



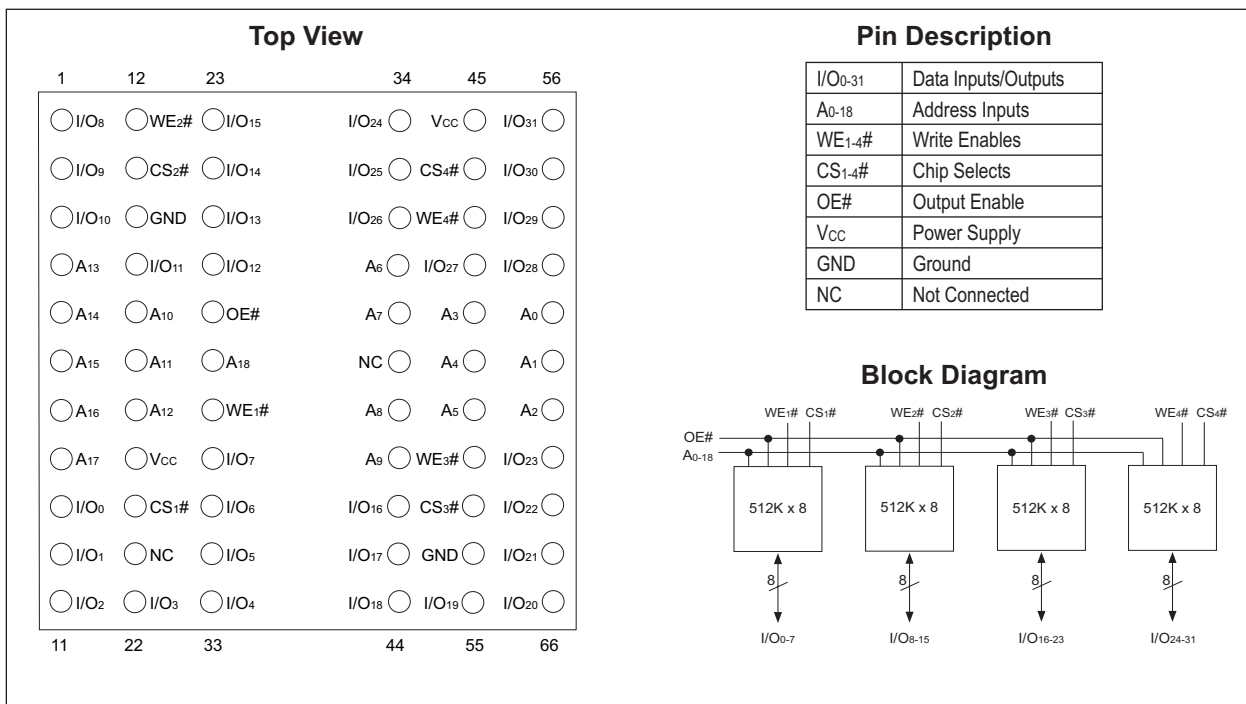
512Kx32 SRAM 3.3V MULTICHIP PACKAGE

FEATURES

- Access Times of 15, 17, 20ns
- Low Voltage Operation
- Packaging
 - 66-pin, PGA Type, 1.075 inch square, Hermetic Ceramic HIP (Package 400)
 - 68 lead, 22.4mm (0.880 inch) CQFP, (G2U), 3.56mm (0.140"), (Package 510)
- Organized as 512Kx32; User Configurable as 2x512Kx16 or 4x512Kx8
- Commercial, Industrial and Military Temperature Ranges
- Low Voltage Operation:
 - 3.3V ± 10% Power Supply
- Low Power CMOS
- TTL Compatible Inputs and Outputs
- Fully Static Operation:
 - No clock or refresh required.
- Three State Output.
- Built-in Decoupling Caps and Multiple Ground Pins for Low Noise Operation
- Weight
 - WS512K32V-XG2UX - 8 grams typical
 - WS512K32NV-XH1X - 13 grams typical

