0 | | ns |
| | t _{E2HICCH} | t _{PU} | 0 | | 0 | | 0 | | ns |
| Chip Enable to Power Down (1) | t _{E1HICCL} | t _{PD} | | 15 | | 17 | | 20 | ns |
| | t _{E2LICCL} | t _{PD} | | 15 | | 17 | | 20 | ns |

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

* 15ns access time is advanced information, contact factory for availability.

AC CHARACTERISTICS – READ CYCLE (25 to 55ns)

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

| Parameter | Symbol | | 25ns | | 35ns | | 45ns | | 55ns | | Units |
|---------------------------------------|----------------------|------------------|------|-----|------|-----|------|-----|------|-----|-------|
| | JEDEC | Alt. | Min | Max | Min | Max | Min | Max | Min | Max | |
| Read Cycle Time | t _{AVAV} | t _{RC} | 25 | | 35 | | 45 | | 55 | | ns |
| Address Access Time | t _{AVQV} | t _{AA} | | 25 | | 35 | | 45 | | 55 | ns |
| Chip Enable Access Time | t _{E1LQV} | t _{ACS} | | 25 | | 35 | | 45 | | 55 | ns |
| Chip Enable Access Time | t _{E2HQV} | t _{ACS} | | 25 | | 35 | | 45 | | 55 | ns |
| Chip Enable to Output in Low Z (1) | t _{E1LQX} | t _{CLZ} | 5 | | 5 | | 5 | | 5 | | ns |
| | t _{E2HQX} | t _{CLZ} | 5 | | 5 | | 5 | | 5 | | ns |
| Chip Disable to Output in Low Z (1) | t _{E1HQZ} | t _{CHZ} | | 10 | | 15 | | 20 | | 20 | ns |
| | t _{E2LQZ} | t _{CHZ} | | 10 | | 15 | | 20 | | 20 | ns |
| Output Hold from Address Change | t _{AVQX} | t _{OH} | 0 | | 0 | | 0 | | 0 | | ns |
| Output Enable to Output Valid | t _{GLQV} | t _{OE} | | 10 | | 15 | | 20 | | 25 | ns |
| Output Enable to Output in Low Z (1) | t _{GLQX} | t _{OLZ} | 0 | | 0 | | 0 | | 0 | | ns |
| Output Disable to Output in High Z(1) | t _{GHQZ} | t _{OHZ} | | 10 | | 15 | | 20 | | 20 | ns |
| Chip Enable to Power Up (1) | t _{E1LICCH} | t _{PU} | 0 | | 0 | | 0 | | 0 | | ns |
| | t _{E2HICCH} | t _{PU} | 0 | | 0 | | 0 | | 0 | | ns |
| Chip Enable to Power Down (1) | t _{E1HICCL} | t _{PD} | | 25 | | 35 | | 45 | | 55 | ns |
| | t _{E2LICCL} | t _{PD} | | 25 | | 35 | | 45 | | 55 | ns |

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



AC CHARACTERISTICS – WRITE CYCLE (15 to 20ns)

