

FEATURES

- Bit organization
 - 4Mb x 8 (byte mode)
 - 2Mb x 16 (word mode)
- Fast access time
 - Random access:80/25ns(max.)
- Page Size
 - 8 words per page
- Current
 - Operating:40mA
 - Standby:15uA(max.)
- Supply voltage
 - VCC : 2.7 ~ 3.6V
 - VCCQ : 2.7 ~ 3.6V
- Package
 - 64 ball mini BGA (10.0mm X 13.0mm, ball pitch 1.0mm)
 - 56 pin TSOP (14mm x 20mm)
- Temperature
 - 25~85°C

PIN DESCRIPTION

| Symbol | Pin Function |
|--------------------|--|
| A0~A21 | Address Inputs, A0 not used in word mode |
| D0~D15 | Data Outputs |
| CE0#, CE1# CE2# | Chip Enable Input |
| OE# | Output Enable Input |
| BYTE# | Word/Byte mode Selection |
| VCC | Power Supply Pin |
| VCCQ | Output VCC Pin |
| GND | Ground Pin |
| NC | No Connection |

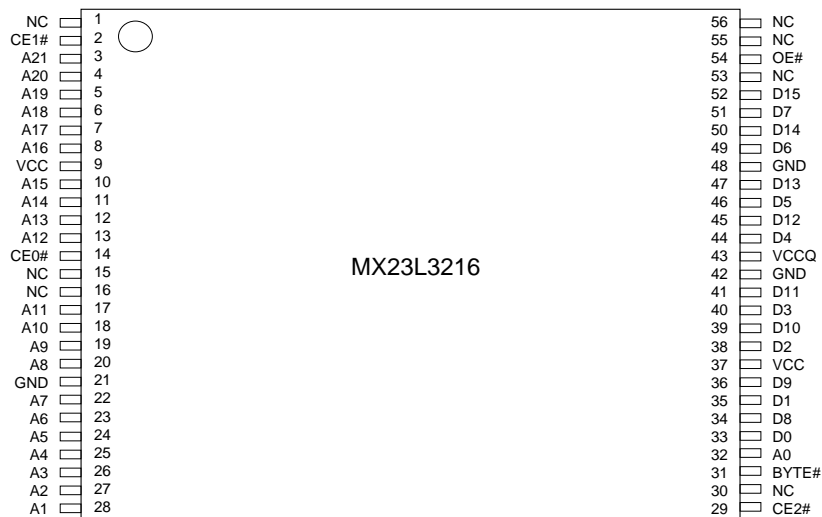
CHIP ENABLE TRUTH TABLE

| CE2# | CE1# | CE0# | Device |
|------|------|------|----------|
| L | L | L | Enabled |
| L | L | H | Disabled |
| L | H | L | Disabled |
| L | H | H | Disabled |
| H | L | L | Enabled |
| H | L | H | Enabled |
| H | H | L | Enabled |
| H | H | H | Disabled |

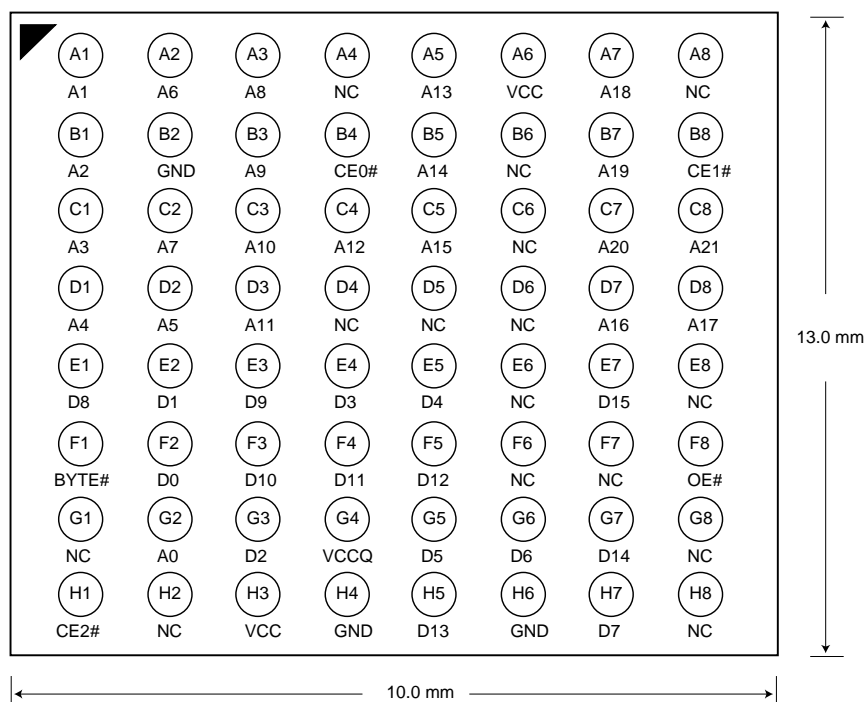
Note: for single-chip applications, CE2#, CE1# can be strapped to GND.

