



1Mx32 5V Flash Module

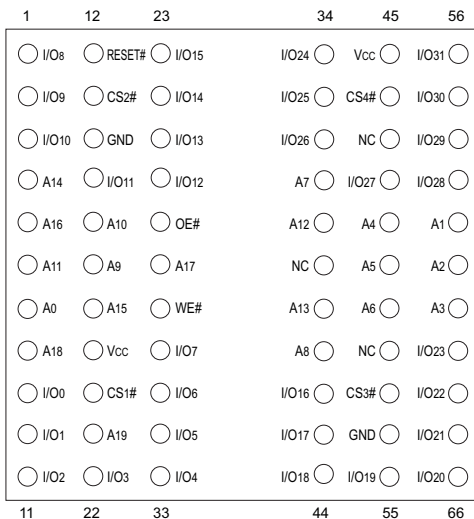
FEATURES

- Access Times of 70, 90, 120ns
- Packaging:
 - 66 pin, PGA Type, 1.185" square, Hermetic Ceramic HIP (Package 401)
 - 68 lead, 22mm Low Profile CQFP, 4.6mm (0.180"), (Package 509)
- Sector Architecture
 - One 16KByte Sectors
 - Two 8KByte Sectors
 - One 32KByte Sectors
 - Fifteen 64KByte Sectors
- 1,000,000 Erase/Program Cycles
- Organized as 1Mx32, user configurable as 2Mx16 or 4Mx8.
- Commercial, Industrial and Military Temperature Ranges
- 5V ± 10% for Read and Write Operations.
- Low Power CMOS
- Embedded Erase and Program Algorithm
- Built-in Decoupling Caps and Multiple Ground Pins for Low Noise Operation
- Weight
 - WEDF1M32B-XG2TX5 - 8 grams typical
 - WEDF1M32B-XHX5 - 13 grams typical

* This product is under development, is not qualified or characterized and is subject to change or cancellation without notice.