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

| Parameter | Symbol | | 15ns* | | 17ns | | 20ns | | Units |
|-------------------------------------|---------------------|------------------|-------|-----|------|-----|------|-----|-------|
| | JEDEC | Alt. | Min | Max | Min | Max | Min | Max | |
| Write Cycle Time | t _{AVAV} | t _{WC} | 15 | | 17 | | 20 | | ns |
| Chip Enable to End of Write | t _{E1LWH} | t _{CW} | 12 | | 13 | | 15 | | ns |
| | t _{E1LE1H} | t _{CW} | 12 | | 13 | | 15 | | ns |
| | t _{E2HWH} | t _{CW} | 12 | | 13 | | 15 | | ns |
| | t _{E2HE2L} | t _{CW} | 12 | | 13 | | 15 | | ns |
| Address Setup Time | t _{AVWL} | t _{AS} | 0 | | 0 | | 0 | | ns |
| | t _{AVE1L} | t _{AS} | 0 | | 0 | | 0 | | ns |
| | t _{AVE2H} | t _{AS} | 0 | | 0 | | 0 | | ns |
| Address Valid to End of Write | t _{AVWH} | t _{AW} | 12 | | 13 | | 15 | | ns |
| Write Pulse Width | t _{WLWH} | t _{WP} | 12 | | 13 | | 15 | | ns |
| | t _{WLE1H} | t _{WP} | 12 | | 13 | | 15 | | ns |
| | t _{WLE2L} | t _{WP} | 12 | | 13 | | 15 | | ns |
| Write Recovery Time | t _{WHAX} | t _{WR} | 0 | | 0 | | 0 | | ns |
| | t _{E1HAX} | t _{WR} | 0 | | 0 | | 0 | | ns |
| | t _{E2LAX} | t _{WR} | 0 | | 0 | | 0 | | ns |
| Data Hold Time | t _{WHDX} | t _{DH} | 0 | | 0 | | 0 | | ns |
| | t _{E1HDX} | t _{DH} | 0 | | 0 | | 0 | | ns |
| | t _{E2LDX} | t _{DH} | 0 | | 0 | | 0 | | ns |
| Write to Output in High Z (1) | t _{WLQZ} | t _{WHZ} | 0 | 7 | 0 | 8 | 0 | 8 | ns |
| Data to Write Time | t _{DVWH} | t _{DW} | 7 | | 8 | | 10 | | ns |
| | t _{DVE1H} | t _{DW} | 7 | | 8 | | 10 | | ns |
| | t _{DVE2L} | t _{DW} | 7 | | 8 | | 10 | | ns |
| Output Active from End of Write (1) | t _{WHQX} | t _{WLZ} | 3 | | 3 | | 3 | | ns |

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

AC CHARACTERISTICS – WRITE CYCLE (25 to 55ns)

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

| Parameter | Symbol | | 25ns | | 35ns | | 45ns | | 55ns | | Units |
|-------------------------------------|---------------------|------------------|------|-----|------|-----|------|-----|------|-----|-------|
| | JEDEC | Alt. | Min | Max | Min | Max | Min | Max | Min | Max | |
| Write Cycle Time | t _{AVAV} | t _{WC} | 25 | | 35 | | 45 | | 55 | | ns |
| Chip Enable to End of Write | t _{E1LWH} | t _{CW} | 20 | | 25 | | 35 | | 45 | | ns |
| | t _{E1LE1H} | t _{CW} | | 16 | | 20 | | 25 | | 40 | ns |
| | t _{E2HWH} | t _{CW} | 16 | | 20 | | 25 | | 40 | | ns |
| | t _{E2HE2L} | t _{CW} | | 16 | | 20 | | 25 | | 40 | ns |
| Address Setup Time | t _{AVWL} | t _{AS} | 0 | | 0 | | 0 | | 0 | | ns |
| | t _{AVE1L} | t _{AS} | 0 | | 0 | | 0 | | 0 | | ns |
| | t _{AVE2H} | t _{AS} | 0 | | 0 | | 0 | | 0 | | ns |
| Address Valid to End of Write | t _{AVWH} | t _{AW} | 20 | | 25 | | 35 | | 45 | | ns |
| | t _{AVEH} | t _{AW} | 20 | | 25 | | 35 | | 45 | | ns |
| Write Pulse Width | t _{WLWH} | t _{WP} | 20 | | 30 | | 30 | | 35 | | ns |
| | t _{WLE1H} | t _{WP} | 20 | | 30 | | 30 | | 35 | | ns |
| | t _{WLE2L} | t _{WP} | 20 | | 30 | | 30 | | 35 | | ns |
| Write Recovery Time | t _{WHAX} | t _{WR} | 0 | | 0 | | 5 | | 5 | | ns |
| | t _{E1HAX} | t _{WR} | 0 | | 0 | | 5 | | 5 | | ns |
| | t _{E2LAX} | t _{WR} | 0 | | 0 | | 5 | | 5 | | ns |
| Data Hold Time | t _{WHDX} | t _{DH} | 0 | | 0 | | 0 | | 0 | | ns |
| | t _{E1HDX} | t _{DH} | 0 | | 0 | | 0 | | 0 | | ns |
| | t _{E2LDX} | t _{DH} | 0 | | 0 | | 0 | | 0 | | ns |
| Write to Output in High Z (1) | t _{WLQZ} | t _{WHZ} | 0 | 10 | 0 | 13 | 0 | 15 | 0 | 20 | ns |
| Data to Write Time | t _{DVWH} | t _{DW} | 15 | | 20 | | 20 | | 25 | | ns |
| | t _{DVE1H} | t _{DW} | 15 | | 20 | | 20 | | 25 | | ns |
| | t _{DVE2L} | t _{DW} | 15 | | 20 | | 20 | | 25 | | ns |
| Output Active from End of Write (1) | t _{WHQX} | t _{WLZ} | 3 | | 3 | | 3 | | 3 | | ns |

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

White Electronic Designs Corp. reserves the right to change products or specifications without notice.