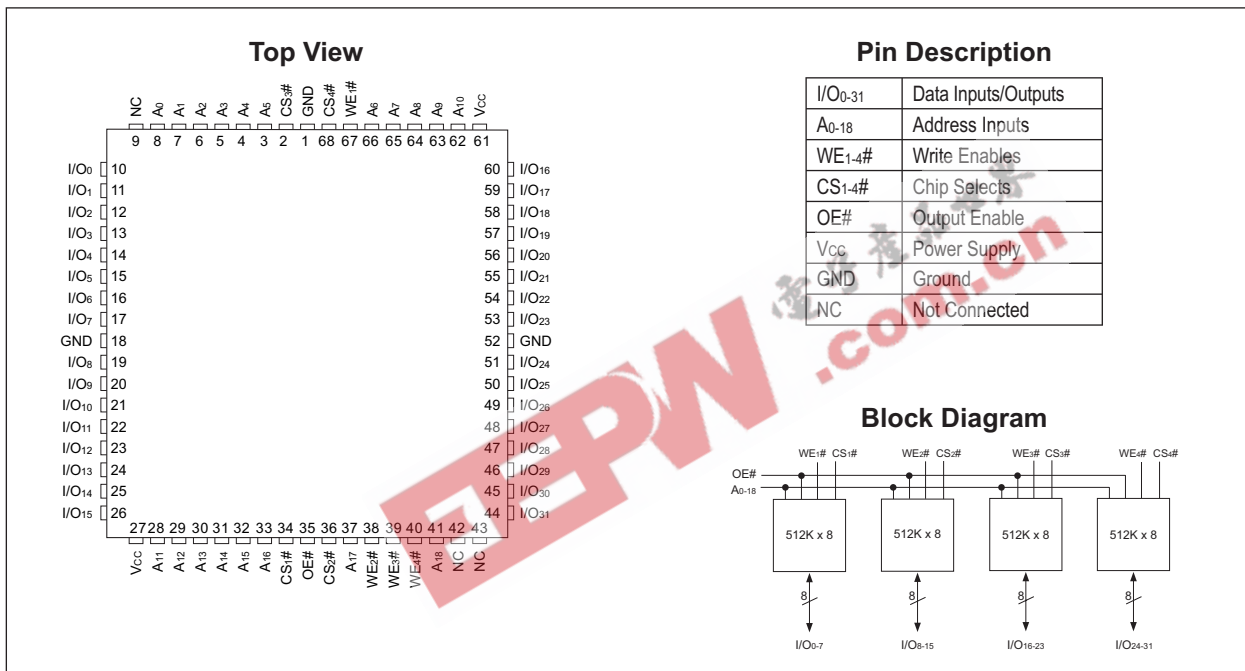
* This product is subject to change without notice.

PIN CONFIGURATION FOR WS512K32NV-XH1X





PIN CONFIGURATION FOR WS512K32V-XG2UX





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 | 4.6 | V |
| Junction Temperature | T _J | | 150 | °C |
| Supply Voltage | V _{CC} | -0.5 | 4.6 | 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} | 3.0 | 3.6 | V |
| Input High Voltage | V _{IH} | 2.2 | V _{CC} + 0.3 | V |
| Input Low Voltage | V _{IL} | -0.3 | +0.8 | V |

CAPACITANCE

T_A = +25°C

| Parameter | Symbol | Conditions | Max | Unit |
|---|------------------|------------------------------------|-----|------|
| OE# capacitance | C _{OE} | V _{IN} = 0V, f = 1.0 MHz | 50 | pF |
| WE1-4# capacitance HIP (PGA) CQFP G2U | C _{WE} | V _{IN} = 0V, f = 1.0 MHz | 20 | pF |
| CS1-4# capacitance | C _{CS} | V _{IN} = 0V, f = 1.0 MHz | 20 | pF |
| Data# I/O capacitance | C _{I/O} | V _{I/O} = 0V, f = 1.0 MHz | 20 | pF |
| Address input capacitance | C _{AD} | V _{IN} = 0V, f = 1.0 MHz | 50 | pF |

This parameter is guaranteed by design but not tested.