PIN CONFIGURATION FOR WF1M32B-XHX5

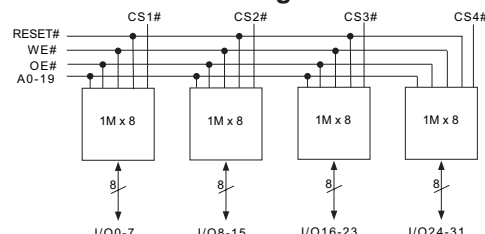
Top View

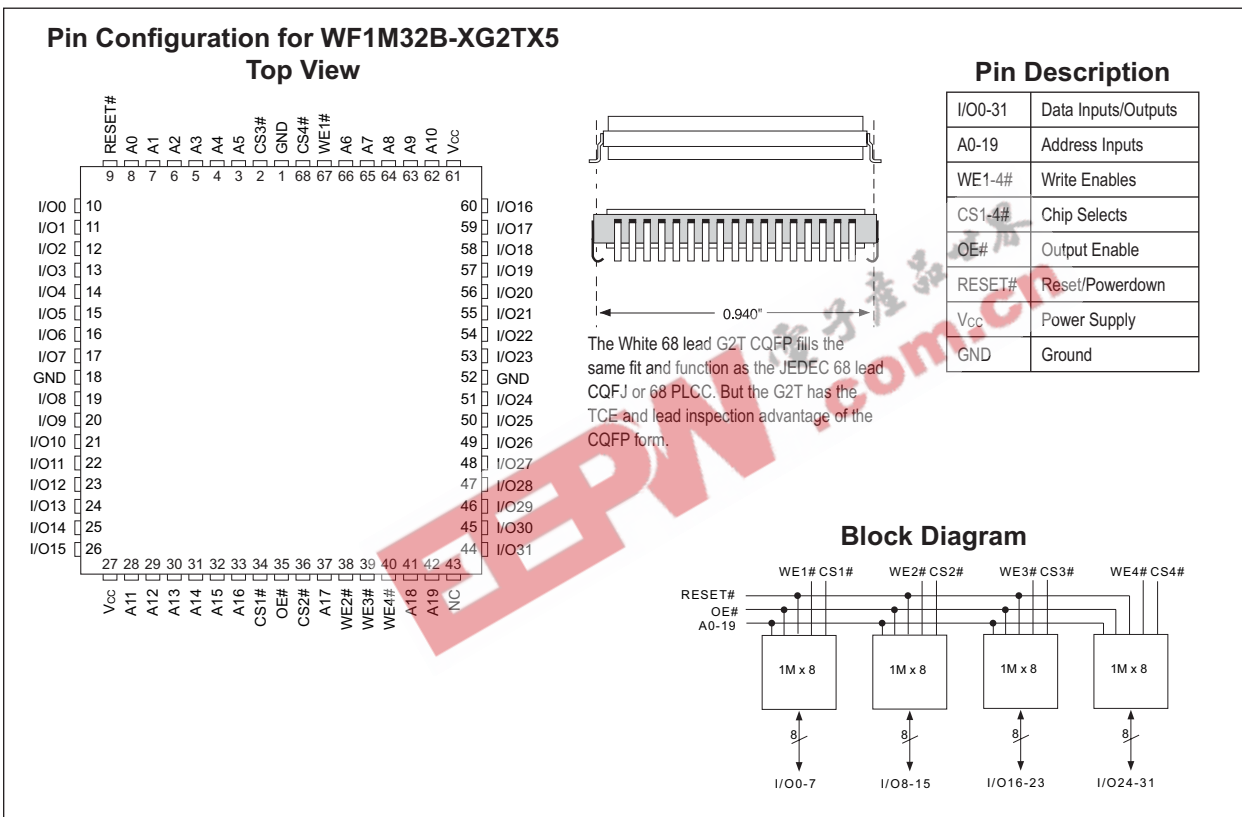


PIN DESCRIPTION

| | |
|---------|---------------------|
| I/O0-31 | Data Inputs/Outputs |
| A0-19 | Address Inputs |
| WE# | Write Enable |
| CS1-4# | Chip Selects |
| OE# | Output Enable |
| RESET# | Reset |
| Vcc | Power Supply |
| GND | Ground |
| NC | Not Connected |

Block Diagram







ABSOLUTE MAXIMUM RATINGS

| Parameter | | Unit |
|--|-----------------|------|
| Voltage on Any Pin with Respect to GND – V_{CC} and V_{PP} | -0.5 to +7.0 | V |
| Voltage with Respect to GND – A9, OE#, and RESET (2) | -2.0 to +12.5 V | V |
| Voltage with Respect to GND – All other pins (1) | -2.0 to +7.0 V | V |
| Output Short Circuit Current | 200 | mA |

NOTES:

1. Minimum DC voltage is -0.5V on input/output pins. During transitions, this level may undershoot to -2.0V for periods <20ns. Maximum DC voltage on input/output pins is $V_{CC} + 0.5V$ which, during transitions, may overshoot to $V_{CC} + 2.0V$ for periods <20ns.
2. Minimum DC input voltage on pins A9, OE#, and RESET is -0.5V. During voltage transitions, A9, OE#, and RESET may undershoot V_{SS} to -2.0V for periods of up to 20ns. See Figure 6. Maximum DC input voltage on pin A9 is +12.5V which may overshoot to +13.5V for periods up to 20ns.
3. Output shorted for no more than one second. No more than one output shorted at a time.