PIN CONFIGURATION

56 TSOP (Normal Type)



64 Mini BGA (Top View, Balls Facing Down)



MODE SELECTION

| CE# | OE# | Byte# | D0~D7 | D8~D15 | Power |
|----------|-----|-------|--------|--------|----------|
| Disabled | X | X | High Z | High Z | Stand-by |
| Enabled | H | X | High Z | High Z | Active |
| Enabled | L | L | D0~D7 | High Z | Active |
| Enabled | L | H | D0~D7 | D8~D15 | Active |

ORDER INFORMATION

| Part No. | Speed | Package | Grade |
|----------------|-------|------------------|------------|
| MX23L3216TI-80 | 80ns | 56 pin TSOP | Industrial |
| MX23L3216TI-10 | 100ns | 56 pin TSOP | Industrial |
| MX23L3216TI-12 | 120ns | 56 pin TSOP | Industrial |
| MX23L3216XI-80 | 80ns | 64 ball mini BGA | Industrial |
| MX23L3216XI-10 | 100ns | 64 ball mini BGA | Industrial |
| MX23L3216XI-12 | 120ns | 64 ball mini BGA | Industrial |

Note: Industrial grade temperature: -25 ~ 85° C
Commercial grade temperature: 0 ~ 70° C

ABSOLUTE MAXIMUM RATINGS

| Item | Symbol | Ratings |
|------------------------------------|--------|------------------|
| Voltage on any Pin Relative to VSS | VIN | -0.3V to 3.9V |
| Ambient Operating Temperature | Topr | -25° C to 85° C |
| Storage Temperature | Tstg | -65° C to 125° C |

DC CHARACTERISTICS (Ta = -25° 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 | VCCQ+0.5V | |
| Input Low Voltage | VIL | -0.5V | 0.8V | |
| Input Leakage Current | ILI | - | 10uA | 0V, VCC |
| Output Leakage Current | ILO | -10 | 10uA | 0V, VCC |
| Operating Current | ICC | - | 40mA | f=5MHz, CE#=VIL, OE#=VIH all output open |
| Standby Current (CMOS) | ISTB | - | 15uA | CE#>VCC-0.2V |
| Input Capacitance | CIN | - | 10pF | Ta = 25° C, f = 1MHZ |
| Output Capacitance | COUT | - | 10pF | Ta = 25° C, f = 1MHZ |

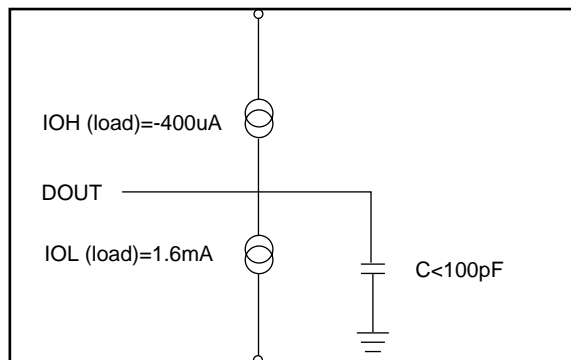
AC CHARACTERISTICS (Ta = -25° C ~ 85° C, VCC = 2.7V~3.6V)

| Item | Symbol | <u>23L3216-80</u> | | <u>23L3216-10</u> | | <u>23L3216-12</u> | |
|---------------------------|--------|-------------------|------|-------------------|-------|-------------------|-------|
| | | MIN. | MAX. | MIN. | MAX. | MIN. | MAX. |
| Read Cycle Time | tRC | 80ns | - | 100ns | - | 120ns | - |
| Address Access Time | tAA | - | 80ns | - | 100ns | - | 120ns |
| Chip Enable Access Time | tACE | - | 80ns | - | 100ns | - | 120ns |
| Page Mode Access Time | tPA | - | 25ns | - | 25ns | - | 25ns |
| Output Enable Time | tOE | - | 25ns | - | 25ns | - | 25ns |
| Output Hold After Address | tOH | 0ns | - | 0ns | - | 0ns | - |
| Output High Z Delay | tHZ | - | 20ns | - | 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 | 0.4V~2.4V |
| Input Rise and Fall Times | 5ns |
| Input Timing Level | 1.5V |
| Output Timing Level | 1.5V |
| Output Load | See Figure 100pF output load capacitance |