DC CHARACTERISTICS

V_{CC} = 3.3V ± 0.3V, V_{SS} = 0V, -55°C ≤ T_A ≤ +125°C

| Parameter | Sym | Conditions | | | Units |
|--------------------------|----------------------|---|-----|-----|-------|
| | | | Min | Max | |
| Input Leakage Current | I _{LI} | 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 x 32} | CS# = V _{IL} , OE# = V _{IH} , f = 5MHz, V _{CC} = 3.6 | | 400 | mA |
| Standby Current | I _{SB} | CS# = V _{IH} , OE# = V _{IH} , f = 5MHz, V _{CC} = 3.6 | | 200 | mA |
| Output Low Voltage | V _{OL} | I _{OL} = 4.0mA | | 0.4 | V |
| Output High Voltage | V _{OH} | I _{OH} = -4.0mA | 2.4 | | V |

NOTE: DC test conditions: V_{IH} = V_{CC} - 0.3V, V_{IL} = 0.3V.
Contact factory for low power option.



AC CHARACTERISTICS

$V_{CC} = 3.3V, GND = 0V, -55^{\circ}C \leq T_A \leq +125^{\circ}C$

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

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

AC CHARACTERISTICS

$V_{CC} = 3.3V, GND = 0V, -55^{\circ}C \leq T_A \leq +125^{\circ}C$

| Parameter | Symbol | -15 | | -17 | | -20 | | Units |
|----------------------------------|-------------------------------|-----|-----|-----|-----|-----|-----|-------|
| | | Min | Max | Min | Max | Min | Max | |
| Write Cycle Time | t _{WC} | 15 | | 17 | | 20 | | ns |
| Chip Select to End of Write | t _{CW} | 12 | | 12 | | 14 | | ns |
| Address Valid to End of Write | t _{AW} | 12 | | 12 | | 14 | | ns |
| Data Valid to End of Write | t _{DW} | 9 | | 9 | | 10 | | ns |
| Write Pulse Width | t _{WP} | 12 | | 14 | | 14 | | ns |
| Address Setup Time | t _{AS} | 0 | | 0 | | 0 | | ns |
| Address Hold Time | t _{AH} | 0 | | 0 | | 0 | | ns |
| Output Active from End of Write | t _{OW} ¹ | 2 | | 3 | | 3 | | ns |
| Write Enable to Output in High Z | t _{WHZ} ¹ | | 8 | | 8 | | 9 | ns |
| Data Hold Time | t _{DH} | 0 | | 0 | | 0 | | ns |

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

AC TEST CIRCUIT

The diagram shows a Device Under Test (D.U.T.) connected to a bipolar supply with a voltage $V_z = 1.5V$. The supply is connected to the D.U.T. through a capacitor with $C_{eff} = 50\text{ pf}$. Two current sources are connected to the D.U.T. outputs, labeled I_{OL} and I_{OH} .