Stresses above 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 above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

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 |

CAPACITANCE

$T_A = +25^\circ C$

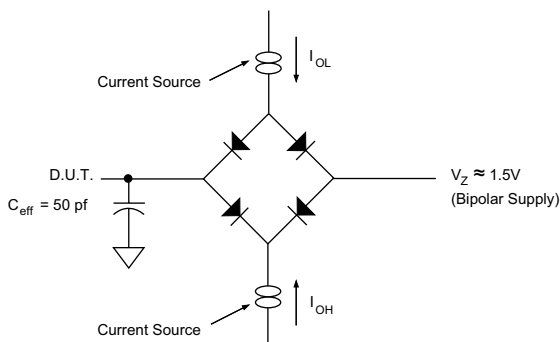
| Parameter | Symbol | Conditions | Max | Unit |
|---------------------------|-----------|------------------------------|-----|------|
| OE# capacitance | C_{OE} | $V_{IN} = 0 V, f = 1.0 MHz$ | 50 | pF |
| WE#1-4 capacitance | C_{WE} | $V_{IN} = 0 V, f = 1.0 MHz$ | 20 | pF |
| CS1-4 capacitance | C_{CS} | $V_{IN} = 0 V, f = 1.0 MHz$ | 20 | pF |
| Data I/O capacitance | $C_{I/O}$ | $V_{I/O} = 0 V, f = 1.0 MHz$ | 20 | pF |
| Address input capacitance | C_{AD} | $V_{IN} = 0 V, f = 1.0 MHz$ | 50 | pF |

This parameter is guaranteed by design but not tested.

DATA RETENTION

| Parameter | Test Conditions | Min | Unit |
|----------------------|-----------------|-----|-------|
| Minimum Pattern Data | 150°C | 10 | Years |
| Retention Time | 125°C | 20 | Years |

AC TEST CIRCUIT



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.



DC CHARACTERISTICS – CMOS COMPATIBLE

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

| Parameter | Symbol | Conditions | Min | Max | Unit |
|--|------------------|--|-----|------|------|
| Input Leakage Current | I _{LI} | V _{IN} = V _{CC} to GND | | 10 | μA |
| Output Leakage Current | I _{LO} | V _{OUT} = V _{CC} to GND | | 10 | μA |
| V _{CC} Read Current (1, 2) | I _{CC1} | CS# = V _{IL} , OE# = V _{IH} , f = 5MHz, I _{OUT} = 0mA | | 160 | mA |
| V _{CC} Write Current (2, 3, 4) | I _{CC2} | CS# = V _{IL} , OE# = V _{IH} | | 200 | mA |
| V _{CC} Standby Current (2, 5) | I _{CC3} | CS# = RESET# = OE# = CS = V _{IH} , f = 5MHz | | 20.0 | μA |
| Output Low Voltage | V _{OL} | V _{CC} = 4.5, I _{OL} = 5.8 mA | | 0.45 | V |
| Output High Voltage | V _{OH} | V _{CC} = 4.5, I _{OH} = -2.5 mA | 2.4 | | V |
| Low V _{CC} Lock-Out Voltage (4) | V _{LKO} | | 3.2 | 4.2 | V |

NOTES:

1. The I_{CC} current listed is typically less than 2mA/MHz, with OE# at V_{IH}.
2. Maximum I_{CC} specifications are tested with V_{CC} = V_{CC} max
3. I_{CC} active while Embedded Erase or Embedded Program is in progress.
4. Not 100% tested.
5. I_{CC3} = 20μA max at extended temperature (> +85°C).