FIGURE 2 – TIMING WAVEFORM - READ CYCLES

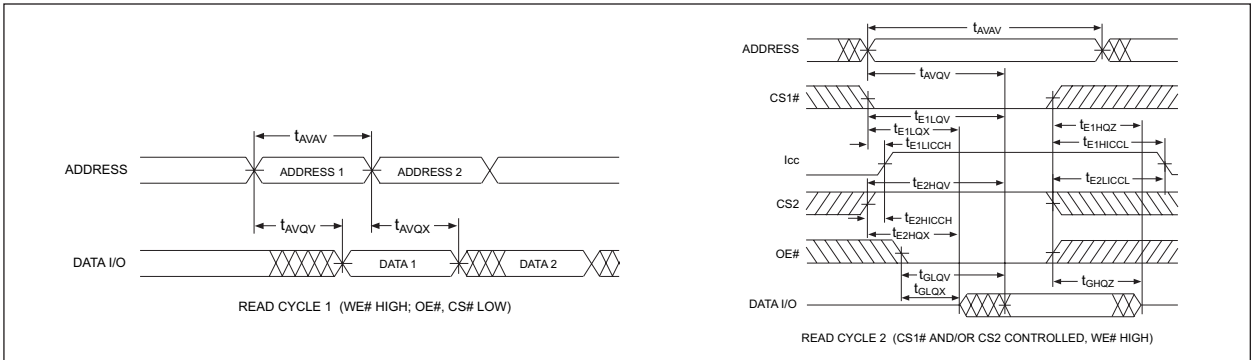


FIGURE 3 – WRITE CYCLE 1

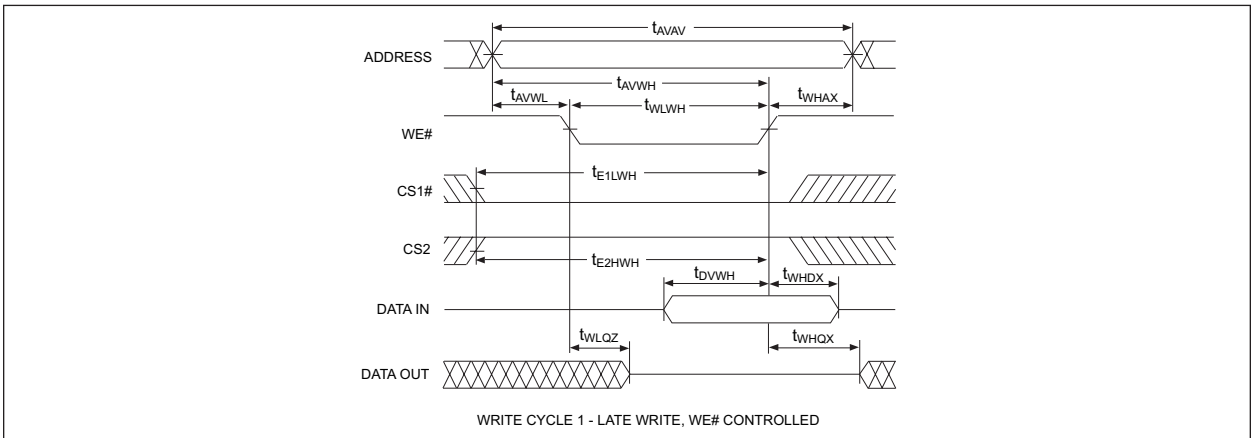