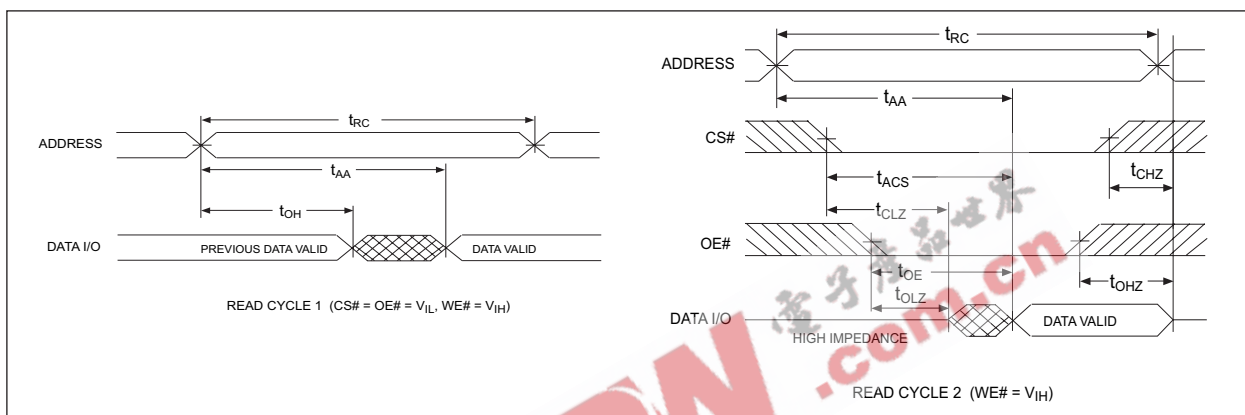
AC Test Conditions

| Parameter | Typ | Unit |
|----------------------------------|----------------------------|------|
| Input Pulse Levels | $V_{IL} = 0, V_{IH} = 2.5$ | V |
| Input Rise and Fall | 5 | ns |
| Input and Output Reference Level | 1.5 | V |
| Output Timing Reference Level | 1.5 | V |

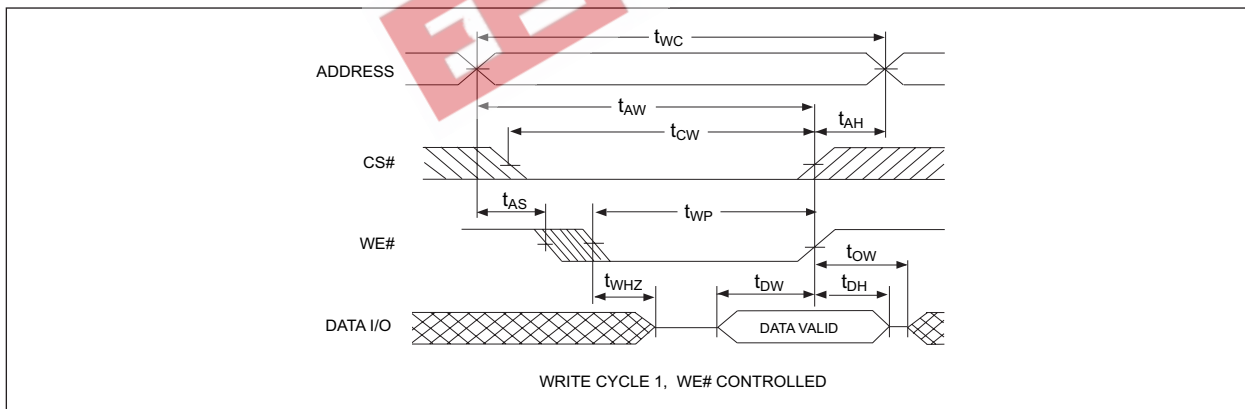
Notes:
 V_z is programmable from -2V to +7V.
 I_{OL} & I_{OH} programmable from 0 to 16mA.
Tester Impedance $Z_0 = 75\ \Omega$.
 V_z is typically the midpoint of V_{OH} and V_{OL} .
 I_{OL} & I_{OH} are adjusted to simulate a typical resistive load circuit.
ATE tester includes jig capacitance.