AC CHARACTERISTICS – WRITE/ERASE/PROGRAM OPERATIONS – CS# CONTROLLED

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

| Parameter | Symbol | | -70 | | -90 | | -120 | | Unit |
|-------------------------------|--------------------|------------------|-----|-----|-----|-----|------|-----|------|
| | | | Min | Max | Min | Max | Min | Max | |
| Write Cycle Time | t _{AVAV} | t _{WC} | 70 | | 90 | | 120 | | ns |
| Chip Select Setup Time | t _{ELWL} | t _{CS} | 0 | | 0 | | 0 | | ns |
| Write Enable Pulse Width | t _{WLWH} | t _{WP} | 345 | | 45 | | 50 | | ns |
| Address Setup Time | t _{AWWH} | t _{AS} | 0 | | 0 | | 0 | | ns |
| Data Setup Time | t _{DVWH} | t _{DS} | 35 | | 45 | | 50 | | ns |
| Data Hold Time | t _{WHDX} | t _{DH} | 0 | | 0 | | 0 | | ns |
| Address Hold Time | t _{WLAX} | t _{AH} | 45 | | 45 | | 50 | | ns |
| Chip Select Hold Time | t _{WHEH} | t _{CH} | 0 | | 0 | | 0 | | ns |
| Write Enable Pulse Width High | t _{WHWL} | t _{WPH} | 20 | | 20 | | 20 | | NS |
| Programming Operation (2) | t _{WHWH1} | | | 300 | | 300 | | 300 | μs |
| Sector Erase Operation (3) | t _{WHWH2} | | | 8 | | 8 | | 8 | sec |
| Write Recovery before Read | t _{WHECL} | | 0 | | 0 | | 0 | | μs |
| Chip Programming Time | | | | 50 | | 50 | | 50 | sec |

NOTES:

1. Guaranteed by design, not tested.
2. Typical value for t_{WHWH1} is 7μs.
3. Typical value for t_{WHWH2} is 1sec.



AC CHARACTERISTICS – WRITE OPERATIONS – CS# CONTROLLED⁽¹⁾

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

| Parameter | Symbol | | -70 | | -90 | | -120 | | Unit |
|------------------------------|--------------------|------------------|-----|-----|-----|-----|------|-----|------|
| | | | Min | Max | Min | Max | Min | Max | |
| Write Enable Cycle Time | t _{WAV} | t _{WC} | 70 | | 90 | | 120 | | ns |
| Write Enable Setup Time | t _{WLEL} | t _{WS} | 0 | | 0 | | 0 | | ns |
| Chip Select Pulse Width | t _{LEH} | t _{CP} | 35 | | 45 | | 50 | | ns |
| Address Setup Time | t _{AVEH} | t _{AS} | 0 | | 0 | | 0 | | ns |
| Data Setup Time | t _{DVEH} | t _{DS} | 30 | | 45 | | 50 | | ns |
| Data Hold Time | t _{EDX} | t _{DH} | 0 | | 0 | | 0 | | ns |
| Address Hold Time | t _{EHAX} | t _{AH} | 45 | | 45 | | 50 | | ns |
| Write Enable Hold Time | t _{EHWH} | t _{WH} | 0 | | 0 | | 0 | | ns |
| Chip Select Pulse Width High | t _{EHEL} | t _{EPH} | 20 | | 20 | | 20 | | μs |
| Programming Operation (1) | t _{WHWH1} | | | 300 | | 300 | | 300 | sec |
| Sector Erase Operation (2) | t _{WHWH2} | | | 8 | | 8 | | 8 | μs |
| Write Recovery before Read | t _{EHCL} | | 0 | | 0 | | 0 | | μs |

NOTES:

1. Typical value for t_{WHWH1} is 7μs.
2. Typical value for t_{WHWH2} is 1sec.

AC CHARACTERISTICS – READ-ONLY OPERATIONS

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

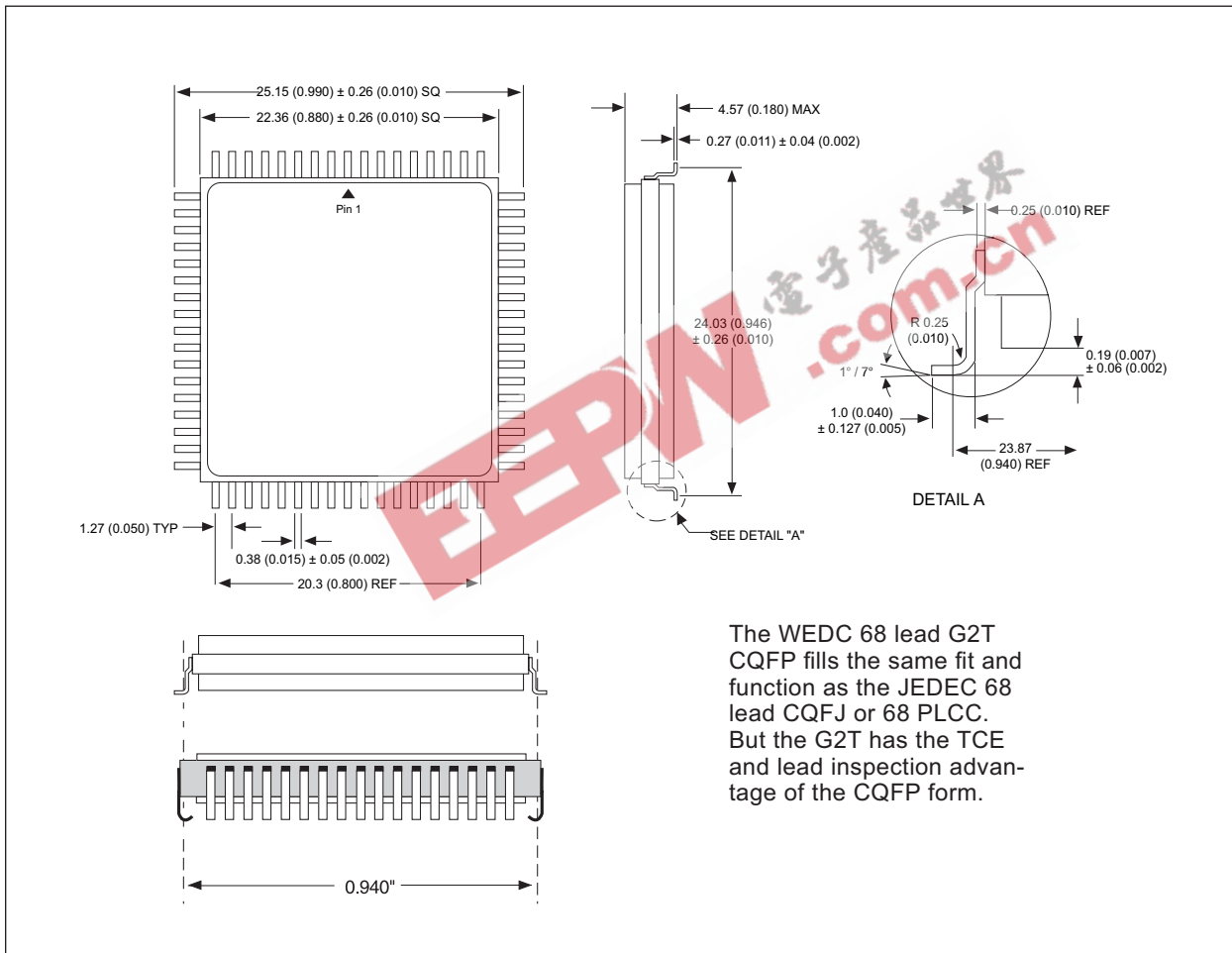
| Parameter | Symbol | | -70 | | -90 | | -120 | | Unit |
|---|-------------------|------------------|-----|-----|-----|-----|------|-----|------|
| | | | Min | Max | Min | Max | Min | Max | |
| Read Cycle Time | t _{WAV} | t _{RC} | 70 | | 90 | | 120 | | ns |
| Address Access Time | t _{AVQV} | t _{ACC} | | 70 | | 90 | | 120 | ns |
| Chip Select to Output Valid (1) | t _{ELQV} | t _{CE} | | 70 | | 90 | | 120 | ns |
| Output Enable to Output Valid (1) | t _{GLQV} | t _{OE} | | 30 | | 35 | | 50 | ns |
| Chip Select to Output Low Z (2) | t _{ELQX} | t _{LZ} | 0 | | 0 | | 0 | | ns |
| Chip Select High to Output High Z (2) | t _{EHQZ} | t _{HZ} | | 20 | | 20 | | 50 | ns |
| Output Enable to Output Low Z (2) | t _{GLQX} | t _{OLZ} | 0 | | 0 | | 0 | | ns |
| Output Enable High to Output High Z (2) | t _{GHQZ} | t _{DF} | | 20 | | 20 | | 30 | ns |
| Output Hold from Addresses, CS# or OE# Change, Whichever is First (2) | | t _{OH} | 0 | | 0 | | 0 | | ns |