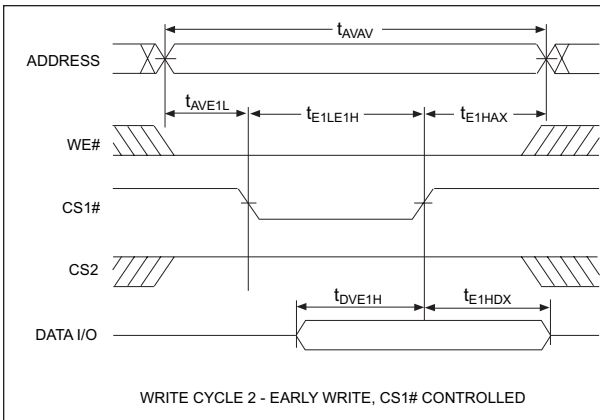
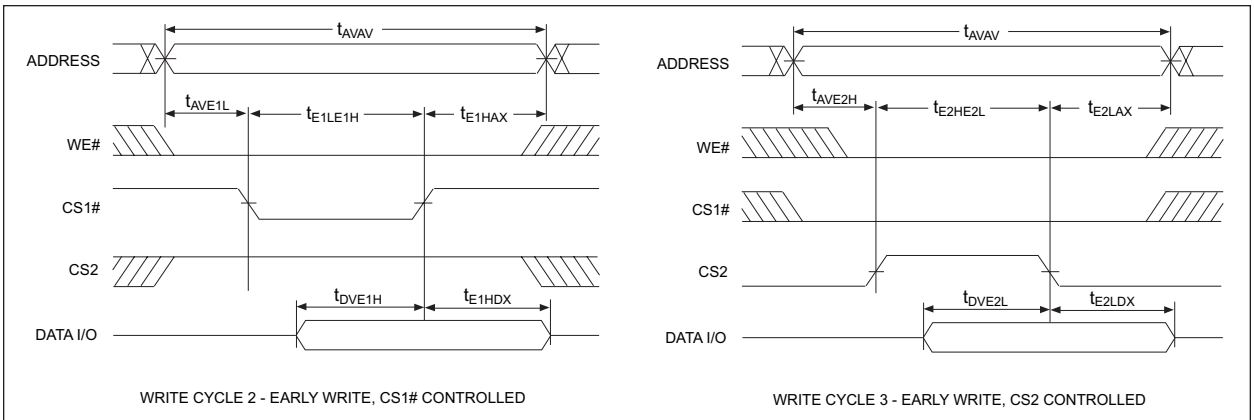
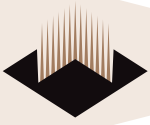


