

FEATURES

- Bit organization
 - 4M x 8 (byte mode)
 - 2M x 16 (word mode)
- Fast access time
 - Random access:90ns(max.)
- Current
 - Operating:16mA
 - Standby:5uA
- Supply voltage
 - 2.7V ~ 3.6V
- Package
 - 48 ball mini BGA (7.0mm x 7.0mm, ball pitch 0.8mm, ball size 0.4mm)

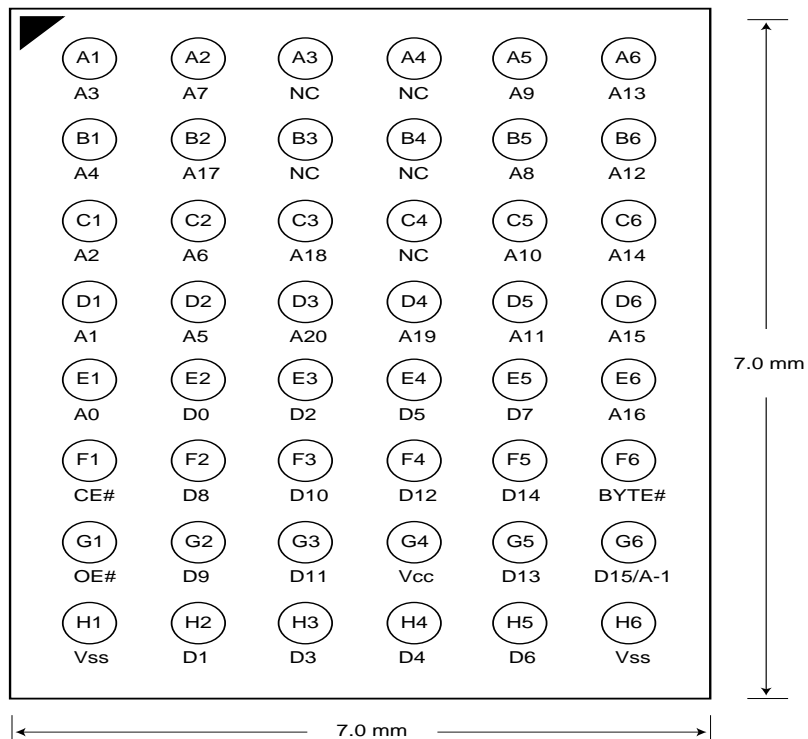
Note: die form: 3.0~3.6V : 70ns/2.7~3.6V : 90ns

PIN DESCRIPTION

| Symbol | Pin Function |
|---------|--|
| A0~A20 | Address Inputs |
| D0~D14 | Data Outputs |
| D15/A-1 | D15 (Word Mode)/ LSB Address (Byte Mode) |
| CE# | Chip Enable Input |
| OE# | Output Enable Input |
| Byte# | Word/ Byte Mode Selection |
| VCC | Power Supply Pin |
| VSS | Ground Pin |
| NC | No Connection |

PIN CONFIGURATION

48 mini BGA (Top View, Ball Down)





ORDER INFORMATION

| Part No. | Speed | Package | Grade |
|-----------------|-------|----------------------------|------------|
| MX23L3212XI-90G | 90ns | 48 ball mini BGA (Pb free) | Industrial |
| MX23L3212XI-12G | 120ns | 48 ball mini BGA (Pb free) | Industrial |

Note: Industrial grade temperature: -40 ~ 85° C
Commercial grade temperature: 0 ~ 70° C

MODE SELECTION

| CE# | OE# | Byte# | D15/A-1 | D0~D7 | D8~D15 | Mode | Power |
|-----|-----|-------|---------|--------|--------|------|----------|
| H | X | X | X | High Z | High Z | - | Stand-by |
| L | H | X | X | High Z | High Z | - | Active |
| L | L | H | Output | D0~D7 | D8~D15 | Word | Active |
| L | L | L | Input | D0~D7 | High Z | Byte | Active |

ABSOLUTE MAXIMUM RATINGS

| Item | Symbol | Ratings |
|------------------------------------|--------|------------------|
| Voltage on any Pin Relative to VSS | VIN | -0.3V to 3.9V |
| Ambient Operating Temperature | Topr | -40° C to 85° C |
| Storage Temperature | Tstg | -65° C to 125° C |

DC CHARACTERISTICS (Ta = -40° C ~ 85° C, VCC = 2.7V~3.6V)

| Item | Symbol | MIN. | MAX. | Conditions |
|------------------------|--------|-------|----------|---|
| Output High Voltage | VOH | 2.4V | - | IOH = -400uA |
| Output Low Voltage | VOL | - | 0.4V | IOL = 1.6mA |
| Input High Voltage | VIH | 2.2V | VCC+0.3V | |
| Input Low Voltage | VIL | -0.3V | 0.8V | |
| Input Leakage Current | ILI | - | 5uA | 0V, VCC |
| Output Leakage Current | ILO | - | 5uA | 0V, VCC |
| Operating Current | ICC | - | 16mA | f=5MHz, CE#=VIL, OE#=VIH all output open |
| Standby Current (CMOS) | ISTB | - | 5uA | CE#>VCC-0.2V |
| Input Capacitance | CIN | - | 10pF | Ta = 25° C, f = 1MHZ |
| Output Capacitance | COUT | - | 10pF | Ta = 25° C, f = 1MHZ |