NOTES:

1. OE# may be delayed up to t_{CE-tOE} after the falling edge of CS# without impact on t_{CS}.
2. Guaranteed by design, not tested.



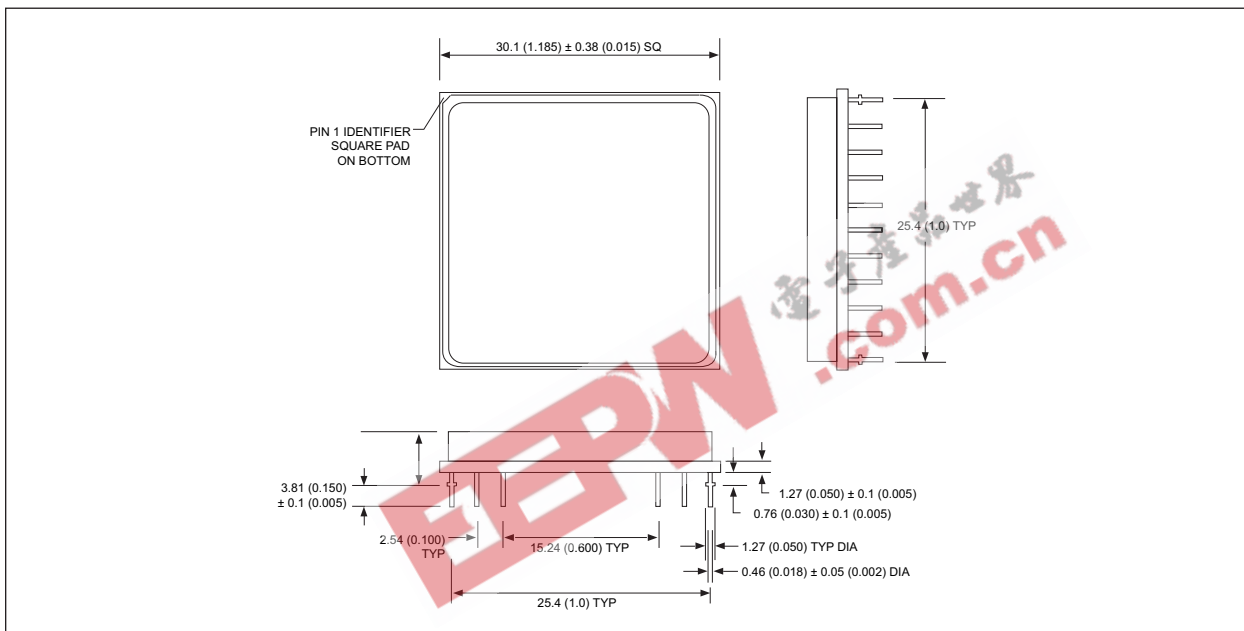
PACKAGE 509: 68 LEAD, CERAMIC QUAD FLAT PACK, CQFP (G2T)



ALL LINEAR DIMENSIONS ARE MILLIMETERS AND PARENTHETICALLY IN INCHES



PACKAGE 401: 66 PIN, PGA TYPE, CERAMIC HEX-IN-LINE PACKAGE, HIP (H)



ALL LINEAR DIMENSIONS ARE MILLIMETERS AND PARENTHETICALLY IN INCHES



ORDERING INFORMATION