FIGURE 4 – WRITE CYCLES 2



WRITE CYCLES 3





DATA RETENTION CHARACTERISTICS (EDI88130LPS Only)

-55°C ≤ T_A ≤ +125°C

| Characteristic Low Power Version only | Sym | Conditions | Min | Typ | Max | Units |
|--|-------------------|---|---------------------|-----|-----|-------|
| Data Retention Voltage | V _{CC} | V _{CC} = 2.0V | 2 | – | – | V |
| Data Retention Quiescent Current | I _{CCDR} | CS1# ≥ V _{CC} - 0.2V and/or CS2 ≥ V _{SS} + 0.2V | – | 0.5 | 2 | mA |
| Chip Disable to Data Retention Time (1) | T _{CDR} | V _{IN} ≥ V _{CC} - 0.2V | 0 | – | – | ns |
| Operation Recovery Time (1) | T _R | or V _{IN} ≤ 0.2V | T _{avav} * | – | – | ns |

NOTE:

1. Parameter guaranteed by design, but not tested.

* Read Cycle Time

FIGURE 5 – DATA RETENTION - CS1# CONTROLLED

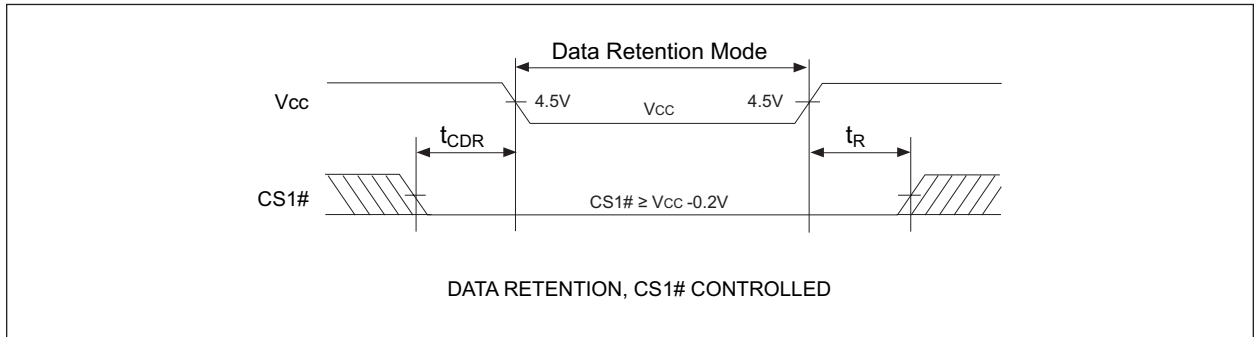
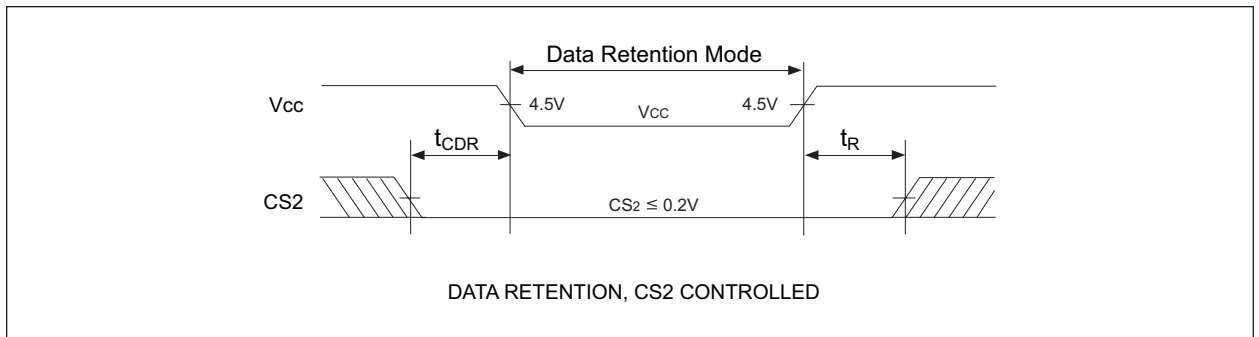
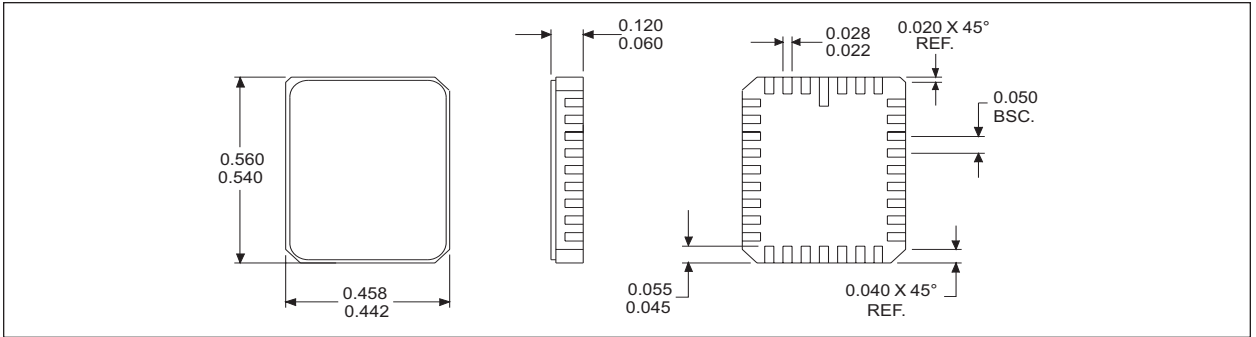