AC CHARACTERISTICS (Ta = -40° C ~ 85° C, VCC = 2.7V~3.6V)

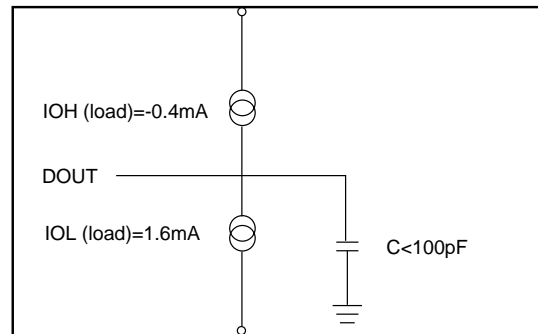
| Item | Symbol | 23L3212-90 | | 23L3212-12 | |
|---------------------------|--------|------------|------|------------|-------|
| | | MIN. | MAX. | MIN. | MAX. |
| Read Cycle Time | tRC | 90ns | - | 120ns | - |
| Address Access Time | tAA | - | 90ns | - | 120ns |
| Chip Enable Access Time | tACE | - | 90ns | - | 120ns |
| Output Enable Time | tOE | - | 40ns | - | 50ns |
| Output Hold After Address | tOH | 0ns | - | 0ns | - |
| Output High Z Delay | tHZ | - | 20ns | - | 20ns |

Note: Output high-impedance delay (tHZ) is measured from OE# or CE# going high, and this parameter guaranteed by design over the full voltage and temperature operating range - not tested.

AC Test Conditions

| | |
|---------------------------|------------|
| Input Pulse Levels | 0V~ 3.0V |
| Input Rise and Fall Times | 5ns |
| Input Timing Level | 1.5V |
| Output Timing Level | 1.5V |
| Output Load | See Figure |

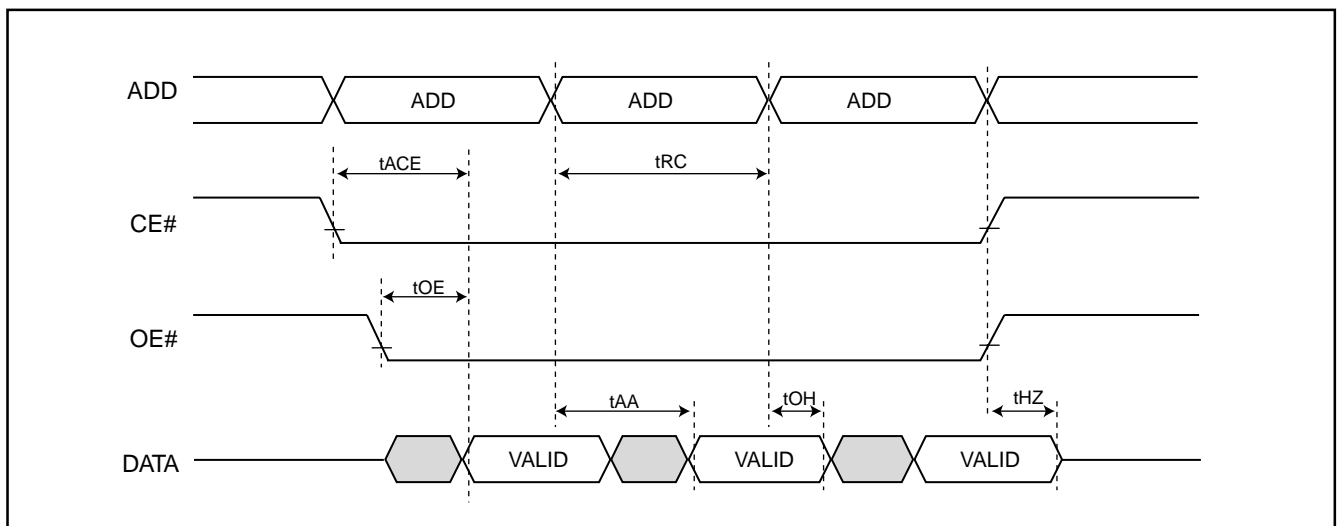
Note: 30pF output load capacitance for 90ns speed grade
100pF output load capacitance for 120ns speed grade



Note: No output loading is present in tester load board.
Active loading is used and under software programming control.
Output loading capacitance includes load board's and all stray capacitance.