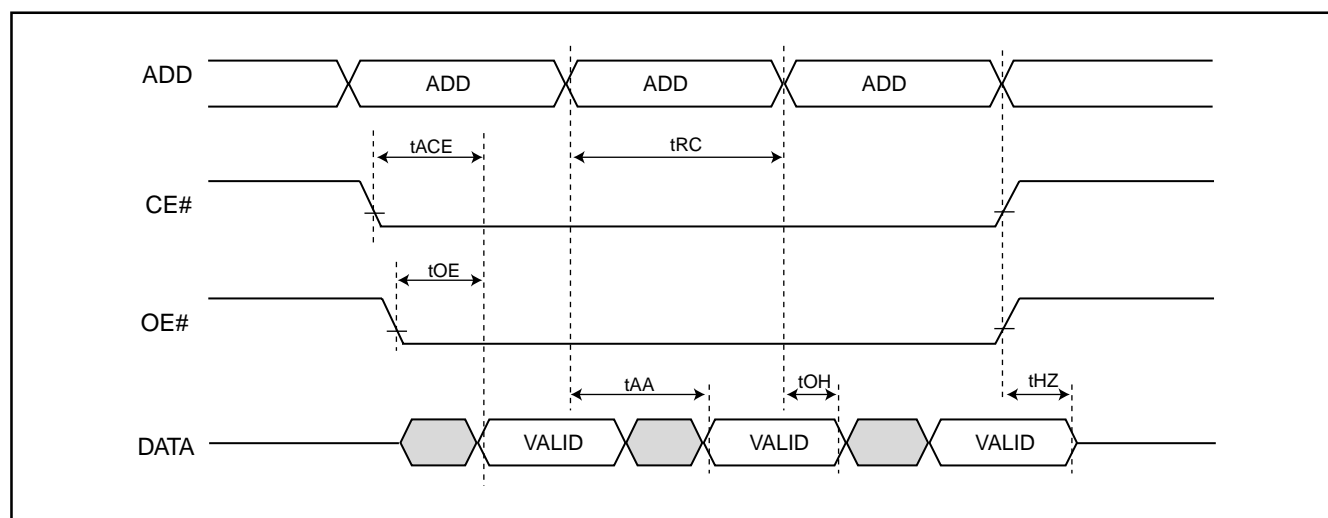
Note: No output loading is present in tester load board.

Active loading is used and under software programming control.

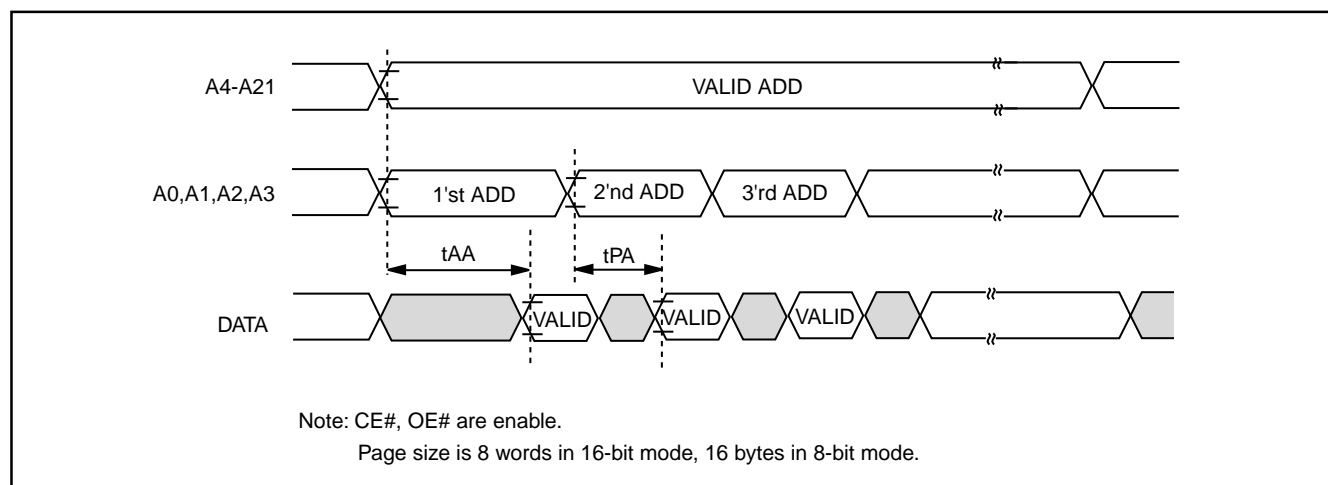
Output loading capacitance includes load board's and all stray capacitance.

TIMING DIAGRAM

RANDOM READ



PAGE READ





MX23L3216

MACRONIX INTERNATIONAL Co., Ltd.

Headquarters:

TEL: +886-3-578-6688

FAX: +886-3-563-2888

Europe Office :

TEL: +32-2-456-8020

FAX: +32-2-456-8021

Hong Kong Office :

TEL: +86-755-834-335-79

FAX: +86-755-834-380-78

Japan Office :

Kawasaki Office :

TEL: +81-44-246-9100

FAX: +81-44-246-9105

Osaka Office :

TEL: +81-6-4807-5460

FAX: +81-6-4807-5461

Singapore Office :

TEL: +65-6346-5505

FAX: +65-6348-8096

Taipei Office :

TEL: +886-2-2509-3300

FAX: +886-2-2509-2200

MACRONIX AMERICA, INC.

TEL: +1-408-262-8887

FAX: +1-408-262-8810

[http : //www.macronix.com](http://www.macronix.com)