FIGURE 6 – DATA RETENTION - CS2 CONTROLLED



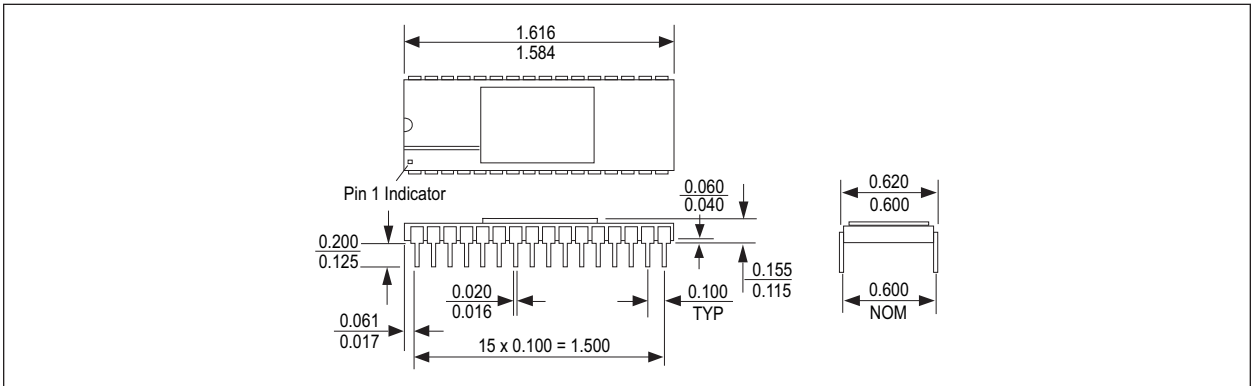


PACKAGE 12: 32 PIN CERAMIC QUAD LCC



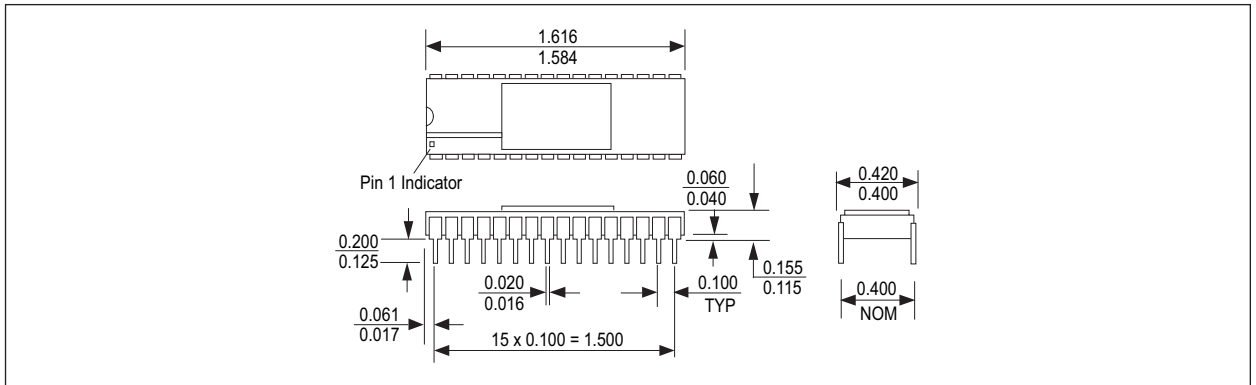
ALL DIMENSIONS ARE IN INCHES

PACKAGE 9: 32 PIN SIDEBRAZED CERAMIC DIP (600 MILS WIDE)



ALL DIMENSIONS ARE IN INCHES

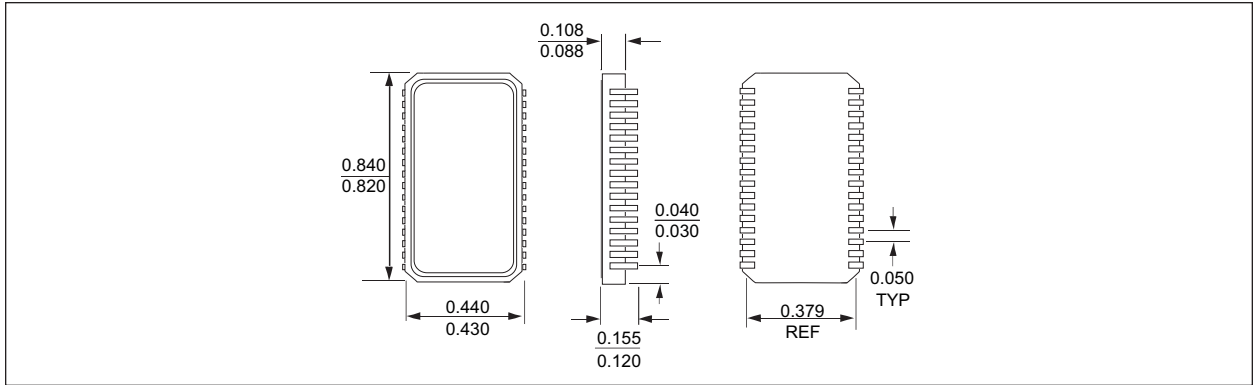
PACKAGE 102: 32 PIN SIDEBRAZED CERAMIC DIP (400 MILS WIDE)