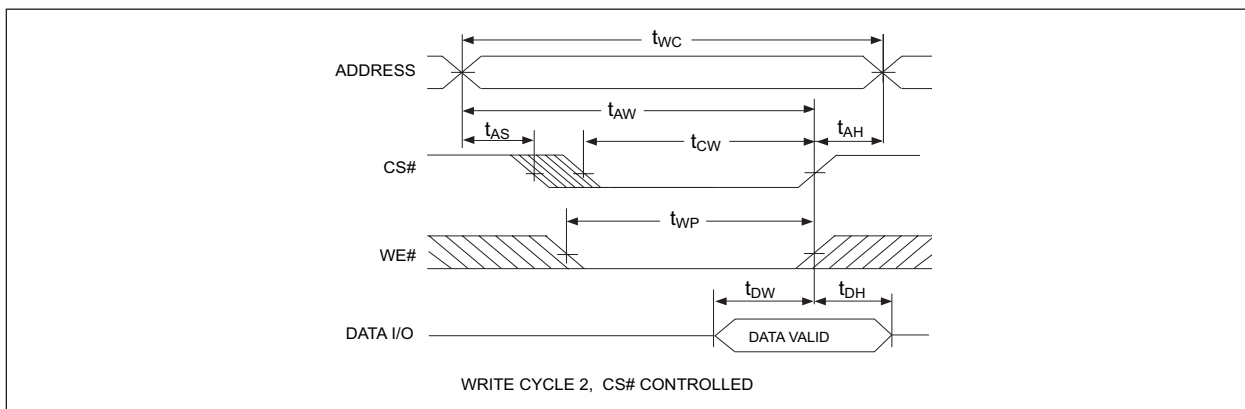
TIMING WAVEFORM - READ CYCLE



WRITE CYCLE - WE# CONTROLLED

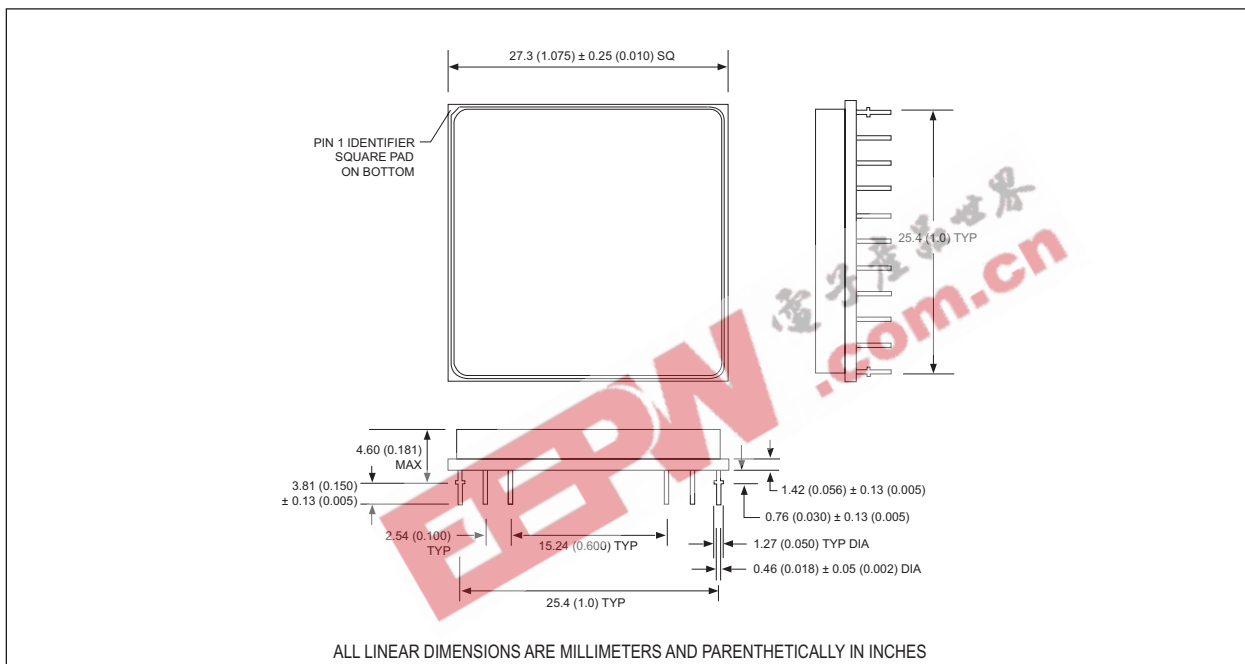


WRITE CYCLE - CS# CONTROLLED

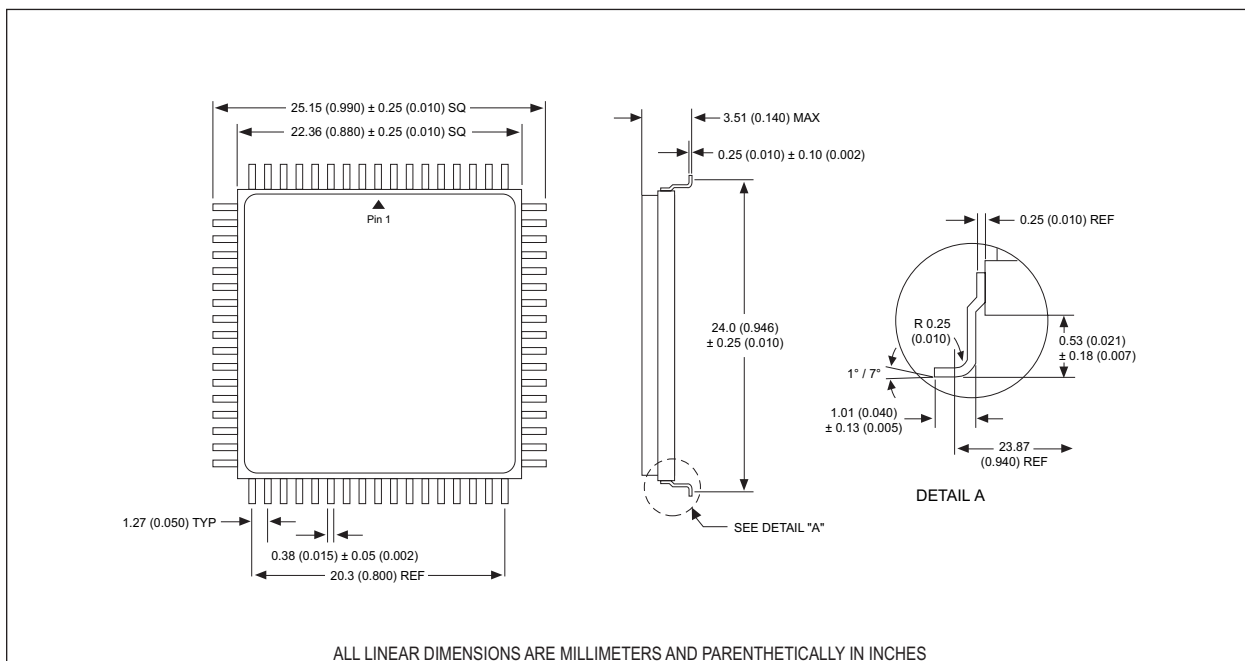




PACKAGE 400: 66 PIN, PGA TYPE, CERAMIC HEX-IN-LINE PACKAGE, HIP (H1)



PACKAGE 510: 68 LEAD, LOW PROFILE CERAMIC QUAD FLAT PACK, CQFP (G2U)





ORDERING INFORMATION

| | | | | | | | | |
|---|----------|----------|---------------|----------|--------------|----------|----------|----------|
| | W | S | 512K32 | X | V-XXX | X | X | X |
| WHITE ELECTRONIC DESIGNS CORP. _____ | | | | | | | | |
| SRAM _____ | | | | | | | | |
| ORGANIZATION, 512Kx32 _____ User configurable as 2x512Kx16 or 4x512Kx8 | | | | | | | | |
| IMPROVEMENT MARK: _____ N = No Connect at pin 21 and 39 in HIP for Upgrades (H1 only) | | | | | | | | |
| Low Voltage Supply 3.3V ± 10% _____ | | | | | | | | |
| ACCESS TIME (ns) _____ | | | | | | | | |
| PACKAGE TYPE: _____ H1 = 1.075" sq. Ceramic Hex In Line Package, HIP (Package 400) G2U = 22.4mm Ceramic Quad Flat Pack, CQFP (Package 510) | | | | | | | | |
| DEVICE GRADE: _____ M = Military -55°C to +125°C I = Industrial -40°C to +85°C C = Commercial 0°C to +70°C | | | | | | | | |
| LEAD FINISH: _____ Blank = Gold plated leads A = Solder dip leads | | | | | | | | |