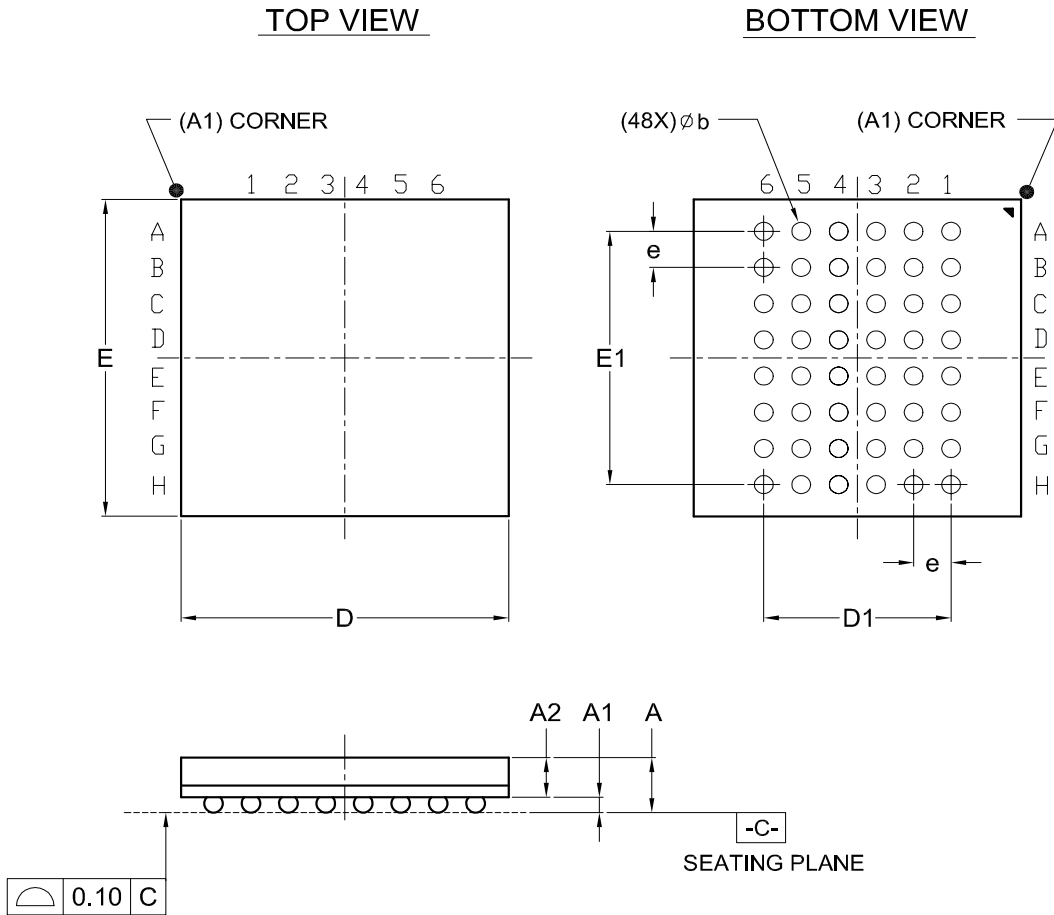
TIMING DIAGRAM

RANDOM READ



PACKAGE INFORMATION

Title: Package Outline for CSP 48BALL(7X7X1.3MM,BALL PITCH 0.8MM,BALL DIAMETER 0.4MM)



Dimensions (inch dimensions are derived from the original mm dimensions)

| SYMBOL | | A | A1 | A2 | b | D | D1 | E | E1 | e |
|--------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| mm | Min. | --- | 0.25 | 0.65 | 0.35 | 6.90 | | 6.90 | | |
| | Nom. | --- | 0.30 | --- | 0.40 | 7.00 | 4.00 | 7.00 | 5.6 | 0.80 |
| | Max. | 1.30 | 0.35 | --- | 0.45 | 7.10 | | 7.10 | | |
| Inch | Min. | --- | 0.010 | 0.026 | 0.014 | 0.272 | | 0.272 | | |
| | Nom. | --- | 0.012 | --- | 0.016 | 0.276 | 0.157 | 0.276 | 0.220 | 0.031 |
| | Max. | 0.051 | 0.014 | --- | 0.018 | 0.280 | | 0.280 | | |

| DWG.NO. | REVISION | REFERENCE | | | ISSUE DATE |
|-----------|----------|-----------|------|--|------------|
| | | JEDEC | EIAJ | | |
| 6110-4204 | 3 | MO-219 | | | 12-12-03 |



REVISION HISTORY

| Revision No. | Description | Page | Date |
|---------------------|---|-------------|-------------|
| 1.1 | Added Order Information | P2 | JUL/11/2001 |
| 1.2 | Add CE#=VIL, OE#=VIH in DC Characteristics's ICC | P2 | OCT/03/2001 |
| 1.3 | Modify package size from 8x10mm to 7x7mm | P1,4 | MAR/27/2002 |
| 1.4 | Modify Package Information | P4 | JUN/20/2003 |
| 1.5 | Add Note: die form: 3.0~3.6V : 70ns/2.7~3.6V : 90ns | P1 | MAY/19/2004 |
| 1.6 | Delete 70ns speed grade | P1,2,3 | JUL/07/2004 |
| 1.7 | Correct typo errors | P5 | JUL/30/2004 |



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