ALL DIMENSIONS ARE IN INCHES

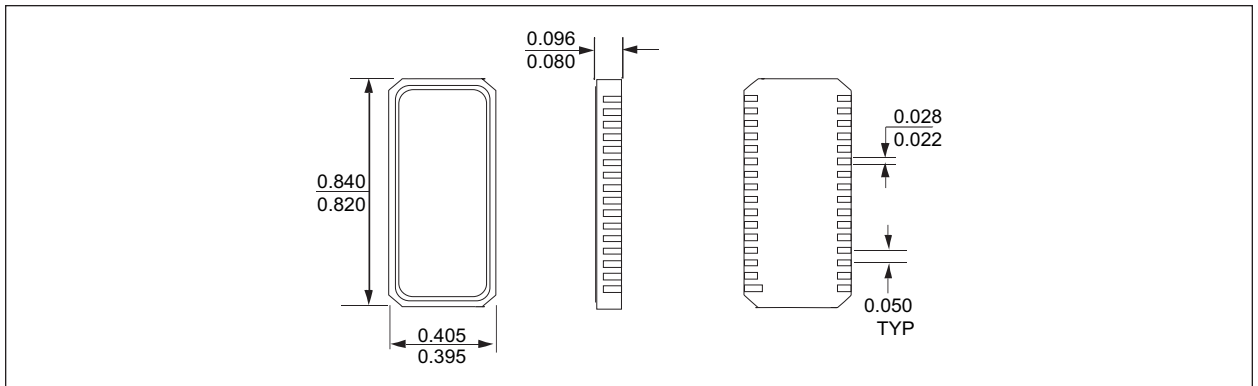


PACKAGE 140: 32 LEAD CERAMIC SOJ



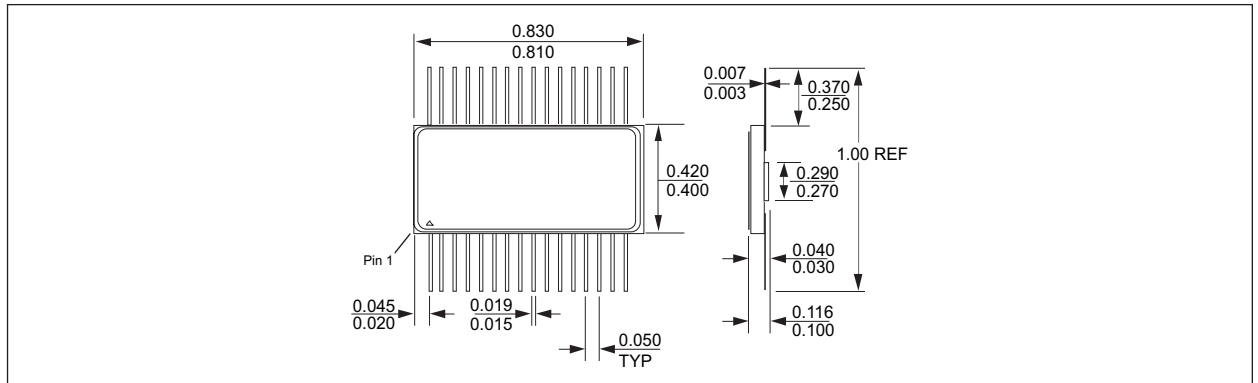
ALL DIMENSIONS ARE IN INCHES

PACKAGE 141: 32 PAD CERAMIC LCC



ALL DIMENSIONS ARE IN INCHES

PACKAGE 142: 32 PIN CERAMIC FLATPACK



ALL DIMENSIONS ARE IN INCHES



ORDERING INFORMATION

EDI 8 8 130 CS X X X

WHITE ELECTRONIC DESIGNS

SRAM

ORGANIZATION, 128Kx8

(130 = Dual CS)

TECHNOLOGY:

CS = CMOS Standard Power (5V)

LPS = Low Power

ACCESS TIME (ns)

PACKAGE TYPE:

C = 32 lead Sidebrazed DIP, 600 mil (Package 9)

F = 32 lead Ceramic Flatpack (Package 142)

L = 32 pad Ceramic LCC (Package 141)

L32 = 32 pad Ceramic Quad LCC (Package 12)

N = 32 lead Ceramic SOJ (Package 140)

T = 32 lead Sidebrazed DIP, 400 mil (Package 102)

DEVICE GRADE:

B = MIL-STD-883 Compliant

M = Military Screened -55°C to +125°C

I = Industrial -40°C to +85°C

C = Commercial 0°C to +70